Non-collateralised Structured Products

Issuer

J.P. Morgan Structured Products B.V.

(Incorporated with limited liability in The Netherlands)

Guarantor

JPMorgan Chase Bank, National Association

(a national banking association organised under the laws of United States of America)

Managers

J.P. Morgan Securities plc

J.P. Morgan Securities (Asia Pacific) Limited

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This document, for which the issuer and the guarantor accept full responsibility, includes particulars given in compliance with the Rules Governing the Listing of Securities on the Stock Exchange of Hong Kong Limited (the "Rules") for the purpose of giving information with regard to the issuer, the guarantor and the structured products referred to in this document. The issuer and the guarantor, having made all reasonable enquiries, confirm that to the best of their knowledge and belief the information contained in this document is accurate and complete in all material respects and not misleading or deceptive, and there are no other matters the omission of which would make any statement herein or this document misleading.

We, the issuer of our structured products, are publishing this base listing document in order to obtain a listing on the Stock Exchange of our standard warrants (the "warrants"), inline warrants, callable bull/bear contracts (the "CBBCs") and other structured products. We will refer to the warrants, inline warrants, CBBCs and other structured products as "structured products" in this document.

We will publish a launch announcement and supplemental listing document for each issue of structured products to set out the terms specific to that issue. If at that point the information in this base listing document (and any applicable addendum) needs to be updated, we will either include the updated information in the relevant launch announcement and supplemental listing document or produce a supplemental disclosure document or an addendum to this base listing document. You should read the relevant launch announcement and supplemental listing document and the supplemental disclosure document (if any) together with this base listing document (including any addendum) before deciding whether to buy our structured products. Neither the delivery of this base listing document nor any sale of any structured products shall under any circumstances create any implication that there has been no change in our affairs or the affairs of the guarantor or its affiliates since the date of this base listing document. You should ask the managers if any supplemental disclosure document or any addendum to this base listing document or any later base listing document has been issued. You must not assume that our supplemental disclosure document or any addendum contains the most recent information at any time after the date of such supplemental disclosure document or addendum. You should read the guarantor's most recent consolidated financial statements for the year ended 31 December 2019 in this base listing document.

The structured products involve derivatives. Investors should not invest in the structured products unless they fully understand and are willing to assume the risks associated with them.

The structured products are complex products. Investors should exercise caution in relation to them.

Investors are warned that the price of the structured products may fall in value as rapidly as it may rise and holders may sustain a total loss of their investment. Prospective purchasers should therefore ensure that they understand the nature of the structured products and carefully study the risk factors set out in this document and, where necessary, seek professional advice, before they invest in the structured products.

The structured products constitute general unsecured contractual obligations of the issuer and of no other person and the guarantee constitutes the general unsecured contractual obligation of the guarantor and of no other person. The structured products will rank equally among themselves and with all our other unsecured obligations and the guarantee will rank equally with all of the guarantor's other unsecured obligations (in each case, save for obligations preferred by law) upon liquidation. If you purchase the structured products you are relying upon the creditworthiness of the issuer and the guarantor and have no rights under the structured products against (a) the company which has issued the underlying shares; (b) the trustee or the manager of the underlying trust; or (c) the index compiler of the underlying index. If the issuer becomes insolvent or defaults on its obligations under the structured products or the guarantor becomes insolvent or defaults on its obligations under the guarantee, you may not be able to recover all or even part of the amount due under the structured products (if any).

The guarantee of the guarantor (i) is an unsecured and unsubordinated general obligation of the guarantor and not of any of its affiliates; (ii) is not a savings account or deposit of the guarantor or any bank or non-bank subsidiary of the guarantor; and (iii) will rank *pari passu* with all other unsecured and unsubordinated obligations of the guarantor, except obligations, including U.S. domestic deposits of the guarantor, that are subject to any priorities or preferences by law. The guarantee is not a deposit insured by the U.S. Federal Deposit Insurance Corporation, the U.S. Deposit Insurance Fund or any other governmental agency or instrumentality.

The issuer and the guarantor are part of a large global financial institution and have many financial products and contracts outstanding at any given time. When purchasing the structured products, you will be relying on the creditworthiness of the issuer and the guarantor and of no one else.

The distribution of this base listing document, any launch announcement and supplemental listing document, any supplemental disclosure document, any addendum and the offering, sale and delivery of structured products in certain jurisdictions may be restricted by law. You are required to inform yourselves about and to observe such restrictions. Please read Annex 3 "Purchase and Sale" in this base listing document. **The structured products have not been and will not be registered under the U.S. Securities Act of 1933, as amended (the "Securities Act"), and trading in the structured products has not been and will not be approved by the U.S. Commodity Futures Trading Commission under the U.S. Commodity Exchange Act. The structured products may not be offered or sold within the United States or to or for the account or benefit of U.S. Persons (as defined in Regulation S under the Securities Act). The guarantee has not been and will not be registered under the rules of the U.S. Office of the Comptroller of the Currency.**

Base Listing Document dated 2 April 2020

J.P.Morgan

IMPORTANT

If you are in doubt as to the contents of this base listing document, you should obtain independent professional advice.

Copies of this base listing document, the relevant launch announcement and supplemental listing document, the supplemental disclosure document (if any) (together with a Chinese translation of each of these documents) and other documents listed under the section "Where can I read copies of the Issuer's documentation?" under the section headed "More information about our structured products and our listing documents" in this base listing document may be inspected at the offices of J.P. Morgan Securities (Asia Pacific) Limited at 23-29/F, Chater House, 8 Connaught Road Central, Hong Kong.

本基本上市文件、有關推出公佈及補充上市文件及補充披露文件（如有)(及以上各份文件的英文版）連同本基本上市文件「有關本公司結構性產品及上市文件的更多資料」一節內「本人從何處可查閱發行人的文件？」一節所列之其餘文件，可於J.P. Morgan Securities (Asia Pacific) Limited於香港干諾道中8號遮打大廈23-29樓的辦事處供查閱。

We do not give you investment advice; you must decide for yourself, after reading the listing documents for the relevant structured products and, if necessary, seeking professional advice, whether our structured products meet your investment needs.

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SUMMARY OF OUR STRUCTURED PRODUCTS

The types of structured products that we may issue include, but are not limited to: cash-settled stock warrants, cash-settled foreign stock warrants, cash-settled warrants over single unit trust, cash-settled index warrants, cash-settled stock inline warrants, cash-settled index inline warrants, cash-settled CBBCs over single stock, cash-settled CBBCs over index, and cash-settled CBBCs over single unit trust. Each type of our structured products will be subject to a separate set of master terms and conditions (Conditions) either as set out in Annex 1 to this base listing document (for the structured products listed above) or as set out in the relevant launch announcement and supplemental listing document (for other types of structured products). For each issue of our structured products, we will publish a launch announcement and supplemental listing document setting out the specific terms. The specific terms set out in the relevant launch announcement and supplemental listing document supplement and amend the applicable set of Conditions to form the legally binding terms and conditions of that issue of structured products.

We describe below the main features of the different types of our structured products.

General features of our structured products:

Issuer:	J.P. Morgan Structured Products B.V.
Guarantor:	JPMorgan Chase Bank, National Association
Current credit ratings of the Guarantor's long-term debt (as of the day immediately preceding the date of this base listing document)	A+ (stable outlook) by S&P Global Ratings ("**S&P**") Aa2 (stable outlook) by Moody's Investors Service, Inc. ("**Moody's**") The ratings of the guarantor are only an assessment by the rating agencies of the guarantor's overall financial capacity to pay its long-term debts. A+ is among the top three major credit rating categories and is the fifth highest investment-grade ranking of the ten investment-grade ratings (including + or – sub-grades) assigned by S&P. Aa2 is the third highest investment-grade ranking of the ten investment-grade ratings (including 1, 2 and 3 sub-grades) assigned by Moody's. Please refer to the brief guide in Annex 4 to this base listing document for more information about credit ratings.
Rating of the structured products:	The structured products are not rated by any credit rating agencies.
Ranking of our structured products:	Upon exercise, our structured products will become our direct, unconditional, unsecured and unsubordinated obligations ranking equally with all our other direct, unconditional, unsecured and unsubordinated obligations.

Guarantee:	The obligations of the guarantor under the guarantee are direct, unconditional, unsecured and unsubordinated, subject to the terms of the guarantee and except as specifically set forth therein. You can find the form of the guarantee in Annex 2.
Liquidity provider:	J.P. Morgan Broking (Hong Kong) Limited or such other entity appointed by us as may be specified in the relevant launch announcement and supplemental listing document. We will describe in each launch announcement and supplemental listing document whether and to what extent we are obligated to provide liquidity in our structured products.
Form:	In registered form subject to and with the benefit of a deed poll made by us and the guarantor. Each issue will be represented by a global certificate registered in the name of HKSCC Nominees Limited (or its successors) as holder and deposited within the Central Clearing and Settlement System (CCASS). We will not issue any definitive certificates for our structured products.
Use of proceeds:	We will use the proceeds from the issue of our structured products for our general working capital or any other purposes permitted under our memorandum and articles of association, including entering into hedging transactions with our affiliates.
Further issues:	We can issue further structured products to form a single series with an existing issue of our structured products.
Delisting of the shares/units underlying our structured products:	If the shares/units of the company/trust or the shares of any of the companies underlying a particular issue of our structured products are delisted from the relevant stock exchange, we may adjust the terms of that issue as further detailed in the relevant terms and conditions of our structured products.
Adjustments upon certain events affecting the company/trust or companies, the index underlying or such other asset underlying our structured products:	If certain events occur in connection with the company/trust or any of the companies underlying our structured products, or if certain events have occurred which materially modify the underlying index or such other underlying asset, we may make adjustments to the terms of that issue to account for the effect of such events. Please see the applicable set of Conditions of our structured products for further details. These events and the possible adjustments we may make are set out in detail in the applicable set of Conditions.
Governing law:	Our structured products and the guarantee are governed by Hong Kong law.

SPECIFIC FEATURES OF OUR STRUCTURED PRODUCTS

Warrants:

Warrants are structured financial products, the value of which is derived from the price or value of another asset. The underlying asset may be a stock, units in funds or trusts, an index, or other asset or combination of such assets.

A list of the eligible underlying assets for warrants is available on the HKEX website at *https://www.hkex.com.hk/Products/Securities/Derivative-Warrants/Derivative-Warrant-Eligible-Underlying-Assets/Eligible-Single-Hong-Kong-Stocks-for-Derivative-Warrant-Issuance-in-Current-Quarter?sc_lang=en.*

- Cash-settled stock warrants, cash-settled foreign stock warrants and cash-settled warrants over single unit trust:

The underlying asset of stock warrants and foreign stock warrants is the shares of a company and the underlying asset of warrants over single unit trust is units in a fund or a trust. The shares and units in the fund or trust may be listed in Hong Kong or overseas.

Our cash-settled stock warrants, cash-settled foreign stock warrants and cash-settled warrants over single unit trust provide for cash settlement only, which means that physical delivery of the underlying shares or units will not be available as a method of settlement; instead, upon the exercise of each board lot of warrants, we will pay the warrantholder a cash amount equal to:

in the case of call warrants:

$$\frac{\text{entitlement} \times (\text{average price} - \text{exercise price}) \times \text{one board lot}}{\text{number of warrant(s) per entitlement}}$$

in the case of put warrants:

$$\frac{\text{entitlement} \times (\text{exercise price} - \text{average price}) \times \text{one board lot}}{\text{number of warrant(s) per entitlement}}$$

and in each case (i) if applicable, converted into the settlement currency at the exchange rate(s) as specified in the relevant launch announcement and supplemental listing document; and (ii) less any exercise expenses, so long as such amount is greater than zero.

The average price of an underlying share or unit is determined by reference to the market closing price on each valuation date; please see the terms and conditions of our warrants for further details.

- Index warrants: The underlying asset of index warrants is an index published by an index compiler.

  Our index warrant gives its holders a right upon exercise of each board lot of warrants, to receive from us a cash amount equal to:

  in the case of call warrants:

$$\frac{(\text{closing level} - \text{strike level}) \times \text{one board lot} \times \text{index currency amount}}{\text{divisor}}$$

  in the case of put warrants:

$$\frac{(\text{strike level} - \text{closing level}) \times \text{one board lot} \times \text{index currency amount}}{\text{divisor}}$$

  and in each case converting such amount into the settlement currency of our warrants if necessary, and less any exercise expenses, so long as such amount is greater than zero.

  The closing level of the index on the date of exercise may be determined by reference to the official settlement price of an exchange traded contract relating to the index or some other means; please see the terms and conditions of our warrants for further details.

The launch announcement and supplemental listing document will set out, among others, the following terms specific to our warrants to supplement the applicable set of master terms and conditions in this base listing document:

Board lot	Minimum number at which our warrants trade
Shares of the company	Name of the underlying company (for our cash-settled stock warrants and cash-settled foreign stock warrants only)
Trust	Name of the underlying trust or fund (for our warrants over single unit trust only)
Index	Name of the underlying index (for our index warrants only)
Index compiler	Name of company that maintains the index and calculates and publishes the index levels (for our index warrants only)
Exercise price	Predetermined exercise price of the underlying share/unit (for our cash-settled stock warrants, cash-settled foreign stock warrants and warrants over single unit trust only)
Strike level	Predetermined level of the underlying index (for our index warrants only)
Expiry date	Date on which our warrants expire

Entitlement	Number of shares/units to which a specified number of warrants relates (for our cash-settled stock warrants, cash-settled foreign stock warrants and warrants over single unit trust only)
Number of warrant(s) per entitlement	Number of warrants to which one entitlement relates (for our cash- settled stock warrants, cash-settled foreign stock warrants and warrants over single unit trust only)
Index currency amount	An amount denominated in the currency in which the constituent stocks of the index are traded, which is used in the calculation of the cash settlement amount payable upon the exercise of a board lot of our warrants (for our index warrants only)
European style	European style warrants can only be exercised on the expiry date
Listing date	The date on which our warrants are scheduled to commence trading on the Stock Exchange

Inline warrants

What is an inline warrant?

An inline warrant is a type of derivative warrants.

A derivative warrant linked to an underlying asset is an instrument which derives its value from the underlying asset. Investing in a derivative warrant does not give you any right in the underlying asset. It usually costs a fraction of the value of the underlying asset.

A derivative warrant may provide leveraged return to you (but conversely, it could also magnify your losses).

How and when can you get back your investment?

Our inline warrants are European style warrants. This means they can only be exercised on the expiry date.

An inline warrant will, upon exercise on the expiry date, entitle you to a cash amount called the "cash settlement amount" (net of any exercise expenses) (if positive) according to the applicable terms and conditions.

You will receive the cash settlement amount less any exercise expenses upon settlement at expiry. As of the date of this document, no exercise expenses are payable for cash settled warrants (including our inline warrants).

How do our inline warrants work?

Our inline warrants carry exotic features and their terms and pricing may be more complicated than the warrants. Our inline warrants provide a pre-fixed potential payoff at either a capped amount or a floor amount at expiry.

You will either:

(i) receive a fixed and capped amount equal to the maximum payoff amount per inline warrant at expiry if the average price (for an inline warrant linked to a share) or closing level (for an inline warrant linked to an index) is at or below the upper strike price or upper strike level (as the case may be) and at or above the lower strike price or lower strike level (as the case may be); or

(ii) receive a fixed and floor amount equal to the minimum payoff amount per inline warrant (which may be substantially less than your initial investment) at expiry and may suffer loss in your investment if the average price (for an inline warrant linked to a share) or closing level (for an inline warrant linked to an index) is above the upper strike price or upper strike level (as the case may be) or below the lower strike price or lower strike level (as the case may be). You will still receive the minimum payoff amount per inline warrant in this scenario because such amount is included in the price you pay for buying our inline warrants.

Where can you find the terms and conditions applicable to our inline warrants?

You should review the terms and conditions applicable to each type of the inline warrants before your investment.

The terms and conditions applicable to each type of our inline warrants are set out in Annex 1 (as may be supplemented by any addendum and/or the relevant launch announcement and supplemental listing document).

What are the factors determining the price of an inline warrant?

The price of an inline warrant generally depends on the prevailing price or level of the underlying asset. However, throughout the term of an inline warrant, its price will be influenced by one or more of the following factors, including:

(a) the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive) applicable to that inline warrants: generally, the wider the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive) of the inline warrants, the greater its value;

(b) the value or level of the underlying asset: generally, the closer the price or level of the underlying asset towards the mid-way of the upper strike price or upper strike level and the lower strike price or lower strike level, ignoring interim interest rates and expected dividend payments on the underlying asset or on any components comprising the underlying index and assuming all other factors remain constant, the greater the value of the inline warrants; conversely, the further away the price or level of the underlying asset from the mid-way of the upper strike price or upper strike level and the lower strike price or lower strike level, ignoring interim interest rates and expected dividend payments on the underlying asset or on any components comprising the underlying index and assuming all other factors remain constant, the lower the value of the inline warrants;

(c) the volatility of the price or level of the underlying asset (being a measure of the fluctuation in the price or level of the underlying asset over time): generally, if an inline warrant is "out-of-the-range" (i.e. the price or level of the underlying asset falls outside the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive)), the higher the volatility, the greater the value of the inline warrants; conversely, if an inline warrant is "in-the-range" (i.e. the price or level of the underlying asset falls within the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive)), the higher the volatility, the lower the value of the inline warrants;

(d) the expected probability of the average price or closing level falling within the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive) at expiry;

(e) the time remaining to expiry: generally, if an inline warrant is out-of-the-range, the longer the remaining life of the inline warrant, the greater its value; conversely, if an inline warrant is in-the-range, the shorter the remaining life of the inline warrant, the greater its value;

(f) the interim interest rates;

(g) the expected dividend payments or other distributions (if any) on the underlying asset or on any components comprising the underlying index;

(h) the liquidity of the underlying asset or of the futures contracts relating to the underlying index;

(i) the supply and demand for the inline warrant;

(j) our related transaction costs; and

(k) our creditworthiness and the creditworthiness of the guarantor.

What is your maximum loss?

If we become insolvent or default on our obligations under our inline warrants or the guarantor becomes insolvent or defaults on its obligations under the guarantee, the maximum loss in the inline warrants will be your entire investment amount plus any transaction costs.

Otherwise, if the average price or closing level (as the case may be) is above the upper strike price or upper strike level (as the case may be) or below the lower strike price or lower strike level (as the case may be) at expiry, the maximum loss in the inline warrants will be your entire investment amount less the minimum payoff amount per inline warrant multiplied by the number of inline warrants purchased plus any transaction costs.

What is your maximum profit?

The potential maximum profit in our inline warrants will be capped at the maximum payoff amount per inline warrant multiplied by the number of inline warrants purchased less your entire investment amount and transaction costs.

You should note that your profit or loss in the inline warrants will be affected by the amount invested by you and transaction costs.

How can you get information about the inline warrants after issue?

You may visit the Stock Exchange's website at *https://www.hkex.com.hk/Products/Securities/Inline-Warrants?sc_lang=en* or our website at *http://www.jpmwarrants.com.hk* to obtain further information on inline warrants or any notice given by us or the Stock Exchange in relation to our inline warrants.

Callable bull/bear contracts (CBBCs):

CBBCs are structured products that track the performance of an underlying asset. CBBCs can be issued on different types of underlying assets, including:

(a) shares or units listed on the Stock Exchange;

(b) Hang Seng Index, Hang Seng China Enterprises Index, Hang Seng China H-Financials Index or other indices; or

(c) other assets as prescribed by the Stock Exchange from time to time.

A list of the eligible underlying assets for CBBCs is available on the HKEX website at *http://www.hkex.com.hk/products/securities/callable-bull-bear-contracts/cbbc-eligible-underlying-assets/eligible-single-hong-kong-stocks-for-cbbc-issuance-in-current-quarter?sc_lang=en.*

CBBCs are issued either as callable bull contracts (bull CBBCs) or callable bear contracts (bear CBBCs). Bull CBBCs are designed for investors who have an optimistic view on the underlying asset. Bear CBBCs are designed for investors who have a pessimistic view on the underlying asset.

CBBCs have a mandatory call feature and, subject to the limited circumstances set out in the relevant conditions in which a mandatory call event (MCE) may be reversed, we must terminate the CBBCs upon the occurrence of a mandatory call event. See "What is the mandatory call feature?" below for further details.

There are two categories of CBBCs, namely (a) category N CBBCs and (b) category R CBBCs. Your entitlement following the occurrence of a mandatory call event will depend on the category of the CBBCs. See "Category R CBBCs or Category N CBBCs?" below for further details.

Our CBBCs are "European style" and, subject to no occurrence of a mandatory call event, only exercisable on the relevant expiry date. The cash settlement amount (if any) payable at expiry represents the difference between the closing price/closing level of the underlying asset on the valuation date and the strike price/strike level. If on the relevant expiry date, the cash settlement amount is zero or a negative amount, you will lose all of your investment in the CBBCs.

What is the mandatory call feature?

Mandatory call event

Subject to the limited circumstances set out in the relevant conditions in which a mandatory call event may be reversed, we must terminate the CBBCs if a mandatory call event occurs. A mandatory call event occurs when the spot price/spot level of the underlying asset is:

(a) for bull CBBCs, at or below the call price/call level; or

(b) for bear CBBCs, at or above the call price/call level,

at any time during the observation period.

The observation period commences from the observation commencement date specified in the relevant launch announcement and supplemental listing document to the trading day immediately preceding the expiry date (both dates inclusive).

Cancellation of trades

Subject to the limited circumstances set out in the relevant conditions in which a mandatory call event may be reversed and such modification and amendment as may be prescribed by the Stock Exchange from time to time:

(a) all trades in the CBBCs concluded via auto-matching or manually after the time at which a mandatory call event occurs; and

(b) if a mandatory call event occurs during a pre-opening session or closing auction session (if applicable), all auction trades in the CBBCs concluded in such session and all manual trades of the CBBCs concluded after the end of the pre-order matching period in such session,

(each, a post MCE trade) will be invalid and will be cancelled, and will not be recognised by us or the Stock Exchange.

The time at which a mandatory call event occurs will be determined by reference to:

(a) in respect of the CBBCs over single stock or CBBCs over single unit trust, the Stock Exchange's trading system time at which the spot price is at or below the call price (for a series of bull CBBCs) or is at or above the call price (for a series of bear CBBCs); or

(b) in respect of the CBBCs over index, the time at which the spot level published by the relevant index compiler is at or below the call level (for a series of bull CBBCs) or is at or above the call level (for a series of bear CBBCs),

subject to the rules and requirements as prescribed by the Stock Exchange from time to time.

Category R CBBCs or Category N CBBCs?

The launch announcement and supplemental listing document for the relevant series will specify whether the CBBCs are category N CBBCs or category R CBBCs.

"Category N CBBCs" refer to CBBCs for which the call price/call level is equal to their strike price/ strike level. In respect of a series of category N CBBCs, you will not receive any cash payment following the occurrence of a mandatory call event.

"Category R CBBCs" refer to CBBCs for which the call price/call level is different from their strike price/ strike level. In respect of a series of category R CBBCs, you may receive a cash payment called the residual value upon the occurrence of a mandatory call event. The residual value payable (if any) is calculated by reference to, among others:

(a) for bull CBBCs, the difference between the minimum trade price/minimum index level of the underlying asset during a specified period called the "MCE valuation period" and the strike price/ strike level; or

(b) for bear CBBCs, the difference between the strike price/strike level and the maximum trade price/maximum index level of the underlying asset during the MCE valuation period.

You must read the applicable conditions and the relevant launch announcement and supplemental listing document to obtain further information on the calculation formula of the residual value applicable to category R CBBCs. If the residual value is zero or a negative number, you will lose all of your investment.

- CBBCs over single stock or CBBCs over single unit trust: The underlying asset of CBBCs over single stock is the shares of a company and the underlying asset of CBBCs over single unit trust is units in a fund or a trust.

  Generally for a series of CBBCs over single stock or a series of CBBCs over single unit trust, if no mandatory call event occurs during the observation period, upon expiry, for each board lot of CBBCs, we will pay the holder a cash amount equal to:

  in the case of bull CBBCs:

  $$\frac{\text{entitlement} \times (\text{closing price} - \text{strike price}) \times \text{one board lot}}{\text{number of CBBC(s) per entitlement}}$$

  in the case of bear CBBCs:

  $$\frac{\text{entitlement} \times (\text{strike price} - \text{closing price}) \times \text{one board lot}}{\text{number of CBBC(s) per entitlement}}$$

  and in each case less any exercise expenses, so long as such amount is greater than zero.

- CBBCs over index: The underlying asset of CBBCs over index is an index published by an index compiler.

  Generally for a series of CBBCs over index, if no mandatory call event occurs during the observation period, upon expiry, for each board lot of CBBCs, we will pay the holder a cash amount equal to:

  in the case of bull CBBCs:

  $$\frac{(\text{closing level} - \text{strike level}) \times \text{one board lot} \times \text{index currency amount}}{\text{divisor}}$$

  in the case of bear CBBCs:

  $$\frac{(\text{strike level} - \text{closing level}) \times \text{one board lot} \times \text{index currency amount}}{\text{divisor}}$$

  and in each case converting such amount into the settlement currency of our CBBCs if necessary, less any exercise expenses, so long as such amount is greater than zero.

  The closing level of the index on the valuation date may be determined by reference to the official settlement price of an exchange traded contract relating to the index or some other means; please see the terms and conditions of our CBBCs for further details.

The launch announcement and supplemental listing document will set out, among others, the following terms specific to our CBBCs to supplement the applicable set of master terms and conditions in this base listing document:

Category	The category of our CBBCs: category N or category R
Type	The type of our CBBCs: bull or bear
Board lot	Minimum number at which our CBBCs trade
Shares of the company	Name of the underlying company (for our CBBCs over single stock only)
Trust	Name of the underlying trust or fund (for our CBBCs over single unit trust only)
Index	Name of the underlying index (for our CBBCs over index only)
Index compiler	Name of company that maintains the index and calculates and publishes the index levels (for our CBBCs over index only)
Call price	Predetermined call price of the underlying share(s)/unit (for our CBBCs over single stock or CBBCs over single unit trust only)
Call level	Predetermined call level of the underlying index (for our CBBCs over index only)
Strike price	Predetermined strike price of the underlying share(s)/unit (for our CBBCs over single stock or CBBCs over single unit trust only)
Strike level	Predetermined strike level of the underlying index (for our CBBCs over index only)
Expiry date	Date on which our CBBCs expire
Valuation date	Date on which the closing price or the closing level of the underlying asset is determined for calculation of the cash settlement amount upon automatic exercise on expiry
Entitlement	Number of shares/units to which a specified number of CBBCs relates (for our CBBCs over single stock or CBBCs over single unit trust only)
Number of CBBC(s) per entitlement	Number of CBBCs to which one entitlement relates (for our CBBCs over single stock or CBBCs over single unit trust only)
Index currency amount	An amount denominated in the currency in which the constituent stocks of the index are traded, which is used in the calculation of the cash settlement amount payable upon the occurrence of a mandatory call event or automatic exercise on expiry (for our CBBCs over index only)
Listing date	The date on which our CBBCs are scheduled to commence trading on the Stock Exchange

MORE INFORMATION ABOUT OUR STRUCTURED PRODUCTS AND OUR LISTING DOCUMENTS

WHO IS RESPONSIBLE FOR THIS BASE LISTING DOCUMENT?

We and the guarantor accept full responsibility for the accuracy of the information contained in this base listing document.

We have included references to websites to guide you to sources of freely available information. The information on these websites does not form part of our base listing document. Neither we nor the guarantor accept any responsibility for the information on these websites. Such information has not been prepared for the purposes of our structured products.

Our base listing document is accurate at the date stated on the cover. You must not assume, however, that the information in this base listing document is accurate at any time after the date of this base listing document.

The managers and the liquidity provider are not responsible in any way for ensuring the accuracy of our listing documents.

This document has not been reviewed by the Securities and Futures Commission (the "**SFC**"). You are advised to exercise caution in relation to the offer of the structured products.

IS THE ISSUER OR THE GUARANTOR REGULATED BY THE HONG KONG MONETARY AUTHORITY REFERRED TO IN RULE 15A.13(2) OR THE SECURITIES AND FUTURES COMMISSION REFERRED TO IN RULE 15A.13(3)?

We are not regulated by any of the bodies referred to in Rule 15A.13(2) or Rule 15A.13(3) of the Rules. The guarantor is a licensed bank regulated by the Hong Kong Monetary Authority. It is also a national banking association organised and subject to regulation under the laws of the United States of America, including the National Bank Act.

WHERE CAN I FIND MORE INFORMATION ABOUT THE ISSUER, THE GUARANTOR AND THE STRUCTURED PRODUCTS?

Information on our structured products is described in this base listing document and the relevant launch announcement and supplemental listing document.

If the information in this base listing document needs to be updated at the time we issue a launch announcement and supplemental listing document, we will put the updated information in the launch announcement and supplemental listing document or a supplemental disclosure document or an addendum. Please read this base listing document together with the relevant launch announcement and supplemental listing document and, if applicable, the relevant supplemental disclosure document or the relevant addendum carefully before you decide whether to buy our structured products.

Additional information regarding the guarantor can be viewed at *http://www.jpmwarrants.com.hk*. You are cautioned that this information will not have been prepared exclusively for the purposes of our structured products.

We have not authorised anyone to give you any information about our structured products other than the information in this base listing document, the relevant launch announcement and supplemental listing document and, if applicable, the relevant supplemental disclosure document and the relevant addendum.

WHEN WERE THE STRUCTURED PRODUCTS AUTHORISED?

The issue of our structured products was authorised by resolutions of our board of directors on 23 March 2020. The giving of the guarantee was authorised pursuant to resolutions of the board of directors of the guarantor adopted on 8 December 2015.

WHERE CAN I READ COPIES OF THE ISSUER'S DOCUMENTATION?

You can read copies of the documents set out below by going to the offices of J.P. Morgan Securities (Asia Pacific) Limited, 23-29/F, Chater House, 8 Connaught Road Central, Hong Kong. These offices are open only during normal business hours and not on Saturdays, Sundays or public holidays.

These are the documents, copies of which may be inspected upon request while any of our structured products are in issue:

- our deed of incorporation;
- the guarantor's articles of association and by-laws;
- our latest audited financial statements;
- the guarantor's consolidated financial statements for the year ended 31 December 2019 comprising consolidated balance sheets at 31 December 2019 and 2018 and the related consolidated statements of income, changes in stockholder's equity, comprehensive income and cash flows for each of the three years ended 31 December 2019;
- the guarantor's unaudited semiannual consolidated financial statements, as and when they become available;
- the guarantee dated 2 April 2020;

- the letter from the guarantor's auditor, PricewaterhouseCoopers LLP, consenting to the reproduction of its audit report on the consolidated financial statements of the guarantor for the year ended 31 December 2019 in this base listing document;

- the amended and restated instrument dated 3 May 2010 (as amended or supplemented from time to time) ("instrument") pertaining to the issue of structured products;

- this base listing document (including any supplemental disclosure document or addenda to this base listing document) and the relevant launch announcement and supplemental listing document (together with a Chinese translation of each of these documents);

- the supplemental disclosure document dated 12 June 2019 which contains the guarantor's recast consolidated financial statements for the two years ended 31 December 2018 and the Report of Independent Auditors on such consolidated financial statements; and

- the supplemental disclosure document dated 30 April 2019 which contains our annual financial statements for the year ended 31 December 2018 and the Independent Auditor's Report on such financial statements.

A reasonable fee will be charged if you want to take photocopies of any of the documents while they are on display.

TRANSFER OF STRUCTURED PRODUCTS

Settlement of transactions between members of the Stock Exchange on any business day must take place on or before the second business day thereafter. Securities executed on the Stock Exchange would normally be settled under the continuous net settlement system in CCASS. Dealings in the structured products will take place in relevant board lots in the relevant settlement currency. For further details on transfers of structured products and their exercise or settlement, see the terms and conditions of the relevant issue of structured products.

DO I HAVE TO PAY STAMP DUTY OR OTHER LEVIES ON THE STRUCTURED PRODUCTS?

There is no Hong Kong stamp duty on issue of our structured products. There is also no Hong Kong stamp duty on the transfer of our cash-settled structured products. The levy for the investor compensation fund is currently suspended. However, the SFC charges a transaction levy at the rate of 0.0027 per cent. on the value of the transaction of structured products and this amount is payable by each of the buyer and seller. Additionally, the Stock Exchange charges a trading fee on every purchase and sale of listed securities calculated at a rate of 0.005 per cent. of the amount of the transaction and is payable by each of the buyer and seller.

You should be aware that you may be required to pay stamp taxes or other documentary charges in accordance with the laws and practices of the country where the structured products are transferred. If you are in any doubt as to your tax position, you should consult your own independent tax advisers. You should also be aware that tax regulations and their application by the relevant taxation authorities change from time to time.

HOW DO I HOLD MY STRUCTURED PRODUCTS?

Our structured products will be issued in global registered form, represented by a global certificate registered in the name of HKSCC Nominees Limited (or its successors).

We have made all necessary arrangements to enable our structured products to be admitted for deposit, clearing and settlement in CCASS. We will not issue any definitive certificates for our structured products. Our structured products will be deposited within CCASS.

If you are a CCASS investor participant, you may hold your structured products in your account with CCASS. If you do not have a CCASS account, your broker or agent (as a CCASS participant) will arrange to hold your structured products for you in an account at CCASS. We or the guarantor will make all payments on our structured products to CCASS: you will have to check your CCASS account or rely on your broker or agent to ensure that payments on your structured products are credited to your account with your broker or agent. Once we have made the relevant payment in this way to CCASS, we will have no further obligations for that payment, even if CCASS or your broker/agent fails to transmit to you your share of such payment or if it was transmitted late. Any notices we and/or the guarantor give in relation to our structured products will be given in the same way: you will have to rely on CCASS and/or your broker or agent to ensure that those notices reach you.

You should carefully consider the following information together with the other information contained in this base listing document and in the applicable launch announcement and supplemental listing document before purchasing our structured products.

This section highlights only some of the risks of investing in the structured products but their inclusion in this base listing document does not mean these are the only significant or relevant risks of investing in our structured products.

Unless otherwise specified or the context otherwise requires, references in this base listing document to:

(a) "JPMorgan Chase" are to JPMorgan Chase & Co. and its consolidated subsidiaries; and

(b) "JPMorgan Chase Bank" and "JPMorgan Chase Bank, N.A." are to JPMorgan Chase Bank, National Association and its consolidated subsidiaries.

Non-collateralised structured products

Our structured products are not secured by any of our or the guarantor's assets or any collateral.

You must rely on our and the guarantor's creditworthiness; our obligations are not deposit liabilities or other types of debt obligations.

Our structured products are not secured on any assets. Our structured products represent our general contractual obligations and will rank equally with our other general unsecured obligations. The number of structured products outstanding at any given time may be substantial. When purchasing our structured products, you will be relying upon our and the guarantor's creditworthiness and of the creditworthiness of no other entity. We do not intend to create upon ourselves a deposit liability or a debt obligation by issuing any structured products.

You should note that we are a non-banking subsidiary of J.P. Morgan International Finance Limited, which is a subsidiary of the guarantor, which is in turn a subsidiary of JPMorgan Chase & Co., a corporation incorporated under the laws of the State of Delaware in the United States of America. Our primary activity is the issuance of securitised derivatives, comprising notes, warrants and certificates including equity-linked, reverse convertible and market participation notes, with the proceeds of securities being used to enter into hedging arrangements with other JPMorgan Chase subsidiaries. Our ability to perform our obligations may therefore be affected by any inability or failure to perform obligations owed to us by other JPMorgan Chase subsidiaries.

Our structured products are subject to our and the guarantor's credit risk, and our and the guarantor's credit ratings and credit spreads may adversely affect the market value of our structured products. Investors in our structured products are dependent on our and the guarantor's ability to pay all amounts due on our structured products, and therefore investors are subject to our and the guarantor's credit risk and to changes in the market's view of our and the guarantor's creditworthiness. Any decline in our or the guarantor's credit ratings or increase in the credit spreads charged by the market for taking our or the guarantor's credit risk is likely to affect adversely the value of our structured products. If we or the guarantor were to default on our payment obligations, an investor may not receive any amounts owed to it under our structured products and the investor could lose its entire investment.

There are risks associated with investing in our structured products; our structured products are volatile instruments and you may sustain a total loss in your investment.

Our structured products are structured financial instruments, their value may fall as rapidly as they may rise and you may sustain a total loss of your investment. Your investment in our structured products involves risks. Before investing in any of our structured products, you should consider whether our structured products are suitable for you in light of your own financial circumstances and investment objectives. Not all of these risks are described in this base listing document or a launch announcement and supplemental listing document. You should consider taking independent professional advice prior to making an investment in our structured products.

Your investment in our structured products will be worthless if you are holding our structured products when:

(a) in the case of category N CBBCs only, they are terminated early following the occurrence of a mandatory call event;

(b) in the case of category R CBBCs only, they are terminated early following the occurrence of a mandatory call event and (for our bull CBBCs) the minimum trade price/minimum index level of the underlying asset is equal to or less than the strike price/level of our CBBCs or (for our bear CBBCs) the strike price/level of our CBBCs is equal to or less than the maximum trade price/maximum index level of the underlying asset; or

(c) they expire out-of-the-money – meaning that the average/closing price or closing level of the underlying asset in respect of the relevant valuation date(s), determined in accordance with the terms and conditions of our structured products, is greater (for our put warrants or bear CBBCs) or less (for our call warrants or bull CBBCs) than the exercise/strike price or strike level of our structured products.

Structured products are complex and volatile instruments.

Our structured products are complex instruments and their values at any time prior to expiry are governed by a number of factors, including but not limited to the time left till expiry, the price or level of the underlying asset compared with the exercise/strike price or strike level of our structured products, the volatility of price or level of the underlying asset, market interest rate movements, our and the guarantor's financial condition and the market's view of our and the guarantor's credit quality. The values of our structured products may rise or fall rapidly over a short time due to changes in one or more factors. The interplay of these different factors also means that the effect on the value of our structured products from the change in one factor may offset or accentuate the effect from the change in another factor. The value or level of the underlying assets (and some of the other relevant factors) can also be unpredictable: it may change suddenly and in large magnitude or not change at all. You may risk losing your entire investment (or, in the case of inline warrants, a substantial part of your investment) if the price or level of the underlying assets does not move in your anticipated direction.

The cash settlement amount of our structured products if calculated at any time prior to expiry may typically be less than the market price of such structured products at that time. The difference will reflect, among other things, a "time value" for the structured products which depends on a number of interrelated factors including those specified above. The value of our warrants or CBBCs will decrease over time. The value of inline warrants is likely to decrease over time when the price or level of the underlying asset falls outside the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive), ignoring interim interest rates and expected dividend payments on the underlying asset or on any components comprising the underlying index and assuming all other factors remain constant. Therefore, our structured products should not be viewed as products for long term investments.

Your ability to realise your investment in our structured products is dependent on the trading market for our structured products.

As our structured products are not exercisable prior to the expiry date, the only way you may be able to realise the value of your investment in our structured products is to dispose of them either in the on-exchange market or over-the-counter market. If you dispose of your investment in our structured products before expiry in this way, the amount you will receive will depend on the price you are able to obtain from the market for our structured products. That price may depend on the quantity of our structured products you are trying to sell. The market price of our structured products may not be equal to the value of our structured products, and changes in the price of our structured products may not correspond (in direction and/or magnitude) with changes in the value of our structured products.

The liquidity provider appointed for our structured products will upon request provide bid and/or ask prices for our structured products on the Stock Exchange and may (but is not obliged to) provide such prices at other times too, but under certain circumstances it may not provide bid and/or ask prices even if requested. You should refer to the section regarding liquidity provider in the relevant launch announcement and supplemental listing document for further details. The prices provided by our liquidity provider are influenced by, among other things, the supply and demand of our structured products for a particular series in the market, and may not correspond with the values of such structured products or changes in such values.

You should note that the prices available in the market for our structured products may also come from other participants in the market, although we cannot predict if and to what extent a secondary market may develop for our structured products or whether that market will be liquid or illiquid. The fact that a particular series of structured products is listed does not necessarily lead to greater liquidity. In addition, no assurance can be given that the listing of any particular series of our structured products will be maintained. If our structured products of a particular series cease to be listed, they may not be transacted through the Stock Exchange or at all, and they may even be terminated early. Off-exchange transactions may involve greater risks than on-exchange transactions. You may be unable to find any buyer for your holdings of our structured products on the Stock Exchange if the value of the structured products falls below HK$0.01.

Only the liquidity provider appointed for our structured products is obliged to provide bid and/or ask prices for our structured products (subject to the terms set out in the relevant launch announcement and supplemental listing document), and at times it may be the only source of bid and/or ask prices for our structured products.

The liquidity of any series of our structured products may also be affected by restrictions on offers and sales of our structured products in some jurisdictions including the restrictions described in Annex 3 "Purchase and Sale" to this base listing document.

If trading in the underlying asset is suspended for whatever reason in the market on which it is listed (including the Stock Exchange), trading in the relevant series of structured products may be suspended for a similar period. The value of our warrants or CBBCs will decrease over time, while the value of inline warrants is likely to decrease over time when the price or level of the underlying asset falls outside the range between the upper strike price or upper strike level and the lower strike price or lower strike level (both inclusive), ignoring interim interest rates and expected dividend payments on the underlying asset or on any components comprising the underlying index and assuming all other factors remain constant. You should note that in the case of a prolonged suspension period, the market price of the relevant structured products may be subject to a significant impact of time decay of such prolonged suspension period and may fluctuate significantly upon resumption of trading after the suspension period of the relevant structured products. This may adversely affect your investment in the relevant structured products.

In respect of our structured products linked to foreign underlying assets, you should note that the trading hours of the foreign underlying assets (based on Hong Kong time) on the relevant stock exchange may be different from the trading hours of the Stock Exchange. In the case where trading in the foreign underlying assets on the relevant stock exchange is suspended during non-trading hours of the Stock Exchange, trading in the relevant structured products on the Stock Exchange will be suspended as soon as practicable afterwards. Such suspension may be lifted and trading of foreign underlying assets on the relevant stock exchange may resume during nontrading hours of the Stock Exchange, in which case, trading in the relevant structured products on the Stock Exchange will also resume as soon as practicable afterwards.

Our structured products are not rated, you should not solely rely on the guarantor's ratings when investing in the structured products.

Rating agencies usually receive a fee from the companies that they rate. When evaluating the guarantor's creditworthiness, you should not solely rely on the guarantor's credit ratings because:

- a credit rating is not a recommendation to buy, sell or hold the structured products;
- credit ratings of companies may involve difficult-to-quantify factors such as market competition, the success or failure of new products and markets and managerial competence;
- a high credit rating is not necessarily indicative of low risk. The guarantor's credit ratings as set out in this base listing document are for reference only. Any downgrading of the guarantor's credit ratings could result in a reduction in the value of the structured products;
- a credit rating is not an indication of the liquidity or volatility of the structured products; and
- a credit rating may be downgraded if the credit quality of the guarantor declines.

The guarantor's credit ratings are subject to change or withdrawal at any time within each rating agency's sole discretion. You should conduct your own research using publicly available sources to obtain the latest information with respect to the guarantor's ratings from time to time.

You have no rights in the underlying assets and the market price for our structured products may fluctuate differently from that of the underlying assets.

Our structured products are financial instruments issued by us and are separate from the underlying assets. You have no rights under our structured products against (i) any company, trust or fund which issues or comprises the underlying assets of the relevant issue of structured products or (ii) the trustee or the manager of any underlying asset that is a trust or a fund or (iii) the sponsor of any underlying asset that is an index. In addition, buying our structured products is not the same as buying the underlying assets or having a direct investment in the underlying assets. You will not be entitled to have voting rights, rights to receive dividends or distributions or any other rights under the underlying shares or units in the underlying fund or trust. As mentioned, there are many factors influencing the value and/or market price of structured products, which are leveraged instruments. For example, increases in the price or level of the underlying assets may not lead to an increase in the value and/or market price of a call warrant by a proportionate amount or even any increase at all; however, a decrease in the price or level of the underlying assets may lead to a greater than proportionate decrease in the value and/or market price of a call warrant. There is no assurance that a change in value and/or market price of our structured products will correspond in direction and/or magnitude with the change in price or level of the underlying assets. In the case of inline warrants, generally, ignoring interim interest rates and expected dividend payments on the underlying asset or on any components comprising the underlying index and assuming all other factors remain constant, the closer the price/level of the underlying asset towards the mid-way of the upper strike price/upper strike level and the lower strike price/lower strike level, the greater the value of the inline warrants; conversely, the further the price/level of the underlying asset from the mid-way of the upper strike price/upper strike level and the lower strike price/ lower strike level, the lower the value of the inline warrants. You should recognise the complexities of utilising our structured products to hedge against the market risk associated with investing in an underlying asset.

The issuer, the trustee, the manager or the sponsor of the underlying assets will have no involvement in the offer and sale of our structured products and no obligation to you as investors in our structured products. The decisions made by them on corporate actions, such as a merger or sale of assets, or adjustment of the method for calculation of an index may also have an adverse impact on the value and/or market price of our structured products.

There could be conflicts of interest arising out of our other activities which may affect our structured products.

We, the guarantor and its subsidiaries and affiliates may engage in transactions (whether for their accounts, including hedging, or trading for accounts under management or otherwise) involving, as well as provide investment banking and other services to, any company or to any trustee or manager of a trust or a fund underlying our structured products or their securities and may enter into transactions with the substantial shareholders of the underlying company. Those transactions may have a positive or negative impact on the price or level of the underlying asset and in turn the value and/or market price of our structured products. We, the guarantor and its subsidiaries and affiliates may have officers who serve as directors of any of the companies underlying our structured products. Our market-making activities (which include hedging of our structured products) in the underlying securities or related structured products may affect the value and/or market price of the structured products. We or the guarantor may issue other competing financial products which may affect the value and/or market price of our structured products. You should also note that potential conflicts of interest may arise from the different roles played by us, the guarantor and its subsidiaries and affiliates in connection with our structured products and the economic interests in each role may be adverse to your interests in our structured products. We or the guarantor owe no duty to you to avoid such conflicts.

We may early terminate our structured products due to illegality or impracticability.

We may terminate our structural products if we determine in good faith and in a commercially reasonable manner that, for reasons beyond our control, it has become or it will become illegal or impracticable: (a) for us to perform our obligations under any structured products or for the guarantor to perform its obligations under the guarantee, in whole or in part as a result of (i) the adoption of, or any change in, any relevant law or regulation (including any tax law) or (ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law) (each of (i) and (ii), a "**Change in Law Event**"); or (b) for us or any of our affiliates to maintain our hedging arrangements with respect to the structured products due to a Change in Law Event. Upon the occurrence of a Change in Law Event, we will, if and to the extent permitted by the applicable law or regulation, pay to each holder of those structured products a cash amount determined by the agent in good faith and in a commercially reasonable manner to be the fair market value of the structured products immediately prior to such termination (ignoring such illegality or impracticability) less our cost of unwinding any related hedging arrangement as determined by us in our sole and absolute discretion. Such fair market value of the structured products could be substantially less than the amount you invested and can be as low as zero.

Risks associated with structured products linked to the value of foreign underlying assets.

You should be aware that investments in structured products linked to the value of foreign underlying assets involve particular risks. For our structured products linked to a foreign stock or an index comprising of stocks traded in equity securities markets of foreign countries, the liquidity and volatility of the relevant foreign equity securities market may be different from that of the Hong Kong equity securities market. Also, there may be less publicly available information about the underlying foreign companies than those available about Hong Kong listed companies and some of that information may or may not be available in English and/or Chinese. Foreign companies may also be subject to different accounting, auditing and financial reporting standards and requirements compared to those applicable to Hong Kong listed companies.

Prices and market value of foreign underlying assets may be subject to political, economic, financial and social factors which may differ favourably or unfavourably from those factors that apply to Hong Kong. Moreover, foreign economies may also differ favorably or unfavorably from the Hong Kong economy in important respects such as growth of gross national product, rate of inflation, capital reinvestment, resources and self-sufficiency.

Further, for our structured products linked to a foreign stock or an index comprising of stocks traded in equity securities markets of foreign countries, the trading hours and closing times of the relevant stock exchange(s) may be different to those of the Stock Exchange and the relevant stock exchange(s) may be located in a different time zone compared with the Stock Exchange. The days on which the relevant stock exchange(s) are open for trading may also be different to those of the Stock Exchange. As a result, there may be certain periods of time during the trading hours of the Stock Exchange when the price/level of the foreign underlying asset are not available. In such circumstances, the liquidity provider may not be able to provide liquidity in the market of the structured products. However, to the extent possible, the liquidity provider may be able to provide liquidity for the structured products in such circumstances using the last available closing price/level of the foreign underlying asset from the relevant stock exchange(s), adjusted where necessary to reflect the fair market value of the foreign underlying asset. In addition, any delay or disruption in the display of the price/level of the foreign underlying asset may also result in a corresponding delay or unavailability of the prices of the structured products. The launch announcement and supplemental listing document for our structured products linked to a foreign stock or an index comprising of stocks traded in equity securities markets of foreign countries will set out further details on the relevant stock exchange(s).

Risks associated with our structured products over single unit trust.

General risks

For our structured products over single unit trust, neither we nor any of our affiliates have the ability to control or predict the actions of the trustee or the manager of the underlying fund or trust. Neither the trustee nor the manager of the underlying fund or trust (i) is involved in the offer of any structured product in any way, or (ii) has any obligation to consider the interest of the holders of any structured product in taking any corporate actions relating to the underlying fund or trust that might affect the value of any structured product. The trustee or the manager of the underlying fund or trust is responsible for making investment and other trading decisions with respect to the management of the underlying fund or trust consistent with its investment objectives and in compliance with the investment restrictions as set out in the constitutive documents of the underlying fund or trust. The manner in which the underlying fund or trust is managed and the timing of actions may have a significant impact on the performance of the units in the underlying fund or trust. Hence, the price which is used to calculate the performance of the units in the underlying fund or trust may also be subject to these risks.

You should note that our structured products over single unit trust reference the units of the underlying fund or trust and the cash settlement amount (if any) payable upon exercise of our structured products will be calculated using the official closing prices of the units in the underlying fund or trust on the Stock Exchange on the valuation date(s). Further, our structured products do not reference any index tracked by the underlying fund or trust and changes in the level of such index may not lead to a corresponding change in the value and/or market price of our structured products over single unit trust.

Exchange traded funds

In the case of our structured products linked to units of an exchange traded fund ("**ETF**"), you should note that:

(a) an ETF is exposed to the economic, political, currency, legal and other risks of a specific sector or market related to the underlying asset pool or index or market that the ETF is designed to track;

(b) there may be disparity between the performance of the ETF and the performance of the underlying asset pool or index or market that the ETF is designed to track as a result of, for example, failure of the tracking strategy, currency differences, fees and expenses; and

(c) where the underlying asset pool or index or market that the ETF tracks is subject to restricted access, the efficiency in the unit creation or redemption to keep the price of the ETF in line with its net asset value may be disrupted, causing the ETF to trade at a higher premium or discount to its net asset value. Hence, the market price of our structured products will also be indirectly subject to these risks.

Synthetic exchange traded funds

Additionally, where the underlying asset of our structured products comprises the units of an ETF adopting a synthetic replication investment strategy to achieve its investment objectives by investing in financial derivative instruments linked to the performance of an underlying asset pool or index that the ETF is designed to track ("**Synthetic ETF**"), you should note that:

(a) investments in financial derivative instruments will expose the Synthetic ETF to the credit, potential contagion and concentration risks of the counterparties who issued such financial derivative instruments. As such counterparties are predominantly international financial institutions, the failure of one such counterparty may have a negative effect on other counterparties of the Synthetic ETF. Even if the Synthetic ETF has collateral to reduce the counterparty risk, there may still be a risk that the market value of the collateral has fallen substantially when the Synthetic ETF seeks to realise the collateral; and

(b) the Synthetic ETF may be exposed to higher liquidity risk if the Synthetic ETF invests in financial derivative instruments which do not have an active secondary market.

The above risks may have a significant impact on the performance of the relevant ETF or Synthetic ETF and hence the market price of our structured products linked to such ETF or Synthetic ETF.

*QFII ETF ("**QFII ETF**"), RQFII ETF ("**RQFII ETF**") and/or China Connect*

An ETF may be issued and traded outside Mainland China with direct investment in the Mainland China's securities markets through the Qualified Foreign Institutional Investor ("**QFII**") regime, the Renminbi Qualified Foreign Institutional Investor ("**RQFII**") regime and/or the Shanghai-Hong Kong Stock Connect and Shenzhen-Hong Kong Stock Connect (collectively, "**China Connect**"). Where the underlying asset of our structured products comprises the units of such ETF, you should note that, amongst others:

(a) the novelty and untested nature of such ETF make it riskier than traditional ETFs investing directly in more developed markets. The policy and rules for QFII, RQFII and China Connect prescribed by the Mainland China government are new and subject to change, and there may be uncertainty to its implementation. The uncertainty and change of the laws and regulations in Mainland China may adversely impact on the performance of the relevant trust and the trading price of the relevant units;

(b) such ETF primarily invests in securities traded in the Mainland China's securities markets and is subject to concentration risk. Investment in the Mainland China's securities markets (which are inherently stock markets with restricted access) involves certain risks and special considerations as compared with investment in more developed economies or markets, such as greater political, tax, economic, foreign exchange, liquidity, volatility and regulatory risks. The operation of such ETF may also be affected by interventions by the applicable government(s) and regulators in the financial markets; and

(c) investment by such ETF in the mainland Chinese securities market under the RQFII regime is currently subject to its manager's RQFII quota allocated to such ETF. In addition, trading of securities invested by the ETF under the China Connect will be subject to a daily quota which does not belong to such ETF and is utilized on a first-come-first-serve basis. In the event that the RQFII quota allocated to such ETF and/or the daily quota under China Connect are reached, the manager may need to suspend creation of further units of such ETF, and therefore may affect the liquidity in unit trading of such ETF. In such event, the trading price of a unit of such ETF is likely to be at a significant premium to its net asset value, and may be highly volatile. Although the State Administration of Foreign Exchange has announced that the quota restrictions under the RQFII (and Qualified Foreign Institutional Investor) regimes will be removed, the detailed implementation rules and official effective date of the quota removal are not yet available.

The above risks may have a significant impact on the performance of the relevant units and the price of the structured products.

Please read the offering documents of the relevant ETF to understand its key features and risks.

ETF traded through dual counters model

Where the underlying asset of our structured products comprises the units of an ETF which adopts the dual counters model for trading its units on the Stock Exchange in Renminbi ("**RMB**") and Hong Kong dollars ("**HKD**") separately, the novelty and relatively untested nature of the Stock Exchange's dual counters model may bring the following additional risks:

(a) the structured products may be linked to the HKD-traded units or the RMB-traded units. If the underlying asset is the HKD-traded units, movements in the trading prices of the RMB-traded units should not directly affect the price of the structured products. Similarly, if the underlying asset is the RMB-traded units, movements in the trading prices of the HKD-traded units should not directly affect the price of the structured products;

(b) if there is a suspension of inter-counter transfer of such units between the HKD counter and the RMB counter for any reason, such units will only be able to be traded in the relevant currency counter on the Stock Exchange, which may affect the demand and supply of such units and have an adverse effect on the price of the structured products; and

(c) the trading price on the Stock Exchange of the HKD-traded units and RMB-traded units may deviate significantly due to different factors, such as market liquidity, RMB conversion risk, supply and demand in each counter and the exchange rate between RMB and HKD. Changes in the trading price of the underlying asset in HKD or RMB (as the case may be) may adversely affect the price of the structured products.

*Real estate investment trust ("**REIT**")*

Where the underlying asset of our structured products comprises the units of a REIT, you should note that the investment objective of a REIT is to invest in a real estate portfolio. Each REIT is exposed to risks relating to investments in real estate, including but not limited to (a) adverse changes in political or economic conditions; (b) changes in interest rates and the availability of debt or equity financing, which may result in an inability by the REIT to maintain or improve the real estate portfolio and finance future acquisitions; (c) changes in environmental, zoning and other governmental rules; (d) changes in market rents; (e) any required repair and maintenance of the portfolio properties; (f) breach of any property laws or regulations; (g) the relative illiquidity of real estate investment; (h) real estate taxes; (i) any hidden interests in the portfolio properties; (j) any increase in insurance premiums and (k) any uninsurable losses.

There may also be disparity between the market price of the units of a REIT and the net asset value per unit. This is because the market price of the units of a REIT also depends on many factors, including but not limited to (a) the market value and perceived prospects of the real estate portfolio; (b) changes in economic or market conditions; (c) changes in market valuations of similar companies; (d) changes in interest rates; (e) the perceived attractiveness of the units of the REIT against those of other equity securities; (f) the future size and liquidity of the market for the units and the REIT market generally; (g) any future changes to the regulatory system, including the tax system and (h) the ability of the REIT to implement its investment and growth strategies and to retain its key personnel.

The above risks may have a significant impact on the performance of the relevant units and the price of the structured products.

Liquidation of underlying company or termination of underlying trust or fund.

In the event of liquidation, dissolution, winding up or termination of the company that issues the underlying shares, or termination of a trust or fund that issues the underlying units or the appointment of a receiver or administrator or analogous person to the company, trust or fund, the relevant structured products shall lapse.

Time lag between the time of early termination/exercise and the time of determination of the settlement amount may affect the settlement amount.

Upon early termination or exercise of your structured products, there may be a time lag between the time of early termination or exercise and the time of determination of the settlement amount. Such delay could be significantly longer in the case of a market disruption event, delisting of the company that issues the underlying shares, termination of the trust or fund that issues the underlying unit or other adjustment events. This may result in the settlement amount being zero.

We may adjust the terms and conditions of our structured products upon the occurrence of certain corporate events or extraordinary events affecting the underlying assets.

We and/or the agent may determine that certain corporate events or extraordinary events affecting the underlying assets have occurred and may in our sole discretion make corresponding adjustments to the terms and conditions of our structured products, including adjustments to (i) the exercise/strike price, the upper strike price/lower strike price or the call price (as and if applicable) of the structured products; (ii) the entitlement of the structured products; (iii) the composition of the underlying assets or (iv) any other terms of the structured products. Such events and/or adjustments (if any) may have adverse impact on the value and/or market price of our structured products.

In the case of structured products which relate to an index, the level of the index may vary over time and may increase or decrease by reference to various factors which may include changes in the formula for or the method of calculating the index. A level for the index may also be published by the index compiler at a time when one or more shares comprising the index are not trading. Certain (but not all) events relating to the index underlying the structured products require or permit us to make certain adjustments or amendments to the conditions (e.g. determining the closing level).

However, we have no obligation to make an adjustment for every event that can affect the underlying asset. The value and/or market price of our structured products may be adversely affected by such events in the absence of an adjustment by us. If adjustments were made, we do not assure that such adjustments can negate any adverse impact of such events on the value and/or market price of our structured products.

We may modify the terms and conditions of the structured products.

We may, without your consent, effect any modification of the terms and conditions of the structured products which, in our opinion, is:

(i) not materially prejudicial to your interests generally (without considering the circumstances of any individual holder of the structured products or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Our determination of the occurrence of a market or settlement disruption event may affect the value and/or market price of our structured products.

We and/or the agent may determine that a market or settlement disruption event has occurred. Such determination may affect the value and/or market price of our structured products, and may delay settlement in respect of our structured products.

If the agent determines that a market disruption event exists, the valuation of the underlying assets for the purpose of calculating the cash settlement amount of our structured products may be postponed. Under certain circumstances, we and/or the agent may determine the good faith estimate of the value or level of the underlying assets that would have prevailed on the relevant valuation date but for such market disruption event.

The implied volatility of our structured products may not reflect the actual volatility of the underlying asset.

The market price of our structured products is determined among other factors by the supply and demand of the structured products. This price "implies" a level of volatility in the underlying asset in the sense that such level of volatility would give a theoretical value for the structured product which is equal to that price; but such level of volatility may not be equal to the actual level of volatility of the underlying asset in the past or future.

Investment in our structured products may involve exchange rate risks and interest rate risks.

An investment in our structured products may involve exchange rate risks. For example, the underlying asset may be denominated in a currency other than that of our structured products, our structured products may be denominated in a currency other than the currency of your home jurisdiction and our structured products may settle in a currency other than the currency in which you wish to receive funds. Changes in the exchange rate(s) between the currency of the underlying asset, the currency in which our structured products settle and/ or the currency of your home jurisdiction may adversely affect the return of your investment in our structured products. We cannot assure that current exchange rates at the issue date of our structured products will be representative of the future exchange rates used in computing the value of our structured products. Fluctuations in exchange rates may therefore affect the value of our structured products.

An investment in our structured products may also involve interest rate risk as the intrinsic value of a structured product may be sensitive to fluctuations in interest rates. Fluctuations in the short term or long term interest rates of the currency in which our structured products are settled or the currency in which the underlying asset is denominated may affect the value and/or market price of our structured products.

United States federal tax may be withheld from payments with respect to structured products that are treated as "dividend equivalents". This may have an adverse effect on the value and liquidity of the structured products.

A "dividend equivalent" payment generally is treated as a dividend from sources within the United States and such payments generally would be subject to a 30 per cent (30%) United States withholding tax if paid to a Non-U.S. Holder (as defined in "Taxation – United States of America"). Under recently promulgated U.S. Treasury regulations and related official guidance issued pursuant to Section 871(m) of the Internal Revenue Code of 1986, as amended (the "**Code**"), payments (including deemed payments) with respect to certain financial instruments linked to U.S. equities or indices that include U.S. equities may be treated as dividend equivalents. Section 871(m) provides certain exceptions to this withholding regime, including for instruments linked to certain broad-based indices that meet requirements set forth in the applicable U.S. Treasury regulations. Additionally, the applicable regulations and guidance exclude from the scope of Section 871(m) instruments issued before 1 January 2023 that do not have a "delta" of one with respect to underlying securities that could pay U.S.-source dividends for U.S. federal income tax purposes. If any payments are treated as dividend equivalents subject to withholding, we (or any applicable withholding agent) would be entitled to withhold taxes without being required to pay any additional amounts with respect to amounts so withheld. As a result, actual payments on the structured products may be substantially less than the amounts specified in their terms.

Payments made by us to certain holders with respect to the structured products may be subject to United States withholding tax under the United States Foreign Account Tax Compliance Act.

The Foreign Account Tax Compliance Act ("**FATCA**") generally imposes a 30 per cent (30%) United States withholding tax on certain United States source payments, including interest (and original issue discount), dividends (and "dividend equivalent" payments), or other fixed or determinable annual or periodical gain, profits, and income, and on the gross proceeds from a disposition (subject to the discussions below relating to the Proposed Regulations) of property of a type which can produce United States source interest or dividends ("**Withholdable Payments**"), if paid to a foreign financial institution (including amounts paid to a foreign financial institution on behalf of a holder), unless such institution enters into an agreement with the U.S. Treasury to collect and provide to the U.S. Treasury substantial information regarding United States account holders (including certain account holders that are foreign entities with United States owners) with such institution, or such institution otherwise complies with its obligations under FATCA. A structured product may constitute an account for these purposes. FATCA also generally imposes a withholding tax of 30 per cent (30%) on Withholdable Payments made to a nonfinancial foreign entity unless such entity provides the withholding agent with a certification that it does not have any substantial United States owners or a certification identifying the direct and indirect substantial United States owners of the entity, or otherwise establishes an exemption.

The U.S. Treasury Department and the U.S. Internal Revenue Service have announced that FATCA withholding on payments of gross proceeds from the sale or disposition of a structured product will only apply to payments made after 31 December 2018. However, recently proposed regulations (which have not yet been finalized) (the "**Proposed Regulations**") have eliminated this withholding requirement. Taxpayers are permitted to rely on the Proposed Regulations until final regulations are issued; however, final regulations could reinstate this withholding obligation (or otherwise modify the Proposed Regulations) at any time, possibly with retroactive effect.

In addition, under FATCA, "passthru payments" made by a foreign financial institution to "recalcitrant holders" or noncompliant foreign financial institutions are subject to a 30 per cent (30%) United States withholding tax. A "recalcitrant holder" generally is a holder of an account with a foreign financial institution that fails to comply with certain requests for information that will help enable the relevant foreign financial institution to comply with its obligations under FATCA (a structured product may constitute an account for these purposes). Pursuant to U.S. Treasury regulations, a passthru payment is any Withholdable Payment and any "foreign passthru payment", which has yet to be defined. Under the Proposed Regulations, withholding on foreign passthru payments would not be required with respect to payments made before the date that is two years after the date of publication in the U.S. Federal Register of final regulations defining the term "foreign passthru payment". Taxpayers are permitted to rely on the Proposed Regulations until final regulations are issued; however, final regulations could reinstate these withholding obligations (or otherwise modify the Proposed Regulations) at any time, possibly with retroactive effect.

If we determine that withholding is appropriate with respect to the structured products, we (or an applicable withholding agent) will withhold tax at the applicable statutory rate without being required to pay any additional amounts with respect to amounts so withheld.

The potential effect of the earnings stripping rule included in the Anti-Tax Avoidance Directive I ("ATAD I") on the financial position of the Issuer may not be fully ascertainable.

As part of its anti-tax avoidance package, ATAD I was adopted as Council Directive (EU) 2016/1164 on 12 July 2016 and was required to be implemented by all European Union Member States by 1 January 2019. The Dutch government has implemented the earnings stripping rule included in ATAD I into Dutch law, as a result of which it came into force in the Netherlands as of 1 January 2019.

Under the earnings stripping rule, the deduction of 'exceeding' borrowing costs (defined as the amount by which the deductible borrowing costs of a taxpayer exceed taxable interest revenues and other economically equivalent taxable revenues) will be limited to 30% of a taxpayer's adjusted EBITDA (to which a euro 1.0 million threshold applies). Given that the Issuer's principal activities generally consist of issuing structured products and the subsequent hedging of those risk positions, the Issuer is not expected to incur any 'exceeding' borrowing costs for purposes of the earnings stripping rule. As such, it is currently not expected that the earnings stripping rule will have an adverse effect on the Issuer and its financial position in the Netherlands. Due to the fact that the earnings stripping rule concerns new legislation and the limited availability of practical guidance, however, the exact scope of its potential effects on the financial position of the Issuer may not be fully ascertainable.

The proposed financial transaction tax ("FTT").

The European Commission has published a proposal for a Directive for a common FTT in Belgium, Germany, Estonia, Greece, Spain, France, Italy, Austria, Portugal, Slovenia and Slovakia. However, Estonia has since stated that it will not participate.

The proposed FTT has very broad scope and could apply to certain dealings in financial instruments (including secondary market transactions). Primary market transactions referred to in Article 5(c) of Regulation (EC) No 1287/2006 are expected to be exempt.

The FTT could apply to persons both within and outside of the participating Member States. Generally, it would apply to certain dealings in financial instruments where at least one party is a financial institution, and either (i) at least one party is established or deemed to be established in a participating Member State or (ii) the financial instruments are issued in a participating Member State.

The proposed Directive remains subject to negotiation between the participating Member States. It may therefore be altered prior to any implementation, the timing of which remains unclear. Additional EU Member States may decide to participate.

Prospective holders of the structured products are advised to seek their own professional advice in relation to the FTT.

Please consult your tax advisers if you are in any doubt of your tax position.

You may be required to pay stamp taxes or other documentary charges in accordance with the laws and practices of the country where our structured products are transferred and such laws and practices may change from time to time. If you are in any doubt of your tax position, you should consult your own independent tax advisers.

Our structured products are issued in global registered form; you have to rely on your brokers to evidence title to your investment and to receive notices and the cash settlement amount.

Our structured products are issued in global registered form and held on your behalf within a clearing system. This means that evidence of title to your interests, as well as the efficiency of ultimate delivery of the cash settlement amount, will be governed by the CCASS Rules.

Our structured products in global registered form will be registered in the name of HKSCC Nominees Limited (or its successors), which shall be treated by us as the holder of our structured products for all purposes. This means that you will not receive definitive certificates and the register will record at all times that our structured products are being held by HKSCC Nominees Limited (or its successors). If you are a CCASS investor participant, you may hold your structured products in your account with CCASS. If you do not have a CCASS account, you will have to rely solely upon your brokers and the statements received from your brokers to evidence title to your investments. You will also have to rely on your brokers to effectively inform you of any notices, announcements and/or meetings issued or called by us (upon receipt by those brokers as CCASS participants of the same from CCASS and ultimately from us). The Rules also provide that our obligations to deliver notices, announcements and/or meetings will be complied with by a posting on the HKEX website. Our obligations to deliver any cash settlement amount to you will be duly performed by the delivery of any such amount to HKSCC Nominees Limited (or its successors) as the holder. You will therefore have to rely on CCASS and/or your brokers for the ultimate delivery of any cash settlement amount to you as the investor.

We and our guarantor do not give you any advice or credit analysis.

Neither we nor the guarantor is responsible for the lawfulness of your acquisition of our structured products. We and the guarantor are not giving you any advice or credit analysis of the underlying assets. You shall be deemed to have made a representation to such effect for each purchase of our structured products of any series.

Risks associated with inline warrants.

Inline warrants are exotic warrants and are not comparable to warrants

Inline warrants are exotic warrants with different terms and risk and return profile compared to standard call or put warrants listed on the Stock Exchange and are not comparable to warrants. Inline warrants carry exotic features and their terms and pricing may be more complicated than warrants. Inline warrants may behave quite differently from warrants and other exotic warrants in its response to the price levels/levels or movements in the price/level of the underlying asset. The pricing structure of inline warrants requires investors to assess accurately the value of inline warrants in relation to the expected probability of the average price/closing level falling within the range between the upper strike price/upper strike level and the lower strike price/lower strike level (both inclusive). Inline warrants are highly complicated and risky financial instruments and may be difficult for investors to properly value and/or to use as a hedging tool. You should carefully review and understand the terms and conditions, including the exotic features, before deciding to invest in inline warrants. In particular, you should note that inline warrants provide a pre-fixed potential payoff at either **a capped amount or a floor amount** at expiry. If the average price/closing level falls outside the range between the lower strike price/lower strike level and the upper strike price/upper strike level (both inclusive), you will receive a lower fixed and floor amount equal to the minimum payoff amount per inline warrant (which may be substantially less than your initial investment) at expiry and may suffer loss in your investment. You will still receive the minimum payoff amount per inline warrant in this scenario because such amount is included in the price you pay for buying the inline warrants. Do not invest in inline warrants unless you fully understand them and are willing to assume the risks associated with them.

Maximum potential payoff is fixed and capped

If the average price/closing level stays within the range between the lower strike price/lower strike level and the upper strike price/upper strike level (both inclusive), we will only pay you a fixed and capped amount equal to the maximum payoff amount per inline warrant at expiry. This is the maximum potential payoff under inline warrants.

Non-recognition of trades executed at the price above HK$1

You should note that any trades of inline warrants which are executed at the price above HK$1 will be cancelled and will not be recognised by the Stock Exchange. The Stock Exchange and its recognised exchange controller, HKEX, will not incur any liability (whether based on contract, tort (including, without limitation, negligence), or any other legal or equitable grounds and without regard to the circumstances giving rise to any purported claim except in the case of wilful misconduct on the part of the Stock Exchange and/or HKEX) for any direct, consequential, special, indirect, economic, punitive, exemplary or any other loss or damage suffered or incurred by us or any other party arising from or in connection with such non-recognition of trades, including without limitation, any delay, failure, mistake or error in such non-recognition of trades.

We and our affiliates shall not have any responsibility for any losses suffered as a result of such non-recognition of trades in any circumstances.

Prohibition on the sale of certain binary options in European retail markets

There have been regulatory concerns over the sale of certain binary options to retail investors across the European Union in recent years. Such binary options are typically traded over-the-counter with bespoke structures and are very short-term, making them extremely speculative in nature. Until recently, the European Securities and Markets Authority ("**ESMA**") implemented a temporary ban on the marketing, distribution or sale of binary options to retail customers in the European Union except for securitised binary options. The temporary ban expired and was lifted by ESMA on 1 July 2019 based on the fact that most national competent authorities within the European Union had taken permanent national product intervention measures relating to binary options that are at least as stringent as ESMA's measure. For example, the Financial Conduct Authority ("**FCA**") in the United Kingdom (a then European Union member) imposed a permanent ban effective from 2 April 2019 on the marketing, distribution or sale of all binary options (including securitised binary options) to retail customers in the United Kingdom while the Federal Financial Supervisory Authority ("**BaFin**") in Germany and the Autorité des Marchés Financiers ("**AMF**") of France had also permanently banned the marketing, distribution or sale of binary options (other than securitised binary options) to retail customers.

Inline warrants are a form of securitised binary options. Unlike the binary options in the European retail markets as described above, the inline warrants listed on the Stock Exchange have a more standardised structure and relatively longer period to expiry (with a minimum duration of 6 months before expiry).

Irrespective of the differences between the inline warrants listed on the Stock Exchange and the binary options in Europe, you should nevertheless note the approach taken by the European regulators over binary options. Inline warrants are complex products. You should fully understand the structure and terms and conditions of inline warrants and are willing to assume the risks associated with them before investing in inline warrants.

Risks associated with CBBCs.

CBBCs will become volatile if trading close to the call price/call level

Although the price changes of a CBBC tend to reflect the changes in value of the underlying asset, when the underlying asset is trading at a price/level close to the applicable call price/ call level, the CBBC tends to be more volatile and any price changes of the CBBC at such time may not be comparable and may be disproportionate with the movement in the value of the underlying asset.

Mandatory call event is irrevocable

A mandatory call event is irrevocable unless it is triggered by:

(a) system malfunction or other technical errors of the HKEX (such as the setting up of wrong call price or call level and other parameters) and such event is reported by the Stock Exchange to us and the Stock Exchange and we mutually agree that such mandatory call event is to be revoked; or

(b) manifest errors caused by the relevant third party price sources (such as any miscalculation of the index level by the index compiler) and such event is reported by us to the Stock Exchange and the Stock Exchange and we mutually agree that such mandatory call event is to be revoked.

In each of the above cases, such mutual agreement must be reached no later than 30 minutes before the commencement of trading (including pre-opening session) (Hong Kong time) on the trading day of the Stock Exchange immediately following the day on which the mandatory call event occurs, or such other timeframe as prescribed by the Stock Exchange from time to time.

In such case, the mandatory call event so triggered will be reversed and all trades cancelled (if any) will be reinstated and the trading of the CBBCs will resume as soon as practicable.

Subject to the limited circumstances described above in which a mandatory call event may be reversed, the CBBCs will be terminated following a mandatory call event and you will not be able to benefit from any movement in the underlying asset after the occurrence of the mandatory call event.

Delay in announcement of mandatory call event

The Stock Exchange will notify the market as soon as practicable after the CBBCs have been called upon the occurrence of a mandatory call event. You should be aware that there may be a delay in the announcement of a mandatory call event due to technical errors, system failures and other factors that are beyond our control and the control of the Stock Exchange.

Non-recognition of post MCE trades

You should note that after the occurrence of a mandatory call event, all post MCE trades will be invalid and will be cancelled and will not be recognised by us or the Stock Exchange.

Disclaimers relating to mandatory call event

The Stock Exchange and its recognised exchange controller, HKEX, will not incur any liability (whether based on contract, tort, (including, without limitation, negligence), or any other legal or equitable grounds and without regard to the circumstances giving rise to any purported claim except in the case of wilful misconduct on the part of the Stock Exchange and/or HKEX) for, any direct, consequential, special, indirect, economic, punitive, exemplary or any other loss or damage suffered or incurred by us or any other party arising from or in connection with the mandatory call event or the suspension of trading (trading suspension) or the non- recognition of trades after a mandatory call event (non-recognition of post MCE trades), including without limitation, any delay, failure, mistake or error in the trading suspension or non-recognition of post MCE trades.

We and our guarantor shall not have any responsibility for any losses suffered as a result of the trading suspension and/or non-recognition of post MCE trades in connection with the occurrence of a mandatory call event, notwithstanding that such trading suspension or non-recognition of post MCE trades may have occurred as a result of an error in the observation of the event.

Fluctuation in the funding cost

The issue price of the CBBCs is set by reference to the difference between the initial reference spot price/level of the underlying asset and the strike price/level, plus the applicable funding cost.

The initial funding cost applicable to the CBBCs will be specified in the relevant launch announcement and supplemental listing document. It will fluctuate throughout the life of the CBBCs as the funding rate changes from time to time. The funding rate is a rate determined by us based on one or more of the following factors, including, but not limited to, the strike price/level, the call price/level, the prevailing interest rate, the expected life of the CBBCs, any expected notional dividends in respect of the underlying asset (if applicable) and the margin financing provided by us.

Residual value will not include residual funding cost

For category R CBBCs, the residual value (if any) payable by us following the occurrence of a mandatory call event will not include the residual funding cost for the CBBCs. You will not receive any residual funding cost back from us upon early termination of a category R CBBC following a mandatory call event.

Our hedging activities

Our or our affiliates' market-making and/or hedging activities and/or other financial instruments issued by us or our affiliates from time to time may have an impact on the price/level of the underlying asset and may trigger a mandatory call event.

In particular, when the price/level of the underlying asset is close to the call price/level, our unwinding activities in relation to the underlying asset may cause a fall or rise (as the case may be) in the price/level of the underlying asset leading to a mandatory call event as a result of such unwinding activities.

In respect of category N CBBCs, we or our affiliates may unwind our hedging transactions relating to the CBBCs at any time even if such unwinding activities may trigger a mandatory call event.

In respect of category R CBBCs, before the occurrence of a mandatory call event, we or our affiliates may unwind our hedging transactions relating to the CBBCs in proportion to the amount of the CBBCs we repurchase from the market from time to time. Upon the occurrence of a mandatory call event, we or our affiliates can unwind any hedging transactions relating to the CBBCs. Such unwinding activities after the occurrence of a mandatory call event may affect the price/level of the underlying asset and consequently the residual value for the CBBCs.

The market price of the CBBCs may become more sensitive to changes in the value of the underlying asset where the value is approaching the call price/call level, resulting in greater volatility of market price of the CBBCs.

The guarantor is subject to the Financial Institutions (Resolution) Ordinance

The Financial Institutions (Resolution) Ordinance (Cap. 628, the Laws of Hong Kong) (the "**FIRO**") was enacted by the Legislative Council of Hong Kong in June 2016. The FIRO (except Part 8, section 192 and Division 10 of Part 15 thereof) came into operation on 7 July 2017.

The FIRO establishes a regime for the orderly resolution of financial institutions with a view to avoiding or mitigating the risks otherwise posed by their non-viability to the stability and effective working of the financial system of Hong Kong, including the continued performance of critical financial functions. The FIRO seeks to empower the resolution authorities with authority to decide whether to initiate the resolution of a financial institution and which stabilization options to apply and other powers to exercise in effecting a resolution. In particular, it is envisaged that subject to certain safeguards, the relevant resolution authority would be provided with powers to affect contractual and property rights as well as payments (including in respect of any priority of payment) that creditors would receive in resolution, including but not limited to powers to write off, or convert into equity, all or a part of the liabilities of the failing financial institution.

We are not subject to or bound by the FIRO. However, the guarantor, as an authorised institution regulated by the Hong Kong Monetary Authority, is subject to and bound by the FIRO. The exercise of any resolution power by the relevant resolution authority under the FIRO in respect of the guarantor may have a material adverse effect on the value of the structured products, and as a result, you may not be able to recover all or any amount due under the structured products (if any).

Status of the Guarantee

JPMorgan Chase Bank, N.A.'s guarantee of our structured products (i) is an unsecured and unsubordinated general obligation of the guarantor and not of any of its affiliates, (ii) is not a savings account or deposit of the guarantor or any bank or non-bank subsidiary or affiliate of the guarantor and (iii) will rank pari passu with all other unsecured and unsubordinated indebtedness of the guarantor, except obligations, including U.S. domestic deposits of the guarantor, that are subject to any priorities or preferences by law. JPMorgan Chase Bank, N.A.'s guarantee is not a deposit insured by the U.S. Federal Deposit Insurance Corporation (the "**FDIC**"), the U.S. Deposit Insurance Fund or any other governmental agency or instrumentality.

In particular, U.S. federal legislation adopted in 1993 provides for a preference in right of payment of certain claims made in the liquidation or other resolution of any FDIC-insured depository institution, which includes JPMorgan Chase Bank, N.A. The statute requires claims to be paid in the following order:

- first, administrative expenses of the receiver;
- second, any deposit liability of the institution;
- third, any other general or senior liability of the institution not described below;
- fourth, any obligation subordinated to depositors or general creditors not described below; and
- fifth, any obligation to shareholders or members (including any depository institution holding company or any shareholder or creditor of such company).

Deposit liabilities have been interpreted by the FDIC to include any deposit payable at an office of the insured depository institution in the United States, and not to include international banking facility deposits or deposits solely payable at an office of the insured depository institution outside the United States.

Limitations of the Guarantee

JPMorgan Chase Bank, N.A.'s guarantee of our structured products is limited in scope to our payment and other obligations in respect of the structured products, and allows the guarantor to avail itself of all exclusions, exceptions and defences available to us under the terms and conditions of the structured products and at law. Further, in certain circumstances, the guarantor will not be obliged under the terms of its guarantee to satisfy our payment or other obligations in respect of the structured products, even where we have failed to perform such obligations. For example, if we are prohibited, unable, or otherwise fail to make any payment, or any portion thereof or to perform any other obligation, because or arising out of an act of war, insurrection or civil strife; an action by a government or any governmental authority or instrumentality thereof (whether de jure or de facto); legal constraint; terrorism; riots; or catastrophe, and we are thereby in default of our payment or other obligations in respect of any of our structured products, the guarantor will be under no obligation under the terms of its guarantee to satisfy our defaulted obligations. See "Form of Guarantee" below.

Risk factors relating to the guarantor.

The risk factors described below as well as the other information included in this document and in any amendment or supplement to this document may be material for the purpose of assessing the business risks that may affect JPMorgan Chase Bank, National Association's business and profitability. The following risk factors are contingencies which may or may not occur and JPMorgan Chase Bank, National Association is not in a position to express a view on the likelihood of any such contingency occurring. References in these risk factors to "JPMorgan Chase" are to JPMorgan Chase & Co. and its subsidiaries, including JPMorgan Chase Bank, National Association.

Regulatory

JPMorgan Chase's businesses are highly regulated, and the laws and regulations that apply to JPMorgan Chase have a significant impact on its business and operations.

JPMorgan Chase is a financial services firm with operations worldwide. JPMorgan Chase must comply with the laws, rules and regulations that apply to its operations in all of the jurisdictions around the world in which it does business. Regulation of financial services is extensive.

JPMorgan Chase has experienced an extended period of significant change in laws and regulations affecting the financial services industry, both within and outside the U.S. The supervision of financial services firms also expanded significantly. The increased regulation and supervision of JPMorgan Chase has affected the way that it conducts its business and structures its operations. Existing and new laws and regulations and expanded supervision could require JPMorgan Chase to make further changes to its business and operations. These changes could result in JPMorgan Chase incurring additional costs for complying with laws and regulations and could reduce its profitability. For example, existing and new laws and regulations have in the past and could in the future require JPMorgan Chase to:

- limit the products and services that it offers
- reduce the liquidity that it can provide through its market-making activities
- stop or discourage it from engaging in business opportunities that it might otherwise pursue
- recognize losses in the value of assets that it holds
- pay higher taxes, assessments, levies or other governmental charges, including in connection with the resolution of tax examinations
- dispose of certain assets, and do so at times or prices that are disadvantageous
- impose restrictions on certain business activities, or
- increase the prices that it charges for products and services, which could reduce the demand for them.

Differences in financial services regulation can be disadvantageous for JPMorgan Chase's business.

The content and application of laws and regulations affecting financial services firms sometimes vary according to factors such as the size of the firm, the jurisdiction in which it is organized or operates, and other criteria. For example:

- larger firms are often subject to more stringent supervision and regulation
- financial technology companies and other non-traditional competitors may not be subject to banking regulation, or may be supervised by a national or state regulatory agency that does not have the same resources or regulatory priorities as the regulatory agencies which supervise more diversified financial services firms, or
- the financial services regulatory framework in a particular jurisdiction may favor financial institutions that are based in that jurisdiction.

These differences in the regulatory framework can result in a firm such as JPMorgan Chase losing market share to competitors that are less regulated or not subject to regulation, especially with respect to unregulated financial products.

There can also be significant differences in the ways that similar regulatory initiatives affecting the financial services industry are implemented in the U.S. and in other countries and regions in which JPMorgan Chase does business. For example, when adopting rules that are intended to implement a global regulatory initiative or standard, a national regulator may introduce additional or more restrictive requirements, which can create competitive disadvantages for financial services firms, such as JPMorgan Chase, that may be subject to those enhanced regulations.

Legislative and regulatory initiatives outside the U.S. could require JPMorgan Chase to make significant modifications to its operations and legal entity structure in the relevant countries or regions in order to comply with those requirements. These include laws and regulations that have been adopted or proposed relating to:

- the resolution of financial institutions
- the establishment of locally-based intermediate holding companies or operating subsidiaries
- requirements to maintain minimum amounts of capital or liquidity in locally-based subsidiaries
- the separation (or "ring fencing") of core banking products and services from markets activities
- requirements for executing or settling transactions on exchanges or through central counterparties ("CCPs")
- position limits and reporting rules for derivatives
- governance and accountability regimes
- conduct of business requirements, and
- restrictions on compensation.

These types of differences in financial services regulation, or inconsistencies or conflicts between laws and regulations between different jurisdictions, could require JPMorgan Chase to:

- divest assets or restructure its operations
- absorb increased operational, capital and liquidity costs
- change the prices that it charges for its products and services
- curtail the products and services that it offers to its customers and clients, or
- incur higher costs for complying with different legal and regulatory frameworks.

Any or all of these factors could harm JPMorgan Chase's ability to compete against other firms that are not subject to the same laws and regulations or supervisory oversight, or harm JPMorgan Chase's businesses, results of operations and profitability.

Heightened regulatory scrutiny of JPMorgan Chase's businesses has increased its compliance costs and could result in restrictions on its operations.

JPMorgan Chase's operations are subject to heightened oversight and scrutiny from regulatory authorities in many jurisdictions where JPMorgan Chase does business. JPMorgan Chase has paid significant fines, provided other monetary relief, incurred other penalties and experienced other repercussions in connection with resolving several investigations and enforcement actions by governmental agencies. JPMorgan Chase could become subject to similar regulatory resolutions or other actions in the future, and addressing the requirements of any such resolutions or actions could result in JPMorgan Chase incurring higher operational and compliance costs or needing to comply with other restrictions.

In connection with resolving specific regulatory investigations or enforcement actions, certain regulators have required JPMorgan Chase and other financial institutions to admit wrongdoing with respect to the activities that gave rise to the resolution. These types of admissions can lead to:

- greater exposure in civil litigation
- damage to reputation
- disqualification from doing business with certain clients or customers, or in specific jurisdictions, or
- other direct and indirect adverse effects.

Furthermore, U.S. government officials have demonstrated a willingness to bring criminal actions against financial institutions and have demanded that institutions plead guilty to criminal offenses or admit other wrongdoing in connection with resolving regulatory investigations or enforcement actions. Resolutions of this type can have significant collateral consequences for the subject financial institution, including:

- loss of clients, customers and business
- restrictions on offering certain products or services, and
- losing permission to operate certain businesses, either temporarily or permanently.

JPMorgan Chase expects that it and other financial services firms will continue to be subject to heightened regulatory scrutiny and governmental investigations and enforcement actions. JPMorgan Chase also expects that regulators will continue to insist that financial institutions be penalized for actual or deemed violations of law with formal and punitive enforcement actions, including the imposition of significant monetary and other sanctions, rather than resolving these matters through informal supervisory actions. Furthermore, if JPMorgan Chase fails to meet the requirements of any resolution of a governmental investigation or enforcement action, or to maintain risk and control processes that meet the heightened standards established by its regulators, it could be required to:

- enter into further resolutions of investigations or enforcement actions
- pay additional regulatory fines, penalties or judgments, or
- accept material regulatory restrictions on, or changes in the management of, its businesses.

In these circumstances, JPMorgan Chase could also become subject to other sanctions, or to prosecution or civil litigation with respect to the conduct that gave rise to an investigation or enforcement action.

Complying with economic sanctions and anti-corruption and anti-money laundering laws and regulations can increase JPMorgan Chase's operational and compliance costs and risks.

JPMorgan Chase must comply with economic sanctions and embargo programs administered by the Office of Foreign Assets Control ("OFAC") and similar national and multi-national bodies and governmental agencies outside the U.S., as well as anti-corruption and anti-money laundering laws and regulations throughout the world. JPMorgan Chase can incur higher costs and face greater compliance risks in structuring and operating its businesses to comply with these requirements. Furthermore, a violation of a sanction or embargo program or anti-corruption or anti-money laundering laws and regulations could subject JPMorgan Chase, and individual employees, to regulatory enforcement actions as well as significant civil and criminal penalties.

JPMorgan Chase's operations can be constrained in countries with less predictable legal and regulatory frameworks.

If the legal and regulatory system in a particular country is less predictable, this can create a more difficult environment in which to conduct business. For example, any of the following could hamper JPMorgan Chase's operations and reduce its earnings in these types of countries:

- the absence of a statutory or regulatory basis or guidance for engaging in specific types of business or transactions

- conflicting or ambiguous laws and regulations, or the inconsistent application or interpretation of existing laws and regulations

- uncertainty concerning the enforceability of contractual, intellectual property or other obligations

- difficulty in competing in economies in which the government controls or protects all or a portion of the local economy or specific businesses, or where graft or corruption may be pervasive, and

- the threat of arbitrary regulatory investigations, civil litigations or criminal prosecutions, the termination of licenses required to operate in the local market or the suspension of business relationships with governmental bodies.

Conducting business in countries with less predictable legal and regulatory regimes could require JPMorgan Chase to devote significant additional resources to understanding, and monitoring changes in, local laws and regulations, as well as structuring its operations to comply with local laws and regulations and implementing and administering related internal policies and procedures.

There can be no assurance that JPMorgan Chase will always be successful in its efforts to fully understand and to conduct its business in compliance with the laws and regulations of all of the jurisdictions in which it operates, and the risk of non-compliance can be greater in countries that have less predictable legal and regulatory systems.

Requirements for the orderly resolution of JPMorgan Chase could result in JPMorgan Chase having to restructure or reorganize its businesses.

JPMorgan Chase is required under Federal Reserve and FDIC rules to prepare and submit periodically to those agencies a detailed plan for rapid and orderly resolution in bankruptcy, without extraordinary government support, in the event of material financial distress or failure. The agencies' evaluation of JPMorgan Chase's resolution plan may change, and the requirements for resolution plans may be modified from time to time. Any such determinations or modifications could result in JPMorgan Chase needing to make changes to its legal entity structure or to certain internal or external activities, which could increase its funding or operational costs, or hamper its ability to serve clients and customers.

If the Federal Reserve and the FDIC were to determine that a resolution plan submitted by JPMorgan Chase has deficiencies, they could jointly impose more stringent capital, leverage or liquidity requirements or restrictions on JPMorgan Chase's growth, activities or operations. After two years, if the deficiencies are not cured, the agencies could also require that JPMorgan Chase restructure, reorganize or divest assets or businesses in ways that could materially and adversely affect JPMorgan Chase's operations and strategy.

Holders of JPMorgan Chase & Co.'s debt and equity securities will absorb losses if it were to enter into a resolution.

Federal Reserve rules require that JPMorgan Chase & Co. (the "Parent Company") maintain minimum levels of unsecured external long-term debt and other loss-absorbing capacity with specific terms ("eligible LTD") for purposes of recapitalizing JPMorgan Chase's operating subsidiaries if the Parent Company were to enter into a resolution either:

- in a bankruptcy proceeding under Chapter 11 of the U.S. Bankruptcy Code, or
- in a receivership administered by the FDIC under Title II of the Dodd-Frank Act ("Title II").

If the Parent Company were to enter into a resolution, holders of eligible LTD and other debt and equity securities of the Parent Company will absorb the losses of the Parent Company and its subsidiaries.

The preferred "single point of entry" strategy under JPMorgan Chase's resolution plan contemplates that only the Parent Company would enter bankruptcy proceedings. JPMorgan Chase's subsidiaries would be recapitalized, as needed, so that they could continue normal operations or subsequently be divested or wound down in an orderly manner. As a result, the Parent Company's losses and any losses incurred by its subsidiaries would be imposed first on holders of the Parent Company's equity securities and thereafter on its unsecured creditors, including holders of eligible LTD and other debt securities. Claims of holders of those securities would have a junior position to the claims of creditors of JPMorgan Chase's subsidiaries and to the claims of priority (as determined by statute) and secured creditors of the Parent Company.

Accordingly, in a resolution of the Parent Company in bankruptcy, holders of eligible LTD and other debt securities of the Parent Company would realize value only to the extent available to the Parent Company as a shareholder of JPMorgan Chase Bank, N.A. and its other subsidiaries, and only after any claims of priority and secured creditors of the Parent Company have been fully repaid.

The FDIC has similarly indicated that a single point of entry recapitalization model could be a desirable strategy to resolve a systemically important financial institution, such as the Parent Company, under Title II. However, the FDIC has not formally adopted a single point of entry resolution strategy.

If the Parent Company were to approach, or enter into, a resolution, none of the Parent Company, the Federal Reserve or the FDIC is obligated to follow JPMorgan Chase's preferred strategy, and losses to holders of eligible LTD and other debt and equity securities of the Parent Company, under whatever strategy is ultimately followed, could be greater than they might have been under JPMorgan Chase's preferred strategy.

Political

The departure of the U.K. from the EU could negatively affect JPMorgan Chase's business, results of operations and operating model.

It remains highly uncertain how the departure of the U.K. from the EU, which is commonly referred to as "Brexit," will affect financial services firms such as JPMorgan Chase that conduct substantial operations in the EU from legal entities that are organized in or operating from the U.K. It is possible that the transition period following the U.K.'s departure from the EU on January 31, 2020 will expire on December 31, 2020 without any agreement having been reached between the U.K. and the EU concerning whether or to what extent U.K.-based firms may conduct financial services activities within the EU. It is also possible that any agreement reached between the U.K. and the EU may, depending on the final outcome of the ongoing negotiations and related legislative developments:

- impede the ability of U.K.-based financial services firms to conduct business in the EU
- fail to address significant unresolved issues relating to the cross-border conduct of financial services activities, or
- apply only temporarily.

JPMorgan Chase has been making appropriate modifications to its legal entity structure and operations in the EU, the locations in which it operates and the staffing in those locations to address the departure of the U.K. from the EU. If the U.K. and the EU fail to reach an agreement on their future relationship before the end of the transition period or if any other outcome persists that does not assure ongoing access for U.K.-based financial services firms to the EU market, the types of structural and operational changes that JPMorgan Chase is in the process of making to its European operations may result in JPMorgan Chase having to sustain a more fragmented operating model across its U.K., EU and other operating entities. Due to considerations such as operating expenses, liquidity, leverage and capital, the modified European operating framework will be more complex, less efficient and more costly than would otherwise have been the case.

A disorderly withdrawal of the U.K. from the EU, or unexpected consequences of the withdrawal, could have significant and immediate destabilizing effects on economic and market conditions in the region and globally. In particular, cross-border financial services activities could be severely disrupted depending on circumstances that may exist following the withdrawal, including:

- the possibility that financial institutions, their clients and counterparties, and other market participants may not be positioned to continue to do business through EU-based legal entities
- reduction or fragmentation of market liquidity that may be caused if significant market participants (including trading venues and CCPs) that are currently based in the U.K. have not completed arrangements to conduct operations from the EU either in the near term or, if authorized to continue to operate from the U.K. on a transitional basis, after any transitional or temporary relief has expired
- uncertainties concerning the application and interpretation of laws and regulations relating to cross- border financial services activities

- inability to engage in certain financial services activities through EU-based legal entities to the extent that licenses or temporary permission to engage in such activities have not been granted timely by local regulators

- unexpected or unfavorable changes in laws and regulations, governmental policies or public sentiment, and

- losses due to process errors or incorrect judgments concerning economic, political or regulatory developments.

Any or all of the above factors could have an adverse effect on the overall operation of the European financial services market as well as JPMorgan Chase's business, operations and earnings in the U.K., the EU and globally.

Economic uncertainty or instability caused by political developments can hurt JPMorgan Chase's businesses.

The economic environment and market conditions in which JPMorgan Chase operates continue to be uncertain due to political developments in the U.S. and other countries.

Certain monetary, fiscal and other policy initiatives and proposals could cause a contraction in U.S. and global economic growth and higher volatility in the financial markets, including:

- monetary and fiscal policies and actions taken by the Federal Reserve and other central banks or governmental authorities, including any suspension or reversal of large-scale asset purchases

- inability to reach political consensus to keep the U.S. government open

- isolationist foreign policies

- the implementation of tariffs and other protectionist trade policies

- political pressure on monetary policy decisions of central banks, or

- the possible withdrawal or reduction of government support for the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation (together, the "U.S. GSEs").

These types of political developments, and uncertainty about the possible outcomes of these developments, could:

- erode investor confidence in the U.S. economy and financial markets, which could potentially undermine the status of the U.S. dollar as a safe haven currency

- provoke retaliatory countermeasures by other countries and otherwise heighten tensions in diplomatic relations

- increase concerns about whether the U.S. government will be funded, and its outstanding debt serviced, at any particular time, and

- result in periodic shutdowns of the U.S. government or governments in other countries.

These factors could lead to:

- slower growth rates, rising inflation or recession
- greater market volatility
- a contraction of available credit and the widening of credit spreads
- diminished investor and consumer confidence
- lower investment growth
- large-scale sales of government debt and other debt and equity securities in the U.S. and other countries
- reduced commercial activity among trading partners
- the potential for a currency redenomination by a particular country
- the possible departure of a country from, or the dissolution of, a political or economic alliance or treaty
- potential expropriation or nationalization of assets
- other market dislocations, including the spread of unfavorable economic conditions from a particular country or region to other countries or regions.

Any of these potential outcomes could cause JPMorgan Chase to suffer losses on its market-making positions or in its investment portfolio, reduce its liquidity and capital levels, hamper its ability to deliver products and services to its clients and customers, and weaken its results of operations and financial condition.

Market

Economic and market events and conditions can materially affect JPMorgan Chase's businesses and investment and market-making positions.

JPMorgan Chase's results of operations can be negatively affected by adverse changes in any of the following:

- investor, consumer and business sentiment
- events that reduce confidence in the financial markets
- inflation or deflation
- high unemployment or, conversely, a tightening labor market
- the availability and cost of capital, liquidity and credit
- levels and volatility of interest rates (including overnight repo rates), credit spreads and market prices for currencies, equities and commodities, and the duration of any changes in levels or volatility

- the economic effects of outbreaks of hostilities, terrorism or other geopolitical instabilities, cyberattacks, climate change, natural disasters, severe weather conditions, health emergencies, the spread of infectious diseases or pandemics, and

- the health of the U.S. and global economies.

All of these are affected by global economic, market and political events and conditions, as well as regulatory restrictions.

In addition, JPMorgan Chase's investment portfolio and market-making businesses can suffer losses due to unanticipated market events, including:

- severe declines in asset values

- unexpected credit events

- unforeseen events or conditions that may cause previously uncorrelated factors to become correlated (and vice versa)

- the inability to effectively hedge market and other risks related to market-making position, or

- other market risks that may not have been appropriately taken into account in the development, structuring or pricing of a financial instrument.

If JPMorgan Chase experiences significant losses in its investment portfolio or from market-making activities, this could reduce JPMorgan Chase's profitability and its liquidity and capital levels, and thereby constrain the growth of its businesses.

JPMorgan Chase's consumer businesses can be negatively affected by adverse economic conditions.

JPMorgan Chase's consumer businesses are particularly affected by U.S. and global economic conditions, including:

- interest rates

- the rates of inflation and unemployment

- housing prices

- the level of consumer and small business confidence

- changes in consumer spending or in the level of consumer debt, and

- the number of personal bankruptcies.

A rapid increase in interest rates could negatively affect consumer credit performance to the extent that consumers are less able to service their debts. Sustained low growth, low or negative interest rates, inflationary pressures or recessionary conditions could diminish customer demand for the products and services offered by JPMorgan Chase's consumer businesses. These conditions could also increase the cost to provide those products and services. Adverse economic conditions could also lead to an increase in delinquencies and higher net charge-offs, which can reduce JPMorgan Chase's earnings. These consequences could be significantly worse in certain geographies where high levels of unemployment have resulted from declining industrial or manufacturing activity, or where high levels of consumer debt, such as outstanding student loans, impair the ability of customers to pay their other consumer loan obligations.

JPMorgan Chase's earnings from its consumer businesses could also be adversely affected by governmental policies and actions that affect consumers, including:

- policies and initiatives relating to medical insurance, education, immigration and employment status
- the inability to reach political consensus to keep the U.S. government open and funded, and
- policies aimed at the economy more broadly, such as infrastructure spending and global trade, which could result in higher inflation or reductions in consumer disposable income.

In addition, governmental proposals to permit student loan obligations to be discharged in bankruptcy proceedings could, if enacted into law, encourage certain of JPMorgan Chase's customers to declare personal bankruptcy and thereby trigger defaults and charge-offs of credit card and other consumer loans extended to those customers.

Unfavorable market and economic conditions can have an adverse effect on JPMorgan Chase's wholesale businesses.

In JPMorgan Chase's wholesale businesses, market and economic factors can affect the volume of transactions that JPMorgan Chase executes for its clients or for which it advises clients, and, therefore, the revenue that JPMorgan Chase receives from those transactions. These factors can also influence the willingness of other financial institutions and investors to participate in capital markets transactions that JPMorgan Chase manages, such as loan syndications or securities underwritings. Furthermore, if a significant and sustained deterioration in market conditions were to occur, the profitability of JPMorgan Chase's capital markets businesses, including its loan syndication, securities underwriting and leveraged lending activities, could be reduced to the extent that those businesses:

- earn less fee revenue due to lower transaction volumes, including when clients are unwilling or unable to refinance their outstanding debt obligations in unfavorable market conditions, or
- dispose of portions of credit commitments at a loss, or hold larger residual positions in credit commitments that cannot be sold at favorable prices.

An adverse change in market conditions in particular segments of the economy, such as a sudden and severe downturn in oil and gas prices or an increase in commodity prices, could have a material adverse effect on clients of JPMorgan Chase whose operations or financial condition are directly or indirectly dependent on the health or stability of those market segments, as well as clients that are engaged in related businesses. JPMorgan Chase could incur losses on its loans and other credit commitments to clients that operate in, or are dependent on, any sector of the economy that is under stress.

The fees that JPMorgan Chase earns from managing client assets or holding assets under custody for clients could be diminished by declining asset values or other adverse macroeconomic conditions. For example, higher interest rates or a downturn in financial markets could affect the valuations of client assets that JPMorgan Chase manages or holds under custody, which, in turn, could affect JPMorgan Chase's revenue from fees that are based on the amount of assets under management or custody. Similarly, adverse macroeconomic or market conditions could prompt outflows from JPMorgan Chase funds or accounts, or cause clients to invest in products that generate lower revenue. Substantial and unexpected withdrawals from a JPMorgan Chase fund can also hamper the investment performance of the fund, particularly if the outflows create the need for the fund to dispose of fund assets at disadvantageous times or prices, and could lead to further withdrawals based on the weaker investment performance.

An economic downturn that results in lower consumer and business spending could also have a negative impact on certain of JPMorgan Chase's wholesale clients, and thereby diminish JPMorgan Chase's earnings from its wholesale operations. For example, the businesses of certain of JPMorgan Chase's wholesale clients are dependent on consistent streams of rental income from commercial real estate properties which are owned or being built by those clients. Severe and sustained adverse economic conditions could reduce the rental cash flows that owners or developers receive from those properties which, in turn, could depress the values of the properties and impair the ability of borrowers to service or refinance their commercial real estate loans. These consequences could result in JPMorgan Chase experiencing higher delinquencies, defaults and write-offs within its commercial real estate loan portfolio and incurring higher costs for servicing a larger volume of delinquent loans in that portfolio, thereby reducing JPMorgan Chase's earnings from its wholesale businesses.

Changes in interest rates and credit spreads can adversely affect certain of JPMorgan Chase's revenue and income streams.

JPMorgan Chase can generally be expected to earn higher net interest income when interest rates are increasing. However, higher interest rates can also lead to:

- fewer originations of commercial and residential real estate loans
- losses on underwriting exposures
- the loss of deposits, including in the event that JPMorgan Chase makes incorrect assumptions about depositor behavior
- lower net interest income if central banks introduce interest rate increases more quickly than anticipated and this results in a misalignment in the pricing of short-term and long-term borrowings
- less liquidity in the financial markets, and
- higher funding costs.

All of these outcomes could adversely affect JPMorgan Chase's revenues and its liquidity and capital levels. Higher interest rates can also negatively affect the payment performance on loans within JPMorgan Chase's consumer and wholesale loan portfolios that are linked to variable interest rates. If borrowers of variable rate loans are unable to afford higher interest payments, those borrowers may reduce or stop making payments, thereby causing JPMorgan Chase to incur losses and increased operational costs related to servicing a higher volume of delinquent loans.

On the other hand, a low or negative interest rate environment may cause:

- net interest margins to be compressed, which could reduce the amounts that JPMorgan Chase earns on its investment portfolio to the extent that it is unable to reinvest contemporaneously in higher-yielding instruments
- unanticipated or adverse changes in depositor behavior, which could negatively affect JPMorgan Chase's broader asset and liability management strategy, and
- a reduction in the value of JPMorgan Chase's mortgage servicing rights ("MSRs") asset, thereby decreasing revenues.

When credit spreads widen, it becomes more expensive for JPMorgan Chase to borrow. JPMorgan Chase's credit spreads may widen or narrow not only in response to events and circumstances that are specific to JPMorgan Chase but also as a result of general economic and geopolitical events and conditions. Changes in JPMorgan Chase's credit spreads will affect, positively or negatively, JPMorgan Chase's earnings on certain liabilities, such as derivatives, that are recorded at fair value.

JPMorgan Chase's results may be materially affected by market fluctuations and significant changes in the value of financial instruments.

The value of securities, derivatives and other financial instruments which JPMorgan Chase owns or in which it makes markets can be materially affected by market fluctuations. Market volatility, illiquid market conditions and other disruptions in the financial markets may make it extremely difficult to value certain financial instruments, particularly during periods of market displacement.

Subsequent valuations of financial instruments in future periods, in light of factors then prevailing, may result in significant changes in the value of these instruments. In addition, at the time of any disposition of these financial instruments, the price that JPMorgan Chase ultimately realizes will depend on the demand and liquidity in the market at that time and may be materially lower than their current fair value. Any of these factors could cause a decline in the value of JPMorgan Chase's financial instruments which may have an adverse effect on JPMorgan Chase's results of operations.

JPMorgan Chase's risk management and monitoring processes, including its stress testing framework, seek to quantify and control JPMorgan Chase's exposure to more extreme market moves. However, JPMorgan Chase could realize significant losses if extreme market events were to occur. Under extreme market conditions, hedging and other risk management strategies may not be as effective at mitigating losses as they would be under more normal market conditions.

Credit

JPMorgan Chase can be adversely affected by the financial condition of clients, counterparties, custodians and CCPs.

JPMorgan Chase routinely executes transactions with brokers and dealers, commercial and investment banks, mutual and hedge funds, investment managers and other types of financial institutions and market participants. Many of these transactions expose JPMorgan Chase to the credit risk of its clients and counterparties, and can involve JPMorgan Chase in disputes and litigation if a client or counterparty defaults. JPMorgan Chase can also be subject to losses or liability where a financial institution that it has appointed to provide custodial services for client assets or funds becomes insolvent as a result of fraud or the failure to abide by existing laws and obligations, including under the EU Alternative Investment Fund Managers Directive.

A default by, or the financial or operational failure of, a CCP through which JPMorgan Chase executes contracts would require JPMorgan Chase to replace those contracts, thereby increasing its operational costs and potentially resulting in losses. JPMorgan Chase can also be exposed to losses if a member of a CCP in which JPMorgan Chase is also a member defaults on its obligations to the CCP because of requirements that each member of the CCP absorb a portion of those losses. As part of its clearing services activities, JPMorgan Chase is also exposed to the risk of nonperformance by its clients, which it seeks to mitigate by requiring clients to provide adequate collateral. JPMorgan Chase is also exposed to intra-day credit risk of its clients in connection with providing cash management, clearing, custodial and other transaction services to those clients. If a client for which JPMorgan Chase provides these services becomes bankrupt or insolvent, JPMorgan Chase may incur losses, become involved in disputes and litigation with one or more CCPs, the client's bankruptcy estate and other creditors, or be subject to regulatory investigations. All of the foregoing events can increase JPMorgan Chase's operational and litigation costs, and JPMorgan Chase may suffer losses to the extent that any collateral that it has received is insufficient to cover those losses. JPMorgan Chase can also be subject to bearing its share of non-default losses incurred by a CCP, including losses from custodial, settlement or investment activities or due to cyber or other security breaches.

Disputes may arise with counterparties to derivatives contracts with regard to the terms, the settlement procedures or the value of underlying collateral. The disposition of those disputes could cause JPMorgan Chase to incur unexpected transaction, operational and legal costs, or result in credit losses. These consequences can also impair JPMorgan Chase's ability to effectively manage its credit risk exposure from its market activities, or cause harm to JPMorgan Chase's reputation.

The financial or operational failure of a significant market participant, such as a major financial institution or a CCP, or concerns about the creditworthiness of such a market participant, can have a cascading effect within the financial markets. JPMorgan Chase's businesses could be significantly disrupted by such an event, particularly if it leads to other market participants incurring significant losses, experiencing liquidity issues or defaulting. JPMorgan Chase is likely to have significant interrelationships with, and credit exposure to, such a significant market participant, and would seek to unwind or hedge positions in securities, derivatives and other obligations in multiple jurisdictions during a period of heightened market volatility.

JPMorgan Chase may suffer losses if the value of collateral declines in stressed market conditions.

During periods of market stress or illiquidity, JPMorgan Chase's credit risk may be further increased when JPMorgan Chase cannot realize the fair value of the collateral held by it or when collateral is liquidated at prices that are not sufficient to recover the full amount of the loan, derivative or other exposure due to it. Furthermore, disputes with counterparties concerning the valuation of collateral may increase in times of significant market stress, volatility or illiquidity, and JPMorgan Chase could suffer losses during these periods if it is unable to realize the fair value of collateral or to manage declines in the value of collateral.

JPMorgan Chase could incur significant losses arising from concentrations of credit and market risk.

JPMorgan Chase is exposed to greater credit and market risk to the extent that groupings of its clients or counterparties:

- engage in similar or related businesses, or in businesses in related industries
- do business in the same geographic region, or
- have business profiles, models or strategies that could cause their ability to meet their obligations to be similarly affected by changes in economic conditions.

For example, a significant deterioration in the credit quality of one of JPMorgan Chase's borrowers or counterparties could lead to concerns about the creditworthiness of other borrowers or counterparties in similar, related or dependent industries. This type of interrelationship could exacerbate JPMorgan Chase's credit, liquidity and market risk exposure and potentially cause it to incur losses, including fair value losses in its market-making businesses.

Similarly, challenging economic conditions that affect a particular industry or geographic area could lead to concerns about the credit quality of JPMorgan Chase's borrowers or counterparties not only in that particular industry or geography but in related or dependent industries, wherever located. These conditions could also heighten concerns about the ability of customers of JPMorgan Chase's consumer businesses who live in those areas or work in those affected industries or related or dependent industries to meet their obligations to JPMorgan Chase. JPMorgan Chase regularly monitors various segments of its credit and market risk exposures to assess the potential risks of concentration or contagion, but its efforts to diversify or hedge its exposures against those risks may not be successful.

JPMorgan Chase's consumer businesses can also be harmed by an excessive expansion of consumer credit by bank or non-bank competitors. Heightened competition for certain types of consumer loans could prompt industry-wide reactions such as significant reductions in the pricing or margins of those loans or the making of loans to less-creditworthy borrowers. If large numbers of consumers subsequently default on their loans, whether due to weak credit profiles, an economic downturn or other factors, this could impair their ability to repay obligations owed to JPMorgan Chase and result in higher charge-offs and other credit-related losses. More broadly, widespread defaults on consumer debt could lead to recessionary conditions in the U.S. economy, and JPMorgan Chase's consumer businesses may earn lower revenues in such an environment.

If JPMorgan Chase is unable to reduce positions effectively during a market dislocation, this can increase both the market and credit risks associated with those positions and the level of risk-weighted assets ("RWA") that JPMorgan Chase holds on its balance sheet. These factors could adversely affect JPMorgan Chase's capital position, funding costs and the profitability of its businesses.

Liquidity

Liquidity is critical to JPMorgan Chase's ability to operate its businesses.

JPMorgan Chase's liquidity could be impaired at any given time by factors such as:

- market-wide illiquidity or disruption
- unforeseen liquidity or capital requirements, including as a result of changes in laws, rules and regulations
- inability to sell assets, or to sell assets at favorable times or prices
- default by a CCP or other significant market participant
- unanticipated outflows of cash or collateral
- unexpected loss of consumer deposits caused by changes in consumer behavior, and
- lack of market or customer confidence in JPMorgan Chase or financial institutions in general.

A reduction in JPMorgan Chase's liquidity may be caused by events over which it has little or no control. For example, during periods of market stress, low investor confidence and significant market illiquidity could result in higher funding costs for JPMorgan Chase and could limit its access to some of its traditional sources of liquidity. There is no assurance that severe conditions of this type will not occur.

JPMorgan Chase may need to raise funding from alternative sources if its access to stable and lower-cost sources of funding, such as deposits and borrowings from Federal Home Loan Banks, is reduced. Alternative sources of funding could be more expensive or limited in availability. JPMorgan Chase's funding costs could also be negatively affected by actions that JPMorgan Chase may take in order to:

- satisfy applicable liquidity coverage ratio and net stable funding ratio requirements
- address obligations under its resolution plan, or

- satisfy regulatory requirements in jurisdictions outside the U.S. relating to the pre-positioning of liquidity in subsidiaries that are material legal entities.

More generally, if JPMorgan Chase fails to effectively manage its liquidity, this could constrain its ability to fund or invest in its businesses and subsidiaries (including, in particular, its broker-dealer subsidiaries), and thereby adversely affect its results of operations.

JPMorgan Chase & Co. is a holding company and depends on the cash flows of its subsidiaries to make payments on its outstanding securities.

JPMorgan Chase & Co. is a holding company that holds the stock of JPMorgan Chase Bank, N.A. and an intermediate holding company, JPMorgan Chase Holdings LLC (the "IHC"). The IHC in turn holds the stock of substantially all of JPMorgan Chase's subsidiaries other than JPMorgan Chase Bank, N.A. and its subsidiaries. The IHC also owns other assets and owes intercompany indebtedness to the holding company.

The holding company is obligated to contribute to the IHC substantially all the net proceeds received from securities issuances (including issuances of senior and subordinated debt securities and of preferred and common stock).

The ability of JPMorgan Chase Bank, N.A. and the IHC to make payments to the holding company is also limited. JPMorgan Chase Bank, N.A. is subject to restrictions on its dividend distributions, as well as capital adequacy and liquidity requirements and other regulatory restrictions on its ability to make payments to the holding company. The IHC is prohibited from paying dividends or extending credit to the holding company if certain capital or liquidity "thresholds" are breached or if limits are otherwise imposed by JPMorgan Chase's management or Board of Directors.

As a result of these arrangements, the ability of the holding company to make various payments is dependent on its receiving dividends from JPMorgan Chase Bank, N.A. and dividends and extensions of credit from the IHC. These limitations could affect the holding company's ability to:

- pay interest on its debt securities

- pay dividends on its equity securities

- redeem or repurchase outstanding securities, and

- fulfill its other payment obligations.

These regulatory restrictions and limitations could also result in the holding company seeking protection under bankruptcy laws at a time earlier than would have been the case absent the existence of the capital and liquidity thresholds to which the IHC is subject.

Reductions in JPMorgan Chase's credit ratings may adversely affect its liquidity and cost of funding.

JPMorgan Chase & Co. and certain of its principal subsidiaries are rated by credit rating agencies. Rating agencies evaluate both general and firm-specific and industry-specific factors when determining credit ratings for a particular financial institution, including:

- expected future profitability

- risk management practices

- legal expenses

- ratings differentials between bank holding companies and their bank and non-bank subsidiaries

- regulatory developments

- assumptions about government support, and

- economic and geopolitical trends.

JPMorgan Chase closely monitors and manages, to the extent that it is able, factors that could influence its credit ratings. However, there is no assurance that JPMorgan Chase's credit ratings will not be lowered in the future. Furthermore, any such downgrade could occur at times of broader market instability when JPMorgan Chase's options for responding to events may be more limited and general investor confidence is low.

A reduction in JPMorgan Chase's credit ratings could curtail JPMorgan Chase's business activities and reduce its profitability in a number of ways, including:

- reducing its access to capital markets

- materially increasing its cost of issuing and servicing securities

- triggering additional collateral or funding requirements, and

- decreasing the number of investors and counterparties that are willing or permitted to do business with or lend to JPMorgan Chase.

Any rating reduction could also increase the credit spreads charged by the market for taking credit risk on JPMorgan Chase & Co. and its subsidiaries. This could, in turn, adversely affect the value of debt and other obligations of JPMorgan Chase & Co. and its subsidiaries.

The reform and replacement of benchmark rates could adversely affect JPMorgan Chase's funding, investments and financial products, and expose it to litigation and other disputes.

Interest rate, equity, foreign exchange rate and other types of indices which are deemed to be "benchmarks," including those in widespread and long-standing use, have been the subject of ongoing international, national and other regulatory scrutiny and initiatives and proposals for reform. Some of these reforms are already effective while others are still to be implemented or are under consideration. These reforms may cause benchmarks to perform differently than in the past, or to disappear entirely, or have other consequences which cannot be fully anticipated.

Any of the benchmark reforms which have been proposed or implemented, or the general increased regulatory scrutiny of benchmarks, could also increase the costs and risks of administering or otherwise participating in the setting of benchmarks and complying with regulations or requirements relating to benchmarks. Such factors may have the effect of discouraging market participants from continuing to administer or contribute to certain benchmarks, trigger changes in the rules or methodologies used in certain benchmarks or lead to the disappearance of certain benchmarks.

Any of these developments, and any future initiatives to regulate, reform or change the administration of benchmarks, could result in adverse consequences to the return on, value of and market for loans, mortgages, securities, derivatives and other financial instruments whose returns are linked to any such benchmark, including those issued, funded, serviced or held by JPMorgan Chase.

Various regulators, industry bodies and other market participants in the U.S. and other countries are engaged in initiatives to develop, introduce and encourage the use of alternative rates to replace certain benchmarks. There is no assurance that these new rates will be accepted or widely used by market participants, or that the characteristics of any of these new rates will be similar to, or produce the economic equivalent of, the benchmarks that they seek to replace. If a particular benchmark were to be discontinued and an alternative rate has not been successfully introduced to replace that benchmark, this could result in widespread dislocation in the financial markets, engender volatility in the pricing of securities, derivatives and other instruments, and suppress capital markets activities, all of which could have adverse effects on JPMorgan Chase's results of operations. In addition, to the extent that appropriate relief is not provided by accounting standard setters with respect to the transition from benchmark rates, the transition could:

- affect hedge accounting relationships between financial instruments linked to a particular benchmark and any related derivatives, which could adversely affect JPMorgan Chase's results of operations, or

- increase JPMorgan Chase's operational costs with respect to the determination of whether the transition has resulted in the modification or extinguishment of specific contracts for accounting purposes.

Representatives of the U.K. Financial Conduct Authority (the "FCA"), which regulates the London interbank offered rate ("LIBOR"), have made a series of public statements during the past several years to the effect that:

- the FCA will no longer persuade or compel banks to submit rates for the calculation of the LIBOR benchmark after 2021, and

- once a significant number of banks are no longer submitting such rates, the FCA may make a determination under applicable regulations that the LIBOR benchmark may not meet the standards required under those regulations for use as a benchmark.

These statements indicate that it is highly likely that LIBOR will be discontinued on or about the end of 2021. Vast amounts of loans, mortgages, securities, derivatives and other financial instruments are linked to the LIBOR benchmark, and any inability of market participants and regulators to successfully introduce benchmark rates to replace LIBOR and implement effective transitional arrangements to address the discontinuation of LIBOR could result in disruption in the financial markets and suppress capital markets activities, all of which could have a negative impact on JPMorgan Chase's results of operations and on LIBOR-linked securities, credit or other instruments which are issued, funded, serviced or held by JPMorgan Chase.

JPMorgan Chase could also become involved in litigation and other types of disputes with clients, customers, counterparties and investors as a consequence of the transition from LIBOR and other benchmark rates to replacement rates, including claims that JPMorgan Chase has:

- treated clients, customers, counterparties or investors unfairly, or caused them to experience losses, higher financing costs or lower returns on investments

- failed to appropriately communicate the effects of the transition from benchmark rates on the products that JPMorgan Chase has sold to its clients and customers, or failed to disclose purported conflicts of interest

- made inappropriate product recommendations to or investments on behalf of its clients, or sold products that did not serve their intended purpose, in connection with the transition from benchmark rates

- engaged in anti-competitive behavior, or in the manipulation of markets or specific benchmarks, in connection with the discontinuation of or transition from benchmark rates, or
- disadvantaged clients, customers, counterparties or investors when interpreting or making determinations under the terms of agreements or financial instruments.

These types of claims could subject JPMorgan Chase to higher legal expenses and operational costs, require it to pay significant amounts in connection with resolving litigation and other disputes, and harm its reputation.

Capital

Maintaining the appropriate level and composition of capital is critical to support JPMorgan Chase's business activities, meet regulatory requirements and distribute capital to shareholders.

JPMorgan Chase is subject to various regulatory capital requirements, and although many of these requirements have been finalized, prudential regulators have recently issued new regulatory capital proposals, and continued uncertainty remains as to the manner in which these requirements ultimately will apply to JPMorgan Chase. As a result, it is possible that these requirements could limit JPMorgan Chase's ability to support its businesses and make capital distributions to its shareholders.

JPMorgan Chase is required to submit, on an annual basis, a capital plan describing proposed dividend payments to shareholders, redemptions and repurchases of its outstanding securities and other capital actions that it intends to take. JPMorgan Chase considers various factors in the management of capital, including the impact of stress on its capital levels, as determined by both internal modeling and the Federal Reserve's modeling of JPMorgan Chase's capital position in supervisory stress tests and CCAR. Because the Federal Reserve and JPMorgan Chase use different forecasting models and methodologies when determining stress test results, there can be significant differences between the estimates of stress loss as determined by the Federal Reserve and JPMorgan Chase, respectively. The Federal Reserve may object to or require modifications to JPMorgan Chase's capital plan, or JPMorgan Chase may otherwise modify its capital plan, and any such modification could have an adverse effect on JPMorgan Chase's shareholders, including by:

- constraining the amount of dividends that may be paid on common stock
- reducing the amount of common stock that JPMorgan Chase is permitted to repurchase
- requiring the issuance of, or prohibiting the redemption of, capital instruments in a manner inconsistent with JPMorgan Chase's capital management strategy
- curtailing JPMorgan Chase's business activities or operations, or
- damaging JPMorgan Chase's reputation.

Operational

JPMorgan Chase's businesses are highly dependent on the effectiveness of its operational systems and those of other market participants.

JPMorgan Chase's businesses rely comprehensively on the ability of JPMorgan Chase's financial, accounting, transaction execution, data processing and other operational systems to process, record, monitor and report a large number of transactions on a continuous basis, and to do so accurately, quickly and securely. In addition to proper design, installation, maintenance and training, the effective functioning of JPMorgan Chase's operational systems depends on:

- the quality of the information contained in those systems, as inaccurate, outdated or corrupted data can significantly compromise the functionality or reliability of a particular system and other systems to which it transmits or from which it receives information, and

- JPMorgan Chase's ability to appropriately maintain and upgrade its systems on a regular basis, and to ensure that any changes introduced to its systems are managed carefully to ensure security and operational continuity and adhere to all applicable legal and regulatory requirements.

JPMorgan Chase also depends on its ability to access and use the operational systems of its vendors, custodians and other market participants, including clearing and payment systems, CCPs, securities exchanges and data processing, security and technology companies.

The ineffectiveness, failure or other disruption of operational systems upon which JPMorgan Chase depends, including due to a systems malfunction, cyberbreach or other systems failure, could result in unfavorable ripple effects in the financial markets and for JPMorgan Chase and its clients and customers, including:

- delays or other disruptions in providing information, services and liquidity to clients and customers

- the inability to settle transactions or obtain access to funds and other assets, including those for which physical settlement and delivery is required

- failure to timely settle or confirm transactions

- the possibility that funds transfers, capital markets trades or other transactions are executed erroneously, illegally or with unintended consequences

- financial losses, including due to loss-sharing requirements of CCPs, payment systems or other market infrastructures, or as possible restitution to clients and customers

- higher operational costs associated with replacing services provided by a system that is unavailable

- client or customer dissatisfaction with JPMorgan Chase's products and services

- loss of confidence in the ability of JPMorgan Chase, or financial institutions generally, to protect against and withstand operational disruptions, or

- harm to JPMorgan Chase's reputation.

As the speed, frequency, volume, interconnectivity and complexity of transactions continue to increase, it becomes more challenging to effectively maintain and upgrade JPMorgan Chase's operational systems and infrastructure, especially due to the heightened risks that:

- errors made by JPMorgan Chase or another market participant, whether inadvertent or malicious, cause widespread system disruption

- isolated or seemingly insignificant errors in operational systems compound, or migrate to other systems over time, to become larger issues

- failures in synchronization or encryption software, or degraded performance of microprocessors due to design flaws, could cause disruptions in operational systems, or the inability of systems to communicate with each other, and

- third parties may attempt to block the use of key technology solutions by claiming that the use infringes on their intellectual property rights.

If JPMorgan Chase's operational systems, or those of external parties on which JPMorgan Chase's businesses depend, are unable to meet the demanding standards of JPMorgan Chase's businesses and operations, or if they fail or have other significant shortcomings, JPMorgan Chase could be materially and adversely affected.

JPMorgan Chase can be negatively affected if it fails to identify and address operational risks associated with the introduction of or changes to products, services and delivery platforms.

When JPMorgan Chase launches a new product or service, introduces a new platform for the delivery or distribution of products or services (including mobile connectivity, electronic trading and cloud computing), or makes changes to an existing product, service or delivery platform, it may not fully appreciate or identify new operational risks that may arise from those changes, or may fail to implement adequate controls to mitigate the risks associated with those changes. Any significant failure in this regard could diminish JPMorgan Chase's ability to operate one or more of its businesses or result in:

- potential liability to clients, counterparties and customers
- increased operating expenses
- higher litigation costs, including regulatory fines, penalties and other sanctions
- damage to JPMorgan Chase's reputation
- impairment of JPMorgan Chase's liquidity
- regulatory intervention, or
- weaker competitive standing.

Any of the foregoing consequences could materially and adversely affect JPMorgan Chase's businesses and results of operations.

JPMorgan Chase's connections to external operational systems expose it to greater operational risks.

External operational systems with which JPMorgan is connected, whether directly or indirectly, can be sources of operational risk to JPMorgan Chase. JPMorgan Chase may be exposed not only to a systems failure that may be experienced by a vendor or market infrastructure with which JPMorgan Chase is directly connected, but also to a systems breakdown of another party to which such a vendor or infrastructure is connected. Similarly, retailers, data aggregators and other external parties with which JPMorgan Chase's customers do business can increase JPMorgan Chase's operational risk. This is particularly the case where activities of customers or those parties are beyond JPMorgan Chase's security and control systems, including through the use of the internet, cloud computing services and personal smart phones and other mobile devices or services.

If an external party obtains access to customer account data on JPMorgan Chase's systems, and that party experiences a cyberbreach of its own systems or misappropriates that data, this could result in a variety of negative outcomes for JPMorgan Chase and its clients and customers, including:

- heightened risk that external parties will be able to execute fraudulent transactions using JPMorgan Chase's systems

- losses from fraudulent transactions, as well as potential liability for losses that exceed thresholds established in consumer protection laws and regulations

- increased operational costs to remediate the consequences of the external party's security breach, and

- harm to reputation arising from the perception that JPMorgan Chase's systems may not be secure.

As JPMorgan Chase's interconnectivity with clients, customers and other external parties expands, JPMorgan Chase increasingly faces the risk of operational failure with respect to the systems of those parties. Security breaches affecting JPMorgan Chase's clients or customers, or systems breakdowns or failures, security breaches or human error or misconduct affecting other external parties, may require JPMorgan Chase to take steps to protect the integrity of its own operational systems or to safeguard confidential information, including restricting the access of customers to their accounts. These actions can increase JPMorgan Chase's operational costs and potentially diminish customer satisfaction and confidence in JPMorgan Chase.

Furthermore, the widespread and expanding interconnectivity among financial institutions, central agents, CCPs, payment processors, securities exchanges, clearing houses and other financial market infrastructures increases the risk that an operational failure at one institution or entity may cause an industry-wide operational failure that could materially affect JPMorgan Chase's ability to conduct business.

JPMorgan Chase's operations depend on the competence and integrity of its employees and those of external parties.

JPMorgan Chase's ability to operate its businesses efficiently and profitably, to offer products and services that meet the expectations of its clients and customers, and to maintain an effective risk management framework is highly dependent on the competence and integrity of its employees, as well as employees of other parties on which JPMorgan Chase's operations rely, including vendors, custodians and financial markets infrastructures. JPMorgan Chase's businesses could be materially and adversely affected by:

- the ineffective implementation of business decisions

- any failure to institute controls that appropriately address risks associated with business activities, or to appropriately train employees with respect to those risks and controls

- a significant operational breakdown or failure, theft, fraud or other unlawful conduct, or

- other negative outcomes caused by human error or misconduct by an employee of JPMorgan Chase or of another party on which JPMorgan Chase's operations depend.

JPMorgan Chase faces substantial legal and operational risks in safeguarding personal information.

JPMorgan Chase's businesses are subject to complex and evolving laws and regulations, both within and outside the U.S., governing the privacy and protection of personal information of individuals. The protected parties can include:

- JPMorgan Chase's clients and customers, and prospective clients and customers
- clients and customers of JPMorgan Chase's clients and customers
- employees and prospective employees, and
- employees of JPMorgan Chase's vendors, counterparties and other external parties.

Ensuring that JPMorgan Chase's collection, use, transfer and storage of personal information comply with all applicable laws and regulations in all relevant jurisdictions, including where the laws of different jurisdictions are in conflict, can:

- increase JPMorgan Chase's compliance and operating costs
- hinder the development of new products or services, curtail the offering of existing products or services, or affect how products and services are offered to clients and customers
- demand significant oversight by JPMorgan Chase's management, and
- require JPMorgan Chase to structure its businesses, operations and systems in less efficient ways.

Furthermore, JPMorgan Chase cannot ensure that all of its clients and customers, vendors, counterparties and other external parties have appropriate controls in place to protect the confidentiality of the information exchanged between them and JPMorgan Chase, particularly where information is transmitted by electronic means. JPMorgan Chase could be exposed to litigation or regulatory fines, penalties or other sanctions if personal, confidential or proprietary information of clients, customers, employees or others were to be mishandled or misused, such as situations where such information is:

- erroneously provided to parties who are not permitted to have the information, or
- intercepted or otherwise compromised by third parties.

Concerns regarding the effectiveness of JPMorgan Chase's measures to safeguard personal information, or even the perception that those measures are inadequate, could cause JPMorgan Chase to lose existing or potential clients and customers, and thereby reduce JPMorgan Chase's revenues. Furthermore, any failure or perceived failure by JPMorgan Chase to comply with applicable privacy or data protection laws and regulations may subject it to inquiries, examinations and investigations that could result in requirements to modify or cease certain operations or practices, significant liabilities or regulatory fines, penalties or other sanctions. Any of these could damage JPMorgan Chase's reputation and otherwise adversely affect its businesses.

In recent years, well-publicized allegations involving the misuse or inappropriate sharing of personal information have led to expanded governmental scrutiny of practices relating to the safeguarding of personal information and the use or sharing of personal data by companies in the U.S. and other countries. That scrutiny has in some cases resulted in, and could in the future lead to, the adoption of stricter laws and regulations relating to the use and sharing of personal information. These types of laws and regulations could prohibit or significantly restrict financial services firms such as JPMorgan Chase from sharing information among affiliates or with third parties such as vendors, and thereby increase compliance costs, or could restrict JPMorgan Chase's use of personal data when developing or offering products or services to customers. These restrictions could also inhibit JPMorgan Chase's development or marketing of certain products or services, or increase the costs of offering them to customers.

A successful cyberattack against JPMorgan Chase could cause significant harm to JPMorgan Chase or its clients and customers.

JPMorgan Chase experiences numerous cyberattacks on its computer systems, software, networks and other technology assets on a daily basis from various actors, including cyber-criminals and "hacktivists" (i.e., individuals or groups that use technology to promote a political agenda or social change). These cyberattacks can take many forms, but a common objective of many of these attacks is to introduce computer viruses or malware into JPMorgan Chase's systems. These viruses or malicious code are typically designed to:

- obtain unauthorized access to confidential information belonging to JPMorgan Chase or its clients, customers, counterparties or employees

- manipulate or destroy data

- disrupt, sabotage or degrade service on JPMorgan Chase's systems, or

- steal money.

JPMorgan Chase has also experienced significant distributed denial-of-service attacks which are intended to disrupt online banking services.

JPMorgan Chase devotes significant resources to maintain and regularly upgrade its systems to protect them against cyberattacks. However, JPMorgan Chase has experienced security breaches due to cyberattacks in the past, and it is inevitable that additional breaches will occur in the future. Any such breach could result in serious and harmful consequences for JPMorgan Chase or its clients and customers.

A principal reason that JPMorgan Chase cannot provide absolute security against cyberattacks is that it may not always be possible to anticipate, detect or recognize threats to JPMorgan Chase's systems, or to implement effective preventive measures against all breaches. This is because:

- the techniques used in cyberattacks change frequently and are increasingly sophisticated, and therefore may not be recognized until launched

- cyberattacks can originate from a wide variety of sources, including third parties who are or may be involved in organized crime or linked to terrorist organizations or hostile countries, or whose objective is to disrupt the operations of financial institutions more generally

- JPMorgan Chase does not have control over the cybersecurity of the systems of the large number of clients, customers, counterparties and third-party service providers with which it does business

- third parties may seek to gain access to JPMorgan Chase's systems either directly or using equipment or security passwords belonging to employees, customers, third-party service providers or other users of JPMorgan Chase's systems, and

- it is possible that a third party, after establishing a foothold on an internal network without being detected, might obtain access to other networks and systems.

The risk of a security breach due to a cyberattack could increase in the future as JPMorgan Chase continues to expand its mobile banking and other internet-based product offerings and its internal use of internet-based products and applications.

A successful penetration or circumvention of the security of JPMorgan Chase's systems or the systems of a vendor, governmental body or another market participant could cause serious negative consequences, including:

- significant disruption of JPMorgan Chase's operations and those of its clients, customers and counterparties, including losing access to operational systems
- misappropriation of confidential information of JPMorgan Chase or that of its clients, customers, counterparties, employees or regulators
- damage to computers or systems of JPMorgan Chase and those of its clients, customers and counterparties
- inability to fully recover and restore data that has been stolen, manipulated or destroyed, or to prevent systems from processing fraudulent transactions
- violations by JPMorgan Chase of applicable privacy and other laws
- financial loss to JPMorgan Chase or to its clients, customers, counterparties or employees
- loss of confidence in JPMorgan Chase's cybersecurity measures
- dissatisfaction among JPMorgan Chase's clients, customers or counterparties
- significant exposure to litigation and regulatory fines, penalties or other sanctions, and
- harm to JPMorgan Chase's reputation.

JPMorgan Chase could also suffer some of the above consequences if a third party were to misappropriate confidential information obtained by intercepting signals or communications from mobile devices used by JPMorgan Chase's employees.

The extent of a particular cyberattack and the steps that JPMorgan Chase may need to take to investigate the attack may not be immediately clear, and it may take a significant amount of time before such an investigation can be completed. While such an investigation is ongoing, JPMorgan Chase may not necessarily know the full extent of the harm caused by the cyberattack, and that damage may continue to spread. These factors may inhibit JPMorgan Chase's ability to provide full and reliable information about the cyberattack to its clients, customers, counterparties and regulators, as well as the public. Furthermore, it may not be clear how best to contain and remediate the harm caused by the cyberattack, and certain errors or actions could be repeated or compounded before they are discovered and remediated. Any or all of these factors could further increase the costs and consequences of a cyberattack.

JPMorgan Chase's operations, results and reputation could be harmed by catastrophes or other events.

JPMorgan Chase's business and operational systems could be seriously disrupted, and its reputation could be harmed, by events or contributing factors that are wholly or partially beyond its control, including:

- cyberbreaches or breaches of physical premises, including data centers
- power, telecommunications or internet outages

- failures of, or loss of access to, operational systems, including computer systems, servers, networks and other technology assets
- damage to or loss of property or assets of JPMorgan Chase or third parties, and any consequent injuries, including in connection with any construction projects undertaken by JPMorgan Chase
- effects of climate change
- natural disasters or severe weather conditions
- accidents such as explosions or structural failures
- health emergencies, the spread of infectious diseases or pandemics, or
- events arising from local or larger-scale political events, including outbreaks of hostilities or terrorist acts.

JPMorgan Chase maintains a firmwide resiliency program that is intended to enable it to recover critical business functions and supporting assets, including staff, technology and facilities, in the event of a business interruption. There can be no assurance that JPMorgan Chase's resiliency plans will fully mitigate all potential business continuity risks to JPMorgan Chase or its clients and customers. In particular, JPMorgan Chase's ability to respond effectively to a business interruption could be hampered to the extent that the members of its workforce, physical assets or systems and other support infrastructure needed to address the event are geographically dispersed, or conversely, if a catastrophic event occurs in an area in which a critical segment of JPMorgan Chase's workforce, physical assets or systems and other support infrastructure is concentrated. In addition, should emergency or catastrophic events such as severe or abnormal weather conditions become more chronic, the disruptive effects of those events on JPMorgan Chase's business and operations, and on its clients, customers, counterparties and employees, could become more significant and long-lasting.

Any significant failure or disruption of JPMorgan Chase's operations or operational systems, or any catastrophic event, could:

- hinder JPMorgan Chase's ability to provide services to its clients and customers or to transact with its counterparties
- require it to expend significant resources to correct the failure or disruption
- cause it to incur losses or liabilities, including from loss of revenue, damage to or loss of property, or injuries
- expose it to litigation or regulatory fines, penalties or other sanctions, and
- harm its reputation.

JPMorgan Chase's risk management framework may not be effective in identifying and mitigating every risk to JPMorgan Chase.

Any inadequacy or lapse in JPMorgan Chase's risk management framework, governance structure, practices, models or reporting systems could expose it to unexpected losses, and its financial condition or results of operations could be materially and adversely affected. In addition, any such inadequacy or lapse could:

- require significant resources to remediate

- attract heightened regulatory scrutiny
- expose JPMorgan Chase to regulatory investigations or legal proceedings
- subject it to litigation or regulatory fines, penalties or other sanctions
- harm its reputation, or
- otherwise diminish confidence in JPMorgan Chase.

JPMorgan Chase relies on data to assess its various risk exposures. Any deficiencies in the quality or effectiveness of JPMorgan Chase's data gathering and validation processes could result in ineffective risk management practices. These deficiencies could also result in inaccurate risk reporting.

Many of JPMorgan Chase's risk management strategies and techniques consider historical market behavior. These strategies and techniques are based to some degree on management's subjective judgment. For example, many models used by JPMorgan Chase are based on assumptions regarding historical correlations among prices of various asset classes or other market indicators. In times of market stress, including difficult or less liquid market environments, or in the event of other unforeseen circumstances, previously uncorrelated indicators may become correlated. Conversely, previously-correlated indicators may make unrelated movements at those times. Sudden market movements and unanticipated or unidentified market or economic movements could, in some circumstances, limit the effectiveness of JPMorgan Chase's risk management strategies, causing it to incur losses.

JPMorgan Chase could incur significant losses, its capital levels could be reduced and it could face greater regulatory scrutiny if its models or estimations prove to be inadequate.

JPMorgan Chase has developed and uses a variety of models and other analytical and judgment-based estimations to measure, monitor and implement controls over its market, credit, liquidity, operational and other risks. These models and estimations are based on a variety of assumptions and historical trends, and are periodically reviewed and modified as necessary. The models and estimations that JPMorgan Chase uses may not be effective in all cases to identify, observe and mitigate risk due to a variety of factors, such as:

- reliance on historical trends that may not accurately predict future events, including assumptions underlying the models and estimations which predict correlation among certain market indicators or asset prices
- inherent limitations associated with forecasting uncertain economic and financial outcomes
- historical trend information may be incomplete, or may not anticipate severely negative market conditions such as extreme volatility, dislocation or lack of liquidity
- technology that is introduced to run models or estimations may not perform as expected, or may not be well understood by the personnel using the technology
- models and estimations may contain erroneous data, valuations, formulas or algorithms, and
- review processes may fail to detect flaws in models and estimations.

Some of the models and other analytical and judgment-based estimations used by JPMorgan Chase in managing risks are subject to review by, and require the approval of, JPMorgan Chase's regulators. These reviews are required before JPMorgan Chase may use those models and estimations in connection with calculating market risk RWA, credit risk RWA and operational risk RWA under Basel III. If

JPMorgan Chase's models or estimations are not approved by its regulators, it may be subject to higher capital charges, which could adversely affect its financial results or limit the ability to expand its businesses. JPMorgan Chase's capital actions could also be constrained if a CCAR submission is not approved by its banking regulators due to the perceived inadequacy of its models or estimations.

Enhanced regulatory and other standards for the oversight of vendors and other service providers can result in higher costs and other potential exposures.

JPMorgan Chase must comply with enhanced regulatory and other standards associated with doing business with vendors and other service providers, including standards relating to the outsourcing of functions as well as the performance of significant banking and other functions by subsidiaries. JPMorgan Chase incurs significant costs and expenses in connection with its initiatives to address the risks associated with oversight of its internal and external service providers. JPMorgan Chase's failure to appropriately assess and manage these relationships, especially those involving significant banking functions, shared services or other critical activities, could materially adversely affect JPMorgan Chase. Specifically, any such failure could result in:

- potential liability to clients and customers
- regulatory fines, penalties or other sanctions
- lower revenues, and the opportunity cost from lost revenues
- increased operational costs, or
- harm to JPMorgan Chase's reputation.

JPMorgan Chase could incur unexpected losses if estimates and judgments underlying its financial statements are incorrect.

Under U.S. generally accepted accounting principles ("U.S. GAAP"), JPMorgan Chase is required to use estimates and apply judgments in preparing its financial statements, including in determining the allowance for credit losses and reserves related to litigation. Certain financial instruments require a determination of their fair value in order to prepare JPMorgan Chase's financial statements, including:

- trading assets and liabilities
- instruments in the investment portfolio
- certain loans
- MSRs
- structured notes, and
- certain repurchase and resale agreements.

Where quoted market prices are not available for these types of financial instruments, JPMorgan Chase may make fair value determinations based on internally developed models or other means which ultimately rely to some degree on management estimates and judgment, and these types of estimates and judgments may not prove to be accurate due to a variety of factors, as noted above. In addition, sudden illiquidity in markets or declines in prices of certain loans and securities may make it more difficult to value certain financial instruments, which could lead to valuations being subsequently changed or adjusted. If estimates or judgments underlying JPMorgan Chase's financial statements prove to have been incorrect, JPMorgan Chase may experience material losses.

JPMorgan Chase establishes an allowance for expected credit losses that are inherent in its credit exposures. It then employs stress testing and other techniques to determine the amounts of capital and liquidity that would be needed in the event of adverse economic or market events. These processes are critical to JPMorgan Chase's results of operations and financial condition. They require difficult, subjective and complex judgments, including forecasts of how economic conditions might impair the ability of JPMorgan Chase's borrowers and counterparties to repay their loans or other obligations. It is possible that JPMorgan Chase will fail to identify the proper factors or that it will fail to accurately estimate the impact of factors that it identifies.

Lapses in controls over disclosure or financial reporting could materially affect JPMorgan Chase's profitability or reputation.

There can be no assurance that JPMorgan Chase's disclosure controls and procedures will be effective in every circumstance, or that a material weakness or significant deficiency in internal control over financial reporting will not occur. Any such lapses or deficiencies could:

- materially and adversely affect JPMorgan Chase's business and results of operations or financial condition
- restrict its ability to access the capital markets
- require it to expend significant resources to correct the lapses or deficiencies
- expose it to litigation or regulatory fines, penalties or other sanctions
- harm its reputation, or
- otherwise diminish investor confidence in JPMorgan Chase.

JPMorgan Chase could be adversely affected by changes in accounting standards or policies.

The preparation of JPMorgan Chase's financial statements is based on accounting standards established by the Financial Accounting Standards Board and the Securities and Exchange Commission, as well as more detailed accounting policies established by JPMorgan Chase's management. From time to time these accounting standards or accounting policies may change, and in some cases these changes could have a significant effect on JPMorgan Chase's financial statements and may adversely affect its financial results or investor perceptions of those results.

As of January 1, 2020, JPMorgan Chase has implemented a new accounting standard, commonly referred to as the Current Expected Credit Losses ("CECL") framework, which requires earlier recognition of expected credit losses on loans and certain other instruments. The allowance for credit losses related to JPMorgan Chase's loans and other lending-related commitments increased as a result of the implementation of CECL, which has a negative impact on JPMorgan Chase's capital levels.

The ongoing impact of the adoption of CECL could include the following, each of which could result in diminished investor confidence:

- greater volatility in JPMorgan Chase's earnings and capital levels over economic cycles
- potential reductions in its capital distributions, or
- unexpected increases in the allowance for credit losses.

In addition, JPMorgan Chase could be adversely impacted by associated changes in the competitive environment in which it operates, including changes in the availability or pricing of loan products, particularly during periods of economic stress, as well as changes related to non-U.S. financial institutions or other competitors that are not subject to this accounting standard.

Strategic

If JPMorgan Chase's management fails to develop and execute effective business strategies, and to anticipate changes affecting those strategies, JPMorgan Chase's competitive standing and results could suffer.

JPMorgan Chase's business strategies significantly affect its competitive standing and operations. These strategies relate to:

- the products and services that JPMorgan Chase offers
- the geographies in which it operates
- the types of clients and customers that it serves
- the counterparties with which it does business, and
- the methods and distribution channels by which it offers products and services.

If management makes choices about these strategies and goals that prove to be incorrect, do not accurately assess the competitive landscape and industry trends, or fail to address changing regulatory and market environments, then the franchise values and growth prospects of JPMorgan Chase's businesses may suffer and its earnings could decline.

JPMorgan Chase's growth prospects also depend on management's ability to develop and execute effective business plans to address these strategic priorities, both in the near term and over longer time horizons. Management's effectiveness in this regard will affect JPMorgan Chase's ability to develop and enhance its resources, control expenses and return capital to shareholders. Each of these objectives could be adversely affected by any failure on the part of management to:

- devise effective business plans and strategies
- offer products and services that meet changing expectations of clients and customers
- allocate capital in a manner that promotes long-term stability to enable JPMorgan Chase to build and invest in market-leading businesses, even in a highly stressed environment
- allocate capital appropriately due to imprecise modeling or subjective judgments made in connection with those allocations
- appropriately address shareholder concerns
- react quickly to changes in market conditions or market structures, or
- develop and enhance the operational, technology, risk, financial and managerial resources necessary to grow and manage JPMorgan Chase's businesses.

Additionally, JPMorgan Chase's Board of Directors plays an important role in exercising appropriate oversight of management's significant strategic decisions, and a failure by the Board to perform this function could also impair JPMorgan Chase's results of operations.

JPMorgan Chase faces significant and increasing competition in the rapidly evolving financial services industry.

JPMorgan Chase operates in a highly competitive environment in which it must evolve and adapt to the significant changes as a result of financial regulatory reform, technological advances, increased public scrutiny and current economic conditions. JPMorgan Chase expects that competition in the U.S. and global financial services industry will continue to be intense. Competitors include:

- other banks and financial institutions
- trading, advisory and investment management firms
- finance companies and technology companies, and
- other nonbank firms that are engaged in providing similar products and services.

JPMorgan Chase cannot provide assurance that the significant competition in the financial services industry will not materially and adversely affect its future results of operations.

New competitors in the financial services industry continue to emerge. For example, technological advances and the growth of e-commerce have made it possible for non- depository institutions to offer products and services that traditionally were banking products. These advances have also allowed financial institutions and other companies to provide electronic and internet-based financial solutions, including electronic securities trading, payments processing and online automated algorithmic-based investment advice. Furthermore, both financial institutions and their non-banking competitors face the risk that payments processing and other services could be significantly disrupted by technologies, such as cryptocurrencies, that require no intermediation. New technologies have required and could require JPMorgan Chase to spend more to modify or adapt its products to attract and retain clients and customers or to match products and services offered by its competitors, including technology companies. In addition, new technologies may be used by customers, or breached or infiltrated by third parties, in unexpected ways, which can increase JPMorgan Chase's costs for complying with laws and regulations that apply to the offering of products and services through those technologies and reduce the income that JPMorgan Chase earns from providing products and services through those new technologies.

Ongoing or increased competition may put pressure on the pricing for JPMorgan Chase's products and services or may cause JPMorgan Chase to lose market share, particularly with respect to traditional banking products such as deposits and bank accounts. This competition may be on the basis of quality and variety of products and services offered, transaction execution, innovation, reputation and price. The failure of any of JPMorgan Chase's businesses to meet the expectations of clients and customers, whether due to general market conditions, under-performance, a decision not to offer a particular product or service, changes in client and customer expectations or other factors, could affect JPMorgan Chase's ability to attract or retain clients and customers. Any such impact could, in turn, reduce JPMorgan Chase's revenues. Increased competition also may require JPMorgan Chase to make additional capital investments in its businesses, or to extend more of its capital on behalf of its clients in order to remain competitive.

Climate change could have a material adverse impact on JPMorgan Chase's business operations, clients and customers.

JPMorgan Chase operates in many regions, countries and communities around the world where its businesses, and the activities of its clients and customers, could be disrupted by climate change. Potential physical risks from climate change may include:

- altered distribution and intensity of rainfall

- prolonged droughts or flooding
- increased frequency of wildfires
- rising sea levels
- rising heat index

In addition, these physical changes may prompt changes in regulations or consumer preferences which in turn could have negative consequences for the business models of JPMorgan Chase's clients.

These climate driven changes could have a material adverse impact on asset values and the financial performance of JPMorgan Chase's businesses, and those of its clients and customers.

Conduct

Conduct failure by JPMorgan Chase employees can harm clients and customers, impact market integrity, damage JPMorgan Chase's reputation and trigger litigation and regulatory action.

JPMorgan Chase's employees interact with clients, customers and counterparties, and with each other, every day. All employees are expected to demonstrate values and exhibit the behaviors that are an integral part of JPMorgan Chase's How We Do Business Principles, including JPMorgan Chase's commitment to "do first class business in a first class way." JPMorgan Chase endeavors to embed conduct risk management throughout an employee's life cycle, including recruiting, onboarding, training and development, and performance management. Conduct risk management is also an integral component of JPMorgan Chase's promotion and compensation processes.

Notwithstanding these expectations, policies and practices, certain employees have in the past engaged in improper or illegal conduct, and these instances of misconduct have resulted in litigation as well as resolutions of governmental investigations or enforcement actions involving consent orders, deferred prosecution agreements, non-prosecution agreements and other civil or criminal sanctions. There is no assurance that further inappropriate or unlawful actions by employees will not occur or that any such actions will always be detected, deterred or prevented.

JPMorgan Chase's reputation could be harmed, and collateral consequences could result, from a failure by one or more employees to act consistently with JPMorgan Chase's expectations, policies and practices, including by acting in ways that harm clients, customers, other market participants or other employees. Some examples of this include:

- improperly selling and marketing JPMorgan Chase's products or services
- engaging in insider trading, market manipulation or unauthorized trading
- facilitating illegal or aggressive tax-motivated transactions, or transactions designed to circumvent economic sanction programs
- failing to fulfill fiduciary obligations or other duties owed to clients or customers
- violating anti-trust or anti-competition laws by colluding with other market participants to manipulate markets, prices or indices
- engaging in discriminatory behavior or harassment
- making risk decisions in ways that subordinate JPMorgan Chase's risk appetite to employee compensation objectives, and

- misappropriating property, confidential or proprietary information, or technology assets belonging to JPMorgan Chase, its clients and customers or third parties.

The consequences of any failure by employees to act consistently with JPMorgan Chase's expectations, policies or practices could include litigation, or regulatory or other governmental investigations or enforcement actions. Any of these proceedings or actions could result in judgments, settlements, fines, penalties or other sanctions, or lead to:

- financial losses
- increased operational and compliance costs
- greater scrutiny by regulators and other parties
- regulatory actions that require JPMorgan Chase to restructure, curtail or cease certain of its activities
- the need for significant oversight by JPMorgan Chase's management
- loss of clients or customers, and
- harm to JPMorgan Chase's reputation.

Reputation

Damage to JPMorgan Chase's reputation could harm its businesses.

Maintaining trust in JPMorgan Chase is critical to its ability to attract and retain clients, customers, investors and employees. Damage to JPMorgan Chase's reputation can therefore cause significant harm to JPMorgan Chase's business and prospects. Harm to JPMorgan Chase's reputation can arise from numerous sources, including:

- employee misconduct, including discriminatory behavior or harassment
- security breaches, including cyberattacks
- failure to safeguard client, customer or employee information
- failure to manage environmental, social and sustainability risk issues associated with its business activities or those of its clients
- compliance or operational failures
- litigation or regulatory fines, penalties or other sanctions
- regulatory investigations or enforcement actions, or resolutions of these matters, and
- failure or perceived failure of clients, customers, counterparties or other parties to comply with laws or regulations, including companies in which JPMorgan Chase has made principal investments, parties to joint ventures with JPMorgan Chase, and vendors with which JPMorgan Chase does business.

JPMorgan Chase's reputation may be significantly damaged by adverse publicity or negative information regarding JPMorgan Chase, whether or not true, that may be published or broadcast by the media or posted on social media, non-mainstream news services or other parts of the internet. This latter risk can be magnified by the speed and pervasiveness with which information is disseminated through those channels.

Social and environmental activists are increasingly targeting financial services firms such as JPMorgan Chase with public criticism for their relationships with clients that are engaged in certain sensitive industries, including businesses whose products are or are perceived to be harmful to human health, or whose activities negatively affect or are perceived to negatively affect the environment, workers' rights or communities. Activists have also engaged in public protests at JPMorgan Chase's headquarters and other properties. Activist criticism of JPMorgan Chase's relationships with clients in sensitive industries could potentially engender dissatisfaction among clients, customers, investors and employees with how JPMorgan Chase addresses social and environmental concerns in its business activities. Alternatively, yielding to activism targeted at certain sensitive industries could damage JPMorgan Chase's relationships with clients and customers, and with governmental bodies in jurisdictions in which JPMorgan Chase does business, whose views are not aligned with those of social and environmental activists. In either case, the resulting harm to JPMorgan Chase's reputation could:

- cause certain clients and customers to cease doing business with JPMorgan Chase
- impair JPMorgan Chase's ability to attract new clients and customers, or to expand its relationships with existing clients and customers
- diminish JPMorgan Chase's ability to hire or retain employees, or
- prompt JPMorgan Chase to cease doing business with certain clients or customers.

Actions by the financial services industry generally or individuals in the industry can also affect JPMorgan Chase's reputation. For example, concerns that consumers have been treated unfairly by a financial institution, or that a financial institution has acted inappropriately with respect to the methods used to offer products to customers, can damage the reputation of the industry as a whole. If JPMorgan Chase is perceived to have engaged in these types of behaviors, this could weaken its reputation among clients or customers.

Failure to effectively manage potential conflicts of interest can result in litigation and enforcement actions, as well as damage JPMorgan Chase's reputation.

JPMorgan Chase's ability to manage potential conflicts of interest is highly complex due to the broad range of its business activities which encompass a variety of transactions, obligations and interests with and among JPMorgan Chase's clients and customers. JPMorgan Chase can become subject to litigation and enforcement actions, and its reputation can be damaged, by the failure or perceived failure to:

- adequately address or appropriately disclose conflicts of interest, including potential conflicts of interest that may arise in connection with providing multiple products and services in the same transaction
- deliver appropriate standards of service and quality
- treat clients and customers with the appropriate standard of care
- use client and customer data responsibly and in a manner that meets legal requirements and regulatory expectations

- provide fiduciary products or services in accordance with the applicable legal and regulatory standards, or

- handle or use confidential information of customers or clients appropriately or in compliance with applicable data protection and privacy laws and regulations.

In the future, a failure or perceived failure to appropriately address conflicts of interest or fiduciary obligations could result in customer dissatisfaction, litigation and regulatory fines, penalties or other sanctions, and heightened regulatory scrutiny and enforcement actions, all of which can lead to lost revenue and higher operating costs and cause serious harm to JPMorgan Chase's reputation.

Country

An outbreak of hostilities between countries or within a country or region could have a material adverse effect on the global economy and on JPMorgan Chase's businesses within the affected region or globally.

Aggressive actions by hostile governments or groups, including armed conflict or intensified cyberattacks, could expand in unpredictable ways by drawing in other countries or escalating into full-scale war with potentially catastrophic consequences, particularly if one or more of the combatants possess nuclear weapons. Depending on the scope of the conflict, the hostilities could result in:

- worldwide economic disruption

- heightened volatility in financial markets

- severe declines in asset values, accompanied by widespread sell-offs of investments

- substantial depreciation of local currencies, potentially leading to defaults by borrowers and counterparties in the affected region

- disruption of global trade, and

- diminished consumer, business and investor confidence.

Any of the above consequences could have significant negative effects on JPMorgan Chase's operations and earnings, both in the countries or regions directly affected by the hostilities or globally. Further, if the U.S. were to become directly involved in such a conflict, this could lead to a curtailment of any operations that JPMorgan Chase may have in the affected countries or region, as well as in any nation that is aligned against the U.S. in the hostilities. JPMorgan Chase could also experience more numerous and aggressive cyberattacks launched by or under the sponsorship of one or more of the adversaries in such a conflict.

JPMorgan Chase's business activities with governmental entities can pose an enhanced risk of loss.

Several of JPMorgan Chase's businesses engage in transactions with, or trade in obligations of, governmental entities, including national, state, provincial, municipal and local authorities, both within and outside the U.S. These activities can expose JPMorgan Chase to enhanced sovereign, credit-related, operational and reputation risks, as governmental entities have in the past, and may in the future, taken actions such as:

- defaulting on or restructuring their obligations

- claiming that actions taken by government officials were beyond the legal authority of those officials, or

- repudiating transactions authorized by a previous incumbent government.

Any or all of these actions could adversely affect JPMorgan Chase's financial condition and results of operations and could hurt its reputation, particularly if JPMorgan Chase pursues claims against a government obligor in a jurisdiction in which it has significant business relationships with clients or customers.

JPMorgan Chase's business and revenues in emerging markets can be hampered by local economic, political, regulatory and social factors.

Some of the countries in which JPMorgan Chase conducts business have economies or markets that are less developed and more volatile, and may have legal and regulatory regimes that are less established or predictable, than the U.S. and other developed markets in which JPMorgan Chase operates. Some of these countries have in the past experienced severe economic disruptions, including:

- extreme currency fluctuations

- high inflation

- low or negative growth, and

- defaults or potential defaults on sovereign debt.

The governments in these countries have sometimes reacted to these developments by imposing restrictive policies that adversely affect the local and regional business environment, including:

- price, capital or exchange controls, including imposition of punitive transfer and convertibility restrictions

- expropriation or nationalization of assets or confiscation of property, including intellectual property, and

- changes in laws and regulations.

The impact of these actions could be accentuated in trading markets that are smaller, less liquid and more volatile than more-developed markets. These types of government actions can negatively affect JPMorgan Chase's operations in the relevant country, either directly or by suppressing the business activities of local clients or multi-national clients that conduct business in the jurisdiction. For example, some or all of these governmental actions can result in funds belonging to JPMorgan Chase, or that it places with a local custodian on behalf of a client, being effectively trapped in a country. In addition to the ultimate risk of losing the funds entirely, JPMorgan Chase could be exposed for an extended period of time to the credit risk of a local custodian that is now operating in a deteriorating domestic economy.

In addition, emerging markets countries, as well as certain more developed countries, have been susceptible to unfavorable social developments arising from poor economic conditions and related governmental actions, as well as natural disasters, including:

- social unrest

- general strikes and demonstrations

- crime and corruption

- security and personal safety issues

- outbreaks of hostilities
- overthrow of incumbent governments
- terrorist attacks, and
- other forms of internal discord.

These economic, political, regulatory and social developments have in the past resulted in, and in the future could lead to, conditions that can adversely affect JPMorgan Chase's operations in those countries and impair the revenues, growth and profitability of those operations. In addition, any of these events or circumstances in one country can affect JPMorgan Chase's operations and investments in another country or countries, including in the U.S.

People

JPMorgan Chase's ability to attract and retain qualified employees is critical to its success.

JPMorgan Chase's employees are its most important resource, and in many areas of the financial services industry, competition for qualified personnel is intense. JPMorgan Chase endeavors to attract talented and diverse new employees and retain and motivate its existing employees. If JPMorgan Chase were unable to continue to attract or retain qualified employees, including successors to the Chief Executive Officer or members of the Operating Committee, JPMorgan Chase's performance, including its competitive position, could be materially and adversely affected.

Unfavorable changes in immigration policies could adversely affect the quality of JPMorgan Chase's businesses and operations.

JPMorgan Chase relies on the skills, knowledge and expertise of employees located throughout the world. Changes in immigration policies in the U.S. and other countries that unduly restrict or otherwise make it more difficult for employees or their family members to work in, or transfer among, jurisdictions in which JPMorgan Chase has operations or conducts its business could inhibit JPMorgan Chase's ability to attract and retain qualified employees, and thereby dilute the quality of its workforce, or could prompt JPMorgan Chase to make structural changes to its worldwide operating model that are less efficient or more costly.

Legal

JPMorgan Chase faces significant legal risks from private actions and formal and informal regulatory and government investigations.

JPMorgan Chase is named as a defendant or is otherwise involved in many legal proceedings, including class actions and other litigation or disputes with third parties. Actions currently pending against JPMorgan Chase may result in judgments, settlements, fines, penalties or other sanctions adverse to JPMorgan Chase. Any of these matters could materially and adversely affect JPMorgan Chase's business, financial condition or results of operations, or cause serious reputational harm. As a participant in the financial services industry, it is likely that JPMorgan Chase will continue to experience a high level of litigation and regulatory and government investigations related to its businesses and operations.

Regulators and other government agencies conduct examinations of JPMorgan Chase and its subsidiaries both on a routine basis and in targeted exams, and JPMorgan Chase's businesses and operations are subject to heightened regulatory oversight. This heightened regulatory scrutiny, or the results of such an investigation or examination, may lead to additional regulatory investigations or enforcement actions. There is no assurance that those actions will not result in resolutions or other enforcement actions against JPMorgan Chase. Furthermore, a single event involving a potential violation of law or regulation may give rise to numerous and overlapping investigations and proceedings, either by multiple federal, state or local agencies and officials in the U.S. or, in some instances, regulators and other governmental officials in non-U.S. jurisdictions.

If another financial institution violates a law or regulation relating to a particular business activity or practice, this will often give rise to an investigation by regulators and other governmental agencies of the same or similar activity or practice by JPMorgan Chase.

These and other initiatives by U.S. and non-U.S. governmental authorities may subject JPMorgan Chase to judgments, settlements, fines, penalties or other sanctions, and may require JPMorgan Chase to restructure its operations and activities or to cease offering certain products or services. All of these potential outcomes could harm JPMorgan Chase's reputation or lead to higher operational costs, thereby reducing JPMorgan Chase's profitability, or result in collateral consequences. In addition, the extent of JPMorgan Chase's exposure to legal and regulatory matters can be unpredictable and could, in some cases, exceed the amount of reserves that JPMorgan Chase has established for those matters.

JPMorgan Chase Bank, N.A. is affected by the risks that affects its parent company.

JPMorgan Chase Bank, N.A. and its subsidiaries are also subject to each of the risks above, in addition to further risks. Risks that affect JPMorgan Chase can also affect JPMorgan Chase Bank, N.A. as there is substantial overlap in the businesses of JPMorgan Chase Bank, N.A. and JPMorgan Chase. Further, JPMorgan Chase Bank, N.A. can be negatively affected by risks and other events affecting JPMorgan Chase even where JPMorgan Chase Bank, N.A. is not directly affected. For example, where JPMorgan Chase's reputation is damaged, JPMorgan Chase Bank, N.A.'s reputation would likely also be damaged which could negatively affect JPMorgan Chase Bank, N.A.

TAXATION

We have based this summary of Hong Kong, The Netherlands and United States tax on current law and practice. It is intended to give potential investors an overview of what Hong Kong, The Netherlands and United States tax they might have to pay if they hold our structured products. It is not complete and we are not giving any tax advice. Any potential investors should consult their own tax adviser for more information about the tax consequences of acquiring, owning and disposing of the structured products in their particular circumstances, particularly if they are subject to special tax rules (for example, if they are a bank, dealer, insurance company or a tax-exempt entity). This summary assumes that each transaction with respect to the structured products is at arm's length.

HONG KONG

Withholding Tax

We are not required under current law to make any withholding on account of Hong Kong tax from payments in respect of our structured products.

Capital Gains Tax

No tax is payable in Hong Kong on any capital gains arising from a sale or disposal of our structured products.

Profits Tax

Hong Kong profits tax may be chargeable on any gains arising from a sale or disposal of our structured products where the sale or disposal is or forms part of a trade, profession or business carried on in Hong Kong and the gains are of a Hong Kong source.

Stamp Duty

Our cash-settled structured products are not subject to Hong Kong stamp duty either when issued or on any subsequent transfer.

THE NETHERLANDS TAXATION

*The following discussion is a summary of certain material Dutch tax considerations relating to structured products issued by J.P. Morgan Structured Products B.V. ("**JPMSP**") held by a holder of structured products (a "**Holder**") who is not a resident of The Netherlands, including where those structured products are held through a paying agent or custodian located in The Netherlands.*

This summary is based on the laws and practice in force as of the date of this base listing document and is subject to any changes in law and the interpretation and application thereof, which changes could be made with retroactive effect. This summary does not purport to be a comprehensive description of all the tax considerations that may be relevant to a decision to acquire, hold or dispose of a structured product, and does not purport to deal with the tax consequences applicable to all categories of investors, some of which may be subject to special rules. This summary does not address the Dutch tax consequences for a Holder who holds a controlling interest in JPMSP. Generally, a Holder will have a controlling interest in JPMSP if such Holder, whether alone or together with related parties or as part of a collaborating group, holds an interest that allows such Holder to exercise control over JPMSP's activities.

For the purpose of the paragraph "Taxes on Income and Capital Gains" below it is assumed that no Holder, being an individual or a non-resident entity, has or will have a substantial interest *(aanmerkelijk belang)*, or – in the case of a Holder being an entity – a deemed substantial interest, in JPMSP and that no connected person (*verbonden persoon*) to the Holder has or will have a substantial interest in JPMSP.

With respect to structured products for which it is specified that physical delivery of shares of a company is applicable, it is furthermore assumed that where such company is a Dutch resident company no Holder being a non-resident individual or entity has or will have a substantial interest *(aanmerkelijk belang)* or a deemed substantial interest in such company and that no connected person *(verbonden persoon)* to such Holder being an individual has or will have a substantial interest in such company.

Generally speaking, an individual has a substantial interest (*aanmerkelijk belang*) in a company if (a) such individual, either alone or together with his partner, directly or indirectly has, or is deemed to have or (b) certain relatives of such individual or his partner directly or indirectly have or are deemed to have (i) the ownership of, a right to acquire the ownership of, or certain rights over, shares representing 5 per cent. or more of either the total issued and outstanding capital of the company or the issued and outstanding capital of any class of shares of the company, or (ii) the ownership of, or certain rights over, profit participating certificates (*winstbewijzen*) that relate to 5 per cent. or more of either the annual profit or the liquidation proceeds of the company.

Generally speaking, a non-resident entity has a substantial interest (*aanmerkelijk belang*) in a company if such entity, directly or indirectly has (i) the ownership of, a right to acquire the ownership of, or certain rights over, shares representing 5 per cent. or more of either the total issued and outstanding capital of the company or the issued and outstanding capital of any class of shares of the company, or (ii) the ownership of, or certain rights over, profit participating certificates (*winstbewijzen*) that relate to 5 per cent. or more of either the annual profit or the liquidation proceeds of the company. An entity has a deemed substantial interest in a company if such entity has disposed of or is deemed to have disposed of all or part of a substantial interest on a non-recognition basis.

For the purpose of this summary, the term "entity" means a corporation as well as any other person that is taxable as a corporation for Dutch corporate tax purposes.

Where this summary refers to a Holder of a structured product, an individual holding a structured product or an entity holding a structured product, such reference is restricted to an individual or entity holding legal title to as well as an economic interest in such structured product or otherwise being regarded as owning a structured product for Dutch tax purposes. It is noted that for purposes of Dutch income, corporate, gift and inheritance tax, assets legally owned by a third party such as a trustee, foundation or similar entity, may be treated as assets owned by the (deemed) settlor, grantor or similar originator or the beneficiaries in proportion to their interest in such arrangement.

Where the summary refers to "The Netherlands" or "Dutch", it refers only to the European part of the Kingdom of the Netherlands.

This summary does not address the tax consequences of any Holder of structured products who is a resident of any non-European part of the Kingdom of the Netherlands.

Withholding Tax

All payments made by JPMSP under the structured products can be made free of withholding or deduction of any taxes of whatsoever nature imposed, levied, withheld or assessed by The Netherlands or any political subdivision or taxing authority thereof or therein, unless the structured products qualify as debt that effectively functions as equity for purposes of article 10, paragraph 1, sub-paragraph (d) of the Corporate Tax Act (*Wet op de vennootschapsbelasting 1969*) or represent, are linked (to the performance of) or are convertible (in part or in whole) into (rights to purchase) (a) shares; (b) profit certificates (*winstbewijzen*); and/or (c) debt instruments having a maturity legally or de facto of more than 50 years, in each case issued by JPMSP or any other entity related to JPMSP. According to Supreme Court case law, the structured products effectively function as equity if (a) the structured products are subordinated to all other non-subordinated creditors of JPMSP, (b) the structured products do not have a fixed maturity or have a maturity of more than 50 years, and (c) payments under the structured products are entirely or almost entirely dependent on JPMSP's profits.

Taxes on Income and Capital Gains

A Holder who is not, and is not deemed to be resident in The Netherlands for the relevant tax purposes will not be subject to taxation on income or a capital gain derived from a structured product unless:

(i) the income or capital gain is attributable to an enterprise or part thereof which is either effectively managed in The Netherlands or carried on, in whole or in part, through a permanent establishment (*vaste inrichting*) or a permanent representative (*vaste vertegenwoordiger*) in The Netherlands; or

(ii) the Holder is an individual and the income or capital gain qualifies as income from miscellaneous activities (*belastbaar resultaat uit overige werkzaamheden*) in The Netherlands as defined in the Income Tax Act 2001 (*Wet inkomstenbelasting 2001*), including, without limitation, activities that exceed normal, active asset management (*normaal, actief vermogensbeheer*).

Stamp/Transfer Taxes

The subscription, issue, placement, allotment, delivery or transfer of a structured product will not be subject to stamp tax, transfer tax or any other similar tax or duty payable in The Netherlands.

Gift and Inheritance Taxes

Dutch gift or inheritance taxes will not be levied on the occasion of the transfer of a structured product by way of gift by, or on the death of, a Holder, unless:

(i) the Holder is, or is deemed to be, resident in The Netherlands for the purpose of the relevant provisions; or

(ii) in the case of a gift of structured products by an individual who at the date of the gift was neither resident nor deemed to be resident in The Netherlands, such individual dies within 180 days after the date of the gift, while being resident or deemed to be resident in The Netherlands.

For purposes of Dutch gift and inheritance tax, an individual with Dutch nationality will be deemed to be resident in The Netherlands if he has been resident in The Netherlands at any time during the ten years preceding the date of the gift or his death.

For purposes of Dutch gift tax, an individual not holding Dutch nationality will be deemed to be resident in The Netherlands if he has been resident in The Netherlands at any time during the twelve months preceding the date of the gift.

For purposes of Dutch gift and inheritance tax, a gift that is made under a condition precedent is deemed to have been made at the moment such condition precedent is satisfied. If the condition precedent is fulfilled after the death of the donor, the gift is deemed to be made upon the death of the donor.

Exchange of information

On 9 December 2014, the Council of the European Union adopted a Directive (EC Council Directive 2014/107/EU amending EU Council Directive 2011/16/EU) on the mandatory automatic exchange of information to implement the OECD measures known as the "**Common Reporting Standard**". Member States were required to implement this Directive in respect of taxable periods from 1 January 2016 and to begin exchanging information pursuant to such Directive no later than 30 September 2017.

In accordance with the Common Reporting Standard, The Netherlands will provide to the tax authorities of another EU Member State (and certain non-EU countries and associated territories specified in said directive) details of payments of interest or other similar income paid by a person within The Netherlands to, or collected by such a person for, an individual resident in such other state.

UNITED STATES OF AMERICA

Section 871(m)

Under Section 871(m) of the Code, enacted under the United States Hiring Incentives to Restore Employment Act of 2010, a "**dividend equivalent**" payment generally is treated as a dividend from sources within the United States and such payments generally would be subject to a 30 per cent. United States withholding tax if paid to a Non-U.S. Holder (as defined below). Under recently promulgated U.S. Treasury regulations and related official guidance issued pursuant to Section 871(m) of the Code, payments (including deemed payments) with respect to certain financial instruments linked to U.S. equities or indices that include U.S. equities may be treated as dividend equivalents. Section 871(m) provides certain exceptions to this withholding regime, including for instruments linked to certain broad-based indices that meet requirements set forth in the applicable U.S. Treasury regulations. Additionally, the applicable regulations and guidance exclude from the scope of Section 871(m) instruments issued before 1 January 2023 that do not have a delta of one with respect to underlying securities that could pay U.S.-source dividends for U.S. federal income tax purposes (each an "**Underlying Security**"). However, it is possible that the structured products could be treated as deemed reissued for U.S. federal income tax purposes upon the occurrence of certain events affecting the Underlying Security or the structured products, and following such occurrence, the structured products could then be subject to withholding on dividend equivalent payments. The regulations provide that the delta of an instrument is the ratio of the change in fair market value of the instrument to the change in the fair market value of the property referenced by the instrument. The regulations and guidance are extremely complex, and significant aspects of their application to the structured products are uncertain. In addition, their application may depend on your particular circumstances, including whether you enter into other transactions with respect to an Underlying Security. Holders are urged to consult with their own tax advisors regarding the possible implications of these regulations and guidance on their investment in the structured products.

If any payments are treated as dividend equivalents subject to withholding, we (or any applicable withholding agent) would be entitled to withhold taxes without being required to pay any additional amounts with respect to amounts so withheld.

The Foreign Account Tax Compliance Act

The Foreign Account Tax Compliance Act ("**FATCA**") (Sections 1471 through 1474 of the Code) generally imposes a 30 per cent. United States withholding tax on certain United States source payments, including interest (and original issue discount), dividends (and "**dividend equivalent**" payments), or other fixed or determinable annual or periodical gain, profits, and income, and on the gross proceeds from a disposition (subject to the discussions below relating to the Proposed Regulations) of property of a type which can produce United States source interest or dividends ("**Withholdable Payments**"), if paid to a foreign financial institution (including amounts paid to a foreign financial institution on behalf of a holder), unless such institution enters into an agreement with the U.S. Treasury to collect and provide to the U.S. Treasury substantial information regarding United States account holders (including certain account holders that are foreign entities with United States owners) with such institution, or such institution otherwise complies with its obligations under FATCA. A structured product may constitute an account for these purposes. FATCA also generally imposes a withholding tax of 30 per cent. on Withholdable Payments made to a nonfinancial foreign entity unless such entity provides the withholding agent with a certification that it does not have any substantial United States owners or a certification identifying the direct and indirect substantial United States owners of the entity, or otherwise establishes an exemption. Under certain circumstances, a holder may be eligible for refunds or credits of such taxes.

The U.S. Treasury Department and the U.S. Internal Revenue Service have announced that FATCA withholding on payments of gross proceeds from the sale or disposition of a structured product will only apply to payments made after 31 December 2018. However, recently proposed regulations (which have not yet been finalized) (the "**Proposed Regulations**") have eliminated this withholding requirement. Taxpayers are permitted to rely on the Proposed Regulations until final regulations are issued; however, final regulations could reinstate this withholding obligation (or otherwise modify the Proposed Regulations) at any time, possibly with retroactive effect.

In addition, under FATCA, "**passthru payments**" made by a foreign financial institution to "**recalcitrant holders**" or noncompliant foreign financial institutions are subject to a 30 per cent. United States withholding tax. A "**recalcitrant holder**" generally is a holder of an account with a foreign financial institution that fails to comply with certain requests for information that will help enable the relevant foreign financial institution to comply with its obligations under FATCA (a structured product may constitute an account for these purposes). Pursuant to U.S. Treasury regulations, a passthru payment is any Withholdable Payment and any "**foreign passthru payment**", which has yet to be defined. This withholding tax, however, will not be imposed on payments that are treated as Withholdable Payments for FATCA purposes solely because such payments are treated as "dividend equivalent" payments under Section 871(m) of the Code, if the obligations giving rise to such payments are executed on or before the date that is six months after the date on which such obligations are first treated as giving rise to "dividend equivalent" payments.

Under the current U.S. Treasury regulations and related official guidance issued by the U.S. Internal Revenue Service, the 30 per cent. United States withholding tax on "**recalcitrant holders**" or noncompliant foreign financial institutions generally may be imposed on "**foreign passthru payments**" made by us with respect to the structured products after the date of publication in the U.S. Federal Register of final regulations defining the term "**foreign passthru payment.**" However, payments on an obligation will not be treated as "**foreign passthru payments**" if such obligation is executed on or before the date that is six months after the date on which final regulations defining the term "**foreign passthru payment**" are filed with the U.S. Federal Register.

Under the Proposed Regulations, withholding on foreign passthru payments would not be required with respect to payments made before the date that is two years after the date of publication in the U.S. Federal Register of final regulations defining the term "foreign passthru payment". Taxpayers are permitted to rely on the Proposed Regulations until final regulations are issued; however, final regulations could reinstate these withholding obligations (or otherwise modify the Proposed Regulations) at any time, possibly with retroactive effect.

If we determine that withholding is appropriate with respect to the structured products, we (or an applicable withholding agent) will withhold tax at the applicable statutory rate without being required to pay any additional amounts with respect to amounts so withheld.

Foreign financial institutions and nonfinancial foreign entities located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules. Holders are urged to consult with their own tax advisors regarding the possible implications of FATCA on their investment in the structured products.

The above summary only applies to you if you are a Non-U.S. Holder. You are a Non-U.S. Holder unless you are: (1) an individual citizen or resident of the United States; (2) a corporation, partnership or other entity (excluding a trust) that is formed or organised under the laws of the United States or any political subdivision of the United States (or is taxable as an entity so formed or organised); (3) an estate, the income of which is subject to U.S. federal income taxation regardless of its source; (4) a trust that is subject to the jurisdiction of a U.S. court and for which one or more "**United States persons**" (as defined in the Code) control all of the substantial decisions, or has otherwise made an appropriate election under the U.S. tax regulations.

GENERAL INFORMATION ABOUT US

History, Development and Organisational Structure

J.P. Morgan Structured Products B.V. (JPMSP) was incorporated as a private limited liability company (*besloten vennootschap met beperkte aansprakelijkheid*) in Amsterdam, The Netherlands, on 6 November 2006 to exist for an unlimited duration. JPMSP mainly operates under the Dutch Civil Code *(Burgerlijk Wetboek)* and the Dutch Financial Supervision Act *(Wet op het financieel toezicht)* JPMSP was and remains registered at the Chamber of Commerce of Amsterdam under registered number 34259454 and has its registered offices at Luna ArenA, Herikerbergweg 238, 1101 CM Amsterdam, The Netherlands (telephone number +31 20 575 5600).

JPMSP is an indirect, wholly-owned subsidiary of JPMorgan Chase Bank, N.A. JPMorgan Chase Bank, N.A. is one of the principal bank subsidiaries of JPMorgan Chase & Co., a company incorporated in the State of Delaware in the United States of America.

Investment Policy

JPMSP may undertake independent investments in its sole discretion with the proceeds (net of third party costs) of an issuance of notes, warrants or certificates, subject to compliance with certain legal, tax and regulatory restrictions.

Principal Activities

JPMSP's business principally consists of the issuance of securitised derivatives comprising notes, warrants and certificates, including equity-linked, reverse convertible and market participation notes (together, and for the purposes of this section only, the "**Securities**") and the subsequent hedging of those risk positions. All issuances which have been closed to date are subject to hedging arrangements. The proceeds of the sale of the Securities are used for general corporate purposes, including the entry into hedging arrangements with other J.P. Morgan affiliates. JPMSP anticipates that the hedging arrangements will be sufficient to hedge itself against the market risk of its securities issuance activities. JPMSP also has receipts from and makes payments to other J.P. Morgan affiliates.

It is anticipated that JPMSP will, for each issuance, enter into hedging arrangements with other J.P. Morgan affiliates, and that such arrangements will be sufficient to hedge its market risk for each such issuance. Accordingly, the ability of JPMSP to perform its obligations under the Securities may be affected by any inability or failure to perform, pursuant to its hedging arrangements, by such other J.P. Morgan affiliate.

Principal Markets

During the financial year ended 31 December 2019, JPMSP issued Securities in the Asia Pacific region, Europe, the Middle East, Africa, Latin America and the United States of America.

Trend Information

JPMSP's primary objective in 2020 will be the continued development of securitised products to be offered and sold to retail, "**high net worth**" and institutional investors principally outside of the United States of America, linked to a range of underlying reference assets including equity, credit, interest rates, commodities and so called "**alternatives**" such as funds and hedge funds.

Directors and Officers

The administrative, management and supervisory bodies of JPMSP comprise its Board of Directors. Set forth below are the names and positions of JPMSP's Directors:

Name	Function	Business address
Wolbert Hinrik Kamphuijs	Managing Director	Luna ArenA, Herikerbergweg 238, 1101 CM Amsterdam, The Netherlands
Nicholas Jonathan Dargan	Managing Director	26/F Chater House, 8 Connaught Road Central, Hong Kong
Marleen Frederika Carola van der Werff	Managing Director	Luna ArenA, Herikerbergweg 238, 1101 CM Amsterdam, The Netherlands
Jozef Cornelis Petrus van Uffelen	Managing Director	Luna ArenA, Herikerbergweg 238, 1101 CM Amsterdam, The Netherlands
Sim Ee Cheah	Managing Director	25/F Chater House, 8 Connaught Road Central, Hong Kong

The principal outside activities of Mr. Kamphuijs, Mrs. van der Werff and Mr. van Uffelen are as employees of TMF Netherlands B.V., a trust company which was established in The Netherlands in 1970. Mr. Dargan is a Managing Director of the Investment Bank division at JPMorgan Chase and there are no principal outside activities performed by Mr. Dargan which are significant to JPMSP as Issuer. Ms. Cheah is an Executive Director at the Investment Bank division at JPMorgan Chase and there are no principal outside activities performed by Ms. Cheah which are significant to JPMSP as Issuer. All Directors hold office until removed.

Subject in the case of Mr. Kamphuijs, Mrs. van der Werff and Mr. van Uffelen to their duties to TMF Netherlands B.V., there are no material potential conflicts of interest between any duties owed to JPMSP by the Directors of JPMSP identified above and their private interests and/or outside duties.

Corporate Governance

JPMSP complies with established and accepted principles of corporate governance in The Netherlands. The Board of Directors of JPMSP conducts itself in accordance with general principles of Dutch corporate law.

The Board of Directors has appointed a committee to authorise and transact issuances of Securities. No other committees made up for specific purposes or to perform specific functions have been appointed.

Capital Structure

The authorised share capital of JPMSP is euro 90,000, divided into 90,000 ordinary shares of euro 1.00 each. At incorporation 18,000 ordinary shares were issued. By a notarial deed of share issuance dated 30 March 2007 an additional 2,000 ordinary shares were issued in consideration of U.S.$500,000,000. The total issued and fully paid up share capital therefore amounts to 20,000 ordinary shares. JPMSP does not hold any of its own shares.

Memorandum and Articles of Association

JPMSP's objects as set out in Article 3 of its Articles of Association are:

(a) to incorporate, to participate in any way whatsoever, to manage, to supervise, to operate and to promote enterprises, businesses and companies;

(b) to finance businesses and companies;

(c) to borrow, to lend and to raise funds, including the issue of bonds, promissory notes or other securities or evidence of indebtedness as well as to enter into agreements in connection with the aforementioned;

(d) to enter into swaps and any other derivative transactions whatsoever to hedge the company's exposure under any agreements, securities or other instruments whatsoever to which it is a party;

(e) to supply advice and to render services to enterprises and companies with which the company forms a group and to third parties;

(f) to render guarantees, to bind the company and to pledge its assets for obligations of the companies and enterprises with which it forms a group and on behalf of third parties;

(g) to obtain, alienate, manage and exploit registered property and items of property in general;

(h) to trade in currencies, securities and items of property in general;

(i) to develop and trade in patent, trademarks, licences, knowhow and other intellectual and industrial property-rights; and

(j) to perform any and all activity of industrial, financial or commercial nature, as well as everything pertaining to the foregoing, relating thereto or conducive thereto, all in the widest sense of the word.

Principal Establishments and Real Estate owned

JPMSP does not own any principal establishments, which account for more than 10 per cent. (ten per cent.) of its revenues, nor does JPMSP own any real estate directly.

Dividends

JPMSP has not paid any dividends since its incorporation on 6 November 2006.

J.P. MORGAN STRUCTURED PRODUCTS B.V.
Amsterdam, the Netherlands

(Chamber of Commerce Number: 34259454)

Financial statements for the six month period ended 30 June 2019

J.P. MORGAN STRUCTURED PRODUCTS B.V.
Interim report for the six month period ended 30 June 2018

Contents **Page**

J.P. MORGAN STRUCTURED PRODUCTS BV
Directors' report

The directors present their report and the interim financial statements of J.P. Morgan Structured Products B.V. (the "Company") for the six month period ended 30 June 2019.

Principal activity

The Company's primary activity is the management and issuance of structured products comprising certificates, warrants and other market participation notes, and the subsequent hedging ("hedge","hedging") of these positions.

Review of business

During the year, the Company continued to issue structured products. The proceeds from the sale of the structured products were used to fund the activities of other JPMorgan Chase & Co. (together with its subsidiaries "Firm" or "JPMorgan Chase") undertakings through certain economic hedging arrangements. The principal purpose of these hedging arrangements is to hedge against various risks associated with the issuance activity. During the period, the Company issued structured products in the Asia Pacific region, Europe, the Middle East, Africa, Latin America and the United States of America, issued to private investors or listed on exchanges.

The Company's ultimate controlling entity is JPMorgan Chase & Co.

Key performance indicators ("KPI")

As the Company is managed as part of the Corporate Investment Bank of JPMorgan Chase there are no KPI's that are specific to the Company. The results are monitored against expectations of the business activities. A more detailed description of the Firm's key performance indicators may be found within the JPMorgan Chase & Co. 2018 Annual Report.

Business environment, strategy and future outlook

The primary objective of the Company is the continued development of structured products to be offered and sold to retail, 'high net worth' and institutional investors principally outside of the United States of America, linked to a range of underlying reference assets including equity, credit, interest rates, commodities and so called 'alternatives' such as funds and hedge funds.

Principal risks and uncertainties

The Company's issuance activities expose it to financial and operational risks, which are managed by the Board of Directors, using the Firm's risk management framework. The Board of Directors monitors the Company's financial and operational risks and has responsibility for ensuring effective risk management and control. Further details on the financial risks of the Company are set out in note 18 to the financial statements.

Results and dividends

The results for the period are set out on page 5 and show the Company's profit for the period after taxation is $8.7 million (2018: $2.1 million).

No dividend was paid or proposed during the period (2018: nil).

Events after the reporting period

The Directors are not aware of any events or circumstances which have taken place after 30 June 2019 but before these financial statements have been approved for issue, that could materially affect the financial position or results of the Company and which would require specific disclosure in these financial statements.

Directors

The directors of the Company who served during the period and up to the date of signing the financial statements were as follows:

J.C.P. van Uffelen	(Appointed 6 March 2007)
D.R. Hansson	(Appointed 5 August 2010) (Resigned 29 July 2019)
W.H. Kamphuijs	(Appointed 1 September 2014)
M.F.C van der Werff	(Appointed 20 March 2018)
Sim Ee Cheah	(Appointed 13 December 2018)
N. Dargan	(Appointed 29 July 2019)

Composition of the Board

The size and composition of the Board of Managing Directors and the combined experience and expertise should reflect the best fit for profile and strategy of the Company. With effect from the 20 March 2018, the Company complies with the gender diversity goals set out in article 2:276 section 2 of the Dutch Civil Code.

Creditor payment policy

All invoices from suppliers are settled on the Company's behalf by an affiliated JPMorgan Chase company, JPMorgan Chase Bank, N.A.

JPMorgan Chase Bank, N.A.'s policy is to pay invoices (including those in respect of the Company) upon presentation, except where other arrangements have been negotiated with the supplier. It is the policy of the Company to abide by the terms of payment, provided the supplier performs according to the terms of the contract.

Registered address

Herikerbergweg 238
Luna ArenA, 1101CM
Amsterdam

Expected developments of the Company

The directors of the Company expect:

a) that the Company will continue to issue structured products;
b) that the Company will not enter into fixed asset investments; and
c) that the interest income will continue to fluctuate in line with the development in market interest rates.

Statement under Transparency Directive (as implemented in Dutch law)

The directors confirm to the best of their knowledge that:

a) the attached financial statements are prepared in accordance with International Financial Reporting Standards ("IFRS") as endorsed by the European Union and give a true and fair view of the assets, liabilities, financial position and profit of the Company for the period ended 30 June 2019, and
b) the interim report for the period ended 30 June 2019, consisting of the directors report and the financial statements, gives a true and fair view of the position as per the balance sheet date 30 June 2019.

The directors further herewith report their arrangements for an audit committee (the "Audit Committee") as follows:

Audit Committee

The Company makes use of the exemption to the requirement to establish its own Audit Committee based on Article 3a of the Royal Decree of 26 July 2008 implementing article 41 of the EU Directive 2006/43EG, as the Audit Committee of JPMorgan Chase & Co. fulfils the requirements at group level. Audit Committee of JPMorgan Chase & Co. covers the Firm, including the Company and is formed of entirely non-management, independent directors in compliance with the recommendations from the EU Commission. Details of the Charter, Membership, Duties and Responsibilities can be found on the Firm's website.

The financial statements on pages 4 to 30 were approved by the Board of Directors on 18 September 2019 and signed on its behalf by:

W.H. Kamphuijs

J.C.P. van Uffelen

Date:

J.P. MORGAN STRUCTURED PRODUCTS B.V.
Balance sheet

	Notes	Unaudited 30 June 2019 $'000	31 December 2018 $'000
Assets			
Non-current assets			
Trade and other receivables	8	2,700,000	3,300,000
Current assets			
Financial assets held at fair value through profit and loss	7	24,951,865	20,591,955
Trade and other receivables	8	150,979	122,977
Cash and cash equivalents	9	5,244,233	2,803,719
Total assets		**33,047,077**	**26,818,651**
Liabilities			
Current liabilities			
Financial liabilities designated at fair value through profit or loss	10	20,742,413	17,420,872
Financial liabilities held at fair value through profit and loss	11	4,209,452	3,171,083
Trade and other payables	13	7,505,857	5,664,636
Current tax liabilities		3,011	1,050
Bank overdraft	9	37,393	20,728
Total liabilities		**32,498,126**	**26,278,369**
Equity			
Capital and reserves attributable to equity shareholders of the Company			
Share capital	14	26	26
Share premium reserve		499,997	499,997
Legal reserve		2	2
Retained earnings		48,926	40,257
Total equity		**548,951**	**540,282**
Total liabilities and equity		**33,047,077**	**26,818,651**

Chamber of Commerce Number: 34259454

The notes on pages 8 - 30 form an integral part of the financial statements.

J.P. MORGAN STRUCTURED PRODUCTS B.V.
Income statement (unaudited)

Six month period ended	Notes	Unaudited 30 June 2019 $'000	Unaudited 30 June 2018 $'000
Fee and commission income	15	5,580	5,283
Fee and commission expense	15	(4,529)	(4,428)
Administrative expense		(805)	(481)
Net foreign exchange (loss)/gain		(9)	83
Operating profit		**237**	**457**
Net interest income	16	11,276	2,356
Profit before income tax		**11,513**	**2,813**
Income tax expense	17	(2,844)	(754)
Profit for the period attributable to equity shareholders of the Company		**8,669**	**2,059**

The profit for the period resulted from continuing operations.

There were no items of other comprehensive income or expense therefore no statement of comprehensive income has been separately presented.

The notes on pages 8 - 30 form an integral part of the financial statements.

J.P. MORGAN STRUCTURED PRODUCTS B.V.
Statement of changes in equity (unaudited)

	Share capital	Share premium reserve	Legal reserve	Retained earnings	Total equity
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
Balance at 1 January 2018	**26**	**499,997**	**2**	**34,841**	**534,866**
Profit for the period	—	—	—	2,059	2,059
Balance as at 30 June 2018	**26**	**499,997**	**2**	**36,900**	**536,925**
Balance as at 1 January 2019	**26**	**499,997**	**2**	**40,257**	**540,282**
Profit for the period	—	—	—	8,669	8,669
Balance as at 30 June 2019	**26**	**499,997**	**2**	**48,926**	**548,951**

The notes on pages 8 - 30 form an integral part of the financial statements.

J.P. MORGAN STRUCTURED PRODUCTS B.V.
Statement of cash flows (unaudited)

	Notes	Unaudited 30 June 2019 $'000	Unaudited 30 June 2018 $'000
Cash flow from operating activities			
Profit before income tax		**11,513**	**2,813**
Income tax paid		(882)	(1,422)
Net interest income	16	(11,276)	(2,356)
Net foreign exchange loss/(gain)		9	(83)
		(636)	**(1,048)**
Changes in working capital			
(Increase)/decrease in financial assets held at fair value through profit and loss		(4,359,910)	4,152,641
Decrease/(increase) in trade and other receivables		571,999	(162,566)
Increase/(decrease) in financial liabilities held at fair value through profit and loss		1,038,369	(4,019,595)
Increase/(decrease) in financial liabilities designated at fair value through profit or loss		3,321,540	(133,046)
Increase in trade and other payables		1,841,220	1,298,905
Net cash from operating activities		**2,412,582**	**1,135,291**
Cash flow from investing activities			
Net interest income	16	11,276	2,356
Net cash from investing activities		**11,276**	**2,356**
Net increase in cash and cash equivalents		**2,423,858**	**1,137,647**
Net cash and cash equivalents at the beginning of the period		**2,782,991**	**6,196,099**
Effect of exchange rate changes on cash and cash equivalents		(9)	83
Net cash and cash equivalents at the end of the period	9	**5,206,840**	**7,333,829**

The notes on pages 8 - 30 form an integral part of the financial statements.

1. General information

J.P. Morgan Structured Products B.V. (the "Company") was incorporated on 6 November 2006 as a private company with limited liability and is incorporated and domiciled in The Netherlands, with registration number 34259454. The address of the registered office is at Herikerbergweg 238, Luna ArenA, 1101CM, Amsterdam, The Netherlands. The company's immediate parent undertaking is J.P. Morgan International Finance Limited which is incorporated in the state of Delaware in the United States of America. The company's ultimate parent undertaking of the largest group in which the results of the Company are consolidated is J.P. Morgan Chase & Co. (together with its subsidiaries, the "Firm" or "JPMorgan Chase"), which is also incorporated in the state of Delaware in the United States of America. The parent undertaking of the smallest group in which the Company's results are consolidated is J.P. Morgan International Finance Limited. The largest and the smallest group's consolidated financial statements can be obtained from 25 Bank Street, Canary Wharf, London E14 5JP, England.

The Company's main activity is the issuance of structured products comprising certificates, warrants and market participation notes, and the subsequent hedging ("hedge", "hedging") of the risk associated with these notes through hedging with other JPMorgan Chase companies. The valuation of a structured product will have no impact on the income statement, capital or net assets; as a change in valuation of a structured product will have an equal offsetting change in the value of the hedging transaction with other JPMorgan Chase undertakings.

These financial statements reflect the operations of the Company during the period from 1 January 2019 to 30 June 2019 and have been approved for issue by the Board of Directors on 18 September 2019.

2.1 Accounting convention

The principal accounting policies applied in the preparation of these financial statements are set out below. These policies have been applied consistently to all the interim periods presented, unless otherwise stated, and the financial statements have been prepared on a going concern basis.

These condensed interim financial statements for the six months ended 30 June 2019 have been prepared in accordance with IAS 34, 'Interim financial reporting', as adopted by the European Union and in accordance with Book 2, Title 9 of the Dutch Civil Code. The condensed interim financial statements should be read in conjunction with the annual financial statements for the year ended 31 December 2018, which have been prepared in accordance with IFRSs as adopted by the European Union. The financial statements have been prepared under the historical cost convention as modified by the revaluation of certain financial assets and financial liabilities measured at fair value through profit or loss.

The preparation of the financial statements in conformity with IFRS required the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the Company's accounting policies. The areas involving a higher degree of judgement or complexity, or areas where assumptions and estimates are significant to the financial statements are disclosed in note 5. Reclassification of and adjustments to prior year amounts have been made to conform with current year presentation and to correctly reflect the nature of the balances so as to provide additional transparency and information in these financial statements.

3. Accounting and reporting developments

Standards adopted during the year ended 31 December 2018

Adoption of IFRS 9

Effective 1 January 2018, the Company adopted IFRS 9 'Financial instruments', which superseded IAS 39 'Financial Instruments Recognition and Measurement'. The adoption of IFRS 9 resulted in changes to the classification and measurement of financial assets including the impairment of financial assets and the presentation of gains and losses related to certain financial liabilities designated at fair value through profit or loss. Refer to note 4 for more information about the changes to the Company's accounting policies.

The requirements of IFRS 9 have been applied effectively from 1 January 2018. As permitted by the transition provisions of IFRS 9, the Company elected not to restate comparative periods.

The adoption of IFRS 9 has resulted in no material impact to the Company.

Adoption of IFRS 15

Effective 1 January 2018, the Company adopted IFRS 15 'Revenue from Contracts with Customers' ("IFRS 15"). IFRS 15 requires that revenue from contracts with customers be recognised upon transfer of control of a good or service in the amount of consideration expected to be received. IFRS 15 also changes the accounting for certain contract costs, including whether they may be offset against revenue in the income statement, and requires additional disclosures about revenue and contract costs.

IFRS 15 permits adoption using a full retrospective approach or a modified, cumulative effect approach wherein the guidance is applied only to existing contracts as of the date of adoption, and to new contracts transacted after that date. The Company adopted IFRS 15 using the full retrospective method.The adoption of IFRS 15 did not result in any material changes in the timing of recognition or in the presentation of the Company's revenue.

4. Summary of significant accounting policies

The principal accounting policies applied in the preparation of these financial statements are set out below. These policies have been applied consistently to all the years presented, unless otherwise stated.

4.1 Foreign currency translation

Monetary assets and monetary liabilities in foreign currencies are translated into United States ("U.S.") dollars at rates of exchange ruling on the balance sheet date. Income and expense items denominated in foreign currencies are translated into U.S. dollars at exchange rates prevailing at the date of the transactions. Any gains or losses arising on translation are taken directly to the income statement.

Non-monetary items denominated in foreign currencies that are stated at historical cost are translated into U.S. dollars at the exchange rate ruling at the date of the transaction.

4.2 Functional and presentation currency

Items included in the financial statements of the Company are measured using the currency of the primary economic environment in which the entity operates (the "functional currency”).

U.S. dollars is considered as the functional and presentation currency of the Company.

4.3 Financial instruments

On adoption of IFRS 9 on 1 January 2018, the Company replaced or substantially revised its accounting policies for classification and measurement of financial assets and financial liabilities, and impairment of financial assets. IFRS 9 also significantly amends other standards dealing with financial instruments such as IFRS 7 'Financial Instruments: Disclosures' ("IFRS 7"). The IFRS 7 disclosures have only been applied to the current period. The comparative period notes disclosures repeat those disclosures made in the prior year.

These new or revised policies are set out in the following table along with the corresponding policy under IAS 39. Because the Company elected not to restate comparative periods on adoption of IFRS 9, the IAS 39 policies should be used to understand the differences in accounting policies with the comparative prior period information presented in these financial statements.

4.3.1 Financial assets and financial liabilities

IFRS 9	IAS 39
Financial assets and financial liabilities	
i. Recognition of financial assets and financial liabilities	
The Company recognises financial assets and financial liabilities when it becomes a party to the contractual provisions of the instrument. Regular way purchases and sales of financial assets are recognised using trade-date accounting.	The Company recognises derivatives on its balance sheet when it becomes a party to the contractual provisions of the instruments. Loans and receivables and financial liabilities at amortised cost are recognised when the Company becomes a party to the contractual provisions of the instrument. Regular way purchases and sales of financial assets are recognised on the trade-date, the date on which the Company commits to purchase or sell the asset.
ii. Classification and measurement of financial assets and financial liabilities	
On initial recognition, financial assets are classified as measured at amortised cost, fair value through other comprehensive income or fair value through profit or loss. The classification is based on both the business model for managing the financial assets and their contractual cash flow characteristics. Factors considered by the Company in determining the business model for a group of assets include past experience on how the cash flows for these assets were collected, how the assets’ performance is evaluated and reported to key management personnel, how risks are assessed and managed, and how managers are compensated. On initial recognition, financial liabilities are classified as measured at either amortised cost or fair value through profit or loss.	The Company classifies its financial assets and financial liabilities in the following categories on initial recognition: Financial assets and financial liabilities held for trading, financial assets and financial liabilities designated at fair value through profit or loss, and loans and receivables and financial liabilities held at amortised cost.

4. Summary of significant accounting policies (continued)

4.3.1 Financial assets and financial liabilities (continued)

IFRS 9	IAS 39
Financial assets and financial liabilities	
Financial assets and financial liabilities measured at amortised cost	Loans and receivables and financial liabilities at amortised cost
Financial assets are measured at amortised cost if they are held under a business model with the objective to collect contractual cash flows ("Hold to Collect") and they have contractual terms under which cash flows are solely payments of principal and interest ("SPPI"). In making the SPPI assessment, the Company considers whether the contractual cash flows are consistent with a basic lending arrangement (i.e., interest includes only consideration for the time value of money, credit risk, other basic lending risks and a profit margin that is consistent with a basic lending arrangement). Where the contractual terms introduce exposure to risk or volatility that are inconsistent with a basic lending arrangement, the related financial asset is classified and measured at fair value through profit or loss. Financial assets with embedded derivatives are considered in their entirety when determining whether their cash flows are solely payment of principal and interest. As a result of the application of these criteria, only debt financial assets are eligible to be measured at amortised cost. Financial assets measured at amortised cost include trade and other receivables and cash and cash equivalents. Financial liabilities are measured at amortised cost unless they are held for trading or are designated as measured at fair value through profit or loss. Financial liabilities measured at amortised cost include trade and other payables and bank overdraft. Financial assets and financial liabilities measured at amortised cost are initially recognised at fair value including transaction costs. The initial amount recognised is subsequently reduced for principal repayments and for accrued interest using the effective interest method. In addition, the carrying amount of financial assets is adjusted by recognising an expected credit loss allowance through to profit or loss. The effective interest method is used to allocate interest income or interest expense over the relevant period. The effective interest rate is the rate that discounts estimated future cash payments or receipts through the expected life of the financial asset or financial liability or a shorter period when appropriate, to the net carrying amount of the financial asset or financial liability. The effective interest rate is established on initial recognition of the financial asset or financial liability. The calculation of the effective interest rate includes all fees and commissions paid or received, transaction costs, and discounts or premiums that are an integral part of the effective interest rate. Transaction costs are incremental costs that are directly attributable to the acquisition, issuance or disposal of a financial asset or financial liability.	Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market except those that are classified as held for trading or designated at fair value through profit or loss. Loans and receivables include trade and other receivables and cash and cash equivalents. Loans and receivables are initially recognised at fair value including directly related incremental transaction costs. They are subsequently measured at amortised cost, including any provision for impairment losses. Interest is recognised in the income statement as ‘interest and similar income’ using the effective interest rate method. Financial liabilities include include trade and other payables and bank overdraft and are recognised initially at fair value including directly related incremental transaction costs and subsequently measured at amortised cost using the effective interest method. The effective interest method is used to calculate the amortised cost of a financial asset or financial liability (or a group of financial assets or financial liabilities). It is a method of allocating the interest income or interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments or receipts through the expected life of the financial asset or financial liability or, when appropriate, a shorter period to the net carrying amount of the financial asset or financial liability. The effective interest rate is established on initial recognition of the financial asset or financial liability. The calculation of the effective interest rate includes all fees and commissions paid or received, transaction costs, and discounts or premiums that are an integral part of the effective interest rate. Transaction costs are incremental costs that are directly attributable to the acquisition, issue or disposal of a financial asset or financial liability.

4. Summary of significant accounting policies (continued)

IFRS 9	**IAS 39**
Financial assets and financial liabilities	
Financial assets and financial liabilities measured at fair value through profit or loss	Financial assets and financial liabilities held for trading
Financial assets and financial liabilities are measured at fair value through profit or loss ("FVTPL") if they are held for trading. Under IFRS 9, a financial asset or a financial liability is defined as “held for trading” if it is acquired or incurred principally for the purpose of selling or re-purchasing it in the near term, or forms part of a portfolio of identified financial instruments that are managed together and for which there is evidence of a recent actual pattern of short-term profit taking or it is a derivative. However, such financial instruments are used by the Company predominantly in connection with its "client-driven” market-making and/or for hedging certain assets, liabilities, positions, cash flows or anticipated transactions (i.e. risk management activities). Financial assets and financial liabilities held for trading comprise both debt and equity securities, derivatives, warrants, and the related unrealised gains and losses. In addition, certain financial assets that are not held for trading are measured at FVTPL if they are do not meet the criteria to be measured at amortised cost or FVOCI. For example, if the financial assets are managed on a fair value basis, have contractual cash flows that are not SPPI or are equity securities. The Company did not elect to measure any equity instruments at FVOCI. Financial instruments measured at FVTPL are initially recognised at fair value in the balance sheet. Transaction costs and any subsequent fair value gains or losses are recognised in profit or loss as they arise. The Company manages cash instruments, in the form of debt and equity securities, and derivatives on a unified basis, including hedging relationships between cash securities and derivatives. Accordingly the Firm reports the gains and losses on the cash instruments and the gains and losses on the derivatives on a net basis in trading profits.	The Company considers a financial asset or financial liability as held for trading if it is acquired or incurred principally for the purpose of selling or re-purchasing it in the near term, or forms part of a portfolio of identified financial instruments that are managed together and for which there is evidence of a recent actual pattern of short-term profit taking or it is a derivative. Financial assets and financial liabilities held for trading comprise both debt and equity securities, loans and derivatives. These instruments are either held for trading purposes or used for hedging certain assets, liabilities, positions, cash flows or anticipated transactions. Included in financial assets held for trading and financial liabilities held for trading, are unrealised trading gains and losses. Financial instruments held for trading are initially recognised at fair value in the balance sheet with transaction costs being recorded in profit or loss and any gains or losses are taken directly to the income statement. Subsequently, they are measured at fair value with movement included in trading profit and loss. The Firm manages cash instruments, in the form of debt and equity securities, and derivatives on a unified basis as part of the trading strategy, including hedging relationships between cash securities and derivatives. Accordingly the Firm reports the gains and losses on the cash instruments and the gains and losses on the derivatives on a net basis in trading profits.

4. Summary of significant accounting policies (continued)

4.3.1 Financial assets and financial liabilities (continued)

IFRS 9	**IAS 39**
Financial assets and financial liabilities	
Financial assets and financial liabilities designated at fair value through profit or loss	Financial assets and financial liabilities designated at fair value through profit or loss
Subject to certain criteria, the Company can designate financial assets and financial liabilities to be measured at fair value through profit or loss. Designation is only possible when the financial instrument is initially recognised and cannot subsequently be reclassified. Financial assets can be designated as measured at fair value through profit or loss only if such designation eliminates or significantly reduces a measurement or recognition inconsistency. Financial liabilities can be designated as measured at fair value through profit or loss only if such designation (a) eliminates or significantly reduces a measurement or recognition inconsistency; or (b) applies to a group of financial assets, financial liabilities or both that the Company manages and evaluates on a fair value basis; or (c) relates to an instrument that contains an embedded derivative unless the embedded derivative does not significantly modify the cash flows required by the contract or when a similar hybrid instrument is considered that separation of the embedded derivative is prohibited. Financial assets and financial liabilities that the Company designates as measured at fair value through profit or loss are recognised at fair value at initial recognition, with transaction costs being recognised in profit or loss and subsequently measured at fair value. Gains and losses on financial assets and financial liabilities designated at fair value through profit or loss are recognised in profit or loss as they arise. Changes in the fair value of financial assets designated as measured at FVTPL are recognised immediately in the income statement. Changes in the fair value of financial liabilities designated as measured at FVTPL are recognised in profit or loss.	Financial assets and financial liabilities that the Company designates on initial recognition as being at fair value through profit or loss are recognised at fair value, with transaction costs being recognised in profit or loss and subsequently measured at fair value. Gains and losses on financial assets and financial liabilities that are designated at fair value through profit or loss are recognised in profit or loss as they arise. A financial instrument may only be designated at inception as held at fair value through profit or loss and cannot subsequently be reclassified. Financial assets or financial liabilities are designated at fair value through profit or loss only if such designation (a) eliminates or significantly reduces a measurement or recognition inconsistency; or (b) applies to a group of financial assets, financial liabilities or both that the Company manages and evaluates on a fair value basis; or (c) relates to an instrument that contains an embedded derivative unless the embedded derivative does not significantly modify the cash flows required by the contract or when a similar hybrid instrument is considered that separation of the embedded derivative is prohibited.

4.3.2 Interest income and expense

IFRS 9	**IAS 39**
Interest income and interest expense	**Interest income and interest expense**
Unless a financial asset is credit-impaired, interest income is recognised by applying the effective interest method to the carrying amount of a financial asset before adjusting for any allowance for expected credit losses. If a financial asset is credit-impaired, interest income is recognised by applying the effective interest rate to the carrying amount of the financial asset including any allowance for expected credit losses. Interest expense on financial liabilities is recognised by applying the effective interest method to the amortised cost of financial liabilities. Interest income and expense on financial assets and financial liabilities measured at amortised cost and FVOCI are presented separately from financial instruments measured at FVTPL.	Interest income and expense are recognised on an effective interest rate basis. All contractual terms of a financial instrument are considered when estimating future cash flows.

4. Summary of significant accounting policies (continued)

4.3.3 Trading profit

IFRS 9	**IAS 39**
Trading profit	**Trading profit**
Profits and losses resulting from the purchase and sale of securities and the revaluation of financial instruments are recognised in trading profit on a trade-date basis, including related transaction costs and the associated interest.	Profits and losses resulting from the purchase and sale of securities and the revaluation of financial instruments are recognised as trading gains or losses on a trade-date basis, including related transaction costs but excluding the associated interest.

4.3.4 Impairment of financial assets

IFRS 9	**IAS 39**
Impairment of financial assets	**Impairment of financial assets**
The Company recognises ECL for financial assets that are measured at amortised cost. Provisions for ECL are recognised on initial recognition of the financial instrument based on expectations of credit losses at that time. The credit loss allowance includes ECLs for financial instruments that may default in the next 12-month period for financial instruments that have not observed a significant increase in credit risk since initial recognition ("stage 1") or over a lifetime period for financial instruments that have observed a significant increase in credit risk since initial recognition ("stage 2"). The allowance also includes lifetime ECLs for financial instruments where there is objective evidence of credit-impairment at the reporting date ("stage 3"). In determining the appropriate stage for a financial instrument, the Company applies the definition of default consistent with the Basel definition of default to maintain uniformity of the definition across the Firm. The determination of the stage for credit losses under the ECL model is dependent on the measurement of a significant increase in credit risk ('SICR'). In determining SICR, the Company has conducted quantitative tests, which considers, but is not limited to, existing risk management indicators, credit rating changes and reasonable and supportable forward-looking information. Forward-looking information reflects a range of scenarios that incorporate macro-economic factors that are composed and monitored by the Firmwide specialised economic forecasting team. The key input components for the quantification of expected credit loss through the ECL model includes the probability of default ("PD"), loss given default ("LGD") and exposure at default ("EAD"). The Company seeks to efficiently and effectively leverage as much as possible existing regulatory and capital frameworks.	The Company assesses at each balance sheet date whether there is any objective evidence that a financial asset or portfolio of financial assets is impaired. A financial asset or portfolio of financial assets is deemed to be impaired if, and only if, there is objective evidence of impairment as a result of one or more events that has occurred after the initial recognition of the asset and that event (or events) has an adverse impact on the estimated future cash flows of the financial asset or group of financial assets that can be reliably estimated. Impairment losses on loans and receivables are measured as the difference between the financial asset's carrying amount and the present value of the estimated future cash flows discounted at the financial asset's effective interest rate. The loss is recognised in the income statement against the carrying amount of the impaired asset on the balance sheet. Interest continues to be accrued on the reduced carrying amount based on the original effective interest rate of the financial asset. Specific provisions are raised against loans and receivables when the Company considers that the credit worthiness of the borrower has deteriorated such that the recovery of the whole or part of an outstanding advance is in serious doubt. Impairment provisions are also raised to cover losses which, although not specifically identified, are known from experience to have occurred in the portfolio of loans and receivables at the balance sheet date. These provisions are adjusted on a monthly basis by an appropriate charge or reversal of the provision following an assessment of the loans and receivables portfolio. Impairment provisions are determined by modelling the current exposure, taking into account such factors as duration and probabilities of default. If, in a subsequent period, the amount of the impairment loss decreases and the decrease can be related objectively to an event occurring after the impairment was recognised, the previously recognised impairment loss shall be reversed in the income statement. The amount of reversal shall not result in a carrying amount of the financial asset that exceeds what the amortised cost would have been had the impairment not been recognised at the date the impairment is reversed.

4. Summary of significant accounting policies (continued)

4.4 Fair value

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Fair values are determined by reference to observable market prices where available and reliable. Fair values of financial assets and financial liabilities are based on quoted market prices or dealer price quotations for financial instruments traded in active markets. Where market prices are unavailable, fair value is based on valuation models that consider relevant transaction characteristics (such as maturity) and use as inputs observable or unobservable market parameters, including but not limited to yield curves, interest rates, volatilities, equity or debt prices, foreign exchange rates and credit curves. Valuation adjustments may be made to ensure that financial instruments are recorded at fair value.

For financial assets and liabilities held at fair value, most market parameters in the valuation model are either directly observable or are implied from instrument prices. When input values do not directly correspond to the most actively traded market parameters the model may perform numerical procedures in the pricing such as interpolation.

The Company classifies its assets and liabilities according to a hierarchy that has been established under IFRS for disclosure of fair value measurements. The fair value hierarchy is based on the transparency of inputs to the valuation of an asset or liability as of the measurement date. The fair value hierarchy gives the highest priority to quoted prices (unadjusted) in active markets for identical assets or liabilities (level 1) and the lowest priority to unobservable inputs (level 3 inputs).

A financial instrument's categorisation within the fair value hierarchy is based on the lowest level of input that is significant to the fair value measurement.

Further details on fair value measurements are provided in note 12 to the financial statements.

4.5 Fee and commission income and expense

Fee and commissions obtained through Firm attribution agreements are recognised when the underlying contract becomes legally binding or at the agreed due date if later.

4.6 Derecognition of financial assets and financial liabilities

Financial assets are derecognised when the contractual right to receive cash flows from the asset has expired, or has been transferred with either of the following conditions met:

a) the Company has transferred substantially all the risks and rewards of ownership of the asset; or

b) the Company has neither retained nor transferred substantially all of the risks and rewards; but has relinquished control of the asset.

Financial liabilities are derecognised when they are extinguished, that is when the obligation is discharged, cancelled or expires.

4.7 Recognition of deferred day one profit and loss

The Company enters into transactions where fair value is determined using valuation models for which not all inputs are market observable prices or rates. Such a financial instrument is initially recognised at the transaction price, although the value obtained from the relevant valuation model may differ. The difference between the transaction price and the model value, commonly referred to as 'day one profit and loss', is not recognised immediately in the income statement when based on significant unobservable inputs.

The timing of recognition of deferred day one profit and loss is determined for each class of financial asset and liability. It is either amortised over the life of the transaction, deferred until the instrument's fair value can be determined using market observable inputs, or realised through settlement.

4.8 Cash and cash equivalents

Cash and cash equivalents include cash and balances at banks with maturities of three months or less.

4.9 Share capital

The share capital of the Company consists of ordinary shares, classified as equity.

4. Summary of significant accounting policies (continued)

4.10 Current and deferred income tax

Income tax payable on taxable profits (current tax) is recognised as an expense in the period in which the profits arise. Income tax recoverable on tax allowable losses is recognised as a current tax asset only to the extent that it is regarded as recoverable by offset against taxable profits arising in the current or prior period. Current tax is measured using tax rates and tax laws that have been enacted or substantively enacted at the balance sheet date.

Deferred tax is provided in full, using the liability method, on temporary differences arising from the differences between the tax bases of assets and liabilities and their carrying amounts in the financial statements. Deferred tax is determined using tax rates and legislation enacted or substantively enacted by the balance sheet date, which are expected to apply when the deferred tax asset is realised or the deferred tax liability is settled. Deferred tax assets and liabilities are only offset when there is both a legal right and an intention to settle on a net basis.

5. Critical accounting estimates and judgements

The preparation of financial statements generally requires management to make judgements, estimates and assumptions that affect the amounts recognised in the financial statements. The nature of estimation means that actual outcomes could differ from those estimates. The following judgements have had the most significant effect on amounts recognised in the financial statements:

Fair value measurement

The Company carries a significant portion of its assets and liabilities at fair value on a recurring basis. Estimating fair value often requires the application of judgement. The type and level of judgement required is largely dependent on the amount of observable market information available to the Company. For instruments valued using internally developed models that use significant unobservable inputs that are classified within level 3 of the valuation hierarchy, judgements used to estimate fair value are more significant than those required when estimating the fair value of instruments classified within levels 1 and 2.

In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate model to use. Second, the lack of observability of certain significant inputs requires management to assess all relevant empirical data in deriving valuation inputs - including, for example, transaction details, yield curves, interest rates, prepayment rates, default rates, volatilities, correlations, equity or debt prices, valuations of comparable instruments, foreign exchange rates and credit curves. For further discussion of the valuation of level 3 instruments, including unobservable inputs used, see note 12.

For instruments classified in levels 2 and 3, management judgement must be applied to assess the appropriate level of valuation adjustments, the Company's credit-worthiness, market funding rates, liquidity considerations, unobservable parameters, and for portfolios that meet specified criteria, the size of the net open risk position. The judgements made are typically affected by the type of product and its specific contractual terms, and the level of liquidity for the product or within the market as a whole. For further discussion of valuation adjustments applied by the Company, see note 12.

The use of methodologies or assumptions different than those used by the Company could result in a different estimate of fair value at the reporting date. For a detailed discussion of the Company's valuation process and hierarchy, its determination of fair value for individual financial instruments, and the potential impact of using reasonable possible alternative assumptions for the valuations, see note 12.

6. Segmental analysis

The Company's activities comprise only one business segment, namely Corporate and Investment Banking services. The Company issues structured notes, of which the majority are issued within EMEA. All fee and commission income is received from JPMorgan Chase undertakings within the EMEA region.

7. Financial assets held at fair value through profit and loss

	Unaudited 30 June 2019	**31 December 2018**
	$'000	**$'000**
Financial assets held at fair value through profit and loss	24,951,865	20,591,955

Financial assets held at fair value through profit and loss include derivatives and fully funded OTC financial instruments with other JPMorgan Chase undertakings, see note 12.

Credit valuation adjustments ("CVA") are necessary to reflect counterparty credit quality in the valuation of assets measured at fair value.

8. Trade and other receivables

	Unaudited 30 June 2019	31 December 2018
	$'000	**$'000**
Trade and other receivables: amounts falling due after one year		
Amounts owed by JPMorgan Chase undertakings	2,700,000	3,300,000
	2,700,000	**3,300,000**
Trade receivables	57,729	114,649
Amounts owed by JPMorgan Chase undertakings	93,250	8,328
	150,979	**122,977**

The majority of amounts within trade and other receivables were not past due or impaired as at 30 June 2019 and 31 December 2018.

9. Net cash and cash equivalents

	Unaudited 30 June 2019	31 December 2018
	$'000	**$'000**
Cash held with JPMorgan Chase undertakings	5,188,623	2,710,496
Cash held with third parties	55,610	93,223
	5,244,233	**2,803,719**
Bank overdraft		
Balances due to JPMorgan Chase undertakings	(21,659)	(18,129)
Balances due to third parties	(15,734)	(2,599)
	(37,393)	**(20,728)**
Net cash and cash equivalents as reported for the period/year	**5,206,840**	**2,782,991**

10. Financial liabilities designated at fair value through profit or loss

	Unaudited 30 June 2019	31 December 2018
	$'000	**$'000**
Financial liabilities designated at fair value through profit or loss	20,742,413	17,420,872

Financial liabilities designated at fair value through profit and loss include short term and long term structured notes. In certain instances, the customers have the rights to exercise put options. Other securities include early redemption clauses. As a result, the notes have been disclosed as having a maturity within one year in the table above. The contractual payments associated with the notes issued by the Company are predominantly guaranteed by JPMorgan Chase Bank, N.A. and may be repayable on customer demand. The details of each note are set out in the prospectus for each issuance.

Debit valuation adjustments are necessary to reflect the credit quality of the Firm in the valuation of such liabilities. The directors consider that the Company is fully hedged and that there would, in the normal course of business, be no impact to the results of the Company due to movements in the fair value of the financial liabilities designated at fair value through profit or loss.

10. Financial liabilities designated at fair value through profit or loss (continued)

The amount of change attributable to changes in its own credit and funding risk in the financial liabilities designated at fair value through profit or loss and held at fair value through profit and loss for the period ended 30 June 2019 is a gain of $42.7 million (2018: gain of $236.2 million). This is fully offset by an equal and opposite amount in financial assets held at fair value through profit and loss (refer to note 7).

11. Financial liabilities held at fair value through profit and loss

	Unaudited 30 June 2018	31 December 2018
	$'000	$'000
Financial liabilities held at fair value through profit and loss	4,209,452	3,171,083

12. Assets and liabilities measured at fair value

Valuation process

The Company carries a portion of its assets and liabilities at fair value on a recurring basis.

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value is based on quoted market prices or inputs, where available. If prices or quotes are not available, fair value is based on valuation models and other valuation techniques that consider relevant transaction characteristics (such as maturity) and use as inputs observable or unobservable market parameters, including yield curves, interest rates, volatilities, equity or debt prices, foreign exchange rates, and credit curves.

The level of precision in estimating unobservable market inputs or other factors can affect the amount of gain or loss recorded for a particular position. Furthermore, while the Company believes its valuation methods are appropriate and consistent with those of other market participants, the methods and assumptions used reflect management judgement and may vary across the Company's businesses and portfolios. The use of different methodologies or assumptions to those used by the Company could result in a different estimate of fair value at the reporting date.

Risk-taking functions are responsible for providing fair value estimates for assets and liabilities carried on the balance sheet at fair value. The Firm's valuation control function, which is part of the Firm's Finance function and independent of the risk-taking functions, is responsible for verifying these estimates and determining any fair value adjustments that may be required to ensure that the Firm's positions are recorded at fair value. The valuation control function verifies fair value estimates provided by the risk-taking functions by leveraging independently derived prices, valuation inputs and other market data, where available.

Debit valuation adjustments ("DVA") are taken to reflect the credit quality of the Company in the valuation of liabilities measured at fair value. The Firm also incorporates the impact of funding in its valuation estimates where there is evidence that a market participant in the principal market would incorporate it in a transfer of the instrument.

Credit valuation adjustments ("CVA") are necessary to reflect counterparty credit quality in the valuation of assets measured at fair value.

Valuation model review and approval

If prices or quotes are not available for an instrument or a similar instrument, fair value is generally determined using valuation models that consider relevant transaction data such as maturity and use as inputs market-based or independently sourced parameters. The Model Risk function is independent of the model owners and reviews and approves valuation models used by the Company. The Model Risk Governance and Review function is independent of the model owners and reviews and approves valuation models used by the Company.

Fair value hierarchy

The Company classifies its assets and liabilities according to a valuation hierarchy that reflects the observability of significant market inputs. The three levels are defined as follows:

Level 1 - inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets.

Level 2 - inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.

12. Assets and liabilities measured at fair value (continued)

Fair value hierarchy (continued)

Level 3 - one or more inputs to the valuation methodology are unobservable and significant to the fair value measurement.

A financial instrument's categorisation within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

Valuation methodologies

The following table describes the valuation methodologies used by the Firm to measure its more significant products/ instruments at fair value, including the general classification of such instruments pursuant to the valuation hierarchy.

Product/instrument	Valuation methodology, inputs and assumptions	Classifications in the valuation hierarchy
Structured notes	• Valuations are based on discounted cash flow analysis that consider the embedded derivative and the terms and payment structure of the note. • The embedded derivative features are considered using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that use observable or unobservable valuation inputs, depending on the embedded derivative. The specific inputs used vary according to the nature of the embedded derivative features, as described in the discussion below regarding derivative valuation. Adjustments are then made to this base valuation to reflect the Firm's own credit risk (DVA).	Level 2 or 3
Equity securities	Quoted market prices are used where available.	Level 1
Derivatives and fully funded OTC financial instruments	Derivatives that are valued using models such as the Black-Scholes option pricing model, simulation models, or a combination of models, that use observable or unobservable valuation inputs as well as considering the contractual terms. The key valuation inputs used will depend on the type of derivative and the nature of the underlying instruments and may include equity prices, commodity prices, interest rate yield curves, foreign exchange rates, volatilities, correlations, credit default swaps ("CDS") spreads and recovery rates. Additionally, the credit quality of the counterparty and of the Firm's as well as market funding levels may also be considered.	Level 2 or 3

The following tables present the assets and liabilities reported at fair value as of 30 June 2019 and 31 December 2018, by major product category and fair value hierarchy.

Assets and liabilities measured at fair value on a recurring basis

	Level 1	Level 2	Level 3	Total
	$'000	$'000	$'000	$'000
Unaudited at 30 June 2019				
Financial assets held at fair value through profit and loss:				
Financial assets held at fair value through profit and loss	248,687	13,539,782	11,163,396	24,951,865
Total financial assets	248,687	13,539,782	11,163,396	24,951,865
Financial liabilities held at fair value through profit and loss:				
Financial liabilities held at fair value through profit and loss	—	(3,818,382)	(391,070)	(4,209,452)
Financial liabilities designated at fair value through profit or loss:				
Structured notes	—	(10,802,817)	(9,939,596)	(20,742,413)
Total financial liabilities	—	(14,621,199)	(10,330,666)	(24,951,865)

12. Assets and liabilities measured at fair value (continued)

Assets and liabilities measured at fair value on a recurring basis **(continued)**

	Level 1	Level 2	Level 3	Total
	$'000	**$'000**	**$'000**	**$'000**
At 31 December 2018				
Financial assets held at fair value through profit and loss:				
Financial assets held at fair value through profit and loss	268,677	10,115,674	10,207,604	20,591,955
Total financial assets	268,677	10,115,674	10,207,604	20,591,955
Financial liabilities held at fair value through profit and loss:				
Financial liabilities held at fair value through profit and loss	—	(2,653,576)	(517,507)	(3,171,083)
Financial liabilities designated at fair value through profit or loss:				
Structured notes	—	(8,807,190)	(8,613,682)	(17,420,872)
Total financial liabilities	—	(11,460,766)	(9,131,189)	(20,591,955)

The Company hedges all structured note issuances by entering into hedging transactions with other JPMorgan Chase companies. The hedging transactions can be booked as multiple elements in order to ensure the risk associated with the notes is fully hedged. Each of these elements is classified in the fair value hierarchy in line with the requirements of IFRS 13 'Fair Value Measurement', and as such the fair value hierarchy of the structured notes and hedges can differ.

12. Assets and liabilities measured at fair value (continued)

Level 3 valuations

The Firm has established well structured processes for determining fair value, including for instruments where fair value is estimated using significant unobservable inputs (level 3).

Estimating fair value requires the application of judgement. The type and level of judgement required is largely dependent on the amount of observable market information available to the Company. For instruments valued using internally developed valuation models and other valuation techniques that use significant unobservable inputs are classified within level 3 of the fair value hierarchy, judgements used to estimate fair value are more significant than those required when estimating the fair value of instruments classified within levels 1 and 2. In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate valuation model or other valuation technique to use.

The following table presents the Company's primary level 3 financial instruments, the valuation techniques used to measure the fair value of those financial instruments, the significant unobservable inputs, the range of values for those inputs and, for certain instruments, the weighted averages of such inputs. While the determination to classify an instrument within level 3 is based on the significance of the unobservable inputs to the overall fair value measurement, level 3 financial instruments typically include observable components (that is, components that are actively quoted and can be validated to external sources) in addition to the unobservable components.

The range of values presented in the table is representative of the highest and lowest level input used to value the significant groups of instruments within a product/ instrument classification. Where provided, the weighted averages of the input values presented in the table are calculated based on the fair value of the instruments that the input is being used to value.

In the Company's view, the input range and the weighted average value do not reflect the degree of input uncertainty or an assessment of the reasonableness of the Company's estimates and assumptions. Rather, they reflect the characteristics of the various instruments held by the Company and the relative distribution of instruments within the range of characteristics. For example, two option contracts may have similar levels of market risk exposure and valuation uncertainty, but may have significantly different implied volatility levels because the option contracts have different underlyings, tenors, or strike prices.

The input range and weighted average values will therefore vary from period-to-period and parameter to parameter based on the characteristics of the instruments held by the Company at each balance sheet date.

Product/instrument	Asset	Liability	Net fair value	Principal valuation technique	Unobservable input	Range of input values
Unaudited at 30 June 2019	**$'000**	**$'000**	**$'000**			
Derivatives and fully funded OTC financial instruments	11,163,396	(391,070)	10,772,326	Option pricing	Interest rate correlation	(45)% - 97%
					Interest rate spread volatility	16bps - 38bps
					Interest rate - FX correlation	(45)% - 60%
					Equity correlation	20% - 98%
					Equity - FX correlation	(75)% - 61%
					Equity - Interest rate correlation	20% - 60%
					Equity volatility	14% - 57%
Structured notes	—	(9,939,596)	(9,939,596)	Option pricing	Interest rate correlation	(45)% - 97%
					Interest rate spread volatility	16bps - 38bps
					Interest rate - FX correlation	(45)% - 60%
					Equity correlation	20% - 98%
					Equity - FX correlation	(75)% - 61%
					Equity - Interest rate correlation	20% - 60%
					Equity volatility	14% - 57%
Total	**11,163,396**	**(10,330,666)**	**832,730**			

12. Assets and liabilities measured at fair value (continued)

Level 3 valuations (continued)

Product/instrument	Asset	Liability	Net fair value	Principal valuation technique	Unobservable input	Range of input values
At 31 December 2018	**$'000**	**$'000**	**$'000**			
Derivatives and fully funded OTC financial instruments	10,207,604	(517,507)	9,690,097	Option pricing	Interest rate correlation	(45)% - 97%
					Interest rate spread volatility	16bps - 38bps
					Interest rate - FX correlation	(45)% - 60%
					Equity correlation	20% - 98%
					Equity - FX correlation	(75)% - 61%
					Equity - Interest rate correlation	20% - 60%
					Equity volatility	14% - 57%
Structured notes	—	(8,613,682)	(8,613,682)	Option pricing	Interest rate correlation	(45)% - 97%
					Interest rate spread volatility	16bps - 38bps
					Interest rate - FX correlation	(45)% - 60%
					Equity correlation	20% - 98%
					Equity - FX correlation	(75)% - 61%
					Equity - Interest rate correlation	20% - 60%
					Equity volatility	14% - 57%
Total	**10,207,604**	**(9,131,189)**	**1,076,415**			

The categories presented in the tables above have been aggregated based upon the product type, which may differ from their classification on the balance sheet.

Changes in and ranges of unobservable inputs

The following discussion provides a description of the impact on fair value measurement of a change in each unobservable input in isolation, and the interrelationship between unobservable inputs, where relevant and significant. The impact of changes in inputs may not be independent as a change in one unobservable input may give rise to a change in another unobservable input. Where relationships exist between two unobservable inputs, those relationships are discussed below. Relationships may also exist between observable and unobservable inputs (for example, as observable interest rates rise, unobservable prepayment rates decline); such relationships have not been included in the discussion below. In addition, for each of the individual relationships described below, the inverse relationship would also generally apply.

Correlation - Correlation is a measure of the relationship between the movements of two variables (e.g., how the change in one variable influences the change in the other). Correlation is a pricing input for a derivative product where the payoff is driven by one or more underlying risks. Correlation inputs are related to the type of derivative due to the nature of the underlying risks. When parameters are positively correlated, an increase in one parameter will result in an increase in the other parameter. When parameters are negatively correlated, an increase in one parameter will result in a decrease in the other parameter. An increase in correlation can result in an increase or a decrease in a fair value measurement. Given a short correlation position, an increase in correlation, in isolation, would generally result in a decrease in a fair value measurement.

Volatility - Volatility is a measure of the variability in possible returns for an instrument, parameter or market index given how much the particular instrument, parameter or index changes in value over time. Volatility is a pricing input for options, including equity options and interest rate options. Generally, the higher the volatility of the underlying, the riskier the instrument. Given a long position in an option, an increase in volatility, in isolation, would generally result in an increase in a fair value measurement.

12. Assets and liabilities measured at fair value (continued)

Fair value of financial instruments valued using techniques that incorporate unobservable inputs

Price risk from the issued instruments is matched by entering into equal and offsetting OTC transactions with other JPMorgan Chase undertakings so that any price risk is effectively hedged. As at 30 June 2019, the use of alternative inputs would result in no change to the results of the Company. Consequently, no sensitivity analysis for level 3 financial instruments is disclosed.

Movement in Level 3 assets and liabilities

Financial assets held at fair value through profit and loss

	Unaudited 30 June 2019	**31 December 2018**
	$'000	**$'000**
At 1 January	**10,207,604**	**7,466,934**
Total loss recognised in income statement *	(460,020)	(1,111,090)
Purchases	5,403,452	6,155,023
Settlements	(3,376,203)	(1,319,332)
Transfers into level 3	177,908	292,789
Transfers out of level 3	(789,345)	(1,276,720)
Total assets at fair value	**11,163,396**	**10,207,604**
Change in unrealised gain related to financial instruments	945,098	10,966

Financial liabilities held at fair value through profit and loss and designated at fair value through profit and loss

	Unaudited 30 June 2019	**31 December 2018**
	$'000	**$'000**
At 1 January	**9,131,189**	**8,923,878**
Total (gain)/loss recognised in income statement *	(175,477)	725,676
Purchases	97,753	138,389
Issuances	5,129,962	4,870,090
Settlements	(3,422,974)	(4,385,685)
Transfers into level 3	220,869	320,213
Transfers out of level 3	(650,656)	(1,461,372)
Total assets at fair value	**10,330,666**	**9,131,189**
Change in unrealised gain/(loss) related to financial instruments	942,138	(16,632)

* As explained above, the Company's hedging transactions are booked as multiple elements in order to ensure the risk associated with the notes is fully hedged, and as such the levelling of the structured notes and hedges can differ. The gain/(loss) recognised in the income statement as a result of changes in fair value related to level 3 financial instruments, including any changes to unrealised gain/(loss) is offset by an equal and opposite impact as a result of changes in fair value of the related hedging instruments that are classified across multiple levels.

12. Assets and liabilities measured at fair value (continued)

Transfers between levels for instruments carried at fair value on a recurring basis

For the period ended 30 June 2019, transfers from level 2 to level 3 included the following:

- $178 million of assets driven by reduction in observability of derivatives and fully funded OTC financial instruments.
- $221 million of liabilities driven by a reduction in observability of structured notes.

For the period ended 30 June 2019, transfers from level 3 to level 2 included the following:

- $789 million of assets driven by increase in observability of derivatives and fully funded OTC financial instruments.
- $651 million of liabilities driven by increase in observability of structured notes.

During the year ended 31 December 2018, transfers from level 2 to level 3 included the following:

- $293 million of assets driven by reduction in observability of derivatives and fully funded OTC financial instruments.
- $320 million of liabilities driven by a reduction in observability of structured notes.

During the year ended 31 December 2018, transfers from level 3 to level 2 included the following:

- $1,277 million of assets driven by increase in observability of derivatives and fully funded OTC financial instruments.
- $1,461 million of liabilities driven by increase in observability of structured notes.

All transfers are assumed to occur at the beginning of the period in which they occur.

Fair value of financial instruments not carried on balance sheet at fair value

Certain financial instruments that are not carried at fair value on balance sheet are carried at amounts that approximate fair value, due to their short term nature and generally negligible credit risk. These instruments include trade and other receivables, cash and cash equivalents, trade and other payables and bank overdraft.

The company has $8,095.2 million (31 December 2018: $6,226.7 million) of financial assets and $7,543.3 million (31 December 2018: $5,685.4 million) of current financial liabilities that are not measured at fair value. Given the short-term nature of these instruments, their carrying amounts in the balance sheet are a reasonable approximation of fair value.

Offsetting financial assets and financial liabilities

No financial assets and liabilities have been offset in the balance sheet as at 30 June 2019 (31 December 2018: nil).

Financial instruments, recognised within financial assets and liabilities held at fair value through profit and loss, which were subject to master netting arrangements or other similar agreements but not offset, as at 30 June 2019, amounted to $421.6 million (31 December 2018: $347.0 million).

13. Trade and other payables

	Unaudited 30 June 2019	31 December 2018
	$'000	$'000
Trade payables	52,683	118,339
Amounts owed to JPMorgan Chase undertakings	7,453,174	5,546,297
	7,505,857	**5,664,636**

Current year trade and other payables predominantly consist of variation margin received from other JPMorgan Chase undertakings.

14. Share capital

	Unaudited 30 June 2019	31 December 2018
	€'000	€'000
Authorised share capital		
90,000 (2018: 90,000) Ordinary shares of €1.00 each	90	90

	Unaudited 30 June 2019	31 December 2018
	$'000	$'000
Issued and fully paid share capital		
20,000 (2018: 20,000) Ordinary shares of €1.00 each	26	26

In accordance with the requirements of Article 373 Book 2 of the Dutch Civil Code, the Company holds an amount of $2,000 in a legal reserve in respect of revaluation of the Euro denominated share capital. There has been no change in the amount of authorised share capital during the period.

15. Fees and commissions

	Unaudited 30 June 2019	Unaudited 30 June 2018
	$'000	$'000
Net gain/(loss) on financial liabilities designated at FVTPL	1,634,160	237,330
Net (loss)/gain on financial assets and liabilities mandatory at FVTPL	(1,634,160)	(237,330)
	—	—

All fee and commission income is receivable from other JPMorgan Chase undertakings.

All fee and commission expense are paid by other JPMorgan Chase undertakings and reimbursed by the Company.

16. Interest income and expenses

All interest income and expenses are from JPMorgan chase undertakings.

17. Income tax expense

	Unaudited 30 June 2019	Unaudited 30 June 2018
Income tax expense:	$'000	$'000
Current tax	2,864	682
Adjustment in respect of previous years	(20)	72
Tax on profit on ordinary activities	**2,844**	**754**
Profit for the year before tax	**11,513**	**2,813**
Tax calculated at applicable tax rates	2,864	682
Adjustments in respect of previous years	(20)	72
Income tax expense	**2,844**	**754**

The standard tax rate in the Netherlands is 25% (2018: 25%). A tax rate of 19% (2018: 20%) is applied to the first €200,000 (2018: €200,000).

18. Financial risk management

Risk is an inherent part of the Company's business activities. The Company's overall objective is to manage its businesses, and the associated risks, in a manner that balances serving the interests of its clients and customers and protects the safety and soundness of the Company.

JPMorgan Chase's and the Company's risk management framework seeks to mitigate risk and loss to the Firm and Company. The Firm has established processes and procedures intended to identify, measure, monitor, report and analyse the types of risk to which the Firm is subject. However, as with any risk management framework, there are inherent limitations to the Firm's risk management strategies because there may exist, or develop in the future, risks that the Firm has not appropriately anticipated or identified.

The Company exercises oversight through the Board of directors which are aligned to the Firm risk management framework and regulatory requirements.

A substantial majority of these risks, which arise from the structured products issued by the Company are offset by simultaneously entering into equal and offsetting Over the Counter ("OTC)" transactions with other JPMorgan Chase undertakings so that all such risks are effectively hedged.

Risk Summary

The following sections outline the key risks that are inherent in the Company's business activities.

A detailed description of the policies and processes adopted by the Firm may be found within the JPMorgan Chase & Co. 2018 Annual Report on Form 10-K. The report is available at https://jpmorganchaseco.gcs-web.com/financial-information/sec-filings

Credit risk

Credit risk is the risk associated with the default or change in credit profile of a client, counterparty or customer. Credit risk management is an independent risk management function that monitors, measures and manages credit risk throughout the Firm and defines credit risk policies and procedures. The credit risk function reports to the Firm's Chief Risk Officer ("CRO").

Risk measurement

Expected credit loss measurement

Approach to measuring expected credit losses

The Company estimates credit impairment through an allowance for expected credit losses ("ECLs"). ECLs are recognised for financial assets that are measured at amortised cost. The measurement of ECLs must reflect:

(a) An unbiased and probability weighted amount that is determined by evaluating a range of possible outcomes;

(b) The time value of money; and

(c) Reasonable and supportable information about past events, current economic conditions, and forecasts of future economic conditions.

The measurement of ECL also reflects how the Company manages the financial instruments it uses for credit risk purposes such as Traditional Credit Products ("TCP"), and non-traditional credit products ("Non-TCP"). The Company does not hold any TCP instruments. Non-TCP consist of debt financial assets measured at amortised cost which include trade and other receivables and cash instruments.

The following table sets out the balances of the Company's financial assets that are measured at amortised cost within the Non-TCP category:

Balance sheet categories	Non-TCP
	$'000
Assets	
Trade and other receivables	2,850,979
Cash and cash equivalents	5,244,233

Off-balance sheet lending-related commitments which are categorised as TCP is reported in provisions for liabilities and are not included in the table above.

For Non-TCPs, the Company utilises a combination of an established provision matrix, as well as quantitative and qualitative considerations to estimate ECLs.

18. Financial risk management (continued)

Credit risk (continued)

Risk measurement (continued)

Expected credit loss measurement (continued)

Approach to measuring expected credit losses (continued)

During the year, the Company recognised no ECL on non-TCP balances as the ECL related to these exposures is assessed as immaterial. The Company's approach to measuring ECLs for Non-TCP portfolios depends on the type of instrument. Refer to the Credit exposures section for an analysis per balance sheet line item.

Credit exposures

Balance sheet exposure by financial asset

The table below presents the Company's gross balance sheet exposure to financial assets without taking account of any collateral or economic hedges in place.

	Unaudited 30 June 2019	31 December 2018
	$'000	$'000
Financial assets held at fair value through profit and loss	24,951,865	20,591,955
Trade and other receivables	2,850,979	3,422,977
Cash and cash equivalents	5,244,233	2,803,719
	33,047,077	**26,818,651**

Included within the above assets, balances held with other JPMorgan Chase undertakings are $32,663 million (2018: $26,334 million).

Financial assets held at fair value through profit and loss does not include equity securities captured under market risk.

The Company's credit exposures and credit risk mitigants are further described below. As no material ECL allowance is recognised on Non-TCP financial assets, refer below for further discussion.

Trade and other receivables

Trade and other receivables mainly consist of amounts due from brokers/dealers such as failed sales, unsettled cash and amounts due from JPMorgan Chase undertakings.

Failed sale receivables generally have minimal credit risk due to the low probability of default of a clearing organisation default and failure to deliver, the short-term nature of receivables related to securities settlements which are predominately on a delivery versus payment basis.

Unsettled cash receivables relate to cash collateral paid to counterparties in respect of derivative financial instruments. Margin posted in cash is reflected as a receivable from the counterparty and is carried at amortised cost. The Company includes these receivables in Stage 1 due to the robust multi-layered credit protection inherent in the design and operations of the margin posted model.

The majority of amounts due from JPMorgan Chase undertakings are with a borrower who is a Material Legal Entity ("MLE"). As MLEs are adequately capitalised to ensure the MLE can fulfil all of its debt obligations even in the event of an orderly liquidation of JPMorgan Chase and are of investment grade, these inter-company receivables are included in Stage 1 as they are held with MLEs and considered to not have an increase in credit risk that would result in material expected credit losses. Receivables from MLE's are only included in Stage 2 if the obligor is no longer considered an MLE and there is evidence of credit deterioration of the obligor, or if certain support triggers defined in the JPMorgan Chase's Resolution Plan occur. Receivables from MLE's are not credit-impaired as the Firm ensures MLE's are more than adequately capitalised as required by the Firms Resolution Plan. The Company recognises no allowance on these balances.

Cash and cash equivalents

The Company places substantially all of its deposits with banks which are of investment-grade. The Company includes cash and cash equivalents in Stage 1 as investment-grade institutions are considered to have high quality credit with low risk of default and therefore a significant increase in credit risk is not deemed probable or material. The Company recognises no allowance on these balances.

18. Financial risk management (continued)

Liquidity risk

Liquidity risk is the risk that the Company will be unable to meet its contractual and contingent financial obligations as they arise or that it does not have the appropriate amount, composition and tenor of funding and liquidity to support its assets and liabilities.

The Company's issuances are economically hedged with the OTC transactions with other JPMorgan Chase undertakings. To the extent that settlement-related timing differences between issuances and the OTC hedge may result in funding requirements, these are funded by other Firm companies involved in the transactions. The contractual payments associated with the notes issued by the Company are all guaranteed, predominantly by JPMorgan Chase Bank, N.A.

The following table provides details on the maturity of all financial liabilities:

	Unaudited 30 June 2019	31 December 2018
	Less than 1 year	Less than 1 year
	$'000	$'000
Financial liabilities designated at fair value through profit or loss	20,742,413	17,420,872
Financial liabilities held at fair value through profit and loss	4,209,452	3,171,083
Bank overdraft	37,393	20,728
Trade and other payables	7,505,857	5,664,636
	32,495,115	**26,277,319**

Included with the above liabilities, the balances held with other JPMorgan Chase undertakings are $11,202 million (2018:$8,034 million).

Market risk

Market risk is the risk associated with the effect of changes in market factors such as interest and foreign exchange rates, equity and commodity prices, credit spreads or implied volatilities, on the value of assets and liabilities held for both the short and long term.

Market Risk, arising from the Company's issuances are economically hedged by equal and offsetting OTC transactions with other Firm companies. Should this change, the Company would be managed as part of the enterprise wide market risk management framework.

Operational risk

Operational risk is the risk associated with inadequate or failed internal processes, people and systems, or from external events and includes compliance risk, conduct risk, legal risk and model risk.

Operational risk is inherent in the Company’s activities and can manifest itself in various ways, including fraudulent acts, business interruptions, cybersecurity attacks, inappropriate employee behaviour, failure to comply with applicable laws, and regulations or failure of vendors to perform in accordance with their agreements. These events could result in financial losses, litigation and regulatory fines, as well as other damages to the Company and the Firm. The goal is to keep operational risk at appropriate levels in light of the Company’s financial position, the characteristics of its businesses, and the markets and regulatory environments in which it operates.

Risk management

To monitor and control operational risk, the Firm has an Operational Risk Management Framework (“ORMF”) which is designed to enable the Firm to maintain a sound and well-controlled operational environment. The ORMF has four main components: Governance, Operational Risk Identification and Assessment, Operational Risk Measurement, and Operational Risk Monitoring and Reporting. The Company’s approach mirrors the Firmwide approach.

Operational risk can manifest itself in various ways. Operational risk subcategories such as Compliance risk, Conduct risk, Legal risk and Model risk, as well as other operational risks, can lead to losses which are captured through the Firm’s operational risk measurement processes. More information on these risk subcategories, where relevant, can be found in the respective risk management sections.

18. Financial risk management (continued)

Cybersecurity risk

Cybersecurity risk is an important, continuous and evolving focus for the Firm and Company. The Firm and Company devotes significant resources to protecting and continuing to improve the security of the Firm and Company's computer systems, software, networks and other technology assets. These security efforts are intended to protect against, among other things, cybersecurity attacks by unauthorised parties to obtain access to confidential information, destroy data, disrupt or degrade service, sabotage systems or cause other damage. The Firm continues to make significant investments in enhancing its cyberdefense capabilities and to strengthen its partnerships with the appropriate government and law enforcement agencies and other businesses in order to understand the full spectrum of cybersecurity risks in the operating environment, enhance defenses and improve resiliency against cybersecurity threats. The Firm actively participates in discussions of cybersecurity risks with law enforcement, government officials, peer and industry groups, and has significantly increased efforts to educate employees and clients on the topic.

Third parties with which the Firm does business or that facilitate the Firm's business activities (e.g., vendors, exchanges, clearing houses, central depositories, and financial intermediaries) could also be sources of cybersecurity risk to the Firm. Third party cybersecurity incidents such as system breakdowns or failures, misconduct by the employees of such parties, or cyber-attacks could affect their ability to deliver a product or service to the Firm or result in lost or compromised information of the Firm or its clients. Clients can also be sources of cybersecurity risk to the Firm, particularly when their activities and systems are beyond the Firm's own security and control systems. As a result, the Firm engages in regular and ongoing discussions with certain vendors and clients regarding cybersecurity risks and opportunities to improve security. However, where cybersecurity incidents are due to client failure to maintain the security of their own systems and processes, clients will generally be responsible for losses incurred.

To protect the confidentiality, integrity and availability of the Firm and Company's infrastructure, resources and information, the Firm leverages the ORMF to ensure risks are identified and managed within defined corporate tolerances. The Firm's Board of Directors and the Audit Committee are regularly briefed on the Firm's cybersecurity policies and practices and ongoing efforts to improve security, as well as its efforts regarding significant cybersecurity events.

Compliance risk

Compliance risk is the risk of failure to comply with legal or regulatory obligations or code of conduct and standards of self-regulatory organisations applicable to the business activities of the Firm.

Each Lines of Business ("LOB" and Corporate within the Company hold primary ownership and accountability for managing compliance risks. The Firm's Compliance Organisation ("Compliance"), which is independent of the line of business, works closely with senior management to provide independent review, monitoring and oversight of business operations with a focus on compliance with the regulatory obligations applicable to the offering of the Firm's products and services to clients and customers.

These compliance risks relate to a wide variety of legal and regulatory obligations, depending on the LOB and the jurisdiction, and include those related to products and services, relationships and interactions with clients and customers, and employee activities. For example, compliance risks include those associated with anti-money laundering compliance, trading activities, market conduct, and complying with the rules and regulations related to the offering of products and services across jurisdictional borders, among others.

Other functions such as Finance (including Tax), Technology and Human Resources provide oversight of significant regulatory obligations that are specific to their respective areas of responsibility.

Compliance has implemented various practices designed to identify and mitigate compliance risk by establishing policies, testing, monitoring, training and providing guidance. The Firm has experienced heightened scrutiny by its regulators of its compliance with regulations, and with respect to its controls and operational processes. The Firm expects that such regulatory scrutiny will continue.

Governance and oversight

Compliance is led by the Firms' Chief Compliance Officer ("CCO") who reports to the Firm's CRO. The regional CCOs, including the EMEA CCO, are part of this structure.

The Firm maintains oversight and coordination of its Compliance Risk Management practices through the Firm's CCO, lines of business CCOs and regional CCOs who implement the Compliance program globally across the lines of business and regions. At a Company level, in the UK the regional CCO is a member of the UK Management Committee (restructured from January 2018 to form the EMEA Management Committee) and the UK Audit & Compliance Committee.

18. Financial risk management (continued)

Compliance risk (continued)

The Firm has in place a Code of Conduct ("Code") which applies to the Company. Each employee is given annual training in respect of the Code and is required annually to affirm his or her compliance with the Code. The Code sets forth the Firm's core principles and fundamental values, including that no employee should ever sacrifice integrity - or give the impression that he or she has. The Code requires prompt reporting of any known or suspected violation of the Code, any internal Firm policy, or any law or regulation applicable to the Firm's business. It also requires the reporting of any illegal conduct, or conduct that violates the underlying principles of the Code, by any of the Firm's employees, customers, suppliers, contract workers, business partners, or agents. Specified employees are specially trained and designated as "code specialists" who act as a resource to employees on Code matters. In addition, concerns may be reported anonymously and the Firm prohibits retaliation against employees for the good faith reporting of any actual or suspected violations of the Code. The Code and the associated employee compliance program are focused on the regular assessment of certain key aspects of the Firm's culture and conduct initiatives.

Reputation risk

Reputation risk is the potential that an action, inaction, transaction, investment or event will reduce trust in the Firm's integrity or competence by its various constituents, including clients, counterparties, customers, investors, regulators, employees, communities or the broader public.

Reputation Risk Management is an independent risk management function that establishes the governance framework for managing reputation risk across the Firm.

The types of events that give rise to reputation risk are broad and could be introduced in various ways, including by the Firm's employees and the clients, customers and counterparties with which the Firm does business. These events could result in financial losses, litigation and regulatory fines, as well as other damages to the Firm. As reputation risk is inherently difficult to identify, manage, and quantify, an independent reputation risk management governance function is critical.

Governance and oversight

The Firm's Reputation Risk Governance policy establishes the principles for managing reputation risk for the Firm. It is the responsibility of employees in each LOB and Corporate to consider the reputation of the Company when deciding whether to offer a new product, engage in a transaction or client relationship, enter a new jurisdiction, initiate a business process or other matters. Increasingly, sustainability, social responsibility and environmental impacts are important considerations in assessing the Firm's reputation risk, and are considered as part of reputation risk governance.

The Firm's reputation risk governance framework applies to each LOB and Corporate. Each LOB Reputation Risk Office ("RRO") advises their business on potential reputation risk issues and provides oversight of policy and standards created to guide the identification and assessment of reputation risk. LOB Reputation Risk Committees and forums review and assess reputation risk for their respective businesses. Each function also applies appropriate diligence to reputation risk arising from their day-to-day activities. Reputation risk issues deemed significant are escalated to the appropriate LOB Risk Committee and/or to the Firmwide Risk Committee. Annual EMEA Corporate & Investment Bank ("CIB") Reputation Risk Committee update are provided to the EMEA Risk Committee ("ERC").

19. Managed capital

Total equity of $549.0 million (2018: $540.3 million) constitutes the managed capital of the Company, which consists entirely of issued share capital, share premium reserve, legal reserve and retained earnings.

The directors are responsible for setting the objectives, policies and processes relating to the management of the Company's capital and maintain a set of policy documents to assist in discharging their responsibilities.

The Company is not subject to any externally imposed capital requirements.

20. Related party transactions

Related parties comprise:

(a) Directors and shareholders of the Company and companies in which they have an ownership interest;

(b) Other JPMorgan Chase undertakings.

None of the Directors received remuneration from the Company during the period (2018: $nil). The Company did not employ any staff in 2019 or 2018.

The Company's parent undertaking is detailed in note 1. There were no transactions with the parent undertaking during the period.

20. Related party transactions (continued)

Related party transactions, outstanding balances at period end, and income and expenses for the period, relating to normal business activities are as follows:

(i) Outstanding balances at period end

	Unaudited JPMorgan Chase undertakings 30 June 2019 $'000	JPMorgan Chase undertakings 31 December 2018 $'000 (restated)
Financial assets held at fair value through profit and loss	24,681,424	20,315,566
Trade and other receivables	2,793,250	3,308,328
Cash and cash equivalents	5,188,623	2,710,496
Financial liabilities held at fair value through profit and loss*	(3,705,288)	(2,449,951)
Financial liabilities designated at fair value through profit or loss	(21,434)	(19,125)
Trade and other payables	(7,453,174)	(5,546,297)
Bank overdraft	(21,659)	(18,129)

*Prior year amounts have been restated to reflect the change in accounting presentation of certain warrants.

(ii) Income and expenses

	Unaudited JPMorgan Chase undertakings 30 June 2019 $'000	Unaudited JPMorgan Chase undertakings 30 June 2018 $'000
Trading gains/(losses)	788,172	(1,352,410)
Fees and commission income	5,580	5,283
Fees and commission expense	(4,529)	(4,428)
Interest income	11,276	2,356

21. Proposed appropriation of net results

Management propose to appropriate the current year profit to the retained earnings. No dividend was paid or proposed during the year.

By order of the Board of Directors

W.H. Kamphuijs

J.C.P. van Uffelen

Date:

Other Information

Profit appropriation according to the Articles of Association

The Articles of Association of the Company require that the allocation of profits be determined in a general meeting of the shareholders. The Management Board may resolve to pay interim dividends up to an amount which does not exceed the amount of the distributable part of the net assets. Dividends shall be paid after adoption of the annual financial statements from which it appears that payment of dividends is permissible.

INFORMATION RELATING TO THE GUARANTOR

History, Development and Organisational Structure

JPMorgan Chase Bank, National Association ("**JPMorgan Chase Bank, N.A.**") is a wholly-owned bank subsidiary of JPMorgan Chase & Co. ("**JPMorgan Chase**"), which is a leading global financial services firm and one of the largest banking institutions in the United States of America ("**U.S.**"), with operations worldwide. JPMorgan Chase Bank, N.A.'s main office is located in Columbus, Ohio, and it has U.S. branches in 38 states and Washington, D.C. as of 31 December 2019. JPMorgan Chase Bank, N.A. operates throughout the U.S. as well as through non-U.S. bank branches and subsidiaries, and representative offices. JPMorgan Chase Bank, N.A. either directly or through such branches, subsidiaries and offices offers a wide range of banking services to its U.S. and non-U.S. customers, including investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. Under the J.P. Morgan and Chase brands, JPMorgan Chase Bank, N.A. serves millions of customers in the U.S. and globally many of the world's most prominent corporate, institutional and government clients. JPMorgan Chase Bank, N.A.'s principal operating subsidiary outside the U.S. is J.P. Morgan Securities plc, a U.K.-based subsidiary.

JPMorgan Chase Bank, N.A. is a national banking association organised under U.S. federal law. JPMorgan Chase Bank, N.A. was initially organised as a New York banking corporation on 26 November 1968, and converted into a national banking association on 13 November 2004. JPMorgan Chase Bank, N.A. is chartered and its business is subject to examination and regulation by the Office of the Comptroller of the Currency (the "**OCC**"), a bureau of the U.S. Department of the Treasury. JPMorgan Chase Bank, N.A. is a member of the U.S. Federal Reserve System and its U.S. domestic deposits are insured by the Federal Deposit Insurance Corporation (the "**FDIC**"). Its U.S. Federal Reserve Bank Identification Number is 852218.

The powers of JPMorgan Chase Bank, N.A. are set forth in the U.S. National Bank Act and include all such incidental powers as shall be necessary to carry on the business of banking; by discounting and negotiating promissory notes, drafts, bills of exchange, and other evidences of debt; by receiving deposits; by buying and selling exchange, coin, and bullion; by loaning money on personal security; and by obtaining, issuing, and circulating notes.

The registered office of JPMorgan Chase Bank, N.A. is located at 1111 Polaris Parkway, Columbus, Ohio 43240, U.S.A. JPMorgan Chase Bank, N.A.'s principal place of business is located at 383 Madison Avenue, New York, New York 10179, U.S.A. and its telephone number is +1 212 270 6000.

Principal Activities and Principal Markets

JPMorgan Chase Bank, N.A.'s activities are organised and integrated with the businesses of JPMorgan Chase and consequently JPMorgan Chase Bank, N.A. is dependent on JPMorgan Chase (including subsidiaries of JPMorgan Chase & Co. and JPMorgan Chase Bank, N.A.) to conduct its business. A description of these businesses, and the products and services they provide to their respective client bases, follows.

Consumer & Community Banking

Consumer & Community Banking ("**CCB**") offers services to consumers and businesses through bank branches, automated teller machines, digital (including online and mobile) and telephone banking. CCB is organized into Consumer & Business Banking (including Consumer Banking/Chase Wealth Management and Business Banking), Home Lending (including Home Lending Production, Home Lending Servicing and Real Estate Portfolios) and Card, Merchant Services & Auto. Consumer & Business Banking offers deposit and investment products and services to consumers, and lending, deposit, and cash management and payment solutions to small businesses. Home Lending includes mortgage origination and servicing activities, as well as portfolios consisting of residential mortgages and home equity loans. Card, Merchant Services & Auto issues credit cards to consumers and small businesses, offers payment processing services to merchants, and originates and services auto loans and leases.

Corporate & Investment Bank

The Corporate & Investment Bank ("**CIB**"), which consists of Banking and Markets & Securities Services, offers a broad suite of investment banking, market-making, prime brokerage, and treasury and securities products and services to a global client base of corporations, investors, financial institutions, government and municipal entities. Banking offers a full range of investment banking products and services in all major capital markets, including advising on corporate strategy and structure, capital-raising in equity and debt markets, as well as loan origination and syndication. Banking also includes Treasury Services, which provides transaction services, consisting of cash management and liquidity solutions. Markets & Securities Services is a global market-maker in cash securities and derivative instruments, and also offers sophisticated risk management solutions, prime brokerage, and research. Markets & Securities Services also includes Securities Services, a leading global custodian which provides custody, fund accounting and administration, and securities lending products principally for asset managers, insurance companies and public and private investment funds.

Commercial Banking

Commercial Banking ("**CB**") provides comprehensive financial solutions, including lending, treasury services, investment banking and asset management products across three primary client segments: Middle Market Banking, Corporate Client Banking and Commercial Real Estate Banking. Middle Market Banking covers small business and midsized corporations, local governments and nonprofit clients. Corporate Client Banking covers large corporations. Commercial Real Estate Banking covers investors, developers, and owners of multifamily, office, retail, industrial and affordable housing properties.

Asset & Wealth Management

Asset & Wealth Management ("**AWM**"), with client assets of $3.2 trillion, is a global leader in investment and wealth management. AWM clients include institutions, high-net-worth individuals and retail investors in major markets throughout the world. AWM offers investment management across most major asset classes including equities, fixed income, alternatives and money market funds. AWM also offers multi-asset investment management, providing solutions for a broad range of clients' investment needs. For Wealth Management clients, AWM also provides retirement products and services, brokerage and banking services including trusts and estates, loans, mortgages and deposits. The majority of AWM's client assets are in actively managed portfolios.

Corporate

The Corporate segment consists of Treasury and Chief Investment Office ("**CIO**") and Other Corporate, which includes corporate staff functions and expense that is centrally managed. Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing JPMorgan Chase's liquidity, funding, capital, structural interest rate and foreign exchange risks. The major Other Corporate functions include Real Estate, Technology, Legal, Corporate Finance, Human Resources, Internal Audit, Risk Management, Compliance, Control Management, Corporate Responsibility and various Other Corporate groups.

Executive Officers and Directors

Executive Officers

The following persons are the Executive Officers of JPMorgan Chase Bank, N.A. as at the date of this base listing document. The business address of each Executive Officer is 383 Madison Avenue, New York, New York 10179, U.S.A.

Name	Title
James Dimon	Chief Executive Officer and President
Ashley Bacon	Chief Risk Officer
Lori A. Beer	Chief Information Officer
Mary Callahan Erdoes	Chief Executive Officer, Asset & Wealth Management
Stacey Friedman	General Counsel
Marianne Lake	Chief Executive Officer, Consumer Lending and Card Services
Robin Leopold	Head, Human Resources
Douglas B. Petno	Chief Executive Officer, Commercial Banking
Jennifer Piepszak	Chief Financial Officer
Daniel E. Pinto	Chief Executive Officer, Corporate & Investment Bank
Peter Scher	Head, Corporate Responsibility
Gordon A. Smith	Chief Executive Officer, Consumer & Community Banking

Directors

The following persons are the members of the Board of Directors of JPMorgan Chase Bank, N.A. as at the date of this base listing document. The business address of each Director is JPMorgan Chase Bank, N.A., 383 Madison Avenue, New York, New York 10179, U.S.A.

Name	Principal Occupation
Linda B. Bammann	Retired Deputy Head of Risk Management of JPMorgan Chase & Co.
James A. Bell*	Retired Executive Vice President of The Boeing Company
Stephen B. Burke, Non-Executive Chairman of the Board	Chief Executive Officer of NBCUniversal, LLC
Todd A. Combs	Investment Officer at Berkshire Hathaway Inc.
James S. Crown	Chairman and Chief Executive Officer of Henry Crown and Company
James Dimon	Chairman of the Board and Chief Executive Officer of JPMorgan Chase & Co.
Timothy P. Flynn	Retired Chairman and Chief Executive Officer of KPMG
Mellody Hobson	President of Ariel Investments, LLC
Laban P. Jackson, Jr.*	Chairman and Chief Executive Officer of Clear Creek Properties, Inc.
Michael A. Neal	Retired Vice Chairman of General Electric Company and Retired Chairman and Chief Executive Officer of GE Capital
Lee R. Raymond	Retired Chairman and Chief Executive Officer of ExxonMobil Corporation

* *On March 19, 2020, JPMorgan Chase & Co. announced that James A. Bell and Laban P. Jackson, Jr. have decided to retire from the Boards of Directors of JPMorgan Chase & Co. and JPMorgan Chase Bank, N.A. when their terms expire on the eve of JPMorgan Chase & Co.'s 2020 Annual Meeting of Shareholders.*

Financial Information

JPMorgan Chase Bank, N.A. prepares annual and semiannual consolidated financial statements in accordance with accounting principles generally accepted in the U.S. ("**U.S. GAAP**"). Additionally, where applicable, the accounting and financial reporting policies of JPMorgan Chase Bank, N.A. conform to the accounting and reporting guidelines prescribed by the U.S. bank regulatory authorities. The audited consolidated financial statements of JPMorgan Chase Bank, N.A. as at and for the years ended 31 December 2019 and 31 December 2018 comprising consolidated balance sheets at 31 December 2019 and 2018 and the related consolidated statements of income, changes in stockholder's equity, comprehensive income and cash flows for each of the three years ended 31 December 2019 are included in this base listing document. In addition, JPMorgan Chase Bank, N.A.'s annual and semiannual consolidated financial statements, as they become available, can be viewed on the websites of the Luxembourg Stock Exchange (*www.bourse.lu*), the U.K. National Storage Mechanism (*www.morningstar.co.uk/uk/nsm*) and Euronext Dublin (*www.ise.ie*). JPMorgan Chase Bank, N.A. files quarterly Consolidated Reports of Condition and Income for A Bank With Domestic and Foreign Offices ("**Call Reports**") with the U.S. Federal Financial Institutions Examination Council (the "**FFIEC**"). The non-confidential portions of the Call Reports can be viewed on the FFIEC's website at *https://cdr.ffiec.gov/public/*. The Call Reports are prepared in accordance with regulatory instructions issued by the FFIEC and not U.S. GAAP. The Call Reports are supervisory and regulatory documents; they are not primarily accounting documents, do not conform with U.S. GAAP and do not provide a complete range of financial disclosure about JPMorgan Chase Bank, N.A. The Call Reports are not incorporated by reference in, and shall not be deemed to be part of, this base listing document.

Risk Management

Risk is an inherent part of JPMorgan Chase's business activities. When JPMorgan Chase extends a consumer or wholesale loan, advises customers and clients on their investment decisions, makes markets in securities, or offers other products or services, JPMorgan Chase takes on some degree of risk.

JPMorgan Chase's overall objective is to manage its businesses, and the associated risks, in a manner that balances serving the interests of its clients, customers and investors and protects the safety and soundness of JPMorgan Chase.

JPMorgan Chase believes that effective risk management requires, among other things:

- Acceptance of responsibility, including identification and escalation of risk issues, by all individuals within JPMorgan Chase;

- Ownership of risk identification, assessment, data and management within each of the line of business ("LOBs") and Corporate; and

- Firmwide structures for risk governance.

JPMorgan Chase strives for continual improvement in its efforts to enhance controls, ongoing employee training and development, talent retention, and other measures. JPMorgan Chase follows a disciplined and balanced compensation framework with strong internal governance and independent oversight by the Board of Directors (the "Board"). The impact of risk and control issues is carefully considered in JPMorgan Chase's performance evaluation and incentive compensation processes.

Risk governance and oversight framework

JPMorgan Chase's risk management governance and oversight framework involves understanding drivers of risks, types of risks, and impacts of risks.

Drivers of Risks are factors that cause a risk to exist. Drivers of risks include the economic environment, regulatory and government policy, competitor and market evolution, business decisions, process and judgment error, deliberate wrongdoing, dysfunctional markets, and natural disasters.

Types of Risks are categories by which risks manifest themselves. Risks are generally categorized in the following four risk types:

- Strategic risk is the risk to earnings, capital, liquidity or reputation associated with poorly designed or failed business plans or inadequate response to changes in the operating environment.

- Credit and investment risk is the risk associated with the default or change in credit profile of a client, counterparty or customer; or loss of principal or a reduction in expected returns on investments, including consumer credit risk, wholesale credit risk, and investment portfolio risk.

- Market risk is the risk associated with the effect of changes in market factors, such as interest and foreign exchange rates, equity and commodity prices, credit spreads or implied volatilities, on the value of assets and liabilities held for both the short and long term.

- Operational risk is the risk associated with an adverse outcome resulting from inadequate or failed internal processes or systems; human factors; or external events impacting JPMorgan Chase's processes or systems; it includes compliance, conduct, legal, and estimations and model risk.

Impacts of Risks are consequences of risks, both quantitative and qualitative. There may be many consequences of risks manifesting, such as a reduction in earnings and capital, liquidity outflows, and fines or penalties, or qualitative impacts such as reputation damage, loss of clients and customers, and regulatory and enforcement actions.

JPMorgan Chase's risk governance and oversight framework is managed on a Firmwide basis. JPMorgan Chase has an Independent Risk Management ("IRM") function, which consists of the Risk Management and Compliance organizations. The Chief Executive Officer ("CEO") appoints, subject to approval by the Risk Committee of the Board ("Board Risk Committee"), JPMorgan Chase's Chief Risk Officer ("CRO") to lead the IRM organization and manage the risk governance structure of JPMorgan Chase. The framework is subject to approval by the Board Risk Committee in the form of the primary risk management policies. JPMorgan Chase's CRO oversees and delegates authorities to LOB CROs, Firmwide Risk Executives ("FREs"), and JPMorgan Chase's Chief Compliance Officer ("CCO"), who each establish Risk Management and Compliance organizations, set JPMorgan Chase's risk governance policies and standards, and define and oversee the implementation of JPMorgan Chase's risk governance. The LOB CROs are responsible for risks that arise in their LOBs, while FREs oversee risk areas that span across the individual LOB, functions and regions.

Three lines of defense

JPMorgan Chase relies upon each of its LOBs and Corporate areas giving rise to risk to operate within the parameters identified by the IRM function, and within its own management-identified risk and control standards. Each LOB and Treasury & CIO, including their aligned Operations, Technology and Control Management are JPMorgan Chase's "first line of defense" and own the identification of risks, as well as the design and execution of controls to manage those risks. The first line of defense is responsible for adherence to applicable laws, rules and regulations and for the implementation of the risk management structure (which may include policy, standards, limits, thresholds and controls) established by IRM.

The IRM function is independent of the businesses and is JPMorgan Chase's "second line of defense." The IRM function sets and oversees the risk management structure for Firmwide risk governance, and independently assesses and challenges the first line of defense risk management practices. IRM is also responsible for its own adherence to applicable laws, rules and regulations and for the implementation of policies and standards established by IRM with respect to its own processes.

The Internal Audit function operates independently from other parts of JPMorgan Chase and performs independent testing and evaluation of processes and controls across JPMorgan Chase as the "third line of defense." The Internal Audit Function is headed by the General Auditor, who reports to the Audit Committee and administratively to the CEO.

In addition, there are other functions that contribute to JPMorgan Chasewide control environment including Finance, Human Resources, Legal and Control Management.

Risk identification and ownership

Each LOB and Corporate area owns the ongoing identification of risks, as well as the design and execution of controls, inclusive of IRM-specified controls, to manage those risks. To support this activity, JPMorgan Chase has a risk identification process designed to facilitate their responsibility to identify material risks inherent to JPMorgan Chase, catalog them in a central repository and review the most material risks on a regular basis. The IRM function reviews and challenges the LOB and Corporate's identification of risks, maintains the central repository and provides the consolidated Firmwide results to JPMorgan Chasewide Risk Committee ("FRC") and Board Risk Committee.

Risk appetite

JPMorgan Chase's overall appetite for risk is governed by a "Risk Appetite" framework. The framework and JPMorgan Chase's risk appetite are set and approved by JPMorgan Chase's CEO, Chief Financial Officer ("**CFO**") and CRO. Quantitative parameters and qualitative factors are used to monitor and measure JPMorgan Chase's capacity to take risk consistent with its stated risk appetite. Qualitative factors have been established to assess select operational risks that impact JPMorgan Chase's reputation. Risk Appetite results are reported to the Board Risk Committee.

Risk governance and oversight structure

The independent status of the IRM function is supported by a governance structure that provides for escalation of risk issues to senior management, the FRC, and the Board of Directors, as appropriate.

JPMorgan Chase's Operating Committee, which consists of JPMorgan Chase's CEO, CRO, CFO and other senior executives, is accountable to and may refer matters to JPMorgan Chase's Board of Directors. The Operating Committee is responsible for escalating to the Board the information necessary to facilitate the Board's exercise of its duties.

Board oversight

JPMorgan Chase's Board of Directors provides oversight of risk. The Board Risk Committee is the principal committee that oversees risk matters. The Audit Committee oversees the control environment, and the Compensation & Management Development Committee oversees compensation and other management-related matters. Each committee of the Board oversees reputational risks and conduct risks within its scope of responsibility.

The JPMorgan Chase Bank, N.A. Board of Directors is responsible for the oversight of management of the bank. The JPMorgan Chase Bank, N.A. Board accomplishes this function acting directly and through the principal standing committees of JPMorgan Chase's Board of Directors. Risk and control oversight on behalf of JPMorgan Chase Bank, N.A. is primarily the responsibility of the Risk Committee and the Audit Committee, respectively, and, with respect to compensation and other management-related matters, the Compensation & Management Development Committee.

The Board Risk Committee assists the Board in its oversight of management's responsibility to implement a global risk management framework reasonably designed to identify, assess and manage JPMorgan Chase's risks. The Board Risk Committee's responsibilities include approval of applicable primary risk policies and review of certain associated frameworks, analysis and reporting established by management. Breaches in risk appetite and parameters issues that may have a material adverse impact on JPMorgan Chase, including capital and liquidity issues, and other significant risk-related matters are escalated to the Board Risk Committee, as appropriate.

The Audit Committee assists the Board in its oversight of management's responsibility to ensure that there is an effective system of controls reasonably designed to safeguard JPMorgan Chase's assets and income, ensure the integrity of JPMorgan Chase's financial statements, and maintain compliance with JPMorgan Chase's ethical standards, policies, plans and procedures, and with laws and regulations. It also assists the Board in its oversight of JPMorgan Chase's independent registered public accounting firm's qualifications, independence and performance, and of the performance of JPMorgan Chase's Internal Audit function.

*The Compensation & Management Development Committee ("**CMDC**")* assists the Board in its oversight of JPMorgan Chase's compensation principles and practices. The CMDC reviews and approves JPMorgan Chase's compensation and benefits programs. In addition, the Committee reviews Operating Committee members' performance against their goals, and approves their compensation awards. The CMDC also reviews the development of and succession for key executives, and provides oversight of JPMorgan Chase's culture, including reviewing updates from management regarding significant conduct issues and any related employee actions, including compensation actions.

The Public Responsibility Committee assists the Board in its oversight of JPMorgan Chase's positions and practices on public responsibility matters such as community investment, fair lending, sustainability, consumer practices and other public policy issues that reflect JPMorgan Chase's values and character and could impact JPMorgan Chase's reputation among all of its stakeholders. The Committee also provides guidance on these matters to management and the Board, as appropriate.

The Corporate Governance & Nominating Committee exercises general oversight with respect to the governance of the Board. The Committee evaluates and recommends to the Board corporate governance practices applicable to JPMorgan Chase. It also appraises the framework for assessing the Board's performance and self-evaluation.

Management oversight

JPMorgan Chase's senior management-level committees that are primarily responsible for key risk-related functions include:

JPMorgan Chasewide Risk Committee is JPMorgan Chase's highest management-level risk committee. It provides oversight of the risks inherent in JPMorgan Chase's businesses and serves as an escalation point for risk topics and issues raised by underlying committees and/or FRC members.

JPMorgan Chasewide Control Committee is an escalation committee for senior management to review and discuss JPMorgan Chasewide operational risk environment including identified issues, operational risk metrics and significant events that have been escalated.

JPMorgan Chasewide Fiduciary Risk Governance Committee provides oversight of the governance framework for fiduciary risk or fiduciary-related conflict of interest risk inherent in each of JPMorgan Chase's LOBs. The FFRGC approves risk or compliance policy exceptions and reviews periodic reports from the LOBs and control functions including fiduciary metrics and control trends.

JPMorgan Chasewide Estimations Risk Committee provides oversight of the governance framework for quantitative and qualitative estimations and models as specified in the Estimations and Model Risk Management Policy. The FERC also has responsibility to set the prioritization of estimations and model risk activities and drive consistency through review of LOB activities and escalated issues.

The Conduct Risk Steering Committee is responsible for reviewing, calibrating and consolidating Firmwide Conduct Risk Appetite and setting overall direction for JPMorgan Chase's Conduct Risk Program.

Line of Business and Regional Risk Committees are responsible for providing oversight of the governance, limits, and controls that are in place through the scope of their activities. These committees review the ways in which the particular LOB or the business operating in a particular region could be exposed to adverse outcomes with a focus on identifying, accepting, escalating and/or requiring remediation of matters brought to these committees.

Line of Business and Corporate Control Committees oversee the control environment of their respective business or function. As part of that mandate, they are responsible for reviewing indicators of elevated or emerging risks and other data that may impact the quality and stability of the processes in a business or function, addressing key operational risk issues, focusing on processes with control concerns and overseeing control remediation.

Line of Business Reputation Risk Committees review and assess transactions, activities and clients that have the potential for material reputation risk to JPMorgan Chase.

JPMorgan Chasewide Asset and Liability Committee is responsible for overseeing JPMorgan Chase's asset and liability management ("ALM") activities and the management of liquidity risk, balance sheet, interest rate risk, and capital risk. The ALCO is supported by the Treasurer Committee and the Capital Governance Committee. The Treasurer Committee is responsible for monitoring JPMorgan Chase's overall balance sheet, liquidity risk and interest rate risk. The Capital Governance Committee is responsible for overseeing and providing guidance concerning the effectiveness of JPMorgan Chase's capital framework, capital policies and regulatory capital implementation.

JPMorgan Chasewide Valuation Governance Forum is composed of senior finance and risk executives and is responsible for overseeing the management of fair value risks arising from valuation activities conducted across JPMorgan Chase.

Supervision and regulation

JPMorgan Chase Bank, N.A. operates and is subject to regulation under federal and state banking and other laws in the United States, including the National Banking Act and the Federal Deposit Insurance Act, as well as the applicable laws of each of the various jurisdictions outside the United States in which it does business. For additional information concerning the supervision and regulation of JPMorgan Chase Bank, N.A. and the significant laws and regulations to which it is subject, see "**Supervision and regulation**" in Note 1 to the Consolidated Financial Statements of JPMorgan Chase Bank, N.A. for the year ended 31 December 2019 included in this base listing document.

Financial Information

Selected financial information

The selected consolidated financial data set forth in the below table have been extracted from the audited Consolidated Financial Statements of JPMorgan Chase Bank, N.A. for the year ended 31 December 2019. This information should be read in conjunction with the notes to the Consolidated Financial Statements and the other detailed financial information concerning JPMorgan Chase Bank, N.A.

Selected income statement data	**Year ended 31 December**	
(in USD millions)	**2019**	**2018**
Total net revenue	U.S.$105,583	U.S.$99,884
Provision for credit losses	5,593	4,872
Total noninterest expense	60,231	57,634
Income before income tax expense	39,759	37,378
Net income	31,339	28,953

Selected balance sheet data	**Year ended 31 December**	
(in USD millions)	**2019**	**2018**
Trading assets	U.S.$263,504	U.S.$264,533
Investment Securities	397,203	260,146
Loans, net of allowance for loan losses	945,109	969,708
Total assets	2,337,646	2,291,480
Deposits	1,650,488	1,557,411
Long-term debt	121,719	110,236
Total stockholders' equity	246,097	250,829

Independent Accountants

The consolidated financial statements of JPMorgan Chase Bank, N.A. as of 31 December 2019 and 2018 and for each of the three years ended 31 December 2019, included in this document, have been audited by PricewaterhouseCoopers LLP, independent accountants, as stated in their report appearing herein.

Litigation

For a summary of certain significant legal proceedings involving JPMorgan Chase Bank, N.A., see Note 28 to the Consolidated Financial Statements of JPMorgan Chase Bank, N.A. for the year ended 31 December 2019 included in this base listing document.

Credit Ratings

The structured products to be offered by the Issuer and guaranteed by JPMorgan Chase Bank, N.A. will not be rated, unless otherwise specified in the launch announcement and supplemental listing document relating to such structured products. The following table, which is presented solely for the convenience of prospective purchasers of structured products of the Issuer, sets forth the credit ratings for JPMorgan Chase Bank, N.A.'s long term debt (as of the day immediately preceding the date of this base listing document). Credit ratings are determined by the rating agencies based Moody_E_Rights Issue Prospectusupon information furnished to them by the relevant obligor Moody_E_Rights Issue Prospectusas well as information obtained by the rating agencies from other sources. Credit ratings are not a recommendation to purchase, hold or sell any security, Moody_E_Rights Issue Prospectusand may be changed, superseded or withdrawn at any time by Moody_E_Rights Issue Prospectusany of the rating agencies. **Prospective purchasers should check the current credit ratings of JPMorgan Chase Bank, N.A. before purchasing any structured products of the Issuer.** Information concerning the current ratings of JPMorgan Chase Bank, N.A.'s debt can be obtained from the relevant rating agencies and can also be viewed on JPMorgan Chase & Co.'s investor relations website at *https://www.jpmorganchase.com/corporate/investor-relations/fixed-income.htm.* Neither the Issuer nor JPMorgan Chase Bank, N.A. undertakes to update the information set forth in the below table.

Rating agency	**Current credit ratings of the guarantor's long-term debt (as of the day immediately preceding the date of this base listing document)**
S&P Global Ratings	A+ (stable outlook)
Moody's Investors Service, Inc.	Aa2 (stable outlook)

Additional Information

Additional information concerning JPMorgan Chase Bank, N.A., including the Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K of JPMorgan Chase & Co. filed by JPMorgan Chase & Co. with the U.S. Securities and Exchange Commission ("**Periodic Reports**"), as they become available, can be viewed on the SEC's website at *www.sec.gov.* Those reports and additional information concerning JPMorgan Chase Bank, N.A. can also be viewed on JPMorgan Chase & Co.'s investor relations website at *https://jpmorganchaseco.gcs-web.com/financial-information/sec-filings.* No websites that are cited or referred to herein shall be deemed to form part of, or to be incorporated by reference in, this base listing document. **The Periodic Reports are not included or incorporated by reference in and shall not be deemed to be part of, this base listing document.**

JPMORGAN CHASE BANK, NATIONAL ASSOCIATION

(a wholly-owned subsidiary of JPMorgan Chase & Co.)

CONSOLIDATED FINANCIAL STATEMENTS

For the three years ended December 31, 2019

FOR THE THREE YEARS ENDED DECEMBER 31, 2019

pwc

Report of Independent Auditors

To the Board of Directors and Shareholder of JPMorgan Chase Bank, National Association

We have audited the accompanying consolidated financial statements of JPMorgan Chase Bank, National Association and its subsidiaries, which comprise the consolidated balance sheets as of December 31, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in stockholder's equity and cash flows for each of the three years in the period ended December 31, 2019.

Management's Responsibility for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on the consolidated financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the consolidated financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the Company's preparation and fair presentation of the consolidated financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of JPMorgan Chase Bank, National Association and its subsidiaries as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 in accordance with accounting principles generally accepted in the United States of America.

PricewaterhouseCoopers LLP

February 25, 2020

PricewaterhouseCoopers LLP • 300 Madison Avenue • New York, NY 10017

Consolidated statements of income

JPMorgan Chase Bank, National Association
(a wholly-owned subsidiary of JPMorgan Chase & Co.)

Year ended December 31, (in millions)	2019	2018	2017
Revenue			
Investment banking fees	**$ 3,217**	$ 3,368	$ 3,419
Principal transactions	**11,564**	11,814	9,883
Lending- and deposit-related fees	**6,368**	6,057	5,941
Asset management, administration and commissions	**11,977**	11,029	10,358
Investment securities gains/(losses)	**253**	(395)	(73)
Mortgage fees and related income	**2,036**	1,253	1,616
Card income	**5,304**	4,989	4,433
Other income	**6,206**	5,612	4,341
Noninterest revenue	**46,925**	43,727	39,918
Interest income[a]	**75,666**	68,781	58,820
Interest expense[a]	**17,008**	12,624	7,846
Net interest income	**58,658**	56,157	50,974
Total net revenue	**105,583**	99,884	90,892
Provision for credit losses	**5,593**	4,872	5,298
Noninterest expense			
Compensation expense	**28,257**	26,541	24,933
Occupancy expense	**4,132**	3,801	3,504
Technology, communications and equipment expense	**9,400**	8,404	7,328
Professional and outside services	**5,917**	5,839	5,420
Marketing	**3,421**	3,145	2,793
Other expense	**9,104**	9,904	9,448
Total noninterest expense	**60,231**	57,634	53,426
Income before income tax expense	**39,759**	37,378	32,168
Income tax expense	**8,420**	8,425	12,528
Net income	**$ 31,339**	$ 28,953	$ 19,640

(a) During the first half of 2019, the Bank implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation. Refer to Note 8 for additional information.

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of comprehensive income

JPMorgan Chase Bank, National Association
(a wholly-owned subsidiary of JPMorgan Chase & Co.)

Year ended December 31, (in millions)		2019		2018		2017
Net income	**$**	**31,339**	$	28,953	$	19,640
Other comprehensive income/(loss), after-tax						
Unrealized gains/(losses) on investment securities		**2,869**		(1,806)		687
Translation adjustments, net of hedges		**(4)**		57		(309)
Fair value hedges		**—**		1		NA
Cash flow hedges		**167**		(198)		176
Defined benefit pension and OPEB plans		**656**		(1,969)		11
DVA on fair value option elected liabilities		**(319)**		321		(55)
Total other comprehensive income/(loss), after-tax		**3,369**		(3,594)		510
Comprehensive income	**$**	**34,708**	$	25,359	$	20,150

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated balance sheets

JPMorgan Chase Bank, National Association
(a wholly-owned subsidiary of JPMorgan Chase & Co.)

December 31, (in millions, except share data)		2019		2018
Assets				
Cash and due from banks	**$**	**21,164**	$	21,611
Deposits with banks		**240,953**		255,135
Federal funds sold and securities purchased under resale agreements (included **$5,682** and $4,370 at fair value)		**211,397**		275,476
Securities borrowed (included **$6,237** and $5,105 at fair value)		**38,776**		45,335
Trading assets (included assets pledged of **$52,148** and $44,189)		**263,504**		264,533
Investment securities (included **$349,663** and $228,712 at fair value and assets pledged of **$16,139** and $17,778)		**397,203**		260,146
Loans (included **$7,104** and $3,151 at fair value)		**958,215**		983,133
Allowance for loan losses		**(13,106)**		(13,425)
Loans, net of allowance for loan losses		**945,109**		969,708
Accrued interest and accounts receivable		**54,232**		49,966
Premises and equipment		**25,258**		14,700
Goodwill, MSRs and other intangible assets		**44,986**		45,970
Other assets (included **$6,480** and $5,708 at fair value and assets pledged of **$1,374** and $1,514)		**95,064**		88,900
Total assets[(a)]	**$**	**2,337,646**	$	2,291,480
Liabilities				
Deposits (included **$28,662** and $23,371 at fair value)	**$**	**1,650,488**	$	1,557,411
Federal funds purchased and securities loaned or sold under repurchase agreements (included **$5,501** and $5,215 at fair value)		**86,549**		107,809
Short-term borrowings (included **$3,865** and $4,594 at fair value)		**8,521**		21,846
Trading liabilities		**87,643**		113,887
Accounts payable and other liabilities (included **$6,483** and $5,757 at fair value)		**118,815**		109,152
Beneficial interests issued by consolidated variable interest entities		**17,814**		20,310
Long-term debt (included **$40,271** and $26,553 at fair value)		**121,719**		110,236
Total liabilities[(a)]		**2,091,549**		2,040,651
Commitments and contingencies (refer to Notes 26, 27 and 28)				
Stockholder's equity				
Preferred stock ($1 par value; authorized 15,000,000 shares: issued **0** shares)		**—**		—
Common stock ($12 par value; authorized 200,000,000 shares; issued **168,971,750** shares)		**2,028**		2,028
Additional paid-in capital		**110,297**		123,792
Retained earnings		**132,016**		126,622
Accumulated other comprehensive income/(loss)		**1,756**		(1,613)
Total stockholder's equity		**246,097**		250,829
Total liabilities and stockholder's equity	**$**	**2,337,646**	$	2,291,480

(a) The following table presents information on assets and liabilities related to VIEs that are consolidated by the Bank at December 31, 2019 and 2018. The assets of the consolidated VIEs are used to settle the liabilities of those entities. The holders of the beneficial interests do not have recourse to the general credit of the Bank. The assets and liabilities in the table below include third-party assets and liabilities of consolidated VIEs and exclude intercompany balances that eliminate in consolidation. Refer to Note 15 for a further discussion.

December 31, (in millions)		2019		2018
Assets				
Trading assets	**$**	**2,183**	$	1,910
Loans		**42,931**		59,456
All other assets		**713**		835
Total assets	**$**	**45,827**	$	62,201
Liabilities				
Beneficial interests issued by consolidated variable interest entities	**$**	**17,814**	$	20,310
All other liabilities		**371**		232
Total liabilities	**$**	**18,185**	$	20,542

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of changes in stockholder's equity

JPMorgan Chase Bank, National Association
(a wholly-owned subsidiary of JPMorgan Chase & Co.)

Year ended December 31, (in millions)	2019	2018	2017
Common stock			
Balance at January 1 and December 31	**$ 2,028**	$ 2,028	$ 2,028
Additional paid-in capital			
Balance at January 1	**123,792**	118,898	114,740
Cash capital contribution from JPMorgan Chase & Co.	**–**	1,094	4,000
Return of capital to JPMorgan Chase & Co.	**(13,500)**	–	–
Adjustments to capital due to transactions with JPMorgan Chase & Co.	**5**	3,800	158
Balance at December 31	**110,297**	123,792	118,898
Retained earnings			
Balance at January 1	**126,622**	123,849	117,209
Cumulative effect of change in accounting principles	**55**	(680)	–
Net income	**31,339**	28,953	19,640
Cash dividends paid to JPMorgan Chase & Co.	**(26,000)**	(25,500)	(13,000)
Balance at December 31	**132,016**	126,622	123,849
Accumulated other comprehensive income			
Balance at January 1	**(1,613)**	1,375	865
Cumulative effect of change in accounting principles	**–**	606	–
Adjustments to AOCI due to transactions with JPMorgan Chase & Co.	**–**	(1623)	–
Other comprehensive income/(loss), after-tax	**3,369**	(1,971)	510
Balance at December 31	**1,756**	(1,613)	1,375
Total stockholder's equity	**$ 246,097**	$ 250,829	$ 246,150

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of cash flows

JPMorgan Chase Bank, National Association
(a wholly-owned subsidiary of JPMorgan Chase & Co.)

Year ended December 31, (in millions)	**2019**	2018	2017
Operating activities			
Net income	**$ 31,339**	$ 28,953	$ 19,640
Adjustments to reconcile net income to net cash provided by/(used in) operating activities:			
Provision for credit losses	**5,593**	4,872	5,298
Depreciation and amortization	**8,102**	7,541	6,000
Deferred tax expense/(benefit)	**1,021**	1,600	(52)
Other	**(253)**	395	73
Originations and purchases of loans held-for-sale	**(66,375)**	(101,476)	(94,628)
Proceeds from sales, securitizations and paydowns of loans held-for-sale	**74,577**	92,788	93,264
Net change in:			
Trading assets	**(12,589)**	(17,348)	9,926
Securities borrowed	**6,691**	(6,304)	(6,462)
Accrued interest and accounts receivable	**(4,416)**	(1,450)	(7,702)
Other assets	**(26,837)**	(8,942)	(681)
Trading liabilities	**(7,933)**	14,521	(28,093)
Accounts payable and other liabilities	**(4,076)**	10,888	(4,289)
Other operating adjustments	**6,607**	1,094	4,346
Net cash provided by/(used in) operating activities	**11,451**	27,132	(3,360)
Investing activities			
Net change in:			
Federal funds sold and securities purchased under resale agreements	**64,083**	(120,260)	17,315
Held-to-maturity securities:			
Proceeds from paydowns and maturities	**3,423**	2,945	4,563
Purchases	**(13,427)**	(9,368)	(2,349)
Available-for-sale securities:			
Proceeds from paydowns and maturities	**51,795**	36,912	55,583
Proceeds from sales	**69,953**	45,953	89,418
Purchases	**(242,149)**	(95,090)	(105,134)
Proceeds from sales and securitizations of loans held-for-investment	**62,070**	29,826	15,791
Other changes in loans, net	**(53,553)**	(81,238)	(62,345)
All other investing activities, net	**(3,249)**	(1,525)	308
Net cash provided by/(used in) investing activities	**(61,054)**	(191,845)	13,150
Financing activities			
Net change in:			
Deposits	**103,887**	24,191	41,578
Federal funds purchased and securities loaned or sold under repurchase agreements	**(21,364)**	13,336	19,657
Short-term borrowings	**(13,964)**	12,693	(4,412)
Beneficial interests issued by consolidated variable interest entities	**4,223**	1,680	(987)
Proceeds from long-term borrowings	**45,147**	37,441	22,098
Payments of long-term borrowings	**(43,370)**	(51,179)	(48,770)
Cash capital contribution from JPMorgan Chase & Co.	**—**	1,094	4,000
Return of capital to JPMorgan Chase & Co.	**(13,500)**	—	—
Dividends paid to JPMorgan Chase & Co.	**(26,000)**	(25,500)	(13,000)
All other financing activities, net	**123**	613	1,698
Net cash provided by financing activities	**35,182**	14,369	21,862
Effect of exchange rate changes on cash and due from banks and deposits with banks	**(208)**	(2,807)	8,045
Net increase/(decrease) in cash and due from banks and deposits with banks	**(14,629)**	(153,151)	39,697
Cash and due from banks and deposits with banks at the beginning of the period	**276,746**	429,897	390,200
Cash and due from banks and deposits with banks at the end of the period	**$ 262,117**	$ 276,746	$ 429,897
Cash interest paid	**$ 17,004**	$ 11,565	$ 7,745
Cash income taxes paid, net[(a)]	**6,200**	3,183	5,589

(a) Includes $4.7 billion, $1.7 billion and $3.4 billion paid to JPMorgan Chase & Co. in 2019, 2018 and 2017, respectively. Refer to Note 23 for discussion of income taxes.

The Notes to Consolidated Financial Statements are an integral part of these statements.

Note 1 – Overview and basis of presentation

JPMorgan Chase Bank, National Association, ("JPMorgan Chase Bank, N.A." or the "Bank"), is a wholly-owned bank subsidiary of JPMorgan Chase & Co. ("JPMorgan Chase"), which is a leading global financial services firm and one of the largest banking institutions in the United States of America ("U.S."), with operations worldwide. The Bank is a national banking association that is chartered by the Office of the Comptroller of the Currency ("OCC"), a bureau of the U.S. Department of the Treasury. The Bank's main office is located in Columbus, Ohio, and it has U.S. branches in 38 states and Washington, D.C. as of December 31, 2019. The Bank operates nationally as well as through non-U.S. bank branches and subsidiaries, and representative offices. The Bank either directly or through such branches, subsidiaries and offices offers a wide range of banking services to its U.S. and non-U.S. customers including investment banking, financial services for consumers and small business, commercial banking, financial transaction processing and asset management. Under the J.P. Morgan and Chase brands, the Bank serves millions of customers in the U.S. and many of the world's most prominent corporate, institutional and government clients. The Bank's principal operating subsidiary in the United Kingdom ("U.K.") is J.P. Morgan Securities plc.

The JPMorgan Chase Bank, N.A. Board of Directors is responsible for the oversight of management of JPMorgan Chase Bank, N.A. The JPMorgan Chase Bank, N.A. Board of Directors accomplishes this function acting directly and through the principal standing committees of JPMorgan Chase's Board of Directors. Risk and control oversight is primarily the responsibility of the Risk Committee and the Audit Committee, respectively, and, with respect to compensation and other management-related matters, the Compensation & Management Development Committee. Each committee of JPMorgan Chase's Board of Directors oversees reputational risks and conduct risks within its scope of responsibility.

The accounting and financial reporting policies of the Bank and its subsidiaries conform to accounting principles generally accepted in the U.S. ("U.S. GAAP"). Additionally, where applicable, the policies conform to the accounting and reporting guidelines prescribed by regulatory authorities.

Certain amounts reported in prior periods have been reclassified to conform with the current presentation.

Internal merger of legal entities under common control

Merger with Chase Bank USA, National Association ("Chase Bank USA, N.A."). On May 18, 2019, JPMorgan Chase completed the merger of Chase Bank USA, N.A. with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank (the "Merger"). Chase Bank USA, N.A. was formerly a wholly-owned banking subsidiary of JPMorgan Chase and its principal credit card-issuing bank. JPMorgan Chase Bank, N.A. issued 20.2 million shares of its common stock to JPMorgan Chase in exchange for the net assets of Chase Bank USA, N.A. The Merger is part of JPMorgan Chase's legal entity simplification strategy.

In accordance with U.S. GAAP, the Merger was accounted for as a transaction between legal entities under common control and was considered a change in the reporting entity. Therefore, the net assets of Chase Bank USA, N.A. were merged at their carrying value. The impacts of the Merger are included in the Consolidated Financial Statements, retrospectively, for all periods presented.

Return of Capital

In connection with its regulatory capital management strategy, the Bank distributed $13.5 billion to JPMorgan Chase as a return of capital. Refer to Note 25 for further discussion of regulatory capital requirements.

Supervision and regulation

The Bank is subject to regulation under U.S. federal and state laws, as well as the applicable laws of the jurisdictions outside the U.S. in which the Bank does business.

In the U.S., the Bank is supervised and regulated by the OCC and, with respect to certain matters, by the Federal Deposit Insurance Corporation (the "FDIC"). J.P. Morgan Securities plc is regulated by the U.K. Prudential Regulation Authority (the "PRA") and the U.K. Financial Conduct Authority (the "FCA").

Restrictions on transactions with affiliates. The Bank and its subsidiaries are subject to restrictions imposed by federal law on extensions of credit to, investments in stock or securities of, and derivatives, securities lending and certain other transactions with, JPMorgan Chase & Co. and certain other affiliates. These restrictions prevent JPMorgan Chase & Co. and other affiliates from borrowing from such subsidiaries unless the loans are secured in specified amounts and comply with certain other requirements.

Refer to "Supervision and regulation" in the Annual Report on Form 10-K of JPMorgan Chase for the year ended December 31, 2019, filed with the U.S. Securities and Exchange Commission on February 25, 2020 for additional information concerning the supervision and regulation of JPMorgan Chase Bank, N.A.

Consolidation

The Consolidated Financial Statements include the accounts of the Bank and other entities in which the Bank has a controlling financial interest. All material intercompany balances and transactions have been eliminated.

Assets held for clients in an agency or fiduciary capacity by the Bank are not assets of the Bank and are not included on the Consolidated balance sheets.

The Bank determines whether it has a controlling financial interest in an entity by first evaluating whether the entity is a voting interest entity or a variable interest entity.

Voting interest entities
Voting interest entities are entities that have sufficient equity and provide the equity investors voting rights that enable them to make significant decisions relating to the entity's operations. For these types of entities, the Bank's determination of whether it has a controlling interest is primarily based on the amount of voting equity interests held. Entities in which the Bank has a controlling financial interest, through ownership of the majority of the entities' voting equity interests, or through other contractual rights that give the Bank control, are consolidated by the Bank.

Investments in companies in which the Bank has significant influence over operating and financing decisions (but does not own a majority of the voting equity interests) are accounted for (i) in accordance with the equity method of accounting (which requires the Bank to recognize its proportionate share of the entity's net earnings), or (ii) at fair value if the fair value option was elected. These investments are generally included in other assets, with income or loss included in noninterest revenue.

Certain Bank-sponsored asset management funds are structured as limited partnerships or limited liability companies. The Bank does not generally consolidate these funds as the Bank is not the general partner or managing member and therefore does not have a controlling financial interest.

Variable interest entities
VIEs are entities that, by design, either (1) lack sufficient equity to permit the entity to finance its activities without additional subordinated financial support from other parties, or (2) have equity investors that do not have the ability to make significant decisions relating to the entity's operations through voting rights, or do not have the obligation to absorb the expected losses, or do not have the right to receive the residual returns of the entity.

The most common type of VIE is a special purpose entity ("SPE"). SPEs are commonly used in securitization transactions in order to isolate certain assets and distribute the cash flows from those assets to investors. The basic SPE structure involves a company selling assets to the SPE; the SPE funds the purchase of those assets by issuing securities to investors. The legal documents that govern the transaction specify how the cash earned on the assets must be allocated to the SPE's investors and other parties that have rights to those cash flows. SPEs are generally structured to insulate investors from claims on the SPE's assets by creditors of other entities, including the creditors of the seller of the assets.

The primary beneficiary of a VIE (i.e., the party that has a controlling financial interest) is required to consolidate the assets and liabilities of the VIE. The primary beneficiary is the party that has both (1) the power to direct the activities of the VIE that most significantly impact the VIE's economic performance; and (2) through its interests in the VIE, the obligation to absorb losses or the right to receive benefits from the VIE that could potentially be significant to the VIE.

To assess whether the Bank has the power to direct the activities of a VIE that most significantly impact the VIE's economic performance, the Bank considers all the facts and circumstances, including its role in establishing the VIE and its ongoing rights and responsibilities. This assessment includes, first, identifying the activities that most significantly impact the VIE's economic performance; and second, identifying which party, if any, has power over those activities. In general, the parties that make the most significant decisions affecting the VIE (such as asset managers, collateral managers, servicers, or owners of call options or liquidation rights over the VIE's assets) or have the right to unilaterally remove those decision-makers are deemed to have the power to direct the activities of a VIE.

To assess whether the Bank has the obligation to absorb losses of the VIE or the right to receive benefits from the VIE that could potentially be significant to the VIE, the Bank considers all of its economic interests, including debt and equity investments, servicing fees, and derivatives or other arrangements deemed to be variable interests in the VIE. This assessment requires that the Bank apply judgment in determining whether these interests, in the aggregate, are considered potentially significant to the VIE. Factors considered in assessing significance include: the design of the VIE, including its capitalization structure; subordination of interests; payment priority; relative share of interests held across various classes within the VIE's capital structure; and the reasons why the interests are held by the Bank.

The Bank performs on-going reassessments of: (1) whether entities previously evaluated under the majority voting-interest framework have become VIEs, based on certain events, and are therefore subject to the VIE consolidation framework; and (2) whether changes in the facts and circumstances regarding the Bank's involvement with a VIE cause the Bank's consolidation conclusion to change.

Refer to Note 15 for further discussion of the Bank's VIEs.

Revenue recognition

Interest income
The Bank recognizes interest income on loans, debt securities, and other debt instruments, generally on a level-yield basis, based on the underlying contractual rate. Refer to Note 8 for further discussion of interest income.

Revenue from contracts with customers
The Bank recognizes noninterest revenue from certain contracts with customers, in investment banking fees, deposit-related fees, asset management administration and commissions, and components of card income, when the Bank's related performance obligations are satisfied. Refer to Note 7 for further discussion of the Bank's revenue from contracts with customers.

Principal transactions revenue
The Bank carries a portion of its assets and liabilities at fair value. Changes in fair value are reported primarily in principal transactions revenue. Refer to Notes 3 and 4 for further discussion of fair value measurement. Refer to Note 7 for further discussion of principal transactions revenue.

Use of estimates in the preparation of consolidated financial statements

The preparation of the Consolidated Financial Statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, revenue and expense, and disclosures of contingent assets and liabilities. Actual results could be different from these estimates.

Foreign currency translation

The Bank revalues assets, liabilities, revenue and expense denominated in non-U.S. currencies into U.S. dollars using applicable exchange rates.

Gains and losses relating to translating functional currency financial statements for U.S. reporting are included in the Consolidated statements of comprehensive income. Gains and losses relating to nonfunctional currency transactions, including non-U.S. operations where the functional currency is the U.S. dollar, are reported in the Consolidated statements of income.

Offsetting assets and liabilities

U.S. GAAP permits entities to present derivative receivables and derivative payables with the same counterparty and the related cash collateral receivables and payables on a net basis on the Consolidated balance sheets when a legally enforceable master netting agreement exists. U.S. GAAP also permits securities sold and purchased under repurchase agreements and securities borrowed or loaned under securities loan agreements to be presented net when specified conditions are met, including the existence of a legally enforceable master netting agreement. The Bank has elected to net such balances when the specified conditions are met.

The Bank uses master netting agreements with third parties and affiliates to mitigate counterparty credit risk in certain transactions, including derivative contracts, resale, repurchase, securities borrowed and securities loaned agreements. A master netting agreement is a single agreement with a counterparty that permits multiple transactions governed by that agreement to be terminated or accelerated and settled through a single payment in a single currency in the event of a default (e.g., bankruptcy, failure to make a required payment or securities transfer or deliver collateral or margin when due). Upon the exercise of derivatives termination rights by the non-defaulting party (i) all transactions are terminated, (ii) all transactions are valued and the positive values of "in the money" transactions are netted against the negative values of "out of the money" transactions and (iii) the only remaining payment obligation is of one of the parties to pay the netted termination amount. Upon exercise of default rights under repurchase agreements and securities loan agreements in general (i) all transactions are terminated and accelerated, (ii) all values of securities or cash held or to be delivered are calculated, and all such sums are netted against each other and (iii) the only remaining payment obligation is of one of the parties to pay the netted termination amount.

Typical master netting agreements for these types of transactions also often contain a collateral/margin agreement that provides for a security interest in, or title transfer of, securities or cash collateral/margin to the party that has the right to demand margin (the "demanding party"). The collateral/margin agreement typically requires a party to transfer collateral/margin to the demanding party with a value equal to the amount of the margin deficit on a net basis across all transactions governed by the master netting agreement, less any threshold. The collateral/margin agreement grants to the demanding party, upon default by the counterparty, the right to set-off any amounts payable by the counterparty against any posted collateral or the cash equivalent of any posted collateral/margin. It also grants to the demanding party the right to liquidate collateral/margin and to apply the proceeds to an amount payable by the counterparty.

Refer to Note 6 for further discussion of the Bank's derivative instruments. Refer to Note 12 for further discussion of the Bank's securities financing agreements.

Statements of cash flows

For the Bank's Consolidated statements of cash flows, cash is defined as those amounts included in cash and due from banks and deposits with banks.

Accounting standards adopted January 1, 2018

Effective January 1, 2018, the Bank adopted several accounting standards resulting in a net decrease of $680 million to retained earnings and a net increase of $606 million to AOCI. Certain of these standards were adopted retrospectively and, accordingly, prior period amounts were revised. The adoption of the recognition and measurement guidance resulted in $456 million of fair value gains in the first half of 2018, recorded in total net revenue, on certain equity investments that were previously held at cost.

Notes to consolidated financial statements

JPMorgan Chase Bank, National Association
(a wholly-owned subsidiary of JPMorgan Chase & Co.)

Significant accounting policies

The following table identifies the Bank's other significant accounting policies and the Note and page where a detailed description of each policy can be found.

Fair value measurement	Note 3	Page 13
Fair value option	Note 4	Page 30
Derivative instruments	Note 6	Page 35
Noninterest revenue and noninterest expense	Note 7	page 49
Interest income and Interest expense	Note 8	Page 52
Pension and other postretirement employee benefit plans	Note 9	page 52
Employee share-based incentives	Note 10	page 58
Investment securities	Note 11	Page 60
Securities financing activities	Note 12	Page 66
Loans	Note 13	page 69
Allowance for credit losses	Note 14	page 89
Variable interest entities	Note 15	Page 94
Goodwill and Mortgage servicing rights	Note 16	page 102
Premises and equipment	Note 17	page 104
Leases	Note 19	page 105
Long-term debt	Note 20	Page 107
Related party transactions	Note 21	Page 108
Income taxes	Note 23	Page 112
Off-balance sheet lending-related financial instruments, guarantees and other commitments	Note 26	Page 118
Litigation	Note 28	page 125

Note 2 – ACCOUNTING AND REPORTING DEVELOPMENTS

Financial Accounting Standards Board ("FASB") Standards Adopted January 1, 2019

Standard	Summary of guidance	Effects on financial statements
Leases *Issued February 2016*	• Requires lessees to recognize all leases longer than twelve months on the Consolidated balance sheets as a lease liability with a corresponding right-of-use asset. • Requires lessees and lessors to classify most leases using principles similar to existing lease accounting, but eliminates the "bright line" classification tests. • Expands qualitative and quantitative leasing disclosures.	• Adopted January 1, 2019. • The Bank elected the available practical expedient to not reassess whether existing contracts contain a lease or whether classification or unamortized initial lease costs would be different under the new lease guidance. The Bank elected the modified retrospective transition method, through a cumulative-effect adjustment to retained earnings without revising prior periods. • Refer to Note 19 for further information.

FASB Standards Issued but not adopted as of December 31, 2019

Standard	Summary of guidance
Financial Instruments – Credit Losses ("CECL") *Issued June 2016*	• Establishes a single allowance framework for all financial assets carried at amortized cost and certain off-balance sheet credit exposures. This framework requires that management's estimate reflects credit losses over the full remaining expected life and considers expected future changes in macroeconomic conditions. • Eliminates existing guidance for PCI loans, and requires recognition of the nonaccretable difference as an increase to the allowance for expected credit losses on financial assets purchased with more than insignificant credit deterioration since origination, with a corresponding increase in the recorded investment of the related loans. • Requires inclusion of expected recoveries, limited to the cumulative amount of prior write-offs, when estimating the allowance for credit losses for in scope financial assets (including collateral dependent assets). • Amends existing impairment guidance for AFS securities to incorporate an allowance, which will allow for reversals of credit impairments in the event that the credit of an issuer improves. • Requires a cumulative-effect adjustment to retained earnings as of the beginning of the reporting period of adoption.

Effects on financial statements

- Adopted January 1, 2020.
- The following table presents the impacts to the allowance for credit losses and retained earnings upon adoption of this guidance on January 1, 2020:

(in billions)	December 31, 2019	CECL adoption impact	January 1, 2020
Allowance for credit losses			
Consumer, excluding credit card	$ 3.2	$ 0.2	$ 3.4
Credit card	5.7	5.5	11.2
Wholesale	5.4	(1.4)	4.0
Total allowance for credit losses	$ 14.3	$ 4.3	$ 18.6
Retained earnings			
Allowance increase		$ 4.3	
Balance sheet reclassification[(a)]		(0.8)	
Total pre-tax impact		3.5	
Tax effect		(0.8)	
Decrease to retained earnings		$ 2.7	

(a) Represents the recognition of the nonaccretable difference on purchased credit deteriorated assets and the Bank's election to recognize the reserve for uncollectible accrued interest on credit card loans in the allowance, both of which resulted in a corresponding increase to loans.

- The Bank estimates losses over a two-year forecast period using the weighted-average of a range of macroeconomic scenarios (established on a JPMorgan Chase Firmwide basis), and then reverts to longer term historical loss experience to estimate losses over more extended periods.
- As permitted by the guidance, the Bank elected the fair value option for certain securities financing agreements. The difference between their carrying amount and fair value was immaterial and was recorded as part of the Bank's cumulative-effect adjustment.

FASB Standards Issued but not adopted as of December 31, 2019 (continued)

Standard	Summary of guidance	Effects on financial statements
Goodwill *Issued January 2017*	• Requires recognition of an impairment loss when the estimated fair value of a reporting unit falls below its carrying value. • Eliminates the requirement that an impairment loss be recognized only if the estimated implied fair value of the goodwill is below its carrying value.	• Adopted January 1, 2020. • No impact is expected upon adoption as the guidance is to be applied prospectively.

Note 3 – Fair value measurement

The Bank carries a portion of its assets and liabilities at fair value. These assets and liabilities are predominantly carried at fair value on a recurring basis (i.e., assets and liabilities that are measured and reported at fair value on the Bank's Consolidated balance sheets). Certain assets, liabilities and unfunded lending-related commitments are measured at fair value on a nonrecurring basis; that is, they are not measured at fair value on an ongoing basis but are subject to fair value adjustments only in certain circumstances (for example, when there is evidence of impairment).

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value is based on quoted market prices or inputs, where available. If prices or quotes are not available, fair value is based on valuation models and other valuation techniques that consider relevant transaction characteristics (such as maturity) and use, as inputs, observable or unobservable market parameters, including yield curves, interest rates, volatilities, prices (such as commodity, equity or debt prices), correlations, foreign exchange rates and credit curves. Valuation adjustments may be made to ensure that financial instruments are recorded at fair value, as described below.

The level of precision in estimating unobservable market inputs or other factors can affect the amount of gain or loss recorded for a particular position. Furthermore, while the Bank believes its valuation methods are appropriate and consistent with those of other market participants, the methods and assumptions used reflect management judgment and may vary across the Bank's businesses and portfolios.

The Bank uses various methodologies and assumptions in the determination of fair value. The use of different methodologies or assumptions by other market participants compared with those used by the Bank could result in the Bank deriving a different estimate of fair value at the reporting date.

Valuation process

Risk-taking functions are responsible for providing fair value estimates for assets and liabilities carried on the Consolidated balance sheets at fair value. JPMorgan Chase's Valuation Control Group ("VCG"), which is part of JPMorgan Chase's Finance function and independent of the risk-taking functions, is responsible for verifying these estimates and determining any fair value adjustments that may be required to ensure that the Bank's positions are recorded at fair value. The Valuation Governance Forum ("VGF") is composed of senior finance and risk executives and is responsible for overseeing the management of risks arising from valuation activities conducted across JPMorgan Chase. The Firmwide VGF is chaired by the Firmwide head of the VCG (under the direction of JPMorgan Chase's Controller).

Price verification process

The VCG verifies fair value estimates provided by the risk-taking functions by leveraging independently derived prices, valuation inputs and other market data, where available. Where independent prices or inputs are not available, the VCG performs additional review to ensure the reasonableness of the estimates. The additional review may include evaluating the limited market activity including client unwinds, benchmarking valuation inputs to those used for similar instruments, decomposing the valuation of structured instruments into individual components, comparing expected to actual cash flows, reviewing profit and loss trends, and reviewing trends in collateral valuation. There are also additional levels of management review for more significant or complex positions.

The VCG determines any valuation adjustments that may be required to the estimates provided by the risk-taking functions. No adjustments to quoted prices are applied for instruments classified within level 1 of the fair value hierarchy (refer to the discussion below for further information on the fair value hierarchy). For other positions, judgment is required to assess the need for valuation adjustments to appropriately reflect liquidity considerations, unobservable parameters, and, for certain portfolios that meet specified criteria, the size of the net open risk position. The determination of such adjustments follows a consistent framework across the Bank:

- Liquidity valuation adjustments are considered where an observable external price or valuation parameter exists but is of lower reliability, potentially due to lower market activity. Liquidity valuation adjustments are made based on current market conditions. Factors that may be considered in determining the liquidity adjustment include analysis of: (1) the estimated bid-offer spread for the instrument being traded; (2) alternative pricing points for similar instruments in active markets; and (3) the range of reasonable values that the price or parameter could take.
- The Bank manages certain portfolios of financial instruments on the basis of net open risk exposure and, as permitted by U.S. GAAP, has elected to estimate the fair value of such portfolios on the basis of a transfer of the entire net open risk position in an orderly transaction. Where this is the case, valuation adjustments may be necessary to reflect the cost of exiting a larger-than-normal market-size net open risk position. Where applied, such adjustments are based on factors that a relevant market participant would consider in the transfer of the net open risk position, including the size of the adverse market move that is likely to occur during the period required to reduce the net open risk position to a normal market-size.

- Uncertainty adjustments related to unobservable parameters may be made when positions are valued using prices or input parameters to valuation models that are unobservable due to a lack of market activity or because they cannot be implied from observable market data. Such prices or parameters must be estimated and are, therefore, subject to management judgment. Adjustments are made to reflect the uncertainty inherent in the resulting valuation estimate.
- Where appropriate, the Bank also applies adjustments to its estimates of fair value in order to appropriately reflect counterparty credit quality (credit valuation adjustments ("CVA")), the Bank's own creditworthiness (debit valuation adjustments ("DVA")) and the impact of funding (funding valuation adjustments ("FVA")), using a consistent framework across the Bank.

Valuation model review and approval

If prices or quotes are not available for an instrument or a similar instrument, fair value is generally determined using valuation models that consider relevant transaction terms such as maturity and use as inputs market-based or independently sourced parameters. Where this is the case the price verification process described above is applied to the inputs in those models.

Under the Bank's Estimations and Model Risk Management Policy, the Model Risk function reviews and approves new models, as well as material changes to existing models, prior to implementation in the operating environment. In certain circumstances exceptions may be granted to the Bank's policy to allow a model to be used prior to review or approval. The Model Risk function may also require the user to take appropriate actions to mitigate the model risk if it is to be used in the interim. These actions will depend on the model and may include, for example, limitation of trading activity.

Valuation hierarchy

A three-level valuation hierarchy has been established under U.S. GAAP for disclosure of fair value measurements. The valuation hierarchy is based on the observability of inputs to the valuation of an asset or liability as of the measurement date. The three levels are defined as follows.

- Level 1 – inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets.
- Level 2 – inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.
- Level 3 – one or more inputs to the valuation methodology are unobservable and significant to the fair value measurement.

A financial instrument's categorization within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

The following table describes the valuation methodologies generally used by the Bank to measure its significant products/instruments at fair value, including the general classification of such instruments pursuant to the valuation hierarchy.

Product/instrument	Valuation methodology	Classifications in the valuation hierarchy
Securities financing agreements	Valuations are based on discounted cash flows, which consider:	Predominantly level 2
	• Derivative features: refer to the discussion of derivatives below for further information.	
	• Market rates for the respective maturity	
	• Collateral characteristics	
Loans and lending-related commitments – wholesale		
Loans carried at fair value (e.g. trading loans and non-trading loans) and associated lending-related commitments	Where observable market data is available, valuations are based on:	Level 2 or 3
	• Observed market prices (circumstances are infrequent)	
	• Relevant broker quotes	
	• Observed market prices for similar instruments	
	Where observable market data is unavailable or limited, valuations are based on discounted cash flows, which consider the following:	
	• Credit spreads derived from the cost of credit default swaps ("CDS"); or benchmark credit curves developed by the Bank, by industry and credit rating	
	• Prepayment speed	
	• Collateral characteristics	
Loans – consumer		
Trading loans – conforming residential mortgage loans expected to be sold	Fair value is based on observable prices for mortgage-backed securities ("MBS") with similar collateral and incorporates adjustments to these prices to account for differences between the securities and the value of the underlying loans, which include credit characteristics, portfolio composition, and liquidity.	Predominantly level 2
Investment and trading securities	Quoted market prices	Level 1
	In the absence of quoted market prices, securities are valued based on:	Level 2 or 3
	• Observable market prices for similar securities	
	• Relevant broker quotes	
	• Discounted cash flows	
	In addition, the following inputs to discounted cash flows are used for the following products:	
	Mortgage- and asset-backed securities ("ABS") specific inputs:	
	• Collateral characteristics	
	• Deal-specific payment and loss allocations	
	• Current market assumptions related to yield, prepayment speed, conditional default rates and loss severity	
	Collateralized loan obligations ("CLOs") specific inputs:	
	• Collateral characteristics	
	• Deal-specific payment and loss allocations	
	• Expected prepayment speed, conditional default rates, loss severity	
	• Credit spreads	
	• Credit rating data	
Physical commodities	Valued using observable market prices or data.	Level 1 or 2

Product/instrument	Valuation methodology	Classifications in the valuation hierarchy
Derivatives	Exchange-traded derivatives that are actively traded and valued using the exchange price.	Level 1
	Derivatives that are valued using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs as well as considering the contractual terms. The key valuation inputs used will depend on the type of derivative and the nature of the underlying instruments and may include equity prices, commodity prices, interest rate yield curves, foreign exchange rates, volatilities, correlations, CDS spreads and recovery rates. Additionally, the credit quality of the counterparty and of the Bank as well as market funding levels may also be considered. In addition, specific inputs used for derivatives that are valued based on models with significant unobservable inputs are as follows: Structured credit derivatives specific inputs include: • CDS spreads and recovery rates • Credit correlation between the underlying debt instruments Equity option specific inputs include: • Forward equity price • Equity volatility • Equity correlation • Equity-FX correlation • Equity-IR correlation Interest rate and FX exotic options specific inputs include: • Interest rate volatility • Interest rate spread volatility • Interest rate correlation • Foreign exchange correlation • Interest rate-FX correlation Commodity derivatives specific inputs include: • Commodity volatility • Forward commodity price Additionally, adjustments are made to reflect counterparty credit quality (CVA) and the impact of funding (FVA).	Level 2 or 3
Mortgage servicing rights ("MSRs")	Refer to Mortgage servicing rights in Note 16.	Level 3
Fund investments (e.g., mutual/ collective investment funds, private equity funds, hedge funds, and real estate funds)	Net asset value ("NAV") • NAV is supported by the ability to redeem and purchase at the NAV level.	Level 1
	• Adjustments to the NAV as required, for restrictions on redemption (e.g., lock-up periods or withdrawal limitations) or where observable activity is limited.	Level 2 or 3[(a)]
Beneficial interests issued by consolidated VIEs	Valued using observable market information, where available. In the absence of observable market information, valuations are based on the fair value of the underlying assets held by the VIE.	Level 2 or 3
Structured notes (included in deposits, short-term borrowings and long-term debt)	• Valuations are based on discounted cash flow analyses that consider the embedded derivative and the terms and payment structure of the note. • The embedded derivative features are considered using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs, depending on the embedded derivative. The specific inputs used vary according to the nature of the embedded derivative features, as described in the discussion above regarding derivatives valuation. Adjustments are then made to this base valuation to reflect the Bank's own credit risk (DVA).	Level 2 or 3

(a) Excludes certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient.

The following table presents the assets and liabilities reported at fair value as of December 31, 2019 and 2018, by major product category and fair value hierarchy.

Assets and liabilities measured at fair value on a recurring basis

	Fair value hierarchy				
December 31, 2019 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments[e]	Total fair value
Federal funds sold and securities purchased under resale agreements	$ —	$ 5,682	$ —	$ —	$ 5,682
Securities borrowed	—	6,237	—	—	6,237
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	—	4,929	708	—	5,637
Residential – nonagency	—	971	14	—	985
Commercial – nonagency	—	204	1	—	205
Total mortgage-backed securities	—	6,104	723	—	6,827
U.S. Treasury, GSEs and government agencies[a]	19,241	1,105	—	—	20,346
Obligations of U.S. states and municipalities	—	4,021	6	—	4,027
Certificates of deposit, bankers' acceptances and commercial paper	—	221	—	—	221
Non-U.S. government debt securities	26,600	27,169	155	—	53,924
Corporate debt securities	—	11,619	531	—	12,150
Loans	—	46,955	1,144	—	48,099
Asset-backed securities	—	387	6	—	393
Total debt instruments	45,841	97,581	2,565	—	145,987
Equity securities	52,030	77	96	—	52,203
Physical commodities[b]	32	1,528	—	—	1,560
Other	—	14,037	268	—	14,305
Total debt and equity instruments[c]	97,903	113,223	2,929	—	214,055
Derivative receivables:					
Interest rate	381	331,505	1,421	(306,094)	27,213
Credit	—	13,921	623	(13,891)	653
Foreign exchange	119	141,207	517	(132,840)	9,003
Equity	—	51,370	6,141	(50,882)	6,629
Commodity	—	24,131	100	(18,334)	5,897
Total derivative receivables	500	562,134	8,802	(522,041)	49,395
Total trading assets[d]	98,403	675,357	11,731	(522,041)	263,450
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	—	110,117	—	—	110,117
Residential – nonagency	—	12,989	1	—	12,990
Commercial – nonagency	—	5,181	—	—	5,181
Total mortgage-backed securities	—	128,287	1	—	128,288
U.S. Treasury and government agencies	139,436	—	—	—	139,436
Obligations of U.S. states and municipalities	—	28,819	—	—	28,819
Certificates of deposit	—	77	—	—	77
Non-U.S. government debt securities	12,966	8,821	—	—	21,787
Corporate debt securities	—	845	—	—	845
Asset-backed securities:					
Collateralized loan obligations	—	24,991	—	—	24,991
Other	—	5,420	—	—	5,420
Total available-for-sale securities	152,402	197,260	1	—	349,663
Loans	—	7,104	—	—	7,104
Mortgage servicing rights	—	—	4,699	—	4,699
Other assets[d]	6,431	—	49	—	6,480
Total assets measured at fair value on a recurring basis	$ 257,236	$ 891,640	$ 16,480	$ (522,041)	$ 643,315
Deposits	$ —	$ 25,290	$ 3,372	$ —	$ 28,662
Federal funds purchased and securities loaned or sold under repurchase agreements	—	5,501	—	—	5,501
Short-term borrowings	—	2,349	1,516	—	3,865
Trading liabilities:					
Debt and equity instruments[c]	34,370	12,398	38	—	46,806
Derivative payables:					
Interest rate	434	303,116	2,695	(297,797)	8,448
Credit	—	14,014	738	(13,183)	1,569
Foreign exchange	111	147,039	1,477	(135,498)	13,129
Equity	—	52,139	7,626	(48,626)	11,139
Commodity	—	25,625	169	(19,242)	6,552
Total derivative payables	545	541,933	12,705	(514,346)	40,837
Total trading liabilities	34,915	554,331	12,743	(514,346)	87,643
Accounts payable and other liabilities	6,464	—	19	—	6,483
Long-term debt	—	24,903	15,368	—	40,271
Total liabilities measured at fair value on a recurring basis	$ 41,379	$ 612,374	$ 33,018	$ (514,346)	$ 172,425

	Fair value hierarchy				
December 31, 2018 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments[e]	Total fair value
Federal funds sold and securities purchased under resale agreements	$ –	$ 4,370	$ –	$ –	$ 4,370
Securities borrowed	–	5,105	–	–	5,105
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	29,330	487	–	29,817
Residential – nonagency	–	870	26	–	896
Commercial – nonagency	–	265	2	–	267
Total mortgage-backed securities	–	30,465	515	–	30,980
U.S. Treasury, GSEs and government agencies[a]	6,552	1	–	–	6,553
Obligations of U.S. states and municipalities	–	4,287	11	–	4,298
Certificates of deposit, bankers' acceptances and commercial paper	–	318	–	–	318
Non-U.S. government debt securities	27,828	27,056	155	–	55,039
Corporate debt securities	–	12,776	232	–	13,008
Loans	–	39,863	1,403	–	41,266
Asset-backed securities	–	400	24	–	424
Total debt instruments	34,380	115,166	2,340	–	151,886
Equity securities	44,725	259	94	–	45,078
Physical commodities[b]	506	–	–	–	506
Other	–	13,178	298	–	13,476
Total debt and equity instruments[c]	79,611	128,603	2,732	–	210,946
Derivative receivables:					
Interest rate	443	275,760	1,841	(255,159)	22,885
Credit	–	18,014	857	(18,512)	359
Foreign exchange	776	167,719	853	(155,922)	13,426
Equity	–	60,504	6,584	(56,827)	10,261
Commodity	–	28,552	60	(22,005)	6,607
Total derivative receivables	1,219	550,549	10,195	(508,425)	53,538
Total trading assets[d]	80,830	679,152	12,927	(508,425)	264,484
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	68,646	–	–	68,646
Residential – nonagency	–	8,519	1	–	8,520
Commercial – nonagency	–	6,585	–	–	6,585
Total mortgage-backed securities	–	83,750	1	–	83,751
U.S. Treasury and government agencies	56,059	–	–	–	56,059
Obligations of U.S. states and municipalities	–	36,152	–	–	36,152
Certificates of deposit	–	75	–	–	75
Non-U.S. government debt securities	15,313	8,789	–	–	24,102
Corporate debt securities	–	1,918	–	–	1,918
Asset-backed securities:					
Collateralized loan obligations	–	19,437	–	–	19,437
Other	–	7,218	–	–	7,218
Total available-for-sale securities	71,372	157,339	1	–	228,712
Loans	–	3,029	122	–	3,151
Mortgage servicing rights	–	–	6,130	–	6,130
Other assets[d]	5,696	–	12	–	5,708
Total assets measured at fair value on a recurring basis	$ 157,898	$ 848,995	$ 19,192	$ (508,425)	$ 517,660
Deposits	$ –	$ 19,182	$ 4,189	$ –	$ 23,371
Federal funds purchased and securities loaned or sold under repurchase agreements	–	5,215	–	–	5,215
Short-term borrowings	–	3,166	1,428	–	4,594
Trading liabilities:					
Debt and equity instruments[c]	56,196	18,329	46	–	74,571
Derivative payables:					
Interest rate	854	248,032	2,288	(244,215)	6,959
Credit	–	18,056	962	(17,632)	1,386
Foreign exchange	729	164,116	1,308	(153,427)	12,726
Equity	–	60,273	7,601	(57,692)	10,182
Commodity	–	28,605	1,233	(21,775)	8,063
Total derivative payables	1,583	519,082	13,392	(494,741)	39,316
Total trading liabilities	57,779	537,411	13,438	(494,741)	113,887
Accounts payable and other liabilities	5,757	–	–	–	5,757
Long-term debt	–	13,754	12,799	–	26,553
Total liabilities measured at fair value on a recurring basis	$ 63,536	$ 578,728	$ 31,854	$ (494,741)	$ 179,377

(a) At December 31, 2019 and 2018, included total U.S. GSE obligations of $82.2 billion and $57.2 billion, respectively, which were mortgage-related.
(b) Physical commodities inventories are generally accounted for at the lower of cost or net realizable value. "Net realizable value" is a term defined in U.S. GAAP as not exceeding fair value less costs to sell ("transaction costs"). Transaction costs for the Bank's physical commodities inventories are either not applicable or immaterial to the value of the inventory. Therefore, net realizable value approximates fair value for the Bank's physical commodities inventories. When fair value hedging has been applied (or when net realizable value is below cost), the carrying value of physical commodities approximates fair value, because under fair value hedge accounting, the cost basis is adjusted for changes in fair value. Refer to Note 6 for a further discussion of the Bank's hedge accounting relationships. To provide consistent fair value disclosure information, all physical commodities inventories have been included in each period presented.
(c) Balances reflect the reduction of securities owned (long positions) by the amount of identical securities sold but not yet purchased (short positions).

(d) Certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not required to be classified in the fair value hierarchy. At December 31, 2019 and 2018, the fair values of these investments, which include certain hedge funds, private equity funds, real estate and other funds, were $72 million and $49 million, respectively. Included in these balances at December 31, 2019 and 2018, were trading assets of $54 million and $49 million, respectively, and other assets of $18 million and zero, respectively.

(e) As permitted under U.S. GAAP, the Bank has elected to net derivative receivables and derivative payables and the related cash collateral received and paid when a legally enforceable master netting agreement exists. The level 3 balances would be reduced if netting were applied, including the netting benefit associated with cash collateral. Additionally, includes derivative receivables and payables with affiliates on a net basis. Refer to Note 21 for information regarding our derivative activities with affiliates.

Level 3 valuations

The Bank has established well-structured processes for determining fair value, including for instruments where fair value is estimated using significant unobservable inputs (level 3). Refer to pages 13-16 of this Note for further information on the Bank's valuation process and a detailed discussion of the determination of fair value for individual financial instruments.

Estimating fair value requires the application of judgment. The type and level of judgment required is largely dependent on the amount of observable market information available to the Bank. For instruments valued using internally developed valuation models and other valuation techniques that use significant unobservable inputs and are therefore classified within level 3 of the fair value hierarchy, judgments used to estimate fair value are more significant than those required when estimating the fair value of instruments classified within levels 1 and 2.

In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate valuation model or other valuation technique to use. Second, due to the lack of observability of significant inputs, management must assess relevant empirical data in deriving valuation inputs including transaction details, yield curves, interest rates, prepayment speed, default rates, volatilities, correlations, prices (such as commodity, equity or debt prices), valuations of comparable instruments, foreign exchange rates and credit curves.

The following table presents the Bank's primary level 3 financial instruments, the valuation techniques used to measure the fair value of those financial instruments, the significant unobservable inputs, the range of values for those inputs and, for certain instruments, the weighted averages of such inputs. While the determination to classify an instrument within level 3 is based on the significance of the unobservable inputs to the overall fair value measurement, level 3 financial instruments typically include observable components (that is, components that are actively quoted and can be validated to external sources) in addition to the unobservable components. The level 1 and/or level 2 inputs are not included in the table. In addition, the Bank manages the risk of the observable components of level 3 financial instruments using securities and derivative positions that are classified within levels 1 or 2 of the fair value hierarchy.

The range of values presented in the table is representative of the highest and lowest level input used to value the significant groups of instruments within a product/instrument classification. Where provided, the weighted averages of the input values presented in the table are calculated based on the fair value of the instruments that the input is being used to value.

In the Bank's view, the input range and the weighted average value do not reflect the degree of input uncertainty or an assessment of the reasonableness of the Bank's estimates and assumptions. Rather, they reflect the characteristics of the various instruments held by the Bank and the relative distribution of instruments within the range of characteristics. For example, two option contracts may have similar levels of market risk exposure and valuation uncertainty, but may have significantly different implied volatility levels because the option contracts have different underlyings, tenors, or strike prices. The input range and weighted average values will therefore vary from period-to-period and parameter-to-parameter based on the characteristics of the instruments held by the Bank at each balance sheet date.

For the Bank's derivatives and structured notes positions classified within level 3 at December 31, 2019, interest rate correlation inputs used in estimating fair value were distributed across the range; equity correlation, equity-FX and equity-IR correlation inputs were concentrated in the middle of the range; commodity correlation inputs were concentrated in the middle of the range; credit correlation inputs were concentrated towards the lower end of the range; and forward equity prices and the interest rate-foreign exchange ("IR-FX") correlation inputs were distributed across the range. In addition, the interest rate volatility and interest rate spread volatility inputs used in estimating fair value were distributed across the range; equity volatilities and commodity volatilities were concentrated towards the lower end of the range; and forward commodity prices used in estimating the fair value of commodity derivatives were concentrated in the middle of the range. Prepayment speed inputs used in estimating the fair value of interest rate derivatives were concentrated towards the lower end of the range. Recovery rate inputs used in estimating the fair value of credit derivatives were distributed across the range; credit spreads were concentrated towards the lower end of the range; conditional default rates and loss severity inputs were concentrated towards the upper end of the range and price inputs were concentrated towards the lower end of the range.

Level 3 inputs[(a)]

December 31, 2019							
Product/Instrument	Fair value (in millions)	Principal valuation technique	Unobservable inputs[(g)]	Range of input values			Weighted average
Residential mortgage-backed securities and loans[(b)]	$ 874	Discounted cash flows	Yield	3%		8%	6%
			Prepayment speed	0%	-	22%	12%
			Conditional default rate	0%	-	4%	0%
			Loss severity	0%	-	39%	1%
Commercial mortgage-backed securities and loans[(c)]	95	Market comparables	Price	$0	-	$100	$81
Obligations of U.S. states and municipalities	6	Market comparables	Price		$100		$100
Corporate debt securities	531	Market comparables	Price	$5	-	$112	$79
Loans[(d)]	899	Market comparables	Price	$3	-	$109	$69
Asset-backed securities	6	Market comparables	Price	$51	-	$100	$54
Net interest rate derivatives	(1,337)	Option pricing	Interest rate volatility	6%	-	44%	
			Interest rate spread volatility	20bps	-	30bps	
			Interest rate correlation	(65)%	-	94%	
			IR-FX correlation	(58)%	-	40%	
	63	Discounted cash flows	Prepayment speed	4%	-	30%	
Net credit derivatives	(151)	Discounted cash flows	Credit correlation	31%	-	59%	
			Credit spread	3bps	-	1,308bps	
			Recovery rate	15%	-	70%	
			Conditional default rate	2%	-	18%	
			Loss severity		100%		
	36	Market comparables	Price	$1	-	$115	
Net foreign exchange derivatives	(822)	Option pricing	IR-FX correlation	(58)%	-	65%	
	(138)	Discounted cash flows	Prepayment speed		9%		
Net equity derivatives	(1,485)	Option pricing	Forward equity price[(h)]	92%	-	105%	
			Equity volatility	9%	-	115%	
			Equity correlation	10%	-	97%	
			Equity-FX correlation	(81)%	-	60%	
			Equity-IR correlation	25%	-	35%	
Net commodity derivatives	(69)	Option pricing	Forward commodity price	$39	-	$ 76 per barrel	
			Commodity volatility	5%	-	105%	
			Commodity correlation	(48)%	-	95%	
MSRs	4,699	Discounted cash flows	Refer to Note 16				
Other assets	317	Discounted cash flows	Credit spread		45bps		45bps
Long-term debt, short-term borrowings, and deposits[(e)]	20,256	Option pricing	Interest rate volatility	6%	-	44%	
			Interest rate correlation	(65)%	-	94%	
			IR-FX correlation	(58)%	-	40%	
			Equity correlation	10%	-	97%	
			Equity-FX correlation	(81)%	-	60%	
			Equity-IR correlation	25%	-	35%	
Other level 3 assets and liabilities, net[(f)]	194						

(a) The categories presented in the table have been aggregated based upon the product type, which may differ from their classification on the Consolidated balance sheets. Furthermore, the inputs presented for each valuation technique in the table are, in some cases, not applicable to every instrument valued using the technique as the characteristics of the instruments can differ.
(b) Comprises U.S. GSEs and government agency securities of $708 million, nonagency securities of $15 million and trading loans of $151 million.
(c) Comprises nonagency securities of $1 million and trading loans of $94 million.
(d) Comprises trading loans.
(e) Long-term debt, short-term borrowings and deposits include structured notes issued by the Bank that are financial instruments that typically contain embedded derivatives. The estimation of the fair value of structured notes includes the derivative features embedded within the instrument. The significant unobservable inputs are broadly consistent with those presented for derivative receivables.
(f) Includes level 3 assets and liabilities that are insignificant both individually and in aggregate.
(g) Price is a significant unobservable input for certain instruments. When quoted market prices are not readily available, reliance is generally placed on price-based internal valuation techniques. The price input is expressed assuming a par value of $100.
(h) Forward equity price is expressed as a percentage of the current equity price.

Changes in and ranges of unobservable inputs

The following discussion provides a description of the impact on a fair value measurement of a change in each unobservable input in isolation, and the interrelationship between unobservable inputs, where relevant and significant. The impact of changes in inputs may not be independent, as a change in one unobservable input may give rise to a change in another unobservable input. Where relationships do exist between two unobservable inputs, those relationships are discussed below. Relationships may also exist between observable and unobservable inputs (for example, as observable interest rates rise, unobservable prepayment rates decline); such relationships have not been included in the discussion below. In addition, for each of the individual relationships described below, the inverse relationship would also generally apply.

The following discussion also provides a description of attributes of the underlying instruments and external market factors that affect the range of inputs used in the valuation of the Bank's positions.

Yield – The yield of an asset is the interest rate used to discount future cash flows in a discounted cash flow calculation. An increase in the yield, in isolation, would result in a decrease in a fair value measurement.

Credit spread – The credit spread is the amount of additional annualized return over the market interest rate that a market participant would demand for taking exposure to the credit risk of an instrument. The credit spread for an instrument forms part of the discount rate used in a discounted cash flow calculation. Generally, an increase in the credit spread would result in a decrease in a fair value measurement.

The yield and the credit spread of a particular mortgage-backed security primarily reflect the risk inherent in the instrument. The yield is also impacted by the absolute level of the coupon paid by the instrument (which may not correspond directly to the level of inherent risk). Therefore, the range of yield and credit spreads reflects the range of risk inherent in various instruments owned by the Bank. The risk inherent in mortgage-backed securities is driven by the subordination of the security being valued and the characteristics of the underlying mortgages within the collateralized pool, including borrower FICO scores, loan-to-value ("LTV") ratios for residential mortgages and the nature of the property and/or any tenants for commercial mortgages. For corporate debt securities, obligations of U.S. states and municipalities and other similar instruments, credit spreads reflect the credit quality of the obligor and the tenor of the obligation.

Prepayment speed – The prepayment speed is a measure of the voluntary unscheduled principal repayments of a prepayable obligation in a collateralized pool. Prepayment speeds generally decline as borrower delinquencies rise. An increase in prepayment speeds, in isolation, would result in a decrease in a fair value measurement of assets valued at a premium to par and an increase in a fair value measurement of assets valued at a discount to par.

Prepayment speeds may vary from collateral pool to collateral pool, and are driven by the type and location of the underlying borrower, and the remaining tenor of the obligation as well as the level and type (e.g., fixed or floating) of interest rate being paid by the borrower. Typically collateral pools with higher borrower credit quality have a higher prepayment rate than those with lower borrower credit quality, all other factors being equal.

Conditional default rate – The conditional default rate is a measure of the reduction in the outstanding collateral balance underlying a collateralized obligation as a result of defaults. While there is typically no direct relationship between conditional default rates and prepayment speeds, collateralized obligations for which the underlying collateral has high prepayment speeds will tend to have lower conditional default rates. An increase in conditional default rates would generally be accompanied by an increase in loss severity and an increase in credit spreads. An increase in the conditional default rate, in isolation, would result in a decrease in a fair value measurement. Conditional default rates reflect the quality of the collateral underlying a securitization and the structure of the securitization itself. Based on the types of securities owned in the Bank's market-making portfolios, conditional default rates are most typically at the lower end of the range presented.

Loss severity – The loss severity (the inverse concept is the recovery rate) is the expected amount of future realized losses resulting from the ultimate liquidation of a particular loan, expressed as the net amount of loss relative to the outstanding loan balance. An increase in loss severity is generally accompanied by an increase in conditional default rates. An increase in the loss severity, in isolation, would result in a decrease in a fair value measurement.

The loss severity applied in valuing a mortgage-backed security investment depends on factors relating to the underlying mortgages, including the LTV ratio, the nature of the lender's lien on the property and other instrument-specific factors.

Correlation – Correlation is a measure of the relationship between the movements of two variables. Correlation is a pricing input for a derivative product where the payoff is driven by one or more underlying risks. Correlation inputs are related to the type of derivative (e.g., interest rate, credit, equity, foreign exchange and commodity due to the nature of the underlying risks. When parameters are positively correlated, an increase in one parameter will result in an increase in the other parameter. When parameters are negatively correlated, an increase in one parameter will result in a decrease in the other parameter. An increase in correlation can result in an increase or a decrease in a fair value measurement. Given a short correlation position, an increase in correlation, in isolation, would generally result in a decrease in a fair value measurement.

The level of correlation used in the valuation of derivatives with multiple underlying risks depends on a number of factors including the nature of those risks. For example, the correlation between two credit risk exposures would be different than that between two interest rate risk exposures. Similarly, the tenor of the transaction may also impact the correlation input, as the relationship between the underlying risks may be different over different time periods. Furthermore, correlation levels are very much dependent on market conditions and could have a relatively wide range of levels within or across asset classes over time, particularly in volatile market conditions.

Volatility – Volatility is a measure of the variability in possible returns for an instrument, parameter or market index given how much the particular instrument, parameter or index changes in value over time. Volatility is a pricing input for options, including equity options, commodity options, and interest rate options. Generally, the higher the volatility of the underlying, the riskier the instrument. Given a long position in an option, an increase in volatility, in isolation, would generally result in an increase in a fair value measurement.

The level of volatility used in the valuation of a particular option-based derivative depends on a number of factors, including the nature of the risk underlying the option (e.g., the volatility of a particular equity security may be significantly different from that of a particular commodity index), the tenor of the derivative as well as the strike price of the option.

Forward price - Forward price is the price at which the buyer agrees to purchase the asset underlying a forward contract on the predetermined future delivery date, and is such that the value of the contract is zero at inception.

The forward price is used as an input in the valuation of certain derivatives and depends on a number of factors including interest rates, the current price of the underlying asset, and the expected income to be received and costs to be incurred by the seller as a result of holding that asset until the delivery date. An increase in the forward can result in an increase or a decrease in a fair value measurement.

Changes in level 3 recurring fair value measurements

The following tables include a rollforward of the Consolidated balance sheets amounts (including changes in fair value) for financial instruments classified by the Bank within level 3 of the fair value hierarchy for the years ended December 31, 2019, 2018 and 2017. When a determination is made to classify a financial instrument within level 3, the determination is based on the significance of the unobservable inputs to the overall fair value measurement. However, level 3 financial instruments typically include, in addition to the unobservable or level 3 components, observable components (that is, components that are actively quoted and can be validated to external sources); accordingly, the gains and losses in the table below include changes in fair value due in part to observable factors that are part of the valuation methodology. Also, the Bank risk-manages the observable components of level 3 financial instruments using securities and derivative positions that are classified within level 1 or 2 of the fair value hierarchy; as these level 1 and level 2 risk management instruments are not included below, the gains or losses in the following tables do not reflect the effect of the Bank's risk management activities related to such level 3 instruments.

Year ended December 31, 2019 (in millions)	Fair value at January 1, 2019	Total realized/ unrealized gains/ (losses)	Purchases[f]	Sales	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2019	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2019
	Fair value measurements using significant unobservable inputs								
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	$ 487	$ (55)	$ 661	$ (261)	$ (124)	$ –	$ –	$ 708	$ (56)
Residential – nonagency	26	23	11	(32)	(2)	–	(12)	14	–
Commercial – nonagency	2	2	–	–	(4)	1	–	1	2
Total mortgage-backed securities	515	(30)	672	(293)	(130)	1	(12)	723	(54)
U.S. Treasury, GSEs and government agencies	–	–	–	–	–	–	–	–	–
Obligations of U.S. states and municipalities	11	–	–	–	(5)	–	–	6	–
Non-U.S. government debt securities	155	1	290	(287)	–	14	(18)	155	4
Corporate debt securities	232	28	369	(123)	(17)	103	(61)	531	(12)
Loans	1,403	99	656	(685)	(332)	545	(542)	1,144	30
Asset-backed securities	24	(3)	–	(10)	(4)	3	(4)	6	(5)
Total debt instruments	2,340	95	1,987	(1,398)	(488)	666	(637)	2,565	(37)
Equity securities	94	5	38	(21)	(22)	46	(44)	96	15
Other	298	12	84	(128)	(53)	61	(6)	268	(30)
Total trading assets – debt and equity instruments	2,732	112 (c)	2,109	(1,547)	(563)	773	(687)	2,929	(52) (c)
Net derivative receivables:[b]									
Interest rate	(447)	(665)	107	(768)	444	(71)	126	(1,274)	(691)
Credit	(105)	7	20	(8)	(14)	29	(44)	(115)	53
Foreign exchange	(455)	(557)	14	(409)	467	(21)	1	(960)	(434)
Equity	(1,017)	473	1,815	(504)	(2,250)	121	(123)	(1,485)	(172)
Commodity	(1,173)	458	49	(365)	85	(1)	878	(69)	238
Total net derivative receivables	(3,197)	(284) (c)	2,005	(2,054)	(1,268)	57	838	(3,903)	(1,006) (c)
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	–	–	–	1	–
Asset-backed securities	–	–	–	–	–	–	–	–	–
Total available-for-sale securities	1	–	–	–	–	–	–	1	–
Loans	122	4 (c)	–	–	(125)	–	(1)	–	–
Mortgage servicing rights	6,130	(1,180) (d)	1,489	(789)	(951)	–	–	4,699	(1,180) (d)
Other assets	12	11 (c)	26	–	–	–	–	49	6 (c)

Year ended December 31, 2019 (in millions)	Fair value at January 1, 2019	Total realized/ unrealized (gains)/ losses	Purchases	Sales	Issuances	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2019	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2019
	Fair value measurements using significant unobservable inputs									
Liabilities:[a]										
Deposits	$ 4,189	$ 295 (c)(e)	$ –	$ –	$ 918	$ (832)	$ 12	$ (1,210)	$ 3,372	$ 311 (c)(e)
Short-term borrowings	1,428	145 (c)(e)	–	–	3,092	(2,977)	19	(191)	1,516	112 (c)(e)
Trading liabilities – debt and equity instruments	46	(2) (c)	(13)	37	–	1	9	(40)	38	2 (c)
Accounts payable and other liabilities	–	9 (c)	–	10	–	–	–	–	19	9 (c)
Long-term debt	12,799	1,316 (c)(e)	–	–	7,317	(5,167)	280	(1,177)	15,368	1,646 (c)(e)

	Fair value measurements using significant unobservable inputs								
Year ended December 31, 2018 (in millions)	Fair value at January 1, 2018	Total realized/ unrealized gains/ (losses)	Purchases[f]	Sales	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2018	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2018
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	$ 289	$ (16)	$ 443	$ (164)	$ (65)	$ –	$ –	$ 487	$ (21)
Residential – nonagency	24	(1)	33	(41)	(2)	15	(2)	26	1
Commercial – nonagency	2	1	–	–	(1)	–	–	2	(2)
Total mortgage-backed securities	315	(16)	476	(205)	(68)	15	(2)	515	(22)
U.S. Treasury, GSEs and government agencies	1	–	–	–	–	–	(1)	–	–
Obligations of U.S. states and municipalities	15	1	–	–	(5)	–	–	11	1
Non-U.S. government debt securities	78	(22)	458	(277)	(11)	23	(94)	155	(9)
Corporate debt securities	191	(16)	331	(284)	(26)	230	(194)	232	13
Loans	2,332	28	1,250	(1,655)	(465)	751	(838)	1,403	(28)
Asset-backed securities	51	–	14	–	(19)	–	(22)	24	9
Total debt instruments	2,983	(25)	2,529	(2,421)	(594)	1,019	(1,151)	2,340	(36)
Equity securities	121	(33)	92	(99)	–	84	(71)	94	24
Other	350	11	408	(223)	(209)	49	(88)	298	34
Total trading assets – debt and equity instruments	3,454	(47) (c)	3,029	(2,743)	(803)	1,152	(1,310)	2,732	22 (c)
Net derivative receivables:[b]									
Interest rate	258	271	111	(641)	(557)	(27)	138	(447)	349
Credit	(33)	(37)	5	(6)	(57)	1	22	(105)	(27)
Foreign exchange	(441)	133	182	(290)	34	(115)	42	(455)	5
Equity	(1,887)	18	2,966	(1,769)	(1,555)	1,037	173	(1,017)	(133)
Commodity	(648)	(54)	8	(175)	(324)	(3)	23	(1,173)	47
Total net derivative receivables	(2,751)	331 (c)	3,272	(2,881)	(2,459)	893	398	(3,197)	241 (c)
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	–	–	–	1	–
Asset-backed securities	276	1	–	–	(277)	–	–	–	–
Total available-for-sale securities	277	1 (i)	–	–	(277)	–	–	1	–
Loans	276	(7) (c)	123	–	(196)	–	(74)	122	(7) (c)
Mortgage servicing rights	6,030	230 (d)	1,246	(636)	(740)	–	–	6,130	230 (d)
Other assets	–	– (c)	14	(2)	–	–	–	12	–

	Fair value measurements using significant unobservable inputs									
Year ended December 31, 2018 (in millions)	Fair value at January 1, 2018	Total realized/ unrealized (gains)/ losses	Purchases	Sales	issuances	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2018	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2018
Liabilities:[a]										
Deposits	$ 4,150	$ (135) (c)(e)	$ –	$ –	$ 1,400	$ (560)	$ 2	$ (668)	$ 4,189	$ (192) (c)(e)
Short-term borrowings	1,604	(188) (c)(e)	–	–	3,031	(2,999)	87	(107)	1,428	(129) (c)(e)
Trading liabilities – debt and equity instruments	37	30 (c)	(97)	101	–	(1)	10	(34)	46	16 (c)
Accounts payable and other liabilities	–	–	–	–	–	–	–	–	–	–
Long-term debt	10,154	(1,442) (c)(e)	–	–	7,465	(2,968)	623	(1,033)	12,799	(651) (c)(e)

Year ended December 31, 2017 (in millions)	Fair value measurements using significant unobservable inputs								
	Fair value at January 1, 2017	Total realized/ unrealized gains/ (losses)	Purchases[f]	Sales	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2017	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2017
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	$ 369	$ (11)	$ 155	$ (163)	$ (61)	$ –	$ –	$ 289	$ (17)
Residential – nonagency	11	3	5	–	(4)	18	(9)	24	4
Commercial – nonagency	6	5	1	(5)	(9)	4	–	2	–
Total mortgage-backed securities	386	(3)	161	(168)	(74)	22	(9)	315	(13)
U.S. Treasury, GSEs and government agencies	–	–	–	–	–	1	–	1	–
Obligations of U.S. states and municipalities	19	1	–	–	(5)	–	–	15	1
Non-U.S. government debt securities	46	–	560	(519)	–	62	(71)	78	–
Corporate debt securities	318	13	514	(472)	(121)	101	(162)	191	5
Loans	4,325	225	2,172	(2,613)	(1,071)	760	(1,466)	2,332	44
Asset-backed securities	70	23	243	(251)	(14)	25	(45)	51	6
Total debt instruments	5,164	259	3,650	(4,023)	(1,285)	971	(1,753)	2,983	43
Equity securities	89	33	51	(44)	(5)	16	(19)	121	23
Other	281	133	151	(51)	(205)	60	(19)	350	110
Total trading assets – debt and equity instruments	5,534	425 (c)	3,852	(4,118)	(1,495)	1,047	(1,791)	3,454	176 (c)
Net derivative receivables:[b]									
Interest rate	1,001	(87)	142	(194)	(494)	41	(151)	258	(688)
Credit	96	(170)	5	(6)	–	81	(39)	(33)	7
Foreign exchange	(1,531)	1	12	(23)	893	(33)	240	(441)	9
Equity	(1,488)	(243)	2,106	(1,162)	(943)	26	(183)	(1,887)	172
Commodity	35	(329)	–	–	(375)	39	(18)	(648)	22
Total net derivative receivables	(1,887)	(828) (c)	2,265	(1,385)	(919)	154	(151)	(2,751)	(478) (c)
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	–	–	–	1	–
Asset-backed securities	663	15	–	(50)	(352)	–	–	276	14
Total available-for-sale securities	664	15 (i)	–	(50)	(352)		–	277	14 (i)
Loans	568	34 (c)	1	(26)	(301)	–	–	276	3 (c)
Mortgage servicing rights	6,096	(232) (d)	1,103	(140)	(797)	–	–	6,030	(232) (d)
Other assets	41	9 (c)	–	(13)	(37)	–	–	–	–

Year ended December 31, 2017 (in millions)	Fair value measurements using significant unobservable inputs									
	Fair value at January 1, 2017	Total realized/ unrealized (gains)/ losses	Purchases	Sales	Issuances	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2017	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2017
Liabilities:[a]										
Deposits	$ 2,121	$ 169 (c)(e)	$ –	$ –	$ 2,990	$ (287)	$ 12	$ (855)	$ 4,150	$ 192 (c)(e)
Short-term borrowings	1,019	102 (c)(e)	–	–	3,019	(2,488)	147	(195)	1,604	109 (c)(e)
Trading liabilities – debt and equity instruments	36	(2) (c)	(43)	45	–	1	–	–	37	–
Accounts payable and other liabilities	–	–	–	–	–	–	–	–	–	–
Long-term debt	7,662	1,080 (c)(e)	–	–	7,613	(7,213)	1,398	(386)	10,154	761 (c)(e)

(a) Level 3 assets as a percentage of total Bank assets accounted for at fair value (including assets measured at fair value on a nonrecurring basis) were 3%,4% and 5% at December 31, 2019, 2018 and 2017, respectively. Level 3 liabilities as a percentage of total Bank liabilities accounted for at fair value (including liabilities measured at fair value on a nonrecurring basis) were 19%, 18% and 19% at December 31, 2019, 2018 and 2017, respectively.
(b) All level 3 derivatives are presented on a net basis, irrespective of underlying counterparty.
(c) Predominantly reported in principal transactions revenue, except for changes in fair value for mortgage loans, and lending-related commitments originated with the intent to sell, and mortgage loan purchase commitments, which are reported in mortgage fees and related income.
(d) Changes in fair value for MSRs are reported in mortgage fees and related income.
(e) Realized (gains)/losses due to DVA for fair value option elected liabilities are reported in principal transactions revenue, and they were not material for the years ended December 31, 2019, 2018 and 2017, respectively. Unrealized (gains)/losses are reported in OCI, and they were $175 million, $(161) million and $6 million for the years ended December 31, 2019, 2018 and 2017, respectively.
(f) Loan originations are included in purchases.
(g) Includes financial assets and liabilities that have matured, been partially or fully repaid, impacts of modifications, deconsolidation associated with beneficial interests in VIEs and other items.
(h) All transfers into and/or out of level 3 are based on changes in the observability and/or significance of the valuation inputs and are assumed to occur at the beginning of the quarterly reporting period in which they occur.
(i) Realized gains/(losses) on AFS securities, as well as other-than-temporary impairment ("OTTI") losses that are recorded in earnings, are reported in investment securities gains/(losses). Unrealized gains/(losses) are reported in OCI. There were no realized gains/(losses) and foreign exchange hedge accounting adjustments recorded in income on AFS securities for the years ended December 31, 2019 and 2017, respectively, and $1 million recorded for the year ended December 31, 2018. There were no unrealized gains/(losses) recorded on AFS securities in OCI for the years ended December 31, 2019 and 2018, respectively, and $15 million recorded for the year ended December 31, 2017.

Level 3 analysis

Consolidated balance sheets changes

Level 3 assets (including assets measured at fair value on a nonrecurring basis) were 0.7% of total Bank assets at December 31, 2019. The following describes significant changes to level 3 assets since December 31, 2018, for those items measured at fair value on a recurring basis. Refer to Assets and liabilities measured at fair value on a nonrecurring basis on page 27 for further information on changes impacting items measured at fair value on a nonrecurring basis.

For the year ended December 31, 2019

Level 3 assets were $16.5 billion at December 31, 2019, reflecting a decrease of $2.7 billion from December 31, 2018, largely due to a $1.4 billion decrease in MSRs. Refer to the Gains and losses section below for additional information.

Transfers between levels for instruments carried at fair value on a recurring basis

During the year ended December 31, 2019, significant transfers from level 2 into level 3 included the following:

- $859 million of gross equity derivative receivables as a result of a decrease in observability and an increase in the significance of unobservable inputs.

During the year ended December 31, 2019, significant transfers from level 3 into level 2 included the following:

- $2.0 billion of gross equity derivative receivables and $1.9 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $1.0 billion of gross commodities derivative payables as a result of an increase in observability.
- $1.2 billion of deposits driven by an increase in observability and a decrease in the significance of unobservable inputs.
- $1.2 billion of long-term debt driven by an increase in observability and a decrease in the significance of unobservable inputs.

During the year ended December 31, 2018, significant transfers from level 2 into level 3 included the following:

- $1.2 billion of total debt and equity instruments, the majority of which were trading loans, driven by a decrease in observability.
- $2.7 billion of gross equity derivative receivables and $1.7 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.

During the year ended December 31, 2018, significant transfers from level 3 into level 2 included the following:

- $1.3 billion of total debt and equity instruments, the majority of which were trading loans, driven by an increase in observability.
- $2.0 billion of gross equity derivative receivables and $2.2 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $1.0 billion of long-term debt driven by an increase in observability.

During the year ended December 31, 2017, significant transfers from level 2 into level 3 included the following:

- $3.4 billion of gross equity derivative receivables and $3.4 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $1.4 billion of long-term debt driven by a decrease in observability.

During the year ended December 31, 2017, significant transfers from level 3 into level 2 included the following:

- $1.8 billion of equity derivative receivables and $1.6 billion of equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $1.5 billion of trading loans driven by an increase in observability.

All transfers are based on changes in the observability and/or significance of the valuation inputs and are assumed to occur at the beginning of the quarterly reporting period in which they occur.

Gains and losses

The following describes significant components of total realized/unrealized gains/(losses) for instruments measured at fair value on a recurring basis for the years ended December 31, 2019, 2018 and 2017.

These amounts exclude any effects of the Bank's risk management activities where the financial instruments are classified as level 1 and 2 of the fair value hierarchy. Refer to Changes in level 3 recurring fair value measurements rollforward tables on pages 22-26 for further information on these instruments.

2019

- $1.3 billion of net losses on assets predominantly driven by MSRs reflecting faster prepayment speeds on lower rates. Refer to Note 16 for information on MSRs.
- $1.8 billion of net losses on liabilities largely driven by market movements in long-term debt.

2018

- $1.7 billion of net gains on liabilities predominantly driven by market movements in long-term debt.

2017

- $1.3 billion of net losses on liabilities largely driven by market movements in long-term debt.

Assets and liabilities measured at fair value on a nonrecurring basis

The following tables present the assets held as of December 31, 2019 and 2018, respectively, for which a nonrecurring fair value adjustment was recorded during the years ended December 31, 2019 and 2018, respectively, by major product category and fair value hierarchy.

December 31, 2019 (in millions)	Fair value hierarchy Level 1	Level 2	Level 3	Total fair value
Loans	$ –	$ 3,463 [b]	$ 269 [c]	$ 3,732
Other assets[a]	–	14	585	599
Total assets measured at fair value on a nonrecurring basis	**$ –**	**$ 3,477**	**$ 854**	**$ 4,331**

December 31, 2018 (in millions)	Fair value hierarchy Level 1	Level 2	Level 3	Total fair value
Loans	$ –	$ 273	$ 251	$ 524
Other assets	–	9	433	442
Total assets measured at fair value on a nonrecurring basis	$ –	$ 282	$ 684	$ 966

(a) Primarily includes equity securities without readily determinable fair values that were adjusted based on observable price changes in orderly transactions from an identical or similar investment of the same issuer (measurement alternative). Of the $585 million in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2019, $343 million related to such equity securities. These equity securities are classified as level 3 due to the infrequency of the observable prices and/or the restrictions on the shares.

(b) Primarily includes certain mortgage loans that were reclassified to held-for sale.

(c) Of the $269 million in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2019, $248 million related to residential real estate loans carried at the net realizable value of the underlying collateral (e.g., collateral-dependent loans and other loans charged off in accordance with regulatory guidance). These amounts are classified as level 3 as they are valued using information from broker's price opinions, appraisals and automated valuation models and discounted based upon the Bank's experience with actual liquidation values. These discounts ranged from 14% to 49% with a weighted average of 28%.

There were no liabilities measured at fair value on a nonrecurring basis at December 31, 2019 and 2018.

Nonrecurring fair value changes

The following table presents the total change in value of assets and liabilities for which a fair value adjustment has been recognized for the years ended December 31, 2019, 2018 and 2017, related to assets and liabilities held at those dates.

December 31, (in millions)	2019	2018	2017
Loans	**$ (272)** [a]	$ (63)	$ (159)
Other assets	**62** [b]	225 [b]	(141)
Accounts payable and other liabilities	**–**	–	(1)
Total nonrecurring fair value gains/(losses)	**$ (210)**	$ 162	$ (301)

(a) Primarily includes the impact of certain mortgage loans that were reclassified to held-for-sale.

(b) Included $82 million and $241 million for the years ended December 31, 2019 and 2018, respectively, of net gains as a result of the measurement alternative.

Refer to Note 13 for further information about the measurement of impaired collateral-dependent loans, and other loans where the carrying value is based on the fair value of the underlying collateral (e.g., residential mortgage loans charged off in accordance with regulatory guidance).

Equity securities without readily determinable fair values

The Bank measures certain equity securities without readily determinable fair values at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer, with such changes recognized in other income.

In its determination of the new carrying values upon observable price changes, the Bank may adjust the prices if deemed necessary to arrive at the Bank's estimated fair values. Such adjustments may include adjustments to reflect the different rights and obligations of similar securities, and other adjustments that are consistent with the Bank's valuation techniques for private equity direct investments.

The following table presents the carrying value of equity securities without readily determinable fair values held as of December 31, 2019 and 2018, that are measured under the measurement alternative and the related adjustments recorded during the periods presented for those securities with observable price changes. These securities are included in the nonrecurring fair value tables when applicable price changes are observable.

As of or for the year ended December 31, (in millions)	2019	2018
Other assets		
Carrying value	**$ 589**	$ 464
Upward carrying value changes[a]	**86**	253
Downward carrying value changes/impairment[b]	**(4)**	(12)

(a) The cumulative upward carrying value changes between January 1, 2018 and December 31, 2019 were $339 million.
(b) The cumulative downward carrying value changes/impairment between January 1, 2018 and December 31, 2019 were $(15) million.

Included in other assets above is the Bank's interest in approximately 40 million Visa Class B shares, recorded at a nominal carrying value. These shares are subject to certain transfer restrictions currently and will be convertible into Visa Class A shares upon final resolution of certain litigation matters involving Visa. The conversion rate of Visa Class B shares into Visa Class A shares is 1.6228 at December 31, 2019, and may be adjusted by Visa depending on developments related to the litigation matters.

Additional disclosures about the fair value of financial instruments that are not carried on the Consolidated balance sheets at fair value

U.S. GAAP requires disclosure of the estimated fair value of certain financial instruments, which are included in the following table. However, this table does not include other items, such as nonfinancial assets, intangible assets, certain financial instruments, and customer relationships. In the opinion of management, these items, in the aggregate, add significant value to the Bank, but their fair value is not disclosed in this table.

Financial instruments for which carrying value approximates fair value

Certain financial instruments that are not carried at fair value on the Consolidated balance sheets are carried at amounts that approximate fair value, due to their short-term nature and generally negligible credit risk. These instruments include cash and due from banks, deposits with banks, federal funds sold, securities purchased under resale agreements and securities borrowed, short-term receivables and accrued interest receivable, short-term borrowings, federal funds purchased, securities loaned and sold under repurchase agreements, accounts payable, and accrued liabilities. In addition, U.S. GAAP requires that the fair value of deposit liabilities with no stated maturity (i.e., demand, savings and certain money market deposits) be equal to their carrying value; recognition of the inherent funding value of these instruments is not permitted.

The following table presents by fair value hierarchy classification the carrying values and estimated fair values at December 31, 2019 and 2018, of financial assets and liabilities, excluding financial instruments that are carried at fair value on a recurring basis, and their classification within the fair value hierarchy.

	December 31, 2019					December 31, 2018				
		Estimated fair value hierarchy					Estimated fair value hierarchy			
(in billions)	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value
Financial assets										
Cash and due from banks	**$ 21.2**	**$ 21.2**	**$ –**	**$ –**	**$ 21.2**	$ 21.6	$ 21.6	$ –	$ –	$ 21.6
Deposits with banks	**241.0**	**241.0**	**–**	**–**	**241.0**	255.1	255.1	–	–	255.1
Accrued interest and accounts receivable	**52.8**	**–**	**52.8**	**–**	**52.8**	48.8	–	48.7	0.1	48.8
Federal funds sold and securities purchased under resale agreements	**205.7**	**–**	**205.7**	**–**	**205.7**	271.1	–	271.1	–	271.1
Securities borrowed	**32.5**	**–**	**32.5**	**–**	**32.5**	40.2	–	40.2	–	40.2
Investment securities, held-to-maturity	**47.5**	**0.1**	**48.8**	**–**	**48.9**	31.4	–	31.5	–	31.5
Loans, net of allowance for loan losses[(a)]	**938.0**	**–**	**213.1**	**733.2**	**946.3**	966.6	–	239.8	725.5	965.3
Other	**53.9**	**–**	**53.2**	**0.7**	**53.9**	44.4	–	43.7	0.8	44.5
Financial liabilities										
Deposits	**$ 1,621.8**	**$ –**	**$ 1,622.1**	**$ –**	**$ 1,622.1**	$ 1,534.0	$ –	$ 1,534.0	$ –	$ 1,534.0
Federal funds purchased and securities loaned or sold under repurchase agreements	**81.0**	**–**	**81.0**	**–**	**81.0**	102.6	–	102.6	–	102.6
Short-term borrowings	**4.7**	**–**	**4.7**	**–**	**4.7**	17.3	–	17.3	–	17.3
Accounts payable and other liabilities	**73.3**	**0.1**	**70.1**	**2.7**	**72.9**	75.8	0.2	73.0	2.3	75.5
Beneficial interests issued by consolidated VIEs	**17.8**	**–**	**17.9**	**–**	**17.9**	20.3	–	20.2	–	20.2
Long-term debt and junior subordinated deferrable interest debentures	**81.2**	**–**	**77.8**	**3.5**	**81.3**	83.7	–	80.2	3.3	83.5

(a) Fair value is typically estimated using a discounted cash flow model that incorporates the characteristics of the underlying loans (including principal, contractual interest rate and contractual fees) and other key inputs, including expected lifetime credit losses, interest rates, prepayment rates, and primary origination or secondary market spreads. For certain loans, the fair value is measured based on the value of the underlying collateral. The difference between the estimated fair value and carrying value of a financial asset or liability is the result of the different methodologies used to determine fair value as compared with carrying value. For example, credit losses are estimated for a financial asset's remaining life in a fair value calculation but are estimated for a loss emergence period in the allowance for loan losses calculation; future loan income (interest and fees) is incorporated in a fair value calculation but is generally not considered in the allowance for loan losses.

The majority of the Bank's lending-related commitments are not carried at fair value on a recurring basis on the Consolidated balance sheets. The carrying value of the wholesale allowance for lending-related commitments and the estimated fair value of these wholesale lending-related commitments were as follows for the periods indicated.

	December 31, 2019					December 31, 2018				
		Estimated fair value hierarchy					Estimated fair value hierarchy			
(in billions)	Carrying value[(a)]	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value[(a)]	Level 1	Level 2	Level 3	Total estimated fair value[(b)]
Wholesale lending-related commitments	**$ 1.2**	**$ –**	**$ –**	**$ 1.9**	**$ 1.9**	$ 1.0	$ –	$ –	$ 2.2	$ 2.2

(a) Excludes the current carrying values of the guarantee liability and the offsetting asset, each of which is recognized at fair value at the inception of the guarantees.
(b) The prior period amounts have been revised to conform with the current period presentation.

The Bank does not estimate the fair value of consumer lending-related commitments. In many cases, the Bank can reduce or cancel these commitments by providing the borrower notice or, in some cases as permitted by law, without notice. Refer to page 15 of this Note for a further discussion of the valuation of lending-related commitments.

Note 4 – Fair value option

The fair value option provides an option to elect fair value as an alternative measurement for selected financial assets, financial liabilities, unrecognized firm commitments, and written loan commitments.

The Bank has elected to measure certain instruments at fair value for several reasons including to mitigate income statement volatility caused by the differences between the measurement basis of elected instruments (e.g., certain instruments that otherwise would be accounted for on an accrual basis) and the associated risk management arrangements that are accounted for on a fair value basis, as well as to better reflect those instruments that are managed on a fair value basis.

The Bank's election of fair value includes the following instruments:

- Loans purchased or originated as part of securitization warehousing activity, subject to bifurcation accounting, or managed on a fair value basis, including lending-related commitments
- Certain securities financing agreements, such as those with an embedded derivative and/or a maturity of greater than one year
- Owned beneficial interests in securitized financial assets that contain embedded credit derivatives, which would otherwise be required to be separately accounted for as a derivative instrument
- Structured notes, which are predominantly financial instruments that contain embedded derivatives, that are issued as part of client-driven activities
- Certain long-term beneficial interests issued by consolidated securitization trusts where the underlying assets are carried at fair value

Changes in fair value under the fair value option election

The following table presents the changes in fair value included in the Consolidated statements of income for the years ended December 31, 2019, 2018 and 2017, for items for which the fair value option was elected. The profit and loss information presented below only includes the financial instruments that were elected to be measured at fair value; related risk management instruments, which are required to be measured at fair value, are not included in the table.

	2019			2018			2017		
December 31, (in millions)	Principal transactions	All other income	Total changes in fair value recorded[d]	Principal transactions	All other income	Total changes in fair value recorded[d]	Principal transactions	All other income	Total changes in fair value recorded[d]
Federal funds sold and securities purchased under resale agreements	$ 4	$ –	$ 4	$ 2	$ –	$ 2	$ 22	$ –	$ 22
Securities borrowed	133	–	133	22	–	22	50	–	50
Trading assets:									
Debt and equity instruments, excluding loans	2,496	–	2,496	(1,881)	1 (c)	(1,880)	1,851	2 (c)	1,853
Loans reported as trading assets:									
Changes in instrument-specific credit risk	723	2 (c)	725	393	–	393	298	14 (c)	312
Other changes in fair value	254	1,224 (c)	1,478	159	185 (c)	344	216	747 (c)	963
Loans:									
Changes in instrument-specific credit risk	(26)	–	(26)	(1)	–	(1)	(1)	–	(1)
Other changes in fair value	1	–	1	(1)	–	(1)	(12)	3 (c)	(9)
Other assets	7	–	7	–	–	–	–	3 (e)	3
Deposits[a]	(1,751)	–	(1,751)	181	–	181	(546)	–	(546)
Federal funds purchased and securities loaned or sold under repurchase agreements	(104)	–	(104)	(1)	–	(1)	(38)	–	(38)
Short-term borrowings[a]	(638)	–	(638)	374	–	374	(1,186)	–	(1,186)
Trading liabilities	6	–	6	1	–	1	(1)	–	(1)
Other liabilities	(16)	–	(16)	–	–	–	–	–	–
Long-term debt[a][b]	(2,655)	1 (c)	(2,654)	1,272	–	1,272	(969)	–	(969)

(a) Unrealized gains/(losses) due to instrument-specific credit risk (DVA) for liabilities for which the fair value option has been elected is recorded in OCI, while realized gains/(losses) are recorded in principal transactions revenue. Realized gains/(losses) due to instrument-specific credit risk recorded in principal transactions revenue were not material for the years ended December 31, 2019, 2018 and 2017.
(b) Long-term debt measured at fair value predominantly relates to structured notes. Although the risk associated with the structured notes is actively managed, the gains/(losses) reported in this table do not include the income statement impact of the risk management instruments used to manage such risk.
(c) Reported in mortgage fees and related income.
(d) Changes in fair value exclude contractual interest, which is included in interest income and interest expense for all instruments other than hybrid financial instruments. Refer to Note 8 for further information regarding interest income and interest expense.
(e) Reported in other income.

Determination of instrument-specific credit risk for items for which a fair value election was made

The following describes how the gains and losses that are attributable to changes in instrument-specific credit risk, were determined.

- Loans and lending-related commitments: For floating-rate instruments, all changes in value are attributed to instrument-specific credit risk. For fixed-rate instruments, an allocation of the changes in value for the period is made between those changes in value that are interest rate-related and changes in value that are credit-related. Allocations are generally based on an analysis of borrower-specific credit spread and recovery information, where available, or benchmarking to similar entities or industries.
- Long-term debt: Changes in value attributable to instrument-specific credit risk were derived principally from observable changes in the Bank's credit spread as observed in the bond market.
- Securities financing agreements: Generally, for these types of agreements, there is a requirement that collateral be maintained with a market value equal to or in excess of the principal amount loaned; as a result, there would be no adjustment or an immaterial adjustment for instrument-specific credit risk related to these agreements.

Difference between aggregate fair value and aggregate remaining contractual principal balance outstanding

The following table reflects the difference between the aggregate fair value and the aggregate remaining contractual principal balance outstanding as of December 31, 2019 and 2018, for loans, long-term debt and long-term beneficial interests for which the fair value option has been elected.

	2019			2018		
December 31, (in millions)	Contractual principal outstanding	Fair value	Fair value over/(under) contractual principal outstanding	Contractual principal outstanding	Fair value	Fair value over/(under) contractual principal outstanding
Loans[(a)]						
Nonaccrual loans						
Loans reported as trading assets	$ 2,452	$ 904	$ (1,548)	$ 2,794	$ 1,098	$ (1,696)
Loans	178	139	(39)	39	–	(39)
Subtotal	2,630	1,043	(1,587)	2,833	1,098	(1,735)
All other performing loans						
Loans reported as trading assets	47,754	47,195	(559)	41,072	40,168	(904)
Loans	7,046	6,965	(81)	3,186	3,151	(35)
Total loans	$ 57,430	$ 55,203	$ (2,227)	$ 47,091	$ 44,417	$ (2,674)
Long-term debt						
Principal-protected debt	$ 18,063 (c)	$ 18,085	$ 22	$ 11,314 (c)	$ 10,903	$ (411)
Nonprincipal-protected debt[(b)]	NA	22,186	NA	NA	15,650	NA
Total long-term debt	NA	$ 40,271	NA	NA	$ 26,553	NA

(a) There were no performing loans that were ninety days or more past due as of December 31, 2019 and 2018.
(b) Remaining contractual principal is not applicable to nonprincipal-protected structured notes. Unlike principal-protected structured notes, for which the Bank is obligated to return a stated amount of principal at maturity, nonprincipal-protected structured notes do not obligate the Bank to return a stated amount of principal at maturity, but to return an amount based on the performance of an underlying variable or derivative feature embedded in the note. However, investors are exposed to the credit risk of the Bank as issuer for both nonprincipal-protected and principal-protected notes.
(c) Where the Bank issues principal-protected zero-coupon or discount notes, the balance reflects the contractual principal payment at maturity or, if applicable, the contractual principal payment at the Bank's next call date.

At December 31, 2019 and 2018, the contractual amount of lending-related commitments for which the fair value option was elected was $4.6 billion and $6.9 billion, respectively, with a corresponding fair value of $(94) million and $(92) million, respectively. Refer to Note 26 for further information regarding off-balance sheet lending-related financial instruments.

Note 5 – Credit risk concentrations

Concentrations of credit risk arise when a number of clients, counterparties or customers are engaged in similar business activities or activities in the same geographic region, or when they have similar economic features that would cause their ability to meet contractual obligations to be similarly affected by changes in economic conditions.

The Bank regularly monitors various segments of its credit portfolios to assess potential credit risk concentrations and to obtain additional collateral when deemed necessary and permitted under the Bank's agreements. Senior management is significantly involved in the credit approval and review process, and risk levels are adjusted as needed to reflect the Bank's risk appetite.

In the Bank's consumer portfolio, concentrations are managed primarily by product and by U.S. geographic region, with a key focus on trends and concentrations at the portfolio level, where potential credit risk concentrations can be remedied through changes in underwriting policies and portfolio guidelines. Refer to Note 13 for additional information on the geographic composition of the Bank's consumer loan portfolios. In the wholesale portfolio, credit risk concentrations are evaluated primarily by industry and monitored regularly on both an aggregate portfolio level and on an individual client or counterparty basis.

The Bank's wholesale exposure is managed through loan syndications and participations, loan sales, securitizations, credit derivatives, master netting agreements, collateral and other risk-reduction techniques. Refer to Note 13 for additional information on loans.

The Bank does not believe that its exposure to any particular loan product or industry segment (e.g., real estate), or its exposure to residential real estate loans with high LTV ratios, results in a significant concentration of credit risk.

Terms of loan products and collateral coverage are included in the Bank's assessment when extending credit and establishing its allowance for loan losses.

The table below presents both on–balance sheet and off–balance sheet consumer and wholesale-related credit exposure by the Bank's three credit portfolio segments as of December 31, 2019 and 2018.

	2019				2018			
		On-balance sheet				On-balance sheet		
December 31, (in millions)	Credit exposure[g]	Loans	Derivatives	Off-balance sheet[h]	Credit exposure[g]	Loans	Derivatives	Off-balance sheet[h]
Consumer, excluding credit card	**$ 386,309**	**$ 334,897**	**$ –**	**$ 51,412**	$ 419,770	$ 373,704	$ –	$ 46,066
Credit card	**819,644**	**168,924**	**–**	**650,720**	762,011	156,632	–	605,379
Total consumer-related	**1,205,953**	**503,821**	**–**	**702,132**	1,181,781	530,336	–	651,445
Wholesale-related[a]								
Real Estate	**149,267**	**116,244**	**619**	**32,404**	143,316	115,737	164	27,415
Individuals and Individual Entities[b]	**101,970**	**91,662**	**693**	**9,615**	97,077	86,586	1,016	9,475
Consumer & Retail	**99,314**	**30,863**	**1,423**	**67,028**	94,783	36,898	1,084	56,801
Technology, Media & Telecommunications	**58,821**	**14,680**	**2,766**	**41,375**	72,646	16,980	2,667	52,999
Industrials	**58,243**	**19,091**	**878**	**38,274**	58,522	19,120	958	38,444
Asset Managers	**50,860**	**23,806**	**7,018**	**20,036**	41,961	16,745	8,658	16,558
Banks & Finance Cos	**50,402**	**30,714**	**5,401**	**14,287**	50,205	28,825	6,173	15,207
Healthcare	**46,271**	**13,727**	**2,000**	**30,544**	47,510	15,848	1,805	29,857
Oil & Gas	**41,489**	**13,023**	**813**	**27,653**	42,533	12,945	556	29,032
Utilities	**34,551**	**5,027**	**2,428**	**27,096**	27,888	5,532	1,579	20,777
State & Municipal Govt[c]	**26,211**	**9,464**	**1,974**	**14,773**	26,741	9,747	1,963	15,031
Automotive	**17,317**	**5,408**	**368**	**11,541**	17,338	5,170	398	11,770
Chemicals & Plastics	**17,276**	**4,710**	**459**	**12,107**	16,034	4,902	180	10,952
Metals & Mining	**15,250**	**5,202**	**315**	**9,733**	15,247	5,370	377	9,500
Central Govt	**14,795**	**2,818**	**10,429**	**1,548**	18,412	3,867	12,825	1,720
Transportation	**13,903**	**4,790**	**715**	**8,398**	15,643	6,375	1,102	8,166
Insurance	**12,199**	**1,267**	**2,281**	**8,651**	12,633	1,355	2,562	8,716
Securities Firms	**6,514**	**558**	**4,500**	**1,456**	3,860	532	1,993	1,335
Financial Markets Infrastructure	**4,088**	**9**	**2,455**	**1,624**	7,397	18	5,854	1,525
All other[d]	**76,481**	**50,177**	**1,860**	**24,444**	68,300	45,217	1,624	21,459
Subtotal	**895,222**	**443,240**	**49,395**	**402,587**	878,046	437,769	53,538	386,739
Loans held-for-sale and loans at fair value	**11,154**	**11,154**	**–**	**–**	15,028	15,028	–	–
Receivables from customers and other[e]	**4,923**	**–**	**–**	**–**	2,098	–	–	–
Total wholesale-related	**911,299**	**454,394**	**49,395**	**402,587**	895,172	452,797	53,538	386,739
Total exposure[f][g]	**$ 2,117,252**	**$ 958,215**	**$ 49,395**	**$ 1,104,719**	$ 2,076,953	$ 983,133	$ 53,538	$ 1,038,184

(a) The industry rankings presented in the table as of December 31, 2018, are based on the industry rankings of the corresponding exposures at December 31, 2019, not actual rankings of such exposures at December 31, 2018.

(b) Individuals and Individual Entities predominantly consists of wealth management clients and includes exposure to personal investment companies and personal and testamentary trusts.

(c) In addition to the credit risk exposure to states and municipal governments (both U.S. and non-U.S.) at December 31, 2019 and 2018, noted above, the Bank held: $4.0 billion and $4.3 billion, respectively, of trading assets; $28.8 billion and $36.2 billion, respectively, of AFS securities; and 4.8 billion at both periods of held-to-maturity ("HTM") securities, issued by U.S. state and municipal governments. Refer to Note 3 and Note 11 for further information.

(d) All other includes: SPEs and Private education and civic organizations, representing approximately 92% and 8%, respectively, at both December 31, 2019 and 2018. Refer to Note 15 for more information on exposures to SPEs.

(e) Receivables from customers primarily represent held-for-investment margin loans to brokerage clients that are collateralized by assets maintained in the clients' brokerage accounts (e.g. cash on deposit, liquid and readily marketable debt or equity securities), as such no allowance is held against these receivables. To manage its credit risk the Bank establishes margin requirements and monitors the required margin levels on an ongoing basis, and requires clients to deposit additional cash or other collateral, or to reduce positions, when appropriate. These receivables are reported within accrued interest and accounts receivable on the Bank's Consolidated balance sheets.

(f) Excludes cash placed with banks of $252.5 billion and $266.5 billion, at December 31, 2019 and 2018, respectively, which is predominantly placed with various central banks, primarily Federal Reserve Banks.

(g) Credit exposure is net of risk participations and excludes the benefit of credit derivatives used in credit portfolio management activities held against derivative receivables or loans and liquid securities and other cash collateral held against derivative receivables.

(h) Represents lending-related financial instruments.

Note 6 – Derivative instruments

Derivative contracts derive their value from underlying asset prices, indices, reference rates, other inputs or a combination of these factors and may expose counterparties to risks and rewards of an underlying asset or liability without having to initially invest in, own or exchange the asset or liability. The Bank makes markets in derivatives for clients and also uses derivatives to hedge or manage its own risk exposures. Predominantly all of the Bank's derivatives are entered into for market-making or risk management purposes.

Market-making derivatives
The majority of the Bank's derivatives are entered into for market-making purposes. Clients use derivatives to mitigate or modify interest rate, credit, foreign exchange, equity and commodity risks. The Bank actively manages the risks from its exposure to these derivatives by entering into other derivative contracts or by purchasing or selling other financial instruments that partially or fully offset the exposure from client derivatives.

Risk management derivatives
The Bank manages certain market and credit risk exposures using derivative instruments, including derivatives in hedge accounting relationships and other derivatives that are used to manage risks associated with specified assets and liabilities.

The Bank generally uses interest rate derivatives to manage the risk associated with changes in interest rates. Fixed-rate assets and liabilities appreciate or depreciate in market value as interest rates change. Similarly, interest income and expense increase or decrease as a result of variable-rate assets and liabilities resetting to current market rates, and as a result of the repayment and subsequent origination or issuance of fixed-rate assets and liabilities at current market rates. Gains and losses on the derivative instruments related to these assets and liabilities are expected to substantially offset this variability.

Foreign currency derivatives are used to manage the foreign exchange risk associated with certain foreign currency–denominated (i.e., non-U.S. dollar) assets and liabilities and forecasted transactions, as well as the Bank's net investments in certain non-U.S. subsidiaries or branches whose functional currencies are not the U.S. dollar. As a result of fluctuations in foreign currencies, the U.S. dollar-equivalent values of the foreign currency–denominated assets and liabilities or the forecasted revenues or expenses increase or decrease. Gains or losses on the derivative instruments related to these foreign currency–denominated assets or liabilities, or forecasted transactions, are expected to substantially offset this variability.

Commodities derivatives are used to manage the price risk of certain commodities inventories. Gains or losses on these derivative instruments are expected to substantially offset the depreciation or appreciation of the related inventory.

Credit derivatives are used to manage the counterparty credit risk associated with loans and lending-related commitments. Credit derivatives compensate the purchaser when the entity referenced in the contract experiences a credit event, such as bankruptcy or a failure to pay an obligation when due. Credit derivatives primarily consist of CDS. Refer to the discussion in the Credit derivatives section on pages 46–48 of this Note for a further discussion of credit derivatives.

Refer to the risk management derivatives gains and losses table on page 46 of this Note, and the hedge accounting gains and losses tables on pages 43–46 of this Note for more information about risk management derivatives.

Derivative counterparties and settlement types
The Bank enters into OTC derivatives with third parties and JPMorgan Chase affiliates, which are negotiated and settled bilaterally with the derivative counterparty. The Bank also enters into, as principal, certain exchange-traded derivatives ("ETD") such as futures and options, and "cleared" over-the-counter ("OTC-cleared") derivative contracts with CCPs. ETD contracts are generally standardized contracts traded on an exchange and cleared by the CCP, which is the Bank's counterparty from the inception of the transactions. OTC-cleared derivatives are traded on a bilateral basis and then novated to the CCP for clearing.

Derivative clearing services
The Bank provides clearing services for clients in which the Bank acts as a clearing member at certain derivative exchanges and clearing houses. The Bank does not reflect the clients' derivative contracts in its Consolidated Financial Statements. Refer to Note 26 for further information on the Bank's clearing services.

Accounting for derivatives

All free-standing derivatives that the Bank executes for its own account are required to be recorded on the Consolidated balance sheets at fair value.

As permitted under U.S. GAAP, the Bank nets derivative assets and liabilities, and the related cash collateral receivables and payables, when a legally enforceable master netting agreement exists between the Bank and the derivative counterparty. Refer to Note 1 for further discussion of the offsetting of assets and liabilities. The accounting for changes in value of a derivative depends on whether or not the transaction has been designated and qualifies for hedge accounting. Derivatives that are not designated as hedges are reported and measured at fair value through earnings. The tabular disclosures on pages 39–46 of this Note provide additional information on the amount of, and reporting for, derivative assets, liabilities, gains and losses. Refer to Notes 3 and 4 for further discussion of derivatives embedded in structured notes.

Derivatives designated as hedges
The Bank applies hedge accounting to certain derivatives executed for risk management purposes – generally interest rate, foreign exchange and commodity derivatives. However, the Bank does not seek to apply hedge accounting to all of

the derivatives involved in its risk management activities. For example, the Bank does not apply hedge accounting to purchased CDS used to manage the credit risk of loans and lending-related commitments, because of the difficulties in qualifying such contracts as hedges. For the same reason, the Bank does not apply hedge accounting to certain interest rate and foreign exchange derivatives used for risk management purposes.

To qualify for hedge accounting, a derivative must be highly effective at reducing the risk associated with the exposure being hedged. In addition, for a derivative to be designated as a hedge, the risk management objective and strategy must be documented. Hedge documentation must identify the derivative hedging instrument, the asset or liability or forecasted transaction and type of risk to be hedged, and how the effectiveness of the derivative is assessed prospectively and retrospectively. To assess effectiveness, the Bank uses statistical methods such as regression analysis, nonstatistical methods such as dollar-value comparisons of the change in the fair value of the derivative to the change in the fair value or cash flows of the hedged item, and qualitative comparisons of critical terms and the evaluation of any changes in those terms. The extent to which a derivative has been, and is expected to continue to be, highly effective at offsetting changes in the fair value or cash flows of the hedged item must be assessed and documented at least quarterly. If it is determined that a derivative is not highly effective at hedging the designated exposure, hedge accounting is discontinued.

There are three types of hedge accounting designations: fair value hedges, cash flow hedges and net investment hedges. The Bank uses fair value hedges primarily to hedge fixed-rate long-term debt, AFS securities and certain commodities inventories. For qualifying fair value hedges, the changes in the fair value of the derivative, and in the value of the hedged item for the risk being hedged, are recognized in earnings. Certain amounts excluded from the assessment of effectiveness are recorded in OCI and recognized in earnings over the life of the derivative. If the hedge relationship is terminated, then the adjustment to the hedged item continues to be reported as part of the basis of the hedged item, and for benchmark interest rate hedges, is amortized to earnings as a yield adjustment. Derivative amounts affecting earnings are recognized consistent with the classification of the hedged item – primarily net interest income and principal transactions revenue.

The Bank uses cash flow hedges primarily to hedge the exposure to variability in forecasted cash flows from floating-rate assets and liabilities and foreign currency–denominated revenue and expense. For qualifying cash flow hedges, changes in the fair value of the derivative are recorded in OCI and recognized in earnings as the hedged item affects earnings. Derivative amounts affecting earnings are recognized consistent with the classification of the hedged item – primarily noninterest revenue, net interest income and compensation expense. If the hedge relationship is terminated, then the change in value of the derivative recorded in accumulated other comprehensive income/(loss) (“AOCI”) is recognized in earnings when the cash flows that were hedged affect earnings. For hedge relationships that are discontinued because a forecasted transaction is not expected to occur according to the original hedge forecast, any related derivative values recorded in AOCI are immediately recognized in earnings.

The Bank uses net investment hedges to protect the value of the Bank’s net investments in certain non-U.S. subsidiaries or branches whose functional currencies are not the U.S. dollar. For qualifying net investment hedges, changes in the fair value of the derivatives due to changes in spot foreign exchange rates are recorded in OCI as translation adjustments. Amounts excluded from the assessment of effectiveness are recorded directly in earnings.

The following table outlines the Bank's primary uses of derivatives and the related hedge accounting designation or disclosure category.

Type of Derivative	Use of Derivative	Designation and disclosure	Page reference
Manage specifically identified risk exposures in qualifying hedge accounting relationships:			
• Interest rate	Hedge fixed rate assets and liabilities	Fair value hedge	43
• Interest rate	Hedge floating-rate assets and liabilities	Cash flow hedge	45
• Foreign exchange	Hedge foreign currency-denominated assets and liabilities	Fair value hedge	43
• Foreign exchange	Hedge foreign currency-denominated forecasted revenue and expense	Cash flow hedge	45
• Foreign exchange	Hedge the value of the Bank's investments in non-U.S. dollar functional currency entities	Net investment hedge	46
• Commodity	Hedge commodity inventory	Fair value hedge	43
Manage specifically identified risk exposures not designated in qualifying hedge accounting relationships:			
• Interest rate	Manage the risk associated with mortgage commitments, warehouse loans and MSRs	Specified risk management	46
• Credit	Manage the credit risk associated with wholesale lending exposures	Specified risk management	46
• Interest rate and foreign exchange	Manage the risk associated with certain other specified assets and liabilities	Specified risk management	46
Market-making derivatives and other activities:			
• Various	Market-making and related risk management	Market-making and other	46
• Various	Other derivatives	Market-making and other	46

Notional amount of derivative contracts

The following table summarizes the notional amount of derivative contracts outstanding as of December 31, 2019 and 2018.

	Notional amounts[b]	
December 31, (in billions)	**2019**	2018
Interest rate contracts		
Swaps	**$ 21,724**	$ 22,104
Futures and forwards	**2,793**	3,180
Written options	**3,948**	4,001
Purchased options	**4,366**	4,334
Total interest rate contracts	**32,831**	33,619
Credit derivatives[a]	**1,214**	1,473
Foreign exchange contracts		
Cross-currency swaps	**3,647**	3,581
Spot, futures and forwards	**5,609**	5,898
Written options	**701**	836
Purchased options	**718**	831
Total foreign exchange contracts	**10,675**	11,146
Equity contracts		
Swaps	**561**	487
Futures and forwards	**125**	83
Written options	**566**	526
Purchased options	**549**	539
Total equity contracts	**1,801**	1,635
Commodity contracts		
Swaps	**385**	368
Spot, futures and forwards	**215**	158
Written options	**144**	143
Purchased options	**129**	126
Total commodity contracts	**873**	795
Total derivative notional amounts	**$ 47,394**	$ 48,668

(a) Refer to the Credit derivatives discussion on pages 46-48 for more information on volumes and types of credit derivative contracts.
(b) Represents the sum of gross long and gross short notional derivative contracts with third-parties and JPMorgan Chase affiliates. Refer to Note 21 for additional information on related party derivatives.

While the notional amounts disclosed above give an indication of the volume of the Bank's derivatives activity, the notional amounts significantly exceed, in the Bank's view, the possible losses that could arise from such transactions. For most derivative contracts, the notional amount is not exchanged; it is simply a reference amount used to calculate payments.

Impact of derivatives on the Consolidated balance sheets

The tables below include derivative receivables and payables with affiliates on a net basis. Refer to Note 21 for information regarding our derivative activities with affiliates.

The following table summarizes information on derivative receivables and payables (before and after netting adjustments) that are reflected on the Bank's Consolidated balance sheets as of December 31, 2019 and 2018, by accounting designation (e.g., whether the derivatives were designated in qualifying hedge accounting relationships or not) and contract type.

Free-standing derivative receivables and payables[(a)]

	Gross derivative receivables				Gross derivative payables			
December 31, 2019 (in millions)	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables[(b)]	Not designated as hedges	Designated as hedges	Total derivative payables	Net derivative payables[(b)]
Trading assets and liabilities								
Interest rate	**$ 332,595**	**$ 710**	**$ 333,305**	**$ 27,213**	**$ 306,244**	**$ 1**	**$ 306,245**	**$ 8,448**
Credit	**14,545**	**—**	**14,545**	**653**	**14,751**	**—**	**14,751**	**1,569**
Foreign exchange	**141,675**	**168**	**141,843**	**9,003**	**147,958**	**670**	**148,628**	**13,129**
Equity	**57,511**	**—**	**57,511**	**6,629**	**59,765**	**—**	**59,765**	**11,139**
Commodity	**24,199**	**33**	**24,232**	**5,897**	**25,790**	**4**	**25,794**	**6,552**
Total fair value of trading assets and liabilities	**$ 570,525**	**$ 911**	**$ 571,436**	**$ 49,395**	**$ 554,508**	**$ 675**	**$ 555,183**	**$ 40,837**

	Gross derivative receivables				Gross derivative payables			
December 31, 2018 (in millions)	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables[(b)]	Not designated as hedges	Designated as hedges	Total derivative payables	Net derivative payables[(b)]
Trading assets and liabilities								
Interest rate	$ 277,357	$ 686	$ 278,043	$ 22,885	$ 251,175	$ —	$ 251,175	$ 6,959
Credit	18,871	—	18,871	359	19,017	—	19,017	1,386
Foreign exchange	168,844	504	169,348	13,426	165,781	372	166,153	12,726
Equity	67,088	—	67,088	10,261	67,874	—	67,874	10,182
Commodity	28,366	247	28,613	6,607	29,717	121	29,838	8,063
Total fair value of trading assets and liabilities	$ 560,526	$ 1,437	$ 561,963	$ 53,538	$ 533,564	$ 493	$ 534,057	$ 39,316

(a) Balances exclude structured notes for which the fair value option has been elected. Refer to Note 4 for further information.
(b) As permitted under U.S. GAAP, the Bank has elected to net derivative receivables and derivative payables and the related cash collateral receivables and payables when a legally enforceable master netting agreement exists.

Derivatives netting

The following tables present, as of December 31, 2019 and 2018, gross and net derivative receivables and payables by contract and settlement type. Derivative receivables and payables, as well as the related cash collateral from the same counterparty, have been netted on the Consolidated balance sheets where the Bank has obtained an appropriate legal opinion with respect to the master netting agreement. Where such a legal opinion has not been either sought or obtained, amounts are not eligible for netting on the Consolidated balance sheets, and those derivative receivables and payables are shown separately in the tables below.

In addition to the cash collateral received and transferred that is presented on a net basis with derivative receivables and payables, the Bank receives and transfers additional collateral (financial instruments and cash). These amounts mitigate counterparty credit risk associated with the Bank's derivative instruments, but are not eligible for net presentation:

- collateral that consists of non-cash financial instruments (generally U.S. government and agency securities and other Group of Seven Nations ("G7") government securities) and cash collateral held at third-party custodians, which are shown separately as "Collateral not nettable on the Consolidated balance sheets" in the tables below, up to the fair value exposure amount;
- the amount of collateral held or transferred that exceeds the fair value exposure at the individual counterparty level, as of the date presented, which is excluded from the tables below; and
- collateral held or transferred that relates to derivative receivables or payables where an appropriate legal opinion has not been either sought or obtained with respect to the master netting agreement, which is excluded from the tables below.

	2019			2018		
December 31, (in millions)	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables
U.S. GAAP nettable derivative receivables						
Interest rate contracts:						
Over-the-counter ("OTC")	$ 319,493	$ (296,646)	$ 22,847	$ 268,586	$ (249,954)	$ 18,632
OTC-cleared	9,244	(9,190)	54	5,574	(5,069)	505
Exchange-traded[(a)]	347	(258)	89	322	(136)	186
Total interest rate contracts	329,084	(306,094)	22,990	274,482	(255,159)	19,323
Credit contracts:						
OTC	10,414	(10,033)	381	11,448	(11,290)	158
OTC-cleared	3,864	(3,858)	6	7,267	(7,222)	45
Total credit contracts	14,278	(13,891)	387	18,715	(18,512)	203
Foreign exchange contracts:						
OTC	139,644	(132,682)	6,962	165,544	(155,675)	9,869
OTC-cleared	185	(152)	33	235	(226)	9
Exchange-traded[(a)]	10	(6)	4	32	(21)	11
Total foreign exchange contracts	139,839	(132,840)	6,999	165,811	(155,922)	9,889
Equity contracts:						
OTC	44,749	(42,313)	2,436	49,162	(46,506)	2,656
Exchange-traded[(a)]	9,793	(8,569)	1,224	13,695	(10,321)	3,374
Total equity contracts	54,542	(50,882)	3,660	62,857	(56,827)	6,030
Commodity contracts:						
OTC	14,189	(12,403)	1,786	15,794	(13,787)	2,007
OTC-cleared	28	(28)	–	–	–	–
Exchange-traded[(a)]	6,153	(5,903)	250	8,815	(8,218)	597
Total commodity contracts	20,370	(18,334)	2,036	24,609	(22,005)	2,604
Derivative receivables with appropriate legal opinion	558,113	(522,041)	36,072 [(d)]	546,474	(508,425)	38,049 [(d)]
Derivative receivables where an appropriate legal opinion has not been either sought or obtained	13,323		13,323	15,489		15,489
Total derivative receivables recognized on the Consolidated balance sheets	$ 571,436		$ 49,395	$ 561,963		$ 53,538
Collateral not nettable on the Consolidated balance sheets[(b)(c)]			(14,178)			(12,821)
Net amounts			$ 35,217			$ 40,717

December 31, (in millions)	2019 Gross derivative payables	2019 Amounts netted on the Consolidated balance sheets	2019 Net derivative payables	2018 Gross derivative payables	2018 Amounts netted on the Consolidated balance sheets	2018 Net derivative payables
U.S. GAAP nettable derivative payables						
Interest rate contracts:						
OTC	**$ 294,595**	**$ (287,526)**	**$ 7,069**	$ 243,338	$ (238,374)	$ 4,964
OTC-cleared	**10,047**	**(9,968)**	**79**	6,375	(5,706)	669
Exchange-traded[a]	**365**	**(303)**	**62**	210	(135)	75
Total interest rate contracts	**305,007**	**(297,797)**	**7,210**	249,923	(244,215)	5,708
Credit contracts:						
OTC	**11,201**	**(9,794)**	**1,407**	12,156	(10,918)	1,238
OTC-cleared	**3,390**	**(3,389)**	**1**	6,716	(6,714)	2
Total credit contracts	**14,591**	**(13,183)**	**1,408**	18,872	(17,632)	1,240
Foreign exchange contracts:						
OTC	**145,897**	**(135,340)**	**10,557**	161,889	(153,156)	8,733
OTC-cleared	**186**	**(152)**	**34**	274	(268)	6
Exchange-traded[a]	**12**	**(6)**	**6**	17	(3)	14
Total foreign exchange contracts	**146,095**	**(135,498)**	**10,597**	162,180	(153,427)	8,753
Equity contracts:						
OTC	**45,876**	**(40,061)**	**5,815**	51,253	(47,341)	3,912
Exchange-traded[a]	**8,959**	**(8,565)**	**394**	11,147	(10,351)	796
Total equity contracts	**54,835**	**(48,626)**	**6,209**	62,400	(57,692)	4,708
Commodity contracts:						
OTC	**15,671**	**(13,350)**	**2,321**	17,545	(13,567)	3,978
OTC-cleared	**30**	**(30)**	**–**	–	–	–
Exchange-traded[a]	**6,007**	**(5,862)**	**145**	8,248	(8,208)	40
Total commodity contracts	**21,708**	**(19,242)**	**2,466**	25,793	(21,775)	4,018
Derivative payables with appropriate legal opinion	**542,236**	**(514,346)**	**27,890** [d]	519,168	(494,741)	24,427 [d]
Derivative payables where an appropriate legal opinion has not been either sought or obtained	**12,947**		**12,947**	14,889		14,889
Total derivative payables recognized on the Consolidated balance sheets	**$ 555,183**		**$ 40,837**	$ 534,057		$ 39,316
Collateral not nettable on the Consolidated balance sheets[b][c]			**(7,896)**			(4,431)
Net amounts			**$ 32,941**			$ 34,885

(a) Exchange-traded derivative balances that relate to futures contracts are settled daily.

(b) Represents liquid security collateral as well as cash collateral held at third-party custodians related to derivative instruments where an appropriate legal opinion has been obtained. For some counterparties, the collateral amounts of financial instruments may exceed the derivative receivables and derivative payables balances. Where this is the case, the total amount reported is limited to the net derivative receivables and net derivative payables balances with that counterparty.

(c) Derivative collateral relates only to OTC and OTC-cleared derivative instruments.

(d) Net derivatives receivable included cash collateral netted of $69.3 billion and $56.8 billion at December 31, 2019 and 2018, respectively. Net derivatives payable included cash collateral netted of $61.6 billion and $43.1 billion at December 31, 2019 and 2018, respectively. Derivative cash collateral relates to OTC and OTC-cleared derivative instruments.

Liquidity risk and credit-related contingent features

In addition to the specific market risks introduced by each derivative contract type, derivatives expose the Bank to credit risk – the risk that derivative counterparties may fail to meet their payment obligations under the derivative contracts and the collateral, if any, held by the Bank proves to be of insufficient value to cover the payment obligation. It is the policy of the Bank to actively pursue, where possible, the use of legally enforceable master netting arrangements and collateral agreements to mitigate derivative counterparty credit risk inherent in derivative receivables.

While derivative receivables expose the Bank to credit risk, derivative payables expose the Bank to liquidity risk, as the derivative contracts typically require the Bank to post cash or securities collateral with counterparties as the fair value of the contracts moves in the counterparties' favor or upon specified downgrades in the Bank's and its subsidiaries' respective credit ratings. Certain derivative contracts also provide for termination of the contract, generally upon a downgrade of either the Bank or the counterparty, at the fair value of the derivative contracts. The following table shows the aggregate fair value of net derivative payables related to OTC and OTC-cleared derivatives that contain contingent collateral or termination features that may be triggered upon a ratings downgrade, and the associated collateral the Bank has posted in the normal course of business, at December 31, 2019 and 2018.

OTC and OTC-cleared derivative payables containing downgrade triggers

December 31, (in millions)	**2019**	2018
Aggregate fair value of net derivative payables	**$ 14,655**	$ 9,198
Collateral posted	**13,319**	8,881

The following table shows the impact of a single-notch and two-notch downgrade of the long-term issuer ratings of the Bank and its subsidiaries at December 31, 2019 and 2018, related to OTC and OTC-cleared derivative contracts with contingent collateral or termination features that may be triggered upon a ratings downgrade. Derivatives contracts generally require additional collateral to be posted or terminations to be triggered when the predefined threshold rating is breached. A downgrade by a single rating agency that does not result in a rating lower than a preexisting corresponding rating provided by another major rating agency will generally not result in additional collateral (except in certain instances in which additional initial margin may be required upon a ratings downgrade), nor in termination payments requirements. The liquidity impact in the table is calculated based upon a downgrade below the lowest current rating of the rating agencies referred to in the derivative contract.

Liquidity impact of downgrade triggers on OTC and OTC-cleared derivatives

	2019		2018	
December 31, (in millions)	Single-notch downgrade	Two-notch downgrade	Single-notch downgrade	Two-notch downgrade
Amount of additional collateral to be posted upon downgrade[(a)]	**$ 189**	**$ 1,467**	$ 76	$ 940
Amount required to settle contracts with termination triggers upon downgrade[(b)]	**104**	**1,395**	172	764

(a) Includes the additional collateral to be posted for initial margin.
(b) Amounts represent fair values of derivative payables, and do not reflect collateral posted.

Derivatives executed in contemplation of a sale of the underlying financial asset

In certain instances the Bank enters into transactions in which it transfers financial assets but maintains the economic exposure to the transferred assets by entering into a derivative with the same counterparty in contemplation of the initial transfer. The Bank generally accounts for such transfers as collateralized financing transactions as described in Note 12, but in limited circumstances they may qualify to be accounted for as a sale and a derivative under U.S. GAAP. The amount of such transfers accounted for as a sale where the associated derivative was outstanding was not material at both December 31, 2019 and 2018.

Impact of derivatives on the Consolidated statements of income

The following tables provide information related to gains and losses recorded on derivatives based on their hedge accounting designation or purpose. Refer to Note 21 for information regarding our derivative activities with affiliates.

Fair value hedge gains and losses

The following tables present derivative instruments, by contract type, used in fair value hedge accounting relationships, as well as pre-tax gains/(losses) recorded on such derivatives and the related hedged items for the years ended December 31, 2019, 2018 and 2017, respectively. The Bank includes gains/(losses) on the hedging derivative in the same line item in the Consolidated statements of income as the related hedged item.

	Gains/(losses) recorded in income			Income statement impact of excluded components[f]		OCI impact
Year ended December 31, 2019 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[g]
Contract type						
Interest rate[a][b]	**$ (3,255)**	**$ 3,067**	**$ (188)**	**$ –**	**$ (204)**	**$ –**
Foreign exchange[c]	**531**	**(49)**	**482**	**–**	**482**	**–**
Commodity[d]	**(242)**	**244**	**2**	**–**	**1**	**–**
Total	**$ (2,966)**	**$ 3,262**	**$ 296**	**$ –**	**$ 279**	**$ –**

	Gains/(losses) recorded in income			Income statement impact of excluded components[f]		OCI impact
Year ended December 31, 2018 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[g]
Contract type						
Interest rate[a][b]	$ 516	$ (624)	$ (108)	$ –	$ (105)	$ –
Foreign exchange[c]	1,937	(1,461)	476	(35)	476	1
Commodity[d]	(21)	11	(10)	–	(10)	–
Total	$ 2,432	$ (2,074)	$ 358	$ (35)	$ 361	$ 1

	Gains/(losses) recorded in income			Income statement impact due to:	
Year ended December 31, 2017 (in millions)	Derivatives	Hedged items	Income statement impact	Hedge ineffectiveness[e]	Excluded components[f]
Contract type					
Interest rate[a][b]	$ 52	$ (253)	$ (201)	$ 2	$ (203)
Foreign exchange[c]	(3,159)	3,523	364	–	364
Commodity[d]	(85)	96	11	–	11
Total	$ (3,192)	$ 3,366	$ 174	$ 2	$ 172

(a) Primarily consists of hedges of the benchmark (e.g., London Interbank Offered Rate ("LIBOR")) interest rate risk of fixed-rate long-term debt and AFS securities. Gains and losses were recorded in net interest income.
(b) Excludes the amortization expense associated with the inception hedge accounting adjustment applied to the hedged item. This expense is recorded in net interest income and substantially offsets the income statement impact of the excluded components. Also excludes the accrual of interest on interest rate swaps and the related hedged items.
(c) Primarily consists of hedges of the foreign currency risk of AFS securities for changes in spot foreign currency rates. Gains and losses related to the derivatives and the hedged items due to changes in foreign currency rates and the income statement impact of excluded components were recorded primarily in principal transactions revenue and net interest income.
(d) Consists of overall fair value hedges of physical commodities inventories that are generally carried at the lower of cost or net realizable value (net realizable value approximates fair value). Gains and losses were recorded in principal transactions revenue.
(e) Hedge ineffectiveness is the amount by which the gain or loss on the designated derivative instrument does not exactly offset the gain or loss on the hedged item attributable to the hedged risk.
(f) The assessment of hedge effectiveness excludes certain components of the changes in fair values of the derivatives and hedged items such as forward points on foreign exchange forward contracts, time values and cross-currency basis spreads. Excluded components may impact earnings either through amortization of the initial amount over the life of the derivative or through fair value changes recognized in the current period.
(g) Represents the change in value of amounts excluded from the assessment of effectiveness under the amortization approach, predominantly cross-currency basis spreads. The amount excluded at inception of the hedge is recognized in earnings over the life of the derivative.

As of December 31, 2019, the following amounts were recorded on the Consolidated balance sheets related to certain cumulative fair value hedge basis adjustments that are expected to reverse through the income statement in future periods as an adjustment to yield.

December 31, 2019 (in millions)	Carrying amount of the hedged items[a][b]	Cumulative amount of fair value hedging adjustments included in the carrying amount of hedged items:		
		Active hedging relationships	Discontinued hedging relationships[d]	Total
Assets				
Investment securities - AFS	$ 125,779 [c]	$ 2,110	$ 278	$ 2,388
Liabilities				
Long-term debt	$ 1,058	$ 183	$ (8)	$ 175

December 31, 2018 (in millions)	Carrying amount of the hedged items[a][b]	Cumulative amount of fair value hedging adjustments included in the carrying amount of hedged items:		
		Active hedging relationships	Discontinued hedging relationships[d]	Total
Assets				
Investment securities - AFS	$ 55,207 [c]	$ (1,105)	$ 381	$ (724)
Liabilities				
Long-term debt	$ 2,021	$ 160	$ (12)	$ 148

(a) Excludes physical commodities with a carrying value of $1.5 billion and $500 million at December 31, 2019 and 2018, respectively, to which the Bank applies fair value hedge accounting. As a result of the application of hedge accounting, these inventories are carried at fair value, thus recognizing unrealized gains and losses in current periods. Since the Bank exits these positions at fair value, there is no incremental impact to net income in future periods.
(b) Excludes hedged items where only foreign currency risk is the designated hedged risk, as basis adjustments related to foreign currency hedges will not reverse through the income statement in future periods. At December 31, 2019 and 2018, the carrying amount excluded for available-for-sale securities is $14.9 billion and $14.6 billion, respectively.
(c) Carrying amount represents the amortized cost.
(d) Represents hedged items no longer designated in qualifying fair value hedging relationships for which an associated basis adjustment exists at the balance sheet date.

Cash flow hedge gains and losses

The following tables present derivative instruments, by contract type, used in cash flow hedge accounting relationships, and the pre-tax gains/(losses) recorded on such derivatives, for the years ended December 31, 2019, 2018 and 2017, respectively. The Bank includes the gain/(loss) on the hedging derivative in the same line item in the Consolidated statements of income as the change in cash flows on the related hedged item.

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2019 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[a]	**$ (28)**	**$ (3)**	**$ 25**
Foreign exchange[b]	**(74)**	**121**	**195**
Total	**$ (102)**	**$ 118**	**$ 220**

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2018 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[a]	$ 43	$ (42)	$ (85)
Foreign exchange[b]	(26)	(201)	(175)
Total	$ 17	$ (243)	$ (260)

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2017 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI[c]	Total change in OCI for period
Contract type			
Interest rate[a]	$ (17)	$ 12	$ 29
Foreign exchange[b]	(117)	135	252
Total	$ (134)	$ 147	$ 281

(a) Primarily consists of hedges of LIBOR-indexed floating-rate assets and floating-rate liabilities. Gains and losses were recorded in net interest income.
(b) Primarily consists of hedges of the foreign currency risk of non-U.S. dollar-denominated revenue and expense. The income statement classification of gains and losses follows the hedged item – primarily noninterest revenue and compensation expense.
(c) Represents the effective portion of changes in value of the related hedging derivative. Hedge ineffectiveness is the amount by which the cumulative gain or loss on the designated derivative instrument exceeds the present value of the cumulative expected change in cash flows on the hedged item attributable to the hedged risk. The Bank did not recognize any ineffectiveness on cash flow hedges during 2017.

The Bank did not experience any forecasted transactions that failed to occur for the years ended 2019, 2018 and 2017.

Over the next 12 months, the Bank expects that approximately $(8) million (after-tax) of net losses recorded in AOCI at December 31, 2019, related to cash flow hedges will be recognized in income. For cash flow hedges that have been terminated, the maximum length of time over which the derivative results recorded in AOCI will be recognized in earnings is approximately five years, corresponding to the timing of the originally hedged forecasted cash flows. For open cash flow hedges, the maximum length of time over which forecasted transactions are hedged is approximately seven years. The Bank's longer-dated forecasted transactions relate to core lending and borrowing activities.

Net investment hedge gains and losses

The following table presents hedging instruments, by contract type, that were used in net investment hedge accounting relationships, and the pre-tax gains/(losses) recorded on such instruments for the years ended December 31, 2019, 2018 and 2017.

	2019		2018		2017	
Year ended December 31, (in millions)	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI[(c)]
Foreign exchange derivatives	$ 56	$ 130	$ (19)	$ 941	$ (172)	$ (847)

(a) Certain components of hedging derivatives are permitted to be excluded from the assessment of hedge effectiveness, such as forward points on foreign exchange forward contracts. The Bank elects to record changes in fair value of these amounts directly in other income.
(b) Excludes amounts reclassified from AOCI to income on the sale or liquidation of hedged entities. The Bank reclassified net pre-tax gains/(losses) of $4 million to other income and $(23) million to other expense related to the liquidation of certain legal entities during the years ended December 31, 2019 and 2018, respectively. During the year ended December 31, 2017, the amount of such reclassifications were not material. Refer to Note 22 for further information.
(c) Represents the effective portion of changes in value of the related hedging derivative. The Bank did not recognize any ineffectiveness on net investment hedges directly in income during 2017.

Gains and losses on derivatives used for specified risk management purposes

The following table presents pre-tax gains/(losses) recorded on a limited number of derivatives, not designated in hedge accounting relationships, that are used to manage risks associated with certain specified assets and liabilities, including certain risks arising from mortgage commitments, warehouse loans, MSRs, wholesale lending exposures, and foreign currency denominated assets and liabilities.

	Derivatives gains/(losses) recorded in income		
Year ended December 31, (in millions)	2019	2018	2017
Contract type			
Interest rate[(a)]	$ 1,502	$ 79	$ 331
Credit[(b)]	(41)	(21)	(74)
Foreign exchange[(c)]	(32)	152	(98)
Total	$ 1,429	$ 210	$ 159

(a) Primarily represents interest rate derivatives used to hedge the interest rate risk inherent in mortgage commitments, warehouse loans and MSRs, as well as written commitments to originate warehouse loans. Gains and losses were recorded predominantly in mortgage fees and related income.
(b) Relates to credit derivatives used to mitigate credit risk associated with lending exposures in the Bank's wholesale businesses. These derivatives do not include credit derivatives used to mitigate counterparty credit risk arising from derivative receivables, which is included in gains and losses on derivatives related to market-making activities and other derivatives. Gains and losses were recorded in principal transactions revenue.
(c) Primarily relates to derivatives used to mitigate foreign exchange risk of specified foreign currency-denominated assets and liabilities. Gains and losses were recorded in principal transactions revenue.

Gains and losses on derivatives related to market-making activities and other derivatives

The Bank makes markets in derivatives in order to meet the needs of customers and uses derivatives to manage certain risks associated with net open risk positions from its market-making activities, including the counterparty credit risk arising from derivative receivables. All derivatives not included in the hedge accounting or specified risk management categories above are included in this category. Gains and losses on these derivatives are primarily recorded in principal transactions revenue. Refer to Note 7 for information on principal transactions revenue.

Credit derivatives

Credit derivatives are financial instruments whose value is derived from the credit risk associated with the debt of a third-party issuer (the reference entity) and which allow one party (the protection purchaser) to transfer that risk to another party (the protection seller). Credit derivatives expose the protection purchaser to the creditworthiness of the protection seller, as the protection seller is required to make payments under the contract when the reference entity experiences a credit event, such as a bankruptcy, a failure to pay its obligation or a restructuring. The seller of credit protection receives a premium for providing protection but has the risk that the underlying instrument referenced in the contract will be subject to a credit event.

The Bank is both a purchaser and seller of protection in the credit derivatives market and uses these derivatives for two primary purposes. First, in its capacity as a market-maker, the Bank actively manages a portfolio of credit derivatives by purchasing and selling credit protection, predominantly on corporate debt obligations, to meet the needs of customers. Second, as an end-user, the Bank uses credit derivatives to manage credit risk associated with lending exposures (loans and unfunded commitments) and derivatives counterparty exposures in the Bank's wholesale businesses, and to manage the credit risk arising from certain financial instruments in the Bank's market-making businesses. Following is a summary of various types of credit derivatives.

Credit default swaps
Credit derivatives may reference the credit of either a single reference entity ("single-name") or a broad-based index. The Bank purchases and sells protection on both single-name and index-reference obligations. Single-name CDS and index CDS contracts are either OTC or OTC-cleared derivative contracts. Single-name CDS are used to manage the default risk of a single reference entity, while index CDS contracts are used to manage the credit risk associated with the broader credit markets or credit market segments. Like the S&P 500 and other market indices, a CDS index consists of a portfolio of CDS across many reference entities. New series of CDS indices are periodically established with a new underlying portfolio of reference entities to reflect changes in the credit markets. If one of the reference entities in the index experiences a credit event, then the reference entity that defaulted is removed from the index. CDS can also be referenced against specific portfolios of reference names or against customized exposure levels based on specific client demands: for example, to provide protection against the first $1 million of realized credit losses in a $10 million portfolio of exposure. Such structures are commonly known as tranche CDS.

For both single-name CDS contracts and index CDS contracts, upon the occurrence of a credit event, under the terms of a CDS contract neither party to the CDS contract has recourse to the reference entity. The protection purchaser has recourse to the protection seller for the difference between the face value of the CDS contract and the fair value of the reference obligation at settlement of the credit derivative contract, also known as the recovery value. The protection purchaser does not need to hold the debt instrument of the underlying reference entity in order to receive amounts due under the CDS contract when a credit event occurs.

Credit-related notes
A credit-related note is a funded credit derivative where the issuer of the credit-related note purchases from the note investor credit protection on a reference entity or an index. Under the contract, the investor pays the issuer the par value of the note at the inception of the transaction, and in return, the issuer pays periodic payments to the investor, based on the credit risk of the referenced entity. The issuer also repays the investor the par value of the note at maturity unless the reference entity (or one of the entities that makes up a reference index) experiences a specified credit event. If a credit event occurs, the issuer is not obligated to repay the par value of the note, but rather, the issuer pays the investor the difference between the par value of the note and the fair value of the defaulted reference obligation at the time of settlement. Neither party to the credit-related note has recourse to the defaulting reference entity.

The following tables present a summary of the notional amounts of credit derivatives and credit-related notes the Bank sold and purchased as of December 31, 2019 and 2018. Upon a credit event, the Bank as a seller of protection would typically pay out only a percentage of the full notional amount of net protection sold, as the amount actually required to be paid on the contracts takes into account the recovery value of the reference obligation at the time of settlement. The Bank manages the credit risk on contracts to sell protection by purchasing protection with identical or similar underlying reference entities. Other purchased protection referenced in the following tables includes credit derivatives bought on related, but not identical, reference positions (including indices, portfolio coverage and other reference points) as well as protection purchased through credit-related notes.

The Bank does not use notional amounts of credit derivatives as the primary measure of risk management for such derivatives, because the notional amount does not take into account the probability of the occurrence of a credit event, the recovery value of the reference obligation, or related cash instruments and economic hedges, each of which reduces, in the Bank's view, the risks associated with such derivatives.

Total credit derivatives and credit-related notes

	Maximum payout/Notional amount			
December 31, 2019 (in millions)	Protection sold	Protection purchased with identical underlyings[b]	Net protection (sold)/ purchased[c]	Other protection purchased[d]
Credit derivatives				
Credit default swaps	**$ (547,953)**	**$ 556,560**	**$ 8,607**	**$ 3,846**
Other credit derivatives[a]	**(45,090)**	**53,507**	**8,417**	**6,964**
Total credit derivatives	**(593,043)**	**610,067**	**17,024**	**10,810**
Credit-related notes	–	–	–	**9,590**
Total	**$ (593,043)**	**$ 610,067**	**$ 17,024**	**$ 20,400**

	Maximum payout/Notional amount			
December 31, 2018 (in millions)	Protection sold	Protection purchased with identical underlyings[b]	Net protection (sold)/ purchased[c]	Other protection purchased[d]
Credit derivatives				
Credit default swaps	$ (680,487)	$ 689,761	$ 9,274	$ 3,712
Other credit derivatives[a]	(44,110)	46,087	1,977	8,488
Total credit derivatives	(724,597)	735,848	11,251	12,200
Credit-related notes	–	–	–	8,338
Total	$ (724,597)	$ 735,848	$ 11,251	$ 20,538

(a) Other credit derivatives predominantly consist of credit swap options and total return swaps.
(b) Represents the total notional amount of protection purchased where the underlying reference instrument is identical to the reference instrument on protection sold; the notional amount of protection purchased for each individual identical underlying reference instrument may be greater or lower than the notional amount of protection sold.
(c) Does not take into account the fair value of the reference obligation at the time of settlement, which would generally reduce the amount the seller of protection pays to the buyer of protection in determining settlement value.
(d) Represents protection purchased by the Bank on referenced instruments (single-name, portfolio or index) where the Bank has not sold any protection on the identical reference instrument.

The following tables summarize the notional amounts by the ratings, maturity profile, and total fair value, of credit derivatives and credit-related notes as of December 31, 2019 and 2018, where the Bank is the seller of protection. The maturity profile is based on the remaining contractual maturity of the credit derivative contracts. The ratings profile is based on the rating of the reference entity on which the credit derivative contract is based. The ratings and maturity profile of credit derivatives and credit-related notes where the Bank is the purchaser of protection are comparable to the profile reflected below.

Protection sold – credit derivatives and credit-related notes ratings[a]/maturity profile

December 31, 2019 (in millions)	<1 year	1-5 years	>5 years	Total notional amount	Fair value of receivables[b]	Fair value of payables[b]	Net fair value
Risk rating of reference entity							
Investment-grade	**$ (114,640)**	**$ (311,433)**	**$ (31,690)**	**$ (457,763)**	**$ 6,078**	**$ (820)**	**$ 5,258**
Noninvestment-grade	**(41,661)**	**(87,705)**	**(5,914)**	**(135,280)**	**4,270**	**(2,737)**	**1,533**
Total	**$ (156,301)**	**$ (399,138)**	**$ (37,604)**	**$ (593,043)**	**$ 10,348**	**$ (3,557)**	**$ 6,791**

December 31, 2018 (in millions)	<1 year	1-5 years	>5 years	Total notional amount	Fair value of receivables[b]	Fair value of payables[b]	Net fair value
Risk rating of reference entity							
Investment-grade	$ (118,135)	$ (402,501)	$ (32,585)	$ (553,221)	$ 5,750	$ (2,390)	$ 3,360
Noninvestment-grade	(45,897)	(119,316)	(6,163)	(171,376)	4,718	(4,820)	(102)
Total	$ (164,032)	$ (521,817)	$ (38,748)	$ (724,597)	$ 10,468	$ (7,210)	$ 3,258

(a) The ratings scale is primarily based on external credit ratings defined by S&P and Moody's.
(b) Amounts are shown on a gross basis, before the benefit of legally enforceable master netting agreements and cash collateral received by the Bank.

Note 7 – Noninterest revenue and noninterest expense

Noninterest revenue

The Bank records noninterest revenue from certain contracts with customers in investment banking fees, deposit-related fees, asset management, administration, and commissions, and components of card income. The related contracts are often terminable on demand and the Bank has no remaining obligation to deliver future services. For arrangements with a fixed term, the Bank may commit to deliver services in the future. Revenue associated with these remaining performance obligations typically depends on the occurrence of future events or underlying asset values, and is not recognized until the outcome of those events or values are known.

Investment banking fees

This revenue category includes debt and equity underwriting and advisory fees. As an underwriter, the Bank helps clients raise capital via public offering and private placement of various types of debt and equity instruments. Underwriting fees are primarily based on the issuance price and quantity of the underlying instruments, and are recognized as revenue typically upon execution of the client's transaction. The Bank also manages and syndicates loan arrangements. Credit arrangement and syndication fees, included within debt underwriting fees, are recorded as revenue after satisfying certain retention, timing and yield criteria.

The Bank also provides advisory services, by assisting its clients with mergers and acquisitions, divestitures, restructuring and other complex transactions. Advisory fees are recognized as revenue typically upon execution of the client's transaction.

The following table presents the components of investment banking fees.

Year ended December 31, (in millions)	2019	2018	2017
Underwriting			
Equity	**$ 439**	$ 488	$ 540
Debt	**1,914**	1,993	2,136
Total underwriting	**2,353**	2,481	2,676
Advisory	**864**	887	743
Total investment banking fees	**$ 3,217**	$ 3,368	$ 3,419

Principal transactions

Principal transactions revenue is driven by many factors, including:

- the bid-offer spread, which is the difference between the price at which a market participant is willing and able to sell an instrument to the Bank and the price at which another market participant is willing and able to buy it from the Bank, and vice versa; and
- realized and unrealized gains and losses on financial instruments and commodities transactions, including those accounted for under the fair value option, primarily used in client-driven market-making activities, and on private equity investments.
  - Realized gains and losses result from the sale of instruments, closing out or termination of transactions, or interim cash payments.
  - Unrealized gains and losses result from changes in valuation.

In connection with its client-driven market-making activities, the Bank transacts in debt and equity instruments, derivatives and commodities, including physical commodities inventories and financial instruments that reference commodities.

Principal transactions revenue also includes realized and unrealized gains and losses related to:

- derivatives designated in qualifying hedge accounting relationships, primarily fair value hedges of commodity and foreign exchange risk;
- derivatives used for specific risk management purposes, primarily to mitigate credit risk and foreign exchange risk

Refer to Note 6 for further information on the income statement classification of gains and losses from derivatives activities.

In the financial commodity markets, the Bank transacts in OTC derivatives (e.g., swaps, forwards, options) and ETD that reference a wide range of underlying commodities. In the physical commodity markets, the Bank primarily purchases and sells precious metals.

The following table presents all realized and unrealized gains and losses recorded in principal transactions revenue. This table excludes interest income and interest expense on trading assets and liabilities, which are an integral part of the overall performance of the Bank's client-driven market-making activities and cash deployment activities. Refer to Note 8 for further information on interest income and interest expense.

Trading revenue is presented primarily by instrument type. The Bank's client-driven market-making activities generally utilize a variety of instrument types in connection with their market-making and related risk-management activities; accordingly, the trading revenue presented in the table below is not representative of the total revenue of the Bank's client-driven market making activities.

Year ended December 31, (in millions)	2019	2018	2017
Trading revenue by instrument type			
Interest rate	$ 2,347	$ 2,779	$ 3,200
Credit	985	910	653
Foreign exchange	3,211	3,618	2,829
Equity	4,279	3,916	2,784
Commodity	741	600	415
Total trading revenue	11,563	11,823	9,881
Private equity gains/(losses)	1	(9)	2
Principal transactions	$ 11,564	$ 11,814	$ 9,883

Lending- and deposit-related fees

Lending-related fees include fees earned from loan commitments, standby letters of credit, financial guarantees, and other loan-servicing activities. Deposit-related fees include fees earned in lieu of compensating balances, and fees earned from performing cash management activities and other deposit account services. Lending- and deposit-related fees in this revenue category are recognized over the period in which the related service is provided.

The following table presents the components of lending- and deposit-related fees.

Year ended December 31, (in millions)	2019	2018	2017
Lending-related fees	$ 1,183	$ 1,122	$ 1,118
Deposit-related fees	5,185	4,935	4,823
Total lending- and deposit-related fees	$ 6,368	$ 6,057	$ 5,941

Asset management, administration and commissions

This revenue category includes fees from investment management and related services, custody, brokerage services and other products. The Bank manages assets on behalf of its clients, including investors in Bank-sponsored funds and owners of separately managed investment accounts. Management fees are typically based on the value of assets under management and are collected and recognized at the end of each period over which the management services are provided and the value of the managed assets is known. The Bank also receives performance-based management fees, which are earned based on exceeding certain benchmarks or other performance targets and are accrued and recognized when the probability of reversal is remote, typically at the end of the related billing period. The Bank has contractual arrangements with third parties to provide distribution and other services in connection with its asset management activities. Amounts paid to these third-party service providers are generally recorded in professional and outside services expense.

The following table presents the components of the Bank asset management, administration and commissions.

Year ended December 31, (in millions)	2019	2018	2017
Asset management fees			
Investment management fees[a]	$ 2,043	$ 2,049	$ 2,039
All other asset management fees	46	53	54
Total asset management fees	2,089	2,102	2,093
Total administration fees[b]	2,193	2,177	2,026
Commissions and other fees			
Brokerage commissions[c]	1,254	1,284	1,115
All other commissions and fees[d]	6,441	5,466	5,124
Total commissions and fees	7,695	6,750	6,239
Total asset management, administration and commissions	$ 11,977	$ 11,029	$ 10,358

(a) Represents fees earned from managing assets on behalf of the Bank's clients, including investors in Bank-sponsored funds and owners of separately managed investment accounts.
(b) Predominantly includes fees for custody, securities lending, funds services and securities clearance. These fees are recorded as revenue over the period in which the related service is provided.
(c) Represents commissions earned when the Bank acts as a broker, by facilitating its clients' purchases and sales of securities and other financial instruments. Brokerage commissions are collected and recognized as revenue upon occurrence of the client transaction. The Bank reports certain costs paid to third-party clearing houses and exchanges net against commission revenue.
(d) Includes fees earned for services provided to affiliates. Refer to Note 21 for discussion of service agreements and fee arrangements.

In addition, included in all other commissions and fees are fees earned by the Bank for providing operational support and services to JPMorgan Chase and its subsidiaries. Refer to Note 21 for further information on related party transactions.

Mortgage fees and related income

This revenue category primarily reflects net production and net mortgage servicing revenue.

Net production revenue includes fees and income recognized as earned on mortgage loans originated with the intent to sell, and the impact of risk management activities associated with the mortgage pipeline and warehouse loans. Net production revenue also includes gains and losses on sales and lower of cost or fair value adjustments on mortgage loans held-for-sale (excluding certain repurchased loans insured by U.S. government agencies), and changes in the fair value of financial instruments measured under the fair value option.

Net mortgage servicing revenue includes operating revenue earned from servicing third-party mortgage loans, which is recognized over the period in which the service is provided; changes in the fair value of MSRs; the impact of risk management activities associated with MSRs; and gains and losses on securitization of excess mortgage servicing. Net mortgage servicing revenue also includes gains and losses on sales and lower of cost or fair value adjustments of certain repurchased loans insured by U.S. government agencies.

Refer to Note 16 for further information on risk management activities and MSRs.

Net interest income from mortgage loans is recorded in interest income.

Card income

This revenue category includes interchange and other income from credit and debit card transactions, and fees earned from processing card transactions for merchants, both of which are recognized when purchases are made by a cardholder and presented net of certain transaction-related costs. Card income also includes account origination costs and annual fees, which are deferred and recognized on a straight-line basis over a 12-month period.

Certain credit card products offer the cardholder the ability to earn points based on account activity, which the cardholder can choose to redeem for cash and non-cash rewards. The cost to the Bank related to these proprietary rewards programs varies based on multiple factors including the terms and conditions of the rewards programs, cardholder activity, cardholder reward redemption rates and cardholder reward selections. The Bank maintains a liability for its obligations under its rewards programs and reports the current-period cost as a reduction of card income.

Credit card revenue sharing agreements

The Bank has contractual agreements with numerous co-brand partners that grant the Bank exclusive rights to issue co-branded credit card products and market them to the customers of such partners. These partners endorse the co-brand credit card programs and provide their customer or member lists to the Bank. The partners may also conduct marketing activities and provide rewards redeemable under their own loyalty programs that the Bank will grant to co-brand credit cardholders based on account activity. The terms of these agreements generally range from five to ten years.

The Bank typically makes payments to the co-brand credit card partners based on the cost of partners' marketing activities and loyalty program rewards provided to credit cardholders, new account originations and sales volumes. Payments to partners based on marketing efforts undertaken by the partners are expensed by the Bank as incurred and reported as marketing expense. Payments for partner loyalty program rewards are reported as a reduction of card income when incurred. Payments to partners based on new credit card account originations are accounted for as direct loan origination costs and are deferred and recognized as a reduction of card income on a straight-line basis over a 12-month period. Payments to partners based on sales volumes are reported as a reduction of card income when the related interchange income is earned.

The following table presents the components of card income:

Year ended December 31, (in millions)	2019	2018	2017
Interchange and merchant processing income	**$ 20,370**	$ 18,808	$ 17,080
Reward costs and partner payments	**(14,312)**	(13,074) [b]	(10,820)
Other card income[a]	**(754)**	(745)	(1,827)
Total card income	**$ 5,304**	$ 4,989	$ 4,433

(a) Predominantly represents account origination costs and annual fees, which are deferred and recognized on a straight-line basis over a 12-month period.

(b) Includes an adjustment to the credit card rewards liability of approximately $330 million, recorded during the first half of 2018.

Refer to Note 19 for information on operating lease income included within other income.

Noninterest expense

Other expense

Other expense on the Bank's Consolidated statements of income included the following:

Year ended December 31, (in millions)	2019	2018	2017
Legal expense/(benefit)	**$ 206**	$ 75	$ (135)
Federal Deposit Insurance Corporation ("FDIC")-related expense	**457**	1,239	1,492

Note 8 – Interest income and Interest expense

Interest income and interest expense are recorded in the Consolidated statements of income and classified based on the nature of the underlying asset or liability.

The following table presents the components of interest income and interest expense:

Year ended December 31, (in millions)	2019	2018	2017
Interest income			
Loans[a]	**$50,320**	$47,558	$40,948
Taxable securities	**7,959**	5,645	5,520
Non-taxable securities[b]	**1,273**	1,498	1,718
Total investment securities[a]	**9,232**	7,143	7,238
Trading assets	**6,320**	5,091	4,700
Federal funds sold and securities purchased under resale agreements	**4,742**	2,241	1,249
Securities borrowed	**304**	195	67
Deposits with banks	**3,884**	5,909	4,237
All other interest-earning assets[c]	**864**	644	381
Total interest income[c]	**75,666**	68,781	58,820
Interest expense			
Interest-bearing deposits	**10,761**	7,311	3,822
Federal funds purchased and securities loaned or sold under repurchase agreements	**1,996**	1,210	518
Trading liabilities - debt, short-term and all other interest-bearing liabilities[c]	**1,521**	1,475	1,309
Long-term debt	**2,187**	2,178	1,697
Beneficial interest issued by consolidated VIEs	**543**	450	500
Total interest expense[c]	**17,008**	12,624	7,846
Net interest income	**58,658**	56,157	50,974
Provision for credit losses	**5,593**	4,872	5,298
Net interest income after provision for credit losses	**$53,065**	$51,285	$45,676

(a) Includes the amortization/accretion of unearned income (e.g., purchase premiums/discounts, net deferred fees/costs, etc.).
(b) Represents securities that are tax-exempt for U.S. federal income tax purposes.
(c) During the first half of 2019, the Bank implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were made to align the accounting treatment between the balance sheet and the related interest income or expense, primarily by offsetting interest income and expense for certain prime brokerage-related held-for-investment customer receivables and payables that are currently presented as a single margin account on the balance sheet. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.

Interest income and interest expense includes the current-period interest accruals for financial instruments measured at fair value, except for derivatives and financial instruments containing embedded derivatives that would be separately accounted for in accordance with U.S. GAAP, absent the fair value option election; for those instruments, all changes in fair value including any interest elements, are reported in principal transactions revenue. For financial instruments that are not measured at fair value, the related interest is included within interest income or interest expense, as applicable. Refer to Notes 13, 11, 12 and 20, for further information on accounting for interest income and interest expense related to loans, investment securities, securities financing activities (i.e., securities purchased or sold under resale or repurchase agreements; securities borrowed; and securities loaned) and long-term debt, respectively.

Note 9 – Pension and other postretirement employee benefit plans

The Bank has various defined benefit pension plans and other postretirement employee benefit ("OPEB") plans that provide benefits to its employees in the U.S. and certain non-U.S. locations. On March 21, 2018 JPMorgan Chase & Co. transferred its qualified U.S. defined benefit pension plan to the Bank. The transfer was accomplished via a noncash capital contribution and was comprised of a net pension asset of $3.2 billion, accumulated other comprehensive income of $1.6 billion (net of taxes), and a deferred tax liability of $760 million. JPMorgan Chase & Co. transferred cash equal to the value of the deferred tax liability to the Bank. U.S. employees are provided pension benefits through this qualified noncontributory U.S. defined benefit pension plan. Prior to the transfer, the Bank's U.S. defined benefit pension expense was determined based upon employee participation in the JPMorgan Chase plan and effected through an intercompany charge from JPMorgan Chase, which was cash settled monthly. The Bank was charged $204 million in 2017, for U.S. qualified defined benefit pension plan expense.

The principal defined benefit pension plan in the U.S. is a qualified noncontributory plan that provides benefits to substantially all U.S. employees of JPMorgan Chase. In connection with changes to the U.S. Retirement Savings Program during the fourth quarter of 2018, the Bank announced that it will freeze the U.S. defined benefit pension plan (the "Plan Freeze"). Commencing on January 1, 2020 (and January 1, 2019 for new hires), new pay credits are directed to the U.S. defined contribution plan. Interest credits on the U.S. defined benefit pension plan will continue to accrue. As a result, a curtailment was triggered and a remeasurement of the U.S. defined benefit pension obligation and plan assets occurred as of November 30, 2018. The plan design change did not have a material impact on the U.S. defined benefit pension plan or the Bank's Consolidated Financial Statements.

The Bank also has defined benefit pension plans that are offered in certain non-U.S. locations based on factors such as eligible compensation, age and/or years of service. It is the Bank's policy to fund the pension plans in amounts sufficient to meet the requirements under applicable laws. The Bank does not anticipate at this time making any contribution to the U.S. defined benefit pension plan in 2020. The 2020 contributions to the non-U.S. defined benefit pension plans are expected to be $49 million of which $34 million are contractually required.

The Bank offers postretirement medical and life insurance benefits to certain U.S. retirees and postretirement medical benefits to certain qualifying U.S. employees through JPMorgan Chase plans. The Bank's U.S. postretirement medical benefit expense is determined based upon employee participation in the JPMorgan Chase plans and effected through an intercompany charge from JPMorgan Chase, which is cash settled monthly. The Bank was charged $1 million for each of the years 2019, 2018 and 2017, for U.S. OPEB plan expense.

The Bank also offers certain qualifying employees in the U.S. the ability to participate in a number of nonqualified noncontributory defined benefit pension plans that are unfunded. These plans provide supplemental defined pension benefits to certain employees.

The Bank also provides a qualified defined contribution plan in the U.S. and maintains other similar arrangements in certain non-U.S. locations.

Pension and OPEB accounting guidance generally requires that the difference between plan assets at fair value and the benefit obligation be measured and recorded on the balance sheet. Plans that are overfunded (excess of plan assets over benefit obligation) are recorded in other assets and plans that are underfunded (excess benefit obligation over plan assets) are recorded in other liabilities. Gains or losses resulting from changes in the benefit obligation and the value of plan assets are recorded in OCI and recognized as part of the net periodic benefit cost over subsequent periods as discussed in the Gains and losses section of this Note. Additionally, benefits earned during the year are reported in compensation expense; all other components of net periodic defined benefit costs are reported in other expense in the Consolidated statements of income.

The following table presents the changes in benefit obligations, plan assets, the net funded status, and the pretax pension amounts recorded in AOCI on the Consolidated balance sheets for the Bank's significant defined benefit pension plans, and the weighted-average actuarial annualized assumptions for the projected and accumulated postretirement benefit obligations.

As of or for the year ended December 31, (in millions)	Defined benefit pension plans	
	2019	2018
Change in benefit obligation		
Benefit obligation, beginning of year	**$ (15,382)**	$ (3,857)
Transfer from JPMorgan Chase	**—**	(12,486)
Benefits earned during the year	**(353)**	(352)
Interest cost on benefit obligations	**(593)**	(551)
Plan amendments	**(5)**	(29)
Plan curtailment	**—**	122
Employee contributions	**(8)**	(7)
Net gain/(loss)[(a)]	**(1,291)**	924
Benefits paid	**815**	861
Plan settlements	**—**	15
Foreign exchange impact and other	**(196)**	(22)
Benefit obligation, end of year[(b)]	**$ (17,013)**	$ (15,382)
Change in plan assets		
Fair value of plan assets, beginning of year	**$ 18,052**	$ 3,921
Transfer from JPMorgan Chase	**—**	15,702
Actual return on plan assets	**2,932**	(568)
The Bank contributions	**75**	63
Employee contributions	**8**	7
Benefits paid	**(815)**	(861)
Plan settlements	**—**	(15)
Foreign exchange impact and other	**121**	(197)
Fair value of plan assets, end of year[(b)(c)]	**$ 20,373**	$ 18,052
Net funded/(unfunded) status[(d)(e)]	**$ 3,360**	$ 2,670
Accumulated benefit obligation, end of year	**$ (16,992)**	$ (15,382)
Pretax pension amounts recorded in AOCI		
Net gain/(loss)	**$ (2,237)**	$ (3,102)
Prior service credit/(cost)	**(26)**	(23)
Accumulated other comprehensive income/(loss), pretax, end of year	**$ (2,263)**	$ (3,125)
Weighted-average actuarial assumptions used to determine benefit obligations		
Discount rate[(f)]	**0.20 - 3.30%**	0.60 - 4.30%
Rate of compensation increase[(f)]	**2.25 - 3.00**	2.25 - 3.00
Interest crediting rate[(f)]	**1.78 - 4.65%**	1.81 - 4.90

(a) At December 31, 2019 and 2018, the gain/(loss) was primarily attributed to the change in the discount rate.
(b) At December 31, 2019 and 2018, included non-U.S. benefit obligations of $(3.8) billion and $(3.3) billion, and plan assets of $4.0 billion and $3.5 billion, respectively, predominantly in the UK.
(c) At December 31, 2019 and 2018, defined benefit pension plan amounts that were not measured at fair value included $1.3 billion and $340 million, respectively, of accrued receivables, and $1.7 billion and $503 million, respectively, of accrued liabilities.
(d) Represents plans with an aggregate overfunded balance of $3.9 billion and $3.1 billion at December 31, 2019 and 2018, respectively, and plans with an aggregate underfunded balance of $519 million and $390 million at December 31, 2019 and 2018, respectively.
(e) For pension plans with a projected benefit obligation exceeding plan assets, the projected benefit obligation and fair value of plan assets was $1.4 billion and $885 million at December 31, 2019, respectively and $1.2 billion and $762 million at December 31, 2018, respectively. For pension plans with an accumulated benefit obligation exceeding plan assets, the accumulated benefit obligation and fair value of plan assets was $1.4 billion and $885 million at December 31, 2019,

respectively, and $1.1 billion and $762 million at December 31, 2018, respectively.

(f) For the U.S. defined benefit pension plans, the discount rate assumption is 3.30% and 4.30% for 2019 and 2018, respectively, and the interest crediting rate is 4.65% and 4.90% for 2019 and 2018, respectively. The rate of compensation increase was not applicable to the U.S. plan in 2019 due to the Plan Freeze, and was 2.30% in 2018. The rate of compensation increase presented in the table for 2019 applies to the non-U.S. plans.

Gains and losses

For the Bank's defined benefit pension plans, fair value is used to determine the expected return on plan assets. Amortization of net gains and losses is included in annual net periodic benefit cost if, as of the beginning of the year, the net gain or loss exceeds 10% of the greater of the projected benefit obligation or the fair value of the plan assets. Any excess is amortized over the average future service period of defined benefit pension plan participants, which for the U.S. defined benefit pension plan is currently eight years and for the non-U.S. defined benefit pension plans is the period appropriate for the affected plan. As a result of the Plan Freeze, beginning in 2020, any excess for the U.S. defined benefit pension plan will be amortized over the average expected lifetime of plan participants which is currently 38 years. In addition, prior service costs are amortized over the average remaining service period of active employees expected to receive benefits under the plan when the prior service cost is first recognized.

The following table presents the components of net periodic benefit costs reported in the Consolidated statements of income for the Bank's significant defined benefit pension and defined contribution plans, and in other comprehensive income for the significant defined benefit pension plans, and the weighted-average annualized actuarial assumptions for the net periodic benefit cost.

	Pension plans		
Year ended December 31, (in millions)	**2019**	2018	2017
Components of net periodic benefit cost			
Benefits earned during the year	**$ 353**	$ 352	$ 29
Interest cost on benefit obligations	**593**	551	83
Expected return on plan assets	**(915)**	(980)	(136)
Amortization:			
Net (gain)/loss	**166**	99	34
Prior service (credit)/cost	**3**	(23)	(2)
Curtailment (gain)/loss	**–**	21	–
Settlement (gain)/loss	**–**	2	2
Net periodic defined benefit cost[a]	**200** [c]	22 [c]	10
Other defined benefit pension plans[b]	**19**	8	15
Total defined benefit plans	**219**	30	25
Total defined contribution plans	**844**	741	680
Total pension cost included in noninterest expense	**$ 1,063**	$ 771	$ 705
Changes in plan assets and benefit obligations recognized in other comprehensive income [d]			
Transfer from JPMorgan Chase	**$ –**	$2,123	$ –
Prior service (credit)/cost arising during the year	**5**	29	–
Net (gain)/loss arising during the year	**(725)**	503	(33)
Amortization of net loss	**(166)**	(99)	(34)
Amortization of prior service (cost)/credit	**(3)**	23	2
Curtailment gain/(loss)	**–**	(21)	–
Settlement gain/(loss)	**–**	(2)	(2)
Foreign exchange impact and other	**27**	25	52
Total recognized in other comprehensive income	**$ (862)**	$2,581	$ (15)
Total recognized in net periodic benefit cost and other comprehensive income	**$ (662)**	$2,603	$ (5)
Weighted-average assumptions used to determine net periodic benefit costs			
Discount rate[e]	**0.60 - 4.30%**	0.60 - 4.50%	0.60 - 4.30%
Expected long-term rate of return on plan assets[e]	**0.00 - 5.50**	0.70 - 5.50	0.70 - 4.30
Rate of compensation increase[e]	**2.25 - 3.00**	2.25 - 3.00	2.25 - 3.00
Interest crediting rate[e]	**1.81 - 4.90%**	1.81 - 4.90	1.81 - 4.90

(a) Benefits earned during the year are reported in compensation expense; all other components of net periodic defined benefit costs are reported within other expense in the Consolidated statements of income.

(b) Includes various defined benefit pension plans which are individually immaterial.

(c) Includes $9 million and $(43) million, for the years ended December 31, 2019 and 2018, respectively, that was charged by the Bank to JPMorgan Chase and its non-bank subsidiaries for their share of the U.S. qualified defined benefit pension plan expense.

(d) Does not include amounts related to immaterial U.K. OPEB plan.

(e) The rate assumptions for the U.S. defined benefit pension plans are at the upper end of the range, except for the rate of compensation increase, which was 2.30% for 2019 and 2018, respectively.

Plan assumptions

The Bank's expected long-term rate of return for defined benefit pension plan assets is a blended weighted average, by asset allocation of the projected long-term returns for the various asset classes, taking into consideration local market conditions and the specific allocation of plan assets. Returns on asset classes are developed using a forward-looking approach and are not strictly based on historical returns. Consideration is also given to current market conditions and the short-term portfolio mix of each plan.

The discount rate used in determining the benefit obligation under the U.S. defined benefit pension plan was provided by the Bank's actuaries. This rate was selected by reference to the yields on portfolios of bonds with maturity dates and coupons that closely match each of the plan's projected cash flows. The discount rate for the U.K. defined benefit pension plan represents a rate of appropriate duration from the analysis of yield curves provided by the Bank's actuaries.

At December 31, 2019, the Bank decreased the discount rates used to determine its benefit obligations for the U.S. defined benefit pension in light of current market interest rates, which is expected to decrease expense by approximately $66 million in 2020. The 2020 expected long-term rate of return on U.S. defined benefit pension plan assets is 4.00%.

The following table represents the effect of a 25-basis point decline in the two listed rates below on estimated 2020 defined benefit pension plan expense, as well as the effect on the postretirement benefit obligations.

(in millions)	Defined benefit pension plan expense	Benefit obligation
Expected long-term rate of return	$ 50	N/A
Discount rate	$ 6	$ 543

Investment strategy and asset allocation

The assets of the Bank's defined benefit pension plans are held in various trusts and are invested in well-diversified portfolios of equity and fixed income securities, cash and cash equivalents, and alternative investments.

The investment policies for the assets of the Bank's defined benefit pension plans are to optimize the risk-return relationship as appropriate to the needs and goals of each plan using a global portfolio of various asset classes diversified by market segment, economic sector, and issuer. Assets are managed by a combination of internal and external investment managers. The Bank regularly reviews the asset allocations and asset managers, as well as other factors that impact the portfolios, which are rebalanced when deemed necessary.

Investments held by the plans include financial instruments which are exposed to various risks such as interest rate, market and credit risks. Exposure to a concentration of credit risk is mitigated by the broad diversification of both U.S. and non-U.S. investments. Additionally, the investments in each of the collective investment funds and/or registered investment companies are further diversified into various financial instruments. As of December 31, 2019, assets held by the Bank's defined benefit pension plans do not include securities issued by JPMorgan Chase or its affiliates, except through indirect exposures through investments in ETFs, mutual funds and collective investment funds managed by third-parties. The plans hold investments that are sponsored or managed by affiliates of JPMorgan Chase in the amount of $3.1 billion and $3.7 billion, as of December 31, 2019 and 2018, respectively.

The following table presents the weighted-average asset allocation of the fair values of total plan assets at December 31 for the years indicated, as well as the respective approved asset allocation ranges by asset class.

December 31,	Asset Allocation	% of plan assets[c] 2019	2018
Asset class			
Debt securities[a]	42-100%	**74%**	48%
Equity securities	0-40	**16**	37
Real Estate	0-6	**1**	2
Alternatives[b]	0-24	**9**	13
Total	100%	**100%**	100%

(a) Debt securities primarily includes cash and cash equivalents, corporate debt, U.S. federal, state, local and non-U.S. government, asset-backed and mortgage-backed securities.
(b) Alternatives primarily include limited partnerships.
(c) Represents the U.S. defined benefit pension plan only, as that is the most significant plan.

Fair value measurement of the plans' assets and liabilities

Refer to Note 3 for information on fair value measurements, including descriptions of level 1, 2, and 3 of the fair value hierarchy and the valuation methods employed by the Bank.

Pension plan assets and liabilities measured at fair value

	Defined benefit pension plans							
	2019				2018			
December 31, (in millions)	Level 1	Level 2	Level 3	Total fair value	Level 1	Level 2	Level 3	Total fair value
Cash and cash equivalents	**$ 157**	**$ 1**	**$ –**	**$ 158**	$ 343	$ 1	$ –	$ 344
Equity securities	**3,240**	**184**	**2**	**3,426**	5,342	162	2	5,506
Collective investment funds[a]	**265**	**–**	**–**	**265**	161	–	–	161
Limited partnerships[b]	**187**	**–**	**–**	**187**	40	–	–	40
Corporate debt securities[c]	**–**	**7,090**	**2**	**7,092**	–	3,540	3	3,543
U.S. federal, state, local and non-U.S. government debt securities	**1,790**	**1,054**	**–**	**2,844**	1,191	743	–	1,934
Mortgage-backed securities	**314**	**701**	**4**	**1,019**	82	272	3	357
Derivative receivables	**–**	**337**	**–**	**337**	–	143	–	143
Other[d]	**785**	**132**	**250**	**1,167**	885	80	302	1,267
Total assets measured at fair value[e]	**$ 6,738**	**$ 9,499**	**$ 258**	**$ 16,495**	$ 8,044	$ 4,941	$ 310	$ 13,295
Derivative payables	**$ –**	**$ (118)**	**$ –**	**$ (118)**	$ –	$ (96)	$ –	$ (96)
Total liabilities measured at fair value[e]	**$ –**	**$ (118)**	**$ –**	**$ (118)**	$ –	$ (96)	$ –	$ (96)

(a) At December 31, 2019 and 2018, collective investment funds primarily included a mix of short-term investment funds, U.S. and non-U.S. equity investments (including index) and real estate funds.
(b) Unfunded commitments to purchase limited partnership investments for the plans were $451 million and $521 million for 2019 and 2018, respectively.
(c) Corporate debt securities include debt securities of U.S. and non-U.S. corporations.
(d) Other consists primarily of mutual funds, money market funds and participating annuity contracts. Mutual funds and money market funds are primarily classified within level 1 of the fair value hierarchy given they are valued using market observable prices. Participating annuity contracts are classified within level 3 of the fair value hierarchy due to a lack of market mechanisms for transferring each policy and surrender restrictions.
(e) At December 31, 2019 and 2018, excludes $4.4 billion and $5.0 billion of certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient, which are not required to be classified in the fair value hierarchy, $1.3 billion and $340 million of defined benefit pension plan receivables for investments sold and dividends and interest receivables, $1.7 billion and $479 million of defined benefit pension plan payables for investments purchased, and $25 million and $24 million of other liabilities, respectively.

Changes in level 3 fair value measurements using significant unobservable inputs

(in millions)	Fair value, Beginning balance	Actual return on plan assets: Realized gains/(losses)	Actual return on plan assets: Unrealized gains/(losses)	Purchases, sales and settlements, net	Transfers in and/or out of level 3	Fair value, Ending balance
Year ended December 31, 2019						
U.S. defined benefit pension plan						
Annuity contracts and other [(a)]	**$ 310**	**$ –**	**$ 31**	**$ (85)**	**$ 2**	**$ 258**
Year ended December 31, 2018						
U.S. defined benefit pension plan						
Annuity contracts and other [(a)]	$ –	$ –	$ –	$ (1)	$ 311 [(b)]	$ 310

(a) Substantially all are participating annuity contracts.
(b) Represents level 3 assets transferred in by JPMorgan Chase.

Estimated future benefit payments

The following table presents benefit payments expected to be paid, which include the effect of expected future service, for the years indicated.

Year ended December 31, (in millions)	Defined benefit pension plans
2020	$ 1,025
2021	1,015
2022	1,015
2023	976
2024	966
Years 2025-2029	4,596

Note 10 – Employee share-based incentives

Employee share-based awards

The Bank's employees receive annual incentive compensation based on their performance, the performance of their business and JPMorgan Chase's consolidated operating results. The Bank's employees participate, to the extent they meet minimum eligibility requirements, in various share-based incentive plans sponsored by JPMorgan Chase.

In 2019, 2018 and 2017, JPMorgan Chase granted long-term share-based awards to certain employees under its Long-Term Incentive Plan ("LTIP"), as amended and restated effective May 15, 2018. Under the terms of the LTIP, as of December 31, 2019, 75 million shares of JPMorgan Chase's common stock were available for issuance through May 2022. The LTIP is the only active plan under which JPMorgan Chase is currently granting share-based incentive awards. In the following discussion, the LTIP, plus prior JPMorgan Chase plans and plans assumed as the result of acquisitions, are referred to collectively as the "LTI Plans," and such plans constitute JPMorgan Chase's share-based incentive plans.

Restricted stock units ("RSUs") are awarded at no cost to the recipient upon their grant. Generally, RSUs are granted annually and vest at a rate of 50% after two years and 50% after three years and are converted into shares of common stock as of the vesting date. In addition, RSUs typically include full-career eligibility provisions, which allow employees to continue to vest upon voluntary termination based on age or service-related requirements, subject to post-employment and other restrictions. All RSU awards are subject to forfeiture until vested and contain clawback provisions that may result in cancellation under certain specified circumstances. Predominantly all RSUs entitle the recipient to receive cash payments equivalent to any dividends paid on the underlying common stock during the period the RSUs are outstanding.

Performance share units ("PSUs") are granted annually, and approved by JPMorgan Chase's Board of Directors, to members of JPMorgan Chase's Operating Committee under the variable compensation program. PSUs are subject to JPMorgan Chase's achievement of specified performance criteria over a three-year period. The number of awards that vest can range from zero to 150% of the grant amount. In addition, dividends that accrue during the vesting period are reinvested in dividend equivalent share units. PSUs and the related dividend equivalent share units are converted into shares of common stock after vesting.

Once the PSUs and dividend equivalent share units have vested, the shares of common stock that are delivered, after applicable tax withholding, must be held for an additional two-year period, for a total combined vesting and holding period of approximately five to eight years from the grant date depending on regulations in certain countries.

Under the LTI Plans, stock appreciation rights ("SARs") and stock options have generally been granted with an exercise price equal to the fair value of JPMorgan Chase's common stock on the grant date. SARs and stock options generally expire ten years after the grant date. There were no material grants of employee SARs or stock options in 2019, 2018 and 2017.

The Bank separately recognizes compensation expense for each tranche of each award, net of estimated forfeitures, as if it were a separate award with its own vesting date. Generally, for each tranche granted, compensation expense is recognized on a straight-line basis from the grant date until the vesting date of the respective tranche, provided that the employees will not become full-career eligible during the vesting period. For awards with full-career eligibility provisions and awards granted with no future substantive service requirement, the Bank accrues the estimated value of awards expected to be awarded to employees as of the grant date without giving consideration to the impact of post-employment restrictions. For each tranche granted to employees who will become full-career eligible during the vesting period, compensation expense is recognized on a straight-line basis from the grant date until the earlier of the employee's full-career eligibility date or the vesting date of the respective tranche.

RSUs, PSUs, employee SARs and stock options activity

Generally, compensation expense for RSUs and PSUs is measured based on the number of units granted multiplied by the stock price at the grant date, and for employee SARs and stock options, is measured at the grant date using the Black-Scholes valuation model. Compensation expense for these awards is recognized in net income as described previously. The following table summarizes the Bank's RSUs, PSUs, employee SARs and stock options activity for 2019.

Year ended December 31, 2019 (in thousands, except weighted-average data, and where otherwise stated)	RSUs/PSUs Number of units	RSUs/PSUs Weighted-average grant date fair value	SARs/Options Number of awards	SARs/Options Weighted-average exercise price	SARs/Options Weighted-average remaining contractual life (in years)	SARs/Options Aggregate intrinsic value
Outstanding, January 1	42,491	$ 85.01	10,574	$ 41.49		
Granted	17,571	99.43	17	111.23		
Exercised or vested	(20,979)	70.35	(6,079)	41.63		
Forfeited	(1,255)	97.78	–	–		
Canceled	NA	NA	(30)	89.71		
Transferred	437	85.01	89	41.49		
Outstanding, December 31	38,265	$ 99.23	4,571	$ 41.30	1.9	$ 446,074
Exercisable, December 31	NA	NA	4,566	41.22	1.9	445,974

The total fair value of RSUs that vested during the years ended December 31, 2019, 2018 and 2017, was $2.1 billion, $2.5 billion and $2.0 billion, respectively. The total intrinsic value of options exercised during the years ended December 31, 2019, 2018 and 2017, was $441 million, $282 million and $554 million, respectively.

Compensation expense

The Bank recognized the following compensation expense related to its various employee share-based incentive plans in its Consolidated statements of income.

Year ended December 31, (in millions)	**2019**	2018	2017
Cost of prior grants of RSUs, PSUs, SARs and employee stock options that are amortized over their applicable vesting periods	**$ 842**	$ 904	$ 802
Accrual of estimated costs of share-based awards to be granted in future periods including those to full-career eligible employees	**804**	778	688
Total compensation expense related to employee share-based incentive plans	**$ 1,646**	$ 1,682	$ 1,490

There are no separate plans solely for the employees of the Bank and, therefore, the share-based compensation expense for the Bank is determined based upon employee participation in the JPMorgan Chase plans and effected through a charge from JPMorgan Chase, which is cash settled.

At December 31, 2019, approximately $525 million (pretax) of compensation expense related to unvested awards had not yet been charged to net income. That cost is expected to be amortized into compensation expense over a weighted-average period of 1.6 years. The Bank does not capitalize any compensation expense related to share-based compensation awards to employees.

Tax benefits

The Bank is recognizing its share of excess tax benefits (including tax benefits from dividends or dividend equivalents) on share-based payment awards within income tax expense in the Consolidated statements of income. Income tax benefits related to share-based incentive arrangements recognized in the Bank's Consolidated statements of income for the years ended December 31, 2019, 2018 and 2017, were $667 million, $753 million and $739 million, respectively.

Note 11 – Investment securities

Investment securities consist of debt securities that are classified as AFS or HTM. Debt securities classified as trading assets are discussed in Note 3. Predominantly all of the Bank's AFS and HTM securities are held in connection with its asset-liability management activities. At December 31, 2019, the investment securities portfolio consisted of debt securities with an average credit rating of AA+ (based upon external ratings where available, and where not available, based primarily upon internal ratings). The Bank's internal risk ratings generally align with the qualitative characteristics (e.g., borrower capacity to meet financial commitments and vulnerability to changes in the economic environment) defined by S&P and Moody's, however the quantitative characteristics (e.g., PDs and LGDs) may differ as they reflect internal historical experiences and assumptions.

AFS securities are carried at fair value on the Consolidated balance sheets. Unrealized gains and losses, after any applicable hedge accounting adjustments, are reported as net increases or decreases to AOCI. The specific identification method is used to determine realized gains and losses on AFS securities, which are included in securities gains/(losses) on the Consolidated statements of income. HTM debt securities, which the Bank has the intent and ability to hold until maturity, are carried at amortized cost on the Consolidated balance sheets.

For both AFS and HTM debt securities, purchase discounts or premiums are generally amortized into interest income on a level-yield basis over the contractual life of the security. However, premiums on certain callable debt securities are amortized to the earliest call date.

During the second half of 2019, the Bank transferred $6.2 billion of collateralized loan obligations from AFS to HTM for capital management purposes. These securities were transferred at fair value in a non-cash transaction.

The amortized costs and estimated fair values of the investment securities portfolio were as follows for the dates indicated.

December 31, (in millions)	2019 Amortized cost	2019 Gross unrealized gains	2019 Gross unrealized losses	2019 Fair value	2018 Amortized cost	2018 Gross unrealized gains	2018 Gross unrealized losses	2018 Fair value
Available-for-sale securities								
Mortgage-backed securities:								
U.S. GSEs and government agencies[(a)]	**$ 107,811**	**$ 2,395**	**$ 89**	**$ 110,117**	$ 69,026	$ 594	$ 974	$ 68,646
Residential:								
U.S.	**10,223**	**233**	**6**	**10,450**	5,877	79	31	5,925
Non-U.S.	**2,477**	**64**	**1**	**2,540**	2,529	72	6	2,595
Commercial	**5,130**	**64**	**13**	**5,181**	6,689	43	147	6,585
Total mortgage-backed securities	**125,641**	**2,756**	**109**	**128,288**	84,121	788	1,158	83,751
U.S. Treasury and government agencies	**139,162**	**449**	**175**	**139,436**	55,771	366	78	56,059
Obligations of U.S. states and municipalities	**26,744**	**2,076**	**1**	**28,819**	34,709	1,523	80	36,152
Certificates of deposit	**77**	**–**	**–**	**77**	75	–	–	75
Non-U.S. government debt securities	**21,427**	**377**	**17**	**21,787**	23,771	351	20	24,102
Corporate debt securities	**823**	**22**	**–**	**845**	1,904	23	9	1,918
Asset-backed securities:								
Collateralized loan obligations	**25,038**	**9**	**56**	**24,991**	19,612	1	176	19,437
Other	**5,405**	**35**	**20**	**5,420**	7,189	51	22	7,218
Total available-for-sale securities	**344,317**	**5,724**	**378**	**349,663**	227,152	3,103	1,543	228,712
Held-to-maturity securities								
Mortgage-backed securities:								
U.S. GSEs and government agencies[(a)]	**36,523**	**1,165**	**62**	**37,626**	26,610	134	200	26,544
Total mortgage-backed securities	**36,523**	**1,165**	**62**	**37,626**	26,610	134	200	26,544
U.S. Treasury and government agencies	**51**	**–**	**1**	**50**	–	–	–	–
Obligations of U.S. states and municipalities	**4,797**	**299**	**–**	**5,096**	4,824	105	15	4,914
Asset-backed securities:								
Collateralized loan obligations	**6,169**	**–**	**–**	**6,169**	–	–	–	–
Total held-to-maturity securities	**47,540**	**1,464**	**63**	**48,941**	31,434	239	215	31,458
Total investment securities	**$ 391,857**	**$ 7,188**	**$ 441**	**$ 398,604**	$ 258,586	$ 3,342	$ 1,758	$ 260,170

(a) Includes AFS U.S. GSE obligations with fair values of $78.5 billion and $50.7 billion, and HTM U.S. GSE obligations with amortized cost of $31.6 billion and $20.9 billion, at December 31, 2019 and 2018, respectively. As of December 31, 2019, mortgage-backed securities issued by Fannie Mae and Freddie Mac each exceeded 10% of JPMorgan Chase Bank, N.A.'s total stockholder's equity; the amortized cost and fair value of such securities were $69.4 billion and $71.4 billion, and $38.7 billion and $39.6 billion, respectively.

Investment securities impairment

The following tables present the fair value and gross unrealized losses for investment securities by aging category at December 31, 2019 and 2018.

	Investment securities with gross unrealized losses					
	Less than 12 months		12 months or more			
December 31, 2019 (in millions)	Fair value	Gross unrealized losses	Fair value	Gross unrealized losses	Total fair value	Total gross unrealized losses
Available-for-sale securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	$ 16,966	$ 53	$ 3,058	$ 36	20,024	$ 89
Residential:						
U.S.	1,072	3	423	3	1,495	6
Non-U.S.	13	–	420	1	433	1
Commercial	1,287	12	199	1	1,486	13
Total mortgage-backed securities	19,338	68	4,100	41	23,438	109
U.S. Treasury and government agencies	23,003	145	5,695	30	28,698	175
Obligations of U.S. states and municipalities	186	1	–	–	186	1
Certificates of deposit	77	–	–	–	77	–
Non-U.S. government debt securities	3,970	13	1,406	4	5,376	17
Corporate debt securities	–	–	–	–	–	–
Asset-backed securities:						
Collateralized loan obligations	10,364	11	7,756	45	18,120	56
Other	1,639	9	753	11	2,392	20
Total available-for-sale securities	58,577	247	19,710	131	78,287	378
Held-to-maturity securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	5,186	62	81	–	5,267	62
Total mortgage-backed securities	5,186	62	81	–	5,267	62
U.S. Treasury and government agencies	50	1	–	–	50	1
Obligations of U.S. states and municipalities	–	–	–	–	–	–
Asset-backed securities:						
Collateralized loan obligations	3,421	–	1,375	–	4,796	–
Total held-to-maturity securities	8,657	63	1,456	–	10,113	63
Total investment securities with gross unrealized losses	$ 67,234	$ 310	$ 21,166	$ 131	$ 88,400	$ 441

December 31, 2018 (in millions)	Investment securities with gross unrealized losses					
	Less than 12 months		12 months or more			
	Fair value	Gross unrealized losses	Fair value	Gross unrealized losses	Total fair value	Total gross unrealized losses
Available-for-sale securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	$ 17,656	$ 318	$ 22,728	$ 656	$ 40,384	$ 974
Residential:						
U.S.	623	4	1,445	27	2,068	31
Non-U.S.	907	5	165	1	1,072	6
Commercial	960	6	3,172	141	4,132	147
Total mortgage-backed securities	20,146	333	27,510	825	47,656	1,158
U.S. Treasury and government agencies	4,792	7	2,391	71	7,183	78
Obligations of U.S. states and municipalities	1,808	15	2,477	65	4,285	80
Certificates of deposit	75	–	–	–	75	–
Non-U.S. government debt securities	3,123	5	1,937	15	5,060	20
Corporate debt securities	478	8	37	1	515	9
Asset-backed securities:						
Collateralized loan obligations	18,681	176	–	–	18,681	176
Other	1,208	6	2,354	16	3,562	22
Total available-for-sale securities	50,311	550	36,706	993	87,017	1,543
Held-to-maturity securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	4,385	23	7,082	177	11,467	200
Total mortgage-backed securities	4,385	23	7,082	177	11,467	200
Obligations of U.S. states and municipalities	12	–	1,114	15	1,126	15
Total held-to-maturity securities	4,397	23	8,196	192	12,593	215
Total investment securities with gross unrealized losses	$ 54,708	$ 573	$ 44,902	$ 1,185	$ 99,610	$ 1,758

Other-than-temporary impairment

AFS and HTM debt securities in unrealized loss positions are analyzed as part of the Bank's ongoing assessment of OTTI. The Bank considers a decline in fair value to be other-than-temporary when the Bank does not expect to recover the entire amortized cost basis of the security.

For AFS debt securities, the Bank recognizes OTTI losses in earnings if the Bank has the intent to sell the debt security, or if it is more likely than not that the Bank will be required to sell the debt security before recovery of its amortized cost basis. In these circumstances the impairment loss is equal to the full difference between the amortized cost basis and the fair value of the securities.

For debt securities in an unrealized loss position that the Bank has the intent and ability to hold, the securities are evaluated to determine if a credit loss exists. In the event of a credit loss, only the amount of impairment associated with the credit loss is recognized in income. Amounts relating to factors other than credit losses are recorded in OCI.

Factors considered in evaluating potential OTTI include adverse conditions specifically related to the industry, geographic area or financial condition of the issuer or underlying collateral of a security; payment structure of the security; changes to the rating of the security by a rating agency; the volatility of the fair value changes; and the Bank's intent and ability to hold the security until recovery.

The Bank's cash flow evaluations take into account the factors noted above and expectations of relevant market and economic data as of the end of the reporting period. When assessing securities issued in a securitization for OTTI, the Bank estimates cash flows considering underlying loan-level data and structural features of the securitization, such as subordination, excess spread, overcollateralization or other forms of credit enhancement, and compares the losses projected for the underlying collateral ("pool losses") against the level of credit enhancement in the securitization structure to determine whether these features are sufficient to absorb the pool losses, or whether a credit loss exists. The Bank also performs other analyses to support its cash flow projections, such as first-loss analyses or stress scenarios.

For beneficial interests in securitizations that are rated below "AA" at their acquisition, or that can be contractually prepaid or otherwise settled in such a way that the Bank would not recover substantially all of its recorded investment, the Bank considers an impairment to be other-than-temporary when there is an adverse change in expected cash flows.

The Bank recognizes unrealized losses on investment securities that it intends to sell as OTTI. The Bank does not intend to sell any of the remaining investment securities with an unrealized loss in AOCI as of December 31, 2019, and it is not likely that the Bank will be required to sell these securities before recovery of their amortized cost basis. Further, the Bank did not recognize any credit-related OTTI losses during the year ended December 31, 2019. Based on its assessment, the Bank believes that the investment securities with an unrealized loss in AOCI as of December 31, 2019, are not other-than-temporarily impaired.

Investment securities gains and losses

The following table presents realized gains and losses and OTTI from AFS securities that were recognized in income.

Year ended December 31, (in millions)	**2019**	2018	2017
Realized gains	**$ 645**	$ 211	$ 1,007
Realized losses	**(392)**	(606)	(1,073)
OTTI losses[(a)]	**–**	–	(7)
Net investment securities gains/ (losses)	**$ 253**	$ (395)	$ (73)

(a) Represents OTTI losses recognized in income on investment securities the Bank intends to sell. Excludes realized losses on securities sold of $22 million and $6 million for the years ended December 31, 2018 and 2017, respectively, that had been previously reported as an OTTI loss due to the intention to sell the securities.

Changes in the credit loss component of credit-impaired debt securities

The cumulative credit loss component, including any changes therein, of OTTI losses that have been recognized in income related to AFS securities was not material as of and during the years ended December 31, 2019, 2018 and 2017.

Contractual maturities and yields

The following table presents the amortized cost and estimated fair value at December 31, 2019, of the Bank's investment securities portfolio by contractual maturity.

By remaining maturity December 31, 2019 (in millions)	Due in one year or less	Due after one year through five years	Due after five years through 10 years	Due after 10 years[(b)]	Total
Available-for-sale securities					
Mortgage-backed securities					
Amortized cost	$ 1	$ 58	$ 11,073	$ 114,509	$ 125,641
Fair value	1	58	11,251	116,978	128,288
Average yield[(a)]	1.99%	2.78%	2.76%	3.40%	3.34%
U.S. Treasury and government agencies					
Amortized cost	$ 10,687	$ 92,805	$ 26,353	$ 9,317	$ 139,162
Fair value	10,700	93,038	26,447	9,251	139,436
Average yield[(a)]	1.82%	1.84%	1.90%	1.98%	1.86%
Obligations of U.S. states and municipalities					
Amortized cost	$ 64	$ 166	$ 739	$ 25,775	$ 26,744
Fair value	64	174	791	27,790	28,819
Average yield[(a)]	2.26%	4.53%	5.16%	4.83%	4.84%
Certificates of deposit					
Amortized cost	$ 77	$ –	$ –	$ –	$ 77
Fair value	77	–	–	–	77
Average yield[(a)]	0.50%	–%	–%	–%	0.50%
Non-U.S. government debt securities					
Amortized cost	$ 6,672	$ 11,544	$ 2,898	$ 313	$ 21,427
Fair value	6,682	11,791	3,001	313	21,787
Average yield[(a)]	2.17%	1.84%	1.29%	1.67%	1.87%
Corporate debt securities					
Amortized cost	$ 205	$ 206	$ 412	$ –	$ 823
Fair value	207	212	426	–	845
Average yield[(a)]	4.49%	4.14%	3.50%	–%	3.91%
Asset-backed securities					
Amortized cost	$ 17	$ 2,353	$ 7,184	$ 20,889	$ 30,443
Fair value	17	2,353	7,177	20,864	30,411
Average yield[(a)]	0.62%	2.78%	2.86%	2.77%	2.79%
Total available-for-sale securities					
Amortized cost	$ 17,723	$ 107,132	$ 48,659	$ 170,803	$ 344,317
Fair value	17,748	107,626	49,093	175,196	349,663
Average yield[(a)]	1.98%	1.87%	2.27%	3.46%	2.72%
Held-to-maturity securities					
Mortgage-backed securities					
Amortized Cost	$ –	$ –	$ 5,850	$ 30,673	$ 36,523
Fair value	–	–	6,114	31,512	37,626
Average yield[(a)]	–%	–%	3.06%	3.10%	3.10%
U.S. Treasury and government agencies					
Amortized cost	$ –	$ 51	$ –	$ –	$ 51
Fair value	–	50	–	–	50
Average yield[(a)]	–%	1.47%	–%	–%	1.47%
Obligations of U.S. states and municipalities					
Amortized cost	$ –	$ –	$ 99	$ 4,698	$ 4,797
Fair value	–	–	106	4,990	5,096
Average yield[(a)]	–%	–%	3.91%	4.04%	4.04%
Asset-backed securities					
Amortized cost	$ –	$ –	$ 5,296	$ 873	$ 6,169
Fair value	–	–	5,296	873	6,169
Average yield[(a)]	–%	–%	3.19%	3.11%	1.47%
Total held-to-maturity securities					
Amortized cost	$ –	$ 51	$ 11,245	$ 36,244	$ 47,540
Fair value	–	50	11,516	37,375	48,941
Average yield[(a)]	–%	1.47%	1.63%	3.15%	2.79%

(a) Average yield is computed using the effective yield of each security owned at the end of the period, weighted based on the amortized cost of each security. The effective yield considers the contractual coupon, amortization of premiums and accretion of discounts, and the effect of related hedging derivatives. Taxable-equivalent amounts are used where applicable. The effective yield excludes unscheduled principal prepayments; and accordingly, actual maturities of securities may differ from their contractual or expected maturities as certain securities may be prepaid.

(b) Substantially all of the Bank's U.S. residential MBS and collateralized mortgage obligations are due in 10 years or more, based on contractual maturity. The estimated weighted-average life, which reflects anticipated future prepayments, is approximately 6 years for agency residential MBS, 3 years for agency residential collateralized mortgage obligations and 2 years for nonagency residential collateralized mortgage obligations.

Note 12 – Securities financing activities

The Bank enters into resale, repurchase, securities borrowed and securities loaned agreements (collectively, "securities financing agreements") primarily to finance the Bank's inventory positions, acquire securities to cover short sales, accommodate customers' financing needs, settle other securities obligations and to deploy the Bank's excess cash.

Securities financing agreements are treated as collateralized financings on the Bank's Consolidated balance sheets. Resale and repurchase agreements are generally carried at the amounts at which the securities will be subsequently sold or repurchased. Securities borrowed and securities loaned agreements are generally carried at the amount of cash collateral advanced or received. Where appropriate under applicable accounting guidance, securities financing agreements with the same counterparty are reported on a net basis. Refer to Note 1 for further discussion of the offsetting of assets and liabilities. Fees received and paid in connection with securities financing agreements are recorded over the life of the agreement in interest income and interest expense on the Consolidated statements of income.

The Bank has elected the fair value option for certain securities financing agreements. Refer to Note 4 for further information regarding the fair value option. The securities financing agreements for which the fair value option has been elected are reported within securities purchased under resale agreements, securities loaned or sold under repurchase agreements, and securities borrowed on the Consolidated balance sheets. Generally, for agreements carried at fair value, current-period interest accruals are recorded within interest income and interest expense, with changes in fair value reported in principal transactions revenue. However, for financial instruments containing embedded derivatives that would be separately accounted for in accordance with accounting guidance for hybrid instruments, all changes in fair value, including any interest elements, are reported in principal transactions revenue.

Securities financing agreements expose the Bank primarily to credit and liquidity risk. To manage these risks, the Bank monitors the value of the underlying securities (predominantly high-quality securities collateral, including government-issued debt and U.S. GSEs and government agencies MBS) that it has received from or provided to its counterparties compared to the value of cash proceeds and exchanged collateral, and either requests additional collateral or returns securities or collateral when appropriate. Margin levels are initially established based upon the counterparty, the type of underlying securities, and the permissible collateral, and are monitored on an ongoing basis.

In resale and securities borrowed agreements, the Bank is exposed to credit risk to the extent that the value of the securities received is less than initial cash principal advanced and any collateral amounts exchanged. In repurchase and securities loaned agreements, credit risk exposure arises to the extent that the value of underlying securities advanced exceeds the value of the initial cash principal received, and any collateral amounts exchanged.

Additionally, the Bank typically enters into master netting agreements and other similar arrangements with its counterparties, which provide for the right to liquidate the underlying securities and any collateral amounts exchanged in the event of a counterparty default. It is also the Bank's policy to take possession, where possible, of the securities underlying resale and securities borrowed agreements. Refer to Note 27 for further information regarding assets pledged and collateral received in securities financing agreements.

As a result of the Bank's credit risk mitigation practices with respect to resale and securities borrowed agreements as described above, the Bank did not hold any reserves for credit impairment with respect to these agreements as of December 31, 2019 and 2018.

The table below summarizes the gross and net amounts of the Bank's securities financing agreements, as of December 31, 2019 and 2018. When the Bank has obtained an appropriate legal opinion with respect to a master netting agreement with a counterparty and where other relevant netting criteria under U.S. GAAP are met, the Bank nets, on the Consolidated balance sheets, the balances outstanding under its securities financing agreements with the same counterparty. In addition, the Bank exchanges securities and/or cash collateral with its counterparty to reduce the economic exposure with the counterparty, but such collateral is not eligible for net Consolidated balance sheet presentation. Where the Bank has obtained an appropriate legal opinion with respect to the counterparty master netting agreement, such collateral, along with securities financing balances that do not meet all these relevant netting criteria under U.S. GAAP, is presented in the table below as "Amounts not nettable on the Consolidated balance sheets," and reduces the "Net amounts" presented. Where a legal opinion has not been either sought or obtained, the securities financing balances are presented gross in the "Net amounts" below.

	2019				
December 31, (in millions)	Gross amounts	Amounts netted on the Consolidated balance sheets	Amounts presented on the Consolidated balance sheets	Amounts not nettable on the Consolidated balance sheets[b]	Net amounts[c]
Assets					
Securities purchased under resale agreements	**$ 434,716**	**$ (223,330)**	**$ 211,386**	**$ (197,430)**	**$ 13,956**
Securities borrowed	**40,100**	**(1,324)**	**38,776**	**(33,840)**	**4,936**
Liabilities					
Securities sold under repurchase agreements	**$ 301,127**	**$ (223,330)**	**$ 77,797**	**$ (76,487)**	**$ 1,310**
Securities loaned and other[a]	**14,557**	**(1,324)**	**13,233**	**(13,211)**	**22**

	2018				
December 31, (in millions)	Gross amounts	Amounts netted on the Consolidated balance sheets	Amounts presented on the Consolidated balance sheets	Amounts not nettable on the Consolidated balance sheets[b]	Net amounts[c]
Assets					
Securities purchased under resale agreements	$ 637,731	$ (362,340)	$ 275,391	$ (264,225)	$ 11,166
Securities borrowed	46,785	(1,450)	45,335	(40,845)	4,490
Liabilities					
Securities sold under repurchase agreements	$ 457,084	$ (362,340)	$ 94,744	$ (92,498)	$ 2,246
Securities loaned and other[a]	19,405	(1,450)	17,955	(17,530)	425

(a) Includes securities-for-securities lending agreements of $6.5 billion and $5.8 billion at December 31, 2019 and 2018, respectively, accounted for at fair value, where the Bank is acting as lender. In the Consolidated balance sheets, the Bank recognizes the securities received at fair value within other assets and the obligation to return those securities within accounts payable and other liabilities.

(b) In some cases, collateral exchanged with a counterparty exceeds the net asset or liability balance with that counterparty. In such cases, the amounts reported in this column are limited to the related net asset or liability with that counterparty.

(c) Includes securities financing agreements that provide collateral rights, but where an appropriate legal opinion with respect to the master netting agreement has not been either sought or obtained. At December 31, 2019 and 2018, included $10.2 billion and $7.4 billion, respectively, of securities purchased under resale agreements; $3.9 billion and $4.0 billion, respectively, of securities borrowed; $372 million and $1.1 billion, respectively, of securities sold under repurchase agreements; and zero and $66 million, respectively, of securities loaned and other.

The tables below present as of December 31, 2019, and 2018 the types of financial assets pledged in securities financing agreements and the remaining contractual maturity of the securities financing agreements.

December 31, (in millions)	Gross liability balance			
	2019		2018	
	Securities sold under repurchase agreements	Securities loaned and other	Securities sold under repurchase agreements	Securities loaned and other
Mortgage-backed securities:				
U.S. GSEs and government agencies	**$ 2,850**	**$ –**	$ 2,129	$ –
Residential - nonagency	**97**	**–**	–	–
Commercial - nonagency	**–**	**–**	2	–
U.S. Treasury, GSEs and government agencies	**141,705**	**6,310**	288,240	5,449
Obligations of U.S. states and municipalities	**–**	**–**	–	–
Non-U.S. government debt	**149,141**	**1,580**	157,252	4,563
Corporate debt securities	**7,293**	**299**	8,883	455
Asset-backed securities	**41**	**–**	228	–
Equity securities	**–**	**6,368**	350	8,938
Total	**$ 301,127**	**$ 14,557**	$ 457,084	$ 19,405

2019 (in millions)	Remaining contractual maturity of the agreements				
	Overnight and continuous	Up to 30 days	30 – 90 days	Greater than 90 days	Total
Total securities sold under repurchase agreements	**$ 106,463**	**$ 127,504**	**$ 46,732**	**$ 20,428**	**$ 301,127**
Total securities loaned and other	**9,586**	**3,104**	**189**	**1,678**	**14,557**

2018 (in millions)	Remaining contractual maturity of the agreements				
	Overnight and continuous	Up to 30 days	30 – 90 days	Greater than 90 days	Total
Total securities sold under repurchase agreements	$ 116,327	$ 208,310	$ 85,876	$ 46,571	$ 457,084
Total securities loaned and other	16,414	635	9	2,347	19,405

Transfers not qualifying for sale accounting

At December 31, 2019 and 2018, the Bank held $743 million and $2.1 billion, respectively, of financial assets for which the rights have been transferred to third parties; however, the transfers did not qualify as a sale in accordance with U.S. GAAP. These transfers have been recognized as collateralized financing transactions. The transferred assets are recorded in trading assets and loans, and the corresponding liabilities are recorded predominantly in short-term borrowings on the Consolidated balance sheets.

Note 13 – Loans

Loan accounting framework

The accounting for a loan depends on management's strategy for the loan, and on whether the loan was credit-impaired at the date of acquisition. The Bank accounts for loans based on the following categories:

- Originated or purchased loans held-for-investment (i.e., "retained"), other than PCI loans
- Loans held-for-sale
- Loans at fair value
- PCI loans held-for-investment

The following provides a detailed accounting discussion of these loan categories:

Loans held-for-investment (other than PCI loans)

Originated or purchased loans held-for-investment, other than PCI loans, are recorded at the principal amount outstanding, net of the following: charge-offs; interest applied to principal (for loans accounted for on the cost recovery method); unamortized discounts and premiums; and net deferred loan fees or costs. Credit card loans also include billed finance charges and fees net of an allowance for uncollectible amounts.

Interest income

Interest income on performing loans held-for-investment, other than PCI loans, is accrued and recognized as interest income at the contractual rate of interest. Purchase price discounts or premiums, as well as net deferred loan fees or costs, are amortized into interest income over the contractual life of the loan as an adjustment of yield.

Nonaccrual loans

Nonaccrual loans are those on which the accrual of interest has been suspended. Loans (other than credit card loans and certain consumer loans insured by U.S. government agencies) are placed on nonaccrual status and considered nonperforming when full payment of principal and interest is not expected, regardless of delinquency status, or when principal and interest has been in default for a period of 90 days or more, unless the loan is both well-secured and in the process of collection. A loan is determined to be past due when the minimum payment is not received from the borrower by the contractually specified due date or for certain loans (e.g., residential real estate loans), when a monthly payment is due and unpaid for 30 days or more. Finally, collateral-dependent loans are typically maintained on nonaccrual status.

On the date a loan is placed on nonaccrual status, all interest accrued but not collected is reversed against interest income. In addition, the amortization of deferred amounts is suspended. Interest income on nonaccrual loans may be recognized as cash interest payments are received (i.e., on a cash basis) if the recorded loan balance is deemed fully collectible; however, if there is doubt regarding the ultimate collectibility of the recorded loan balance, all interest cash receipts are applied to reduce the carrying value of the loan (the cost recovery method). For consumer loans, application of this policy typically results in the Bank recognizing interest income on nonaccrual consumer loans on a cash basis.

A loan may be returned to accrual status when repayment is reasonably assured and there has been demonstrated performance under the terms of the loan or, if applicable, the terms of the restructured loan.

As permitted by regulatory guidance, credit card loans are generally exempt from being placed on nonaccrual status; accordingly, interest and fees related to credit card loans continue to accrue until the loan is charged off or paid in full. The Bank separately establishes an allowance, which reduces loans and is charged to interest income, for the estimated uncollectible portion of accrued and billed interest and fee income on credit card loans.

Allowance for loan losses

The allowance for loan losses represents the estimated probable credit losses inherent in the held-for-investment loan portfolio at the balance sheet date and is recognized on the balance sheet as a contra asset, which brings the recorded investment to the net carrying value. Changes in the allowance for loan losses are recorded in the provision for credit losses on the Bank's Consolidated statements of income. Refer to Note 14 for further information on the Bank's accounting policies for the allowance for loan losses.

Charge-offs

Consumer loans, other than risk-rated business banking and auto loans, and PCI loans, are generally charged off or charged down to the net realizable value of the underlying collateral (i.e., fair value less costs to sell), with an offset to the allowance for loan losses, upon reaching specified stages of delinquency in accordance with standards established by the Federal Financial Institutions Examination Council ("FFIEC"). Residential real estate loans and non-modified credit card loans are generally charged off no later than 180 days past due. Scored auto and modified credit card loans are charged off no later than 120 days past due.

Certain consumer loans will be charged off or charged down to their net realizable value earlier than the FFIEC charge-off standards in certain circumstances as follows:

- Loans modified in a troubled debt restructuring ("TDR") that are determined to be collateral-dependent.
- Loans to borrowers who have experienced an event that suggests a loss is either known or highly certain are subject to accelerated charge-off standards (e.g., residential real estate and auto loans are charged off within 60 days of receiving notification of a bankruptcy filing).

- Auto loans upon repossession of the automobile.

Other than in certain limited circumstances, the Bank typically does not recognize charge-offs on government-guaranteed loans.

Wholesale loans, risk-rated business banking loans and risk-rated auto loans are charged off when it is highly certain that a loss has been realized, including situations where a loan is determined to be both impaired and collateral-dependent. The determination of whether to recognize a charge-off includes many factors, including the prioritization of the Bank's claim in bankruptcy, expectations of the workout/restructuring of the loan and valuation of the borrower's equity or the loan collateral.

When a loan is charged down to the estimated net realizable value, the determination of the fair value of the collateral depends on the type of collateral (e.g., securities, real estate). In cases where the collateral is in the form of liquid securities, the fair value is based on quoted market prices or broker quotes. For illiquid securities or other financial assets, the fair value of the collateral is generally estimated using a discounted cash flow model.

For residential real estate loans, collateral values are based upon external valuation sources. When it becomes likely that a borrower is either unable or unwilling to pay, the Bank utilizes a broker's price opinion, appraisal and/or an automated valuation model of the home based on an exterior-only valuation ("exterior opinions"), which is then updated at least every twelve months, or more frequently depending on various market factors. As soon as practicable after the Bank receives the property in satisfaction of a debt (e.g., by taking legal title or physical possession), the Bank generally obtains an appraisal based on an inspection that includes the interior of the home ("interior appraisals"). Exterior opinions and interior appraisals are discounted based upon the Bank's experience with actual liquidation values as compared with the estimated values provided by exterior opinions and interior appraisals, considering state-specific factors.

For commercial real estate loans, collateral values are generally based on appraisals from internal and external valuation sources. Collateral values are typically updated every six to twelve months, either by obtaining a new appraisal or by performing an internal analysis, in accordance with the Bank's policies. The Bank also considers both borrower- and market-specific factors, which may result in obtaining appraisal updates or broker price opinions at more frequent intervals.

Loans held-for-sale

Loans held-for-sale are measured at the lower of cost or fair value, with valuation changes recorded in noninterest revenue. For consumer loans, the valuation is performed on a portfolio basis. For wholesale loans, the valuation is performed on an individual loan basis.

Interest income on loans held-for-sale is accrued and recognized based on the contractual rate of interest.

Loan origination fees or costs and purchase price discounts or premiums are deferred in a contra loan account until the related loan is sold. The deferred fees or costs and discounts or premiums are an adjustment to the basis of the loan and therefore are included in the periodic determination of the lower of cost or fair value adjustments and/or the gain or loss recognized at the time of sale.

Because these loans are recognized at the lower of cost or fair value, the Bank's allowance for loan losses and charge-off policies do not apply to these loans. However, loans held-for-sale are subject to the nonaccrual policies described above.

Loans at fair value

Loans used in a market-making strategy or risk managed on a fair value basis are measured at fair value, with changes in fair value recorded in noninterest revenue.

Interest income on these loans is accrued and recognized based on the contractual rate of interest. Changes in fair value are recognized in noninterest revenue. Loan origination fees are recognized upfront in noninterest revenue. Loan origination costs are recognized in the associated expense category as incurred.

Because these loans are recognized at fair value, the Bank's allowance for loan losses and charge-off policies do not apply to these loans. However, loans at fair value are subject to the nonaccrual policies described above.

Refer to Note 4 for further information on the Bank's elections of fair value accounting under the fair value option. Refer to Note 3 and Note 4 for further information on loans carried at fair value and classified as trading assets.

PCI loans

PCI loans held-for-investment are initially measured at fair value. PCI loans have evidence of credit deterioration since the loan's origination date and therefore it is probable, at acquisition, that all contractually required payments will not be collected. Because PCI loans are initially measured at fair value, which includes an estimate of future credit losses, no allowance for loan losses related to PCI loans is recorded at the acquisition date. Refer to page 81 of this Note for information on accounting for PCI loans subsequent to their acquisition.

Loan classification changes

Loans in the held-for-investment portfolio that management decides to sell are transferred to the held-for-sale portfolio at the lower of cost or fair value on the date of transfer. Credit-related losses are charged against the allowance for loan losses; non-credit related losses such as those due to changes in interest rates or foreign currency exchange rates are recognized in noninterest revenue.

In the event that management decides to retain a loan in the held-for-sale portfolio, the loan is transferred to the held-for-investment portfolio at the lower of cost or fair value on the date of transfer. These loans are subsequently assessed for impairment based on the Bank's allowance methodology. Refer to Note 14 for a further discussion of the methodologies used in establishing the Bank's allowance for loan losses.

Loan modifications

The Bank seeks to modify certain loans in conjunction with its loss-mitigation activities. Through the modification, the Bank grants one or more concessions to a borrower who is experiencing financial difficulty in order to minimize the Bank's economic loss and avoid foreclosure or repossession of the collateral, and to ultimately maximize payments received by the Bank from the borrower. The concessions granted vary by program and by borrower-specific characteristics, and may include interest rate reductions, term extensions, payment deferrals, principal forgiveness, or the acceptance of equity or other assets in lieu of payments.

Such modifications are accounted for and reported as TDRs. A loan that has been modified in a TDR is generally considered to be impaired until it matures, is repaid, or is otherwise liquidated, regardless of whether the borrower performs under the modified terms. In certain limited cases, the effective interest rate applicable to the modified loan is at or above the current market rate at the time of the restructuring. In such circumstances, and assuming that the loan subsequently performs under its modified terms and the Bank expects to collect all contractual principal and interest cash flows, the loan is disclosed as impaired and as a TDR only during the year of the modification; in subsequent years, the loan is not disclosed as an impaired loan or as a TDR so long as repayment of the restructured loan under its modified terms is reasonably assured.

Loans, except for credit card loans, modified in a TDR are generally placed on nonaccrual status, although in many cases such loans were already on nonaccrual status prior to modification. These loans may be returned to performing status (the accrual of interest is resumed) if the following criteria are met: (i) the borrower has performed under the modified terms for a minimum of six months and/or six payments, and (ii) the Bank has an expectation that repayment of the modified loan is reasonably assured based on, for example, the borrower's debt capacity and level of future earnings, collateral values, LTV ratios, and other current market considerations. In certain limited and well-defined circumstances in which the loan is current at the modification date, such loans are not placed on nonaccrual status at the time of modification.

Because loans modified in TDRs are considered to be impaired, these loans are measured for impairment using the Bank's established asset-specific allowance methodology, which considers the expected re-default rates for the modified loans. A loan modified in a TDR generally remains subject to the asset-specific allowance methodology throughout its remaining life, regardless of whether the loan is performing and has been returned to accrual status and/or the loan has been removed from the impaired loans disclosures (i.e., loans restructured at market rates). Refer to Note 14 for further discussion of the methodology used to estimate the Bank's asset-specific allowance.

Foreclosed property

The Bank acquires property from borrowers through loan restructurings, workouts, and foreclosures. Property acquired may include real property (e.g., residential real estate, land, and buildings) and commercial and personal property (e.g., automobiles, aircraft, railcars, and ships).

The Bank recognizes foreclosed property upon receiving assets in satisfaction of a loan (e.g., by taking legal title or physical possession). For loans collateralized by real property, the Bank generally recognizes the asset received at foreclosure sale or upon the execution of a deed in lieu of foreclosure transaction with the borrower. Foreclosed assets are reported in other assets on the Consolidated balance sheets and initially recognized at fair value less costs to sell. Each quarter the fair value of the acquired property is reviewed and adjusted, if necessary, to the lower of cost or fair value. Subsequent adjustments to fair value are charged/credited to noninterest revenue. Operating expense, such as real estate taxes and maintenance, are charged to other expense.

Loan portfolio

The Bank's loan portfolio is divided into three portfolio segments, which are the same segments used by the Bank to determine the allowance for loan losses: Consumer, excluding credit card; Credit card; and Wholesale. Within each portfolio segment the Bank monitors and assesses the credit risk in the following classes of loans, based on the risk characteristics of each loan class.

Consumer, excluding credit card	Credit card	Wholesale[e]
Residential real estate – excluding PCI • Residential mortgage[a] • Home equity[b] Other consumer loans[c] • Auto • Consumer & Business Banking[d] Residential real estate – PCI • Home equity • Prime mortgage • Subprime mortgage • Option ARMs	• Credit card loans	• Commercial and industrial • Real estate • Financial institutions • Governments & Agencies • Other[f]

(a) Predominantly includes prime loans (including option ARMs).
(b) Includes senior and junior lien home equity loans.
(c) Includes certain business banking and auto dealer risk-rated loans for which the wholesale methodology is applied for determining the allowance for loan losses and therefore, for consistency in presentation, are included with the other consumer loan classes.
(d) Predominantly includes business banking loans.
(e) Classes are internally defined and may not align with regulatory definitions.
(f) Includes loans to: individuals and individual entities (predominantly consists of wealth management clients and includes loans to personal investment companies and personal and testamentary trusts), SPEs and Private education and civic organizations. Refer to Note 15 for more information on SPEs.

The following tables summarize the Bank's loan balances by portfolio segment.

December 31, 2019 (in millions)	Consumer, excluding credit card	Credit card[a]	Wholesale	Total	
Retained	**$ 331,895**	**$ 168,924**	**$ 443,240**	**$ 944,059**	[b]
Held-for-sale	**3,002**	**–**	**4,050**	**7,052**	
At fair value	**–**	**–**	**7,104**	**7,104**	
Total	**$ 334,897**	**$ 168,924**	**$ 454,394**	**$ 958,215**	

December 31, 2018 (in millions)	Consumer, excluding credit card	Credit card[a]	Wholesale	Total	
Retained	$ 373,609	$ 156,616	$ 437,769	$ 967,994	[b]
Held-for-sale	95	16	11,877	11,988	
At fair value	–	–	3,151	3,151	
Total	$ 373,704	$ 156,632	$ 452,797	$ 983,133	

(a) Includes accrued interest and fees net of an allowance for the uncollectible portion of accrued interest and fee income.
(b) Loans (other than PCI loans and those for which the fair value option has been elected) are presented net of unamortized discounts and premiums and net deferred loan fees or costs. These amounts were not material as of December 31, 2019 and 2018.

The following tables provide information about the carrying value of retained loans purchased, sold and reclassified to held-for-sale during the periods indicated. Reclassifications of loans to held-for sale are non-cash transactions. The Bank manages its exposure to credit risk on an ongoing basis. Selling loans is one way that the Bank reduces its credit exposures. Loans that were reclassified to held-for-sale and sold in a subsequent period are excluded from the sales line of this table.

Year ended December 31, (in millions)	2019			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	**$ 1,282** (a)(b)	**$ –**	**$ 1,291**	**$ 2,573**
Sales	**30,484**	**–**	**23,435**	**53,919**
Retained loans reclassified to held-for-sale	**9,188**	**–**	**2,371**	**11,559**

Year ended December 31, (in millions)	2018			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	$ 2,543 (a)(b)	$ –	$ 2,354	$ 4,897
Sales	9,984	–	16,757	26,741
Retained loans reclassified to held-for-sale	36	–	2,276	2,312

Year ended December 31, (in millions)	2017			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	$ 3,461 (a)(b)	$ –	$ 1,799	$ 5,260
Sales	3,405	–	11,063	14,468
Retained loans reclassified to held-for-sale	6,340 (c)	–	1,229	7,569

(a) Purchases predominantly represent the Bank's voluntary repurchase of certain delinquent loans from loan pools as permitted by Government National Mortgage Association ("Ginnie Mae") guidelines. The Bank typically elects to repurchase these delinquent loans as it continues to service them and/or manage the foreclosure process in accordance with applicable requirements of Ginnie Mae, the Federal Housing Administration ("FHA"), Rural Housing Service ("RHS") and/or the U.S. Department of Veterans Affairs ("VA").

(b) Excludes purchases of retained loans sourced through the correspondent origination channel and underwritten in accordance with the Bank's standards. Such purchases were $16.6 billion, $18.6 billion and $23.5 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

(c) Includes the Bank's student loan portfolio which was sold in 2017.

Gains and losses on sales of loans

Net gains on sales of loans (including adjustments to record loans held-for-sale at the lower of cost or fair value) recognized in noninterest revenue was $386 million for the year ended December 31, 2019. Gains and losses on sales of loans were not material for the years ended December 31, 2018 and 2017. In addition, the sale of loans may also result in write downs, recoveries or changes in the allowance recognized in the provision for credit losses.

Consumer, excluding credit card, loan portfolio

Consumer loans, excluding credit card loans, consist primarily of residential mortgages, home equity loans and lines of credit, auto loans and consumer and business banking loans, with a focus on serving the prime consumer credit market. The portfolio also includes home equity loans secured by junior liens, prime mortgage loans with an interest-only payment period, and certain payment-option loans that may result in negative amortization.

The following table provides information about retained consumer loans, excluding credit card, by class.

December 31, (in millions)	2019	2018
Residential real estate – excluding PCI		
Residential mortgage	**$ 199,018**	$ 231,054
Home equity	**23,917**	28,336
Other consumer loans		
Auto	**61,522**	63,573
Consumer & business banking	**27,075**	26,612
Residential real estate – PCI		
Home equity	**7,377**	8,963
Prime mortgage	**3,965**	4,690
Subprime mortgage	**1,740**	1,945
Option ARMs	**7,281**	8,436
Total retained loans	**$ 331,895**	$ 373,609

Delinquency rates are a primary credit quality indicator for consumer loans. Loans that are more than 30 days past due provide an early warning of borrowers who may be experiencing financial difficulties and/or who may be unable or unwilling to repay the loan. As the loan continues to age, it becomes more clear whether the borrower is likely either unable or unwilling to pay. In the case of residential real estate loans, late-stage delinquencies (greater than 150 days past due) are a strong indicator of loans that will ultimately result in a foreclosure or similar liquidation transaction. In addition to delinquency rates, other credit quality indicators for consumer loans vary based on the class of loan, as follows:

- For residential real estate loans, including both non-PCI and PCI portfolios, the current estimated LTV ratio, or the combined LTV ratio in the case of junior lien loans, is an indicator of the potential loss severity in the event of default. Additionally, LTV or combined LTV ratios can provide insight into a borrower's continued willingness to pay, as the delinquency rate of high-LTV loans tends to be greater than that for loans where the borrower has equity in the collateral. The geographic distribution of the loan collateral also provides insight as to the credit quality of the portfolio, as factors such as the regional economy, home price changes and specific events such as natural disasters, will affect credit quality. The borrower's current or "refreshed" FICO score is a secondary credit quality indicator for certain loans, as FICO scores are an indication of the borrower's credit payment history. Thus, a loan to a borrower with a low FICO score (less than 660) is considered to be of higher risk than a loan to a borrower with a higher FICO score. Further, a loan to a borrower with a high LTV ratio and a low FICO score is at greater risk of default than a loan to a borrower that has both a high LTV ratio and a high FICO score.
- For scored auto and scored business banking loans, geographic distribution is an indicator of the credit performance of the portfolio. Similar to residential real estate loans, geographic distribution provides insights into the portfolio performance based on regional economic activity and events.
- Risk-rated business banking and auto loans are similar to wholesale loans in that the primary credit quality indicators are the internal risk ratings that are assigned to the loan and whether the loans are considered to be criticized and/or nonaccrual. Risk ratings are reviewed on a regular and ongoing basis by Credit Risk Management and are adjusted as necessary for updated information about borrowers' ability to fulfill their obligations. Refer to page 86 of this Note for further information about risk-rated wholesale loan credit quality indicators.

Residential real estate – excluding PCI loans

The following table provides information by class for retained residential real estate – excluding PCI loans.

Residential real estate – excluding PCI loans

December 31, (in millions, except ratios)	Residential mortgage		Home equity		Total residential real estate – excluding PCI	
	2019	2018	2019	2018	2019	2018
Loan delinquency[(a)]						
Current	$ 198,007	$ 225,880	$ 23,385	$ 27,607	$ 221,392	$ 253,487
30–149 days past due	602	2,760	336	453	938	3,213
150 or more days past due	409	2,414	196	276	605	2,690
Total retained loans	$ 199,018	$ 231,054	$ 23,917	$ 28,336	$ 222,935	$ 259,390
% of 30+ days past due to total retained loans[(b)]	0.49%	0.48%	2.22%	2.57%	0.67%	0.71%
90 or more days past due and government guaranteed[(c)]	$ 37	$ 2,539	$ –	$ –	$ 37	$ 2,539
Nonaccrual loans	1,615	1,763	1,162	1,323	2,777	3,086
Current estimated LTV ratios[(d)(e)]						
Greater than 125% and refreshed FICO scores:						
Equal to or greater than 660	$ 18	$ 25	$ 4	$ 6	$ 22	$ 31
Less than 660	8	13	1	1	9	14
101% to 125% and refreshed FICO scores:						
Equal to or greater than 660	31	37	56	111	87	148
Less than 660	35	53	19	37	54	90
80% to 100% and refreshed FICO scores:						
Equal to or greater than 660	5,013	3,977	606	985	5,619	4,962
Less than 660	206	281	191	326	397	607
Less than 80% and refreshed FICO scores:						
Equal to or greater than 660	186,968	212,499	19,597	22,630	206,565	235,129
Less than 660	5,998	6,453	2,776	3,355	8,774	9,808
No FICO/LTV available	687	810	667	885	1,354	1,695
U.S. government-guaranteed	54	6,906	–	–	54	6,906
Total retained loans	$ 199,018	$ 231,054	$ 23,917	$ 28,336	$ 222,935	$ 259,390
Geographic region [(f)]						
California	$ 66,278	$ 74,758	$ 4,831	$ 5,694	$ 71,109	$ 80,452
New York	25,704	28,845	4,885	5,768	30,589	34,613
Illinois	13,204	15,249	1,788	2,130	14,992	17,379
Texas	12,600	13,768	1,599	1,819	14,199	15,587
Florida	10,453	10,703	1,325	1,575	11,778	12,278
Washington	7,708	8,304	720	869	8,428	9,173
Colorado	7,777	8,140	444	521	8,221	8,661
New Jersey	5,792	7,301	1,394	1,641	7,186	8,942
Massachusetts	5,596	6,574	202	236	5,798	6,810
Arizona	3,929	4,433	932	1,158	4,861	5,591
All other[(g)]	39,977	52,979	5,797	6,925	45,774	59,904
Total retained loans	$ 199,018	$ 231,054	$ 23,917	$ 28,336	$ 222,935	$ 259,390

(a) Individual delinquency classifications include mortgage loans insured by U.S. government agencies as follows: current included $10 million and $2.8 billion; 30–149 days past due included $18 million and $2.1 billion; and 150 or more days past due included $26 million and $2.0 billion at December 31, 2019 and 2018, respectively.
(b) At December 31, 2019 and 2018, residential mortgage loans excluded mortgage loans insured by U.S. government agencies of $44 million and $4.1 billion, respectively, that are 30 or more days past due. These amounts have been excluded based upon the government guarantee.
(c) These balances are excluded from nonaccrual loans as the loans are guaranteed by U.S. government agencies. Typically the principal balance of the loans is insured and interest is guaranteed at a specified reimbursement rate subject to meeting agreed-upon servicing guidelines. At December 31, 2019, and 2018, these balances included $33 million and $997 million, respectively, of loans that are no longer accruing interest based on the agreed-upon servicing guidelines. For the remaining balance, interest is being accrued at the guaranteed reimbursement rate. There were no loans that were not guaranteed by U.S. government agencies that are 90 or more days past due and still accruing interest at December 31, 2019 and 2018.
(d) Represents the aggregate unpaid principal balance of loans divided by the estimated current property value. Current property values are estimated, at a minimum, quarterly, based on home valuation models using nationally recognized home price index valuation estimates incorporating actual data to the extent available and forecasted data where actual data is not available. These property values do not represent actual appraised loan level collateral values; as such, the resulting ratios are necessarily imprecise and should be viewed as estimates. Current estimated combined LTV for junior lien home equity loans considers all available lien positions, as well as unused lines, related to the property.
(e) Refreshed FICO scores represent each borrower's most recent credit score, which is obtained by the Bank on at least a quarterly basis.
(f) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.
(g) At December 31, 2019 and 2018, included mortgage loans insured by U.S. government agencies of $54 million and $6.9 billion, respectively. These amounts have been excluded from the geographic regions presented based upon the government guarantee.

Approximately 37% of the home equity portfolio are senior lien loans; the remaining balance are junior lien HELOANs or HELOCs. The following table provides the Bank's delinquency statistics for junior lien home equity loans and lines as of December 31, 2019 and 2018.

December 31, (in millions, except ratios)	Total loans		Total 30+ day delinquency rate	
	2019	2018	2019	2018
HELOCs:[a]				
Within the revolving period[b]	$ 5,488	$ 5,606	0.35%	0.25%
Beyond the revolving period	8,724	11,283	2.48	2.80
HELOANs	754	1,030	2.52	2.82
Total	$ 14,966	$ 17,919	1.70%	2.00%

(a) These HELOCs are predominantly revolving loans for a 10-year period, after which time the HELOC converts to a loan with a 20-year amortization period, but also include HELOCs that allow interest-only payments beyond the revolving period.
(b) The Bank manages the risk of HELOCs during their revolving period by closing or reducing the undrawn line to the extent permitted by law when borrowers are experiencing financial difficulty.

HELOCs beyond the revolving period and HELOANs have higher delinquency rates than HELOCs within the revolving period. That is primarily because the fully-amortizing payment that is generally required for those products is higher than the minimum payment options available for HELOCs within the revolving period. The higher delinquency rates associated with amortizing HELOCs and HELOANs are factored into the Bank's allowance for loan losses.

Impaired loans

The table below provides information about the Bank's residential real estate impaired loans, excluding PCI loans. These loans are considered to be impaired as they have been modified in a TDR. All impaired loans are evaluated for an asset-specific allowance as described in Note 14.

December 31, (in millions)	Residential mortgage		Home equity		Total residential real estate – excluding PCI	
	2019	2018	2019	2018	2019	2018
Impaired loans						
With an allowance	$ 2,847	$ 3,376	$ 1,042	$ 1,151	$ 3,889	$ 4,527
Without an allowance[a]	1,152	1,182	879	907	2,031	2,089
Total impaired loans[b][c]	$ 3,999	$ 4,558	$ 1,921	$ 2,058	$ 5,920	$ 6,616
Allowance for loan losses related to impaired loans	$ 52	$ 88	$ 13	$ 45	$ 65	$ 133
Unpaid principal balance of impaired loans[d]	5,430	6,198	3,301	3,531	8,731	9,729
Impaired loans on nonaccrual status[e]	1,364	1,457	965	963	2,329	2,420

(a) Represents collateral-dependent residential real estate loans that are charged off to the fair value of the underlying collateral less costs to sell. The Bank reports, in accordance with regulatory guidance, residential real estate loans that have been discharged under Chapter 7 bankruptcy and not reaffirmed by the borrower ("Chapter 7 loans") as collateral-dependent nonaccrual TDRs, regardless of their delinquency status. At December 31, 2019, Chapter 7 residential real estate loans included approximately 9% of residential mortgages and approximately 7% of home equity that were 30 days or more past due.
(b) At December 31, 2019 and 2018, $8 million and $4.1 billion, respectively, of loans modified subsequent to repurchase from Ginnie Mae in accordance with the standards of the appropriate government agency (i.e., FHA, VA, RHS) are not included in the table above. When such loans perform subsequent to modification in accordance with Ginnie Mae guidelines, they are generally sold back into Ginnie Mae loan pools. Modified loans that do not re-perform become subject to foreclosure.
(c) Predominantly all impaired loans in the table above are in the U.S.
(d) Represents the contractual amount of principal owed at December 31, 2019 and 2018. The unpaid principal balance differs from the impaired loan balances due to various factors including charge-offs, net deferred loan fees or costs, and unamortized discounts or premiums on purchased loans.
(e) As of December 31, 2019 and 2018, nonaccrual loans included $1.9 billion and $2.0 billion, respectively, of TDRs for which the borrowers were less than 90 days past due. Refer to the Loan accounting framework on pages 69-71 of this Note for additional information about loans modified in a TDR that are on nonaccrual status.

The following table presents average impaired loans and the related interest income reported by the Bank.

Year ended December 31, (in millions)	Average impaired loans			Interest income on impaired loans[(a)]			Interest income on impaired loans on a cash basis[(a)]		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Residential mortgage	**$ 4,301**	$ 5,075	$ 5,789	**$ 224**	$ 257	$ 287	**$ 68**	$ 75	$ 75
Home equity	**2,007**	2,123	2,222	**132**	131	127	**83**	84	80
Total residential real estate – excluding PCI	**$ 6,308**	$ 7,198	$ 8,011	**$ 356**	$ 388	$ 414	**$ 151**	$ 159	$ 155

(a) Generally, interest income on loans modified in TDRs is recognized on a cash basis until the borrower has made a minimum of six payments under the new terms, unless the loan is deemed to be collateral-dependent.

Loan modifications

Modifications of residential real estate loans, excluding PCI loans, are generally accounted for and reported as TDRs. There were no additional commitments to lend to borrowers whose residential real estate loans, excluding PCI loans, have been modified in TDRs.

The following table presents new TDRs reported by the Bank.

Year ended December 31, (in millions)	**2019**	2018	2017
Residential mortgage	**$ 234**	$ 400	$ 373
Home equity	**256**	335	383
Total residential real estate – excluding PCI	**$ 490**	$ 735	$ 756

Nature and extent of modifications

The Bank's proprietary modification programs as well as government programs, including U.S. GSEs, generally provide various concessions to financially troubled borrowers including, but not limited to, interest rate reductions, term or payment extensions and deferral of principal and/or interest payments that would otherwise have been required under the terms of the original agreement.

The following table provides information about how residential real estate loans, excluding PCI loans, were modified under the Bank's loss mitigation programs described above during the periods presented. This table excludes Chapter 7 loans where the sole concession granted is the discharge of debt.

Year ended December 31,	Residential mortgage			Home equity			Total residential real estate – excluding PCI		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Number of loans approved for a trial modification	**2,102**	2,558	1,281	**3,767**	4,605 (c)	5,765 (c)	**5,869**	7,163 (c)	7,046 (c)
Number of loans permanently modified	**1,447**	2,900	2,624	**3,470**	4,946	5,624	**4,917**	7,846	8,248
Concession granted:[(a)]									
Interest rate reduction	**66%**	40%	63%	**81%**	62%	59%	**77%**	54%	60%
Term or payment extension	**90**	55	72	**64**	66	69	**71**	62	70
Principal and/or interest deferred	**26**	44	15	**7**	20	10	**13**	29	12
Principal forgiveness	**6**	8	16	**5**	7	13	**5**	7	14
Other[(b)]	**45**	38	33	**70**	58	31	**63**	51	32

(a) Represents concessions granted in permanent modifications as a percentage of the number of loans permanently modified. The sum of the percentages exceeds 100% because predominantly all of the modifications include more than one type of concession. Concessions offered on trial modifications are generally consistent with those granted on permanent modifications.

(b) Includes variable interest rate to fixed interest rate modifications for the years ended December 31, 2019, 2018 and 2017. Also includes forbearances that meet the definition of a TDR for the years ended December 31, 2019 and 2018. Forbearances suspend or reduce monthly payments for a specific period of time to address a temporary hardship.

(c) The prior period amounts have been revised to conform with the current period presentation. This revision also impacted home equity impaired loans and new TDRs in this note, as well as loans by impairment methodology in Note 14.

Financial effects of modifications and redefaults

The following table provides information about the financial effects of the various concessions granted in modifications of residential real estate loans, excluding PCI, under the loss mitigation programs described above and about redefaults of certain loans modified in TDRs for the periods presented. The following table presents only the financial effects of permanent modifications and does not include temporary concessions offered through trial modifications. This table also excludes Chapter 7 loans where the sole concession granted is the discharge of debt.

Year ended December 31, (in millions, except weighted-average data)	Residential mortgage			Home equity			Total residential real estate – excluding PCI		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Weighted-average interest rate of loans with interest rate reductions – before TDR	**5.88%**	5.65%	5.15%	**5.53%**	5.39%	4.95%	**5.67%**	5.50%	5.06%
Weighted-average interest rate of loans with interest rate reductions – after TDR	**4.21**	3.80	2.99	**3.53**	3.46	2.64	**3.81**	3.60	2.83
Weighted-average remaining contractual term (in years) of loans with term or payment extensions – before TDR	**20**	23	24	**19**	19	21	**20**	21	23
Weighted-average remaining contractual term (in years) of loans with term or payment extensions – after TDR	**39**	38	38	**40**	39	39	**39**	38	38
Charge-offs recognized upon permanent modification	**$ 1**	$ 1	$ 2	**$ –**	$ 1	$ 1	**$ 1**	$ 2	$ 3
Principal deferred	**15**	21	12	**4**	9	10	**19**	30	22
Principal forgiven	**4**	10	20	**3**	7	13	**7**	17	33
Balance of loans that redefaulted within one year of permanent modification(a)	**$ 107**	$ 97	$ 124	**$ 59**	$ 63	$ 56	**$ 166**	$ 160	$ 180

(a) Represents loans permanently modified in TDRs that experienced a payment default in the periods presented, and for which the payment default occurred within one year of the modification. The dollar amounts presented represent the balance of such loans at the end of the reporting period in which such loans defaulted. For residential real estate loans modified in TDRs, payment default is deemed to occur when the loan becomes two contractual payments past due. In the event that a modified loan redefaults, it is probable that the loan will ultimately be liquidated through foreclosure or another similar type of liquidation transaction. Redefaults of loans modified within the last 12 months may not be representative of ultimate redefault levels.

At December 31, 2019, the weighted-average estimated remaining lives of residential real estate loans, excluding PCI loans, permanently modified in TDRs were 9 years for residential mortgage and 8 years for home equity. The estimated remaining lives of these loans reflect estimated prepayments, both voluntary and involuntary (i.e., foreclosures and other forced liquidations).

Active and suspended foreclosure

At December 31, 2019 and 2018, the Bank had non-PCI residential real estate loans, excluding those insured by U.S. government agencies, with a carrying value of $529 million and $652 million, respectively, that were not included in REO, but were in the process of active or suspended foreclosure.

Other consumer loans

The table below provides information for other consumer retained loan classes, including auto and business banking loans.

December 31, (in millions, except ratios)	Auto		Consumer & business banking		Total other consumer	
	2019	2018	**2019**	2018	**2019**	2018
Loan delinquency						
Current	**$ 60,944**	$ 62,984	**$ 26,718**	$ 26,249	**$ 87,662**	$ 89,233
30–119 days past due	**578**	589	**240**	252	**818**	841
120 or more days past due	**–**	–	**117**	111	**117**	111
Total retained loans	**$ 61,522**	$ 63,573	**$ 27,075**	$ 26,612	**$ 88,597**	$ 90,185
% of 30+ days past due to total retained loans	**0.94%**	0.93%	**1.32%**	1.36%	**1.06%**	1.06%
Nonaccrual loans[a]	**113**	128	**247**	245	**360**	373
Geographic region[b]						
California	**$ 8,081**	$ 8,330	**$ 5,891**	$ 5,520	**$ 13,972**	$ 13,850
Texas	**6,804**	6,531	**3,105**	2,993	**9,909**	9,524
New York	**3,639**	3,863	**4,372**	4,381	**8,011**	8,244
Illinois	**3,360**	3,716	**1,733**	2,046	**5,093**	5,762
Florida	**3,262**	3,256	**1,594**	1,502	**4,856**	4,758
Arizona	**2,024**	2,084	**1,273**	1,491	**3,297**	3,575
Ohio	**1,986**	1,973	**1,137**	1,305	**3,123**	3,278
New Jersey	**1,905**	1,981	**797**	723	**2,702**	2,704
Michigan	**1,215**	1,357	**1,250**	1,329	**2,465**	2,686
Louisiana	**1,617**	1,587	**740**	860	**2,357**	2,447
All other	**27,629**	28,895	**5,183**	4,462	**32,812**	33,357
Total retained loans	**$ 61,522**	$ 63,573	**$ 27,075**	$ 26,612	**$ 88,597**	$ 90,185
Loans by risk ratings[c]						
Noncriticized	**$ 14,178**	$ 15,749	**$ 19,156**	$ 18,743	**$ 33,334**	$ 34,492
Criticized performing	**360**	273	**727**	751	**1,087**	1,024
Criticized nonaccrual	**–**	–	**198**	191	**198**	191

(a) There were no loans that were 90 or more days past due and still accruing interest at December 31, 2019 and December 31, 2018.
(b) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.
(c) For risk-rated business banking and auto loans, the primary credit quality indicator is the internal risk rating of the loan, including whether the loans are considered to be criticized and/or nonaccrual.

Other consumer impaired loans and loan modifications

The following table provides information about the Bank's other consumer impaired loans, including risk-rated business banking and auto loans that have been placed on nonaccrual status, and loans that have been modified in TDRs.

December 31, (in millions)	2019	2018
Impaired loans		
With an allowance	**$ 227**	$ 222
Without an allowance[(a)]	**19**	29
Total impaired loans[(b)(c)]	**$ 246**	$ 251
Allowance for loan losses related to impaired loans	**$ 71**	$ 63
Unpaid principal balance of impaired loans[(d)]	**342**	355
Impaired loans on nonaccrual status	**224**	229

(a) When discounted cash flows, collateral value or market price equals or exceeds the recorded investment in the loan, the loan does not require an allowance. This typically occurs when the impaired loans have been partially charged off and/or there have been interest payments received and applied to the loan balance.
(b) Predominantly all other consumer impaired loans are in the U.S.
(c) Other consumer average impaired loans were $246 million, $275 million and $427 million for the years ended December 31, 2019, 2018 and 2017, respectively. The related interest income on impaired loans, including those on a cash basis, was not material for the years ended December 31, 2019, 2018 and 2017.
(d) Represents the contractual amount of principal owed at December 31, 2019 and 2018. The unpaid principal balance differs from the impaired loan balances due to various factors, including charge-offs, interest payments received and applied to the principal balance, net deferred loan fees or costs and unamortized discounts or premiums on purchased loans.

Loan modifications

Certain other consumer loan modifications are considered to be TDRs as they provide various concessions to borrowers who are experiencing financial difficulty. All of these TDRs are reported as impaired loans. At December 31, 2019 and 2018, other consumer loans modified in TDRs were $76 million and $79 million, respectively. The impact of these modifications, as well as new TDRs, were not material to the Bank for the years ended December 31, 2019, 2018 and 2017. Additional commitments to lend to borrowers whose loans have been modified in TDRs as of December 31, 2019 and 2018 were not material. TDRs on nonaccrual status were $54 million and $57 million at December 31, 2019 and 2018, respectively.

Purchased credit-impaired loans

PCI loans are initially recorded at fair value at acquisition. PCI loans acquired in the same fiscal quarter may be aggregated into one or more pools, provided that the loans have common risk characteristics. A pool is then accounted for as a single asset with a single composite interest rate and an aggregate expectation of cash flows. All of the Bank's residential real estate PCI loans were acquired in the same fiscal quarter and aggregated into pools of loans with common risk characteristics.

On a quarterly basis, the Bank estimates the total cash flows (both principal and interest) expected to be collected over the remaining life of each pool. These estimates incorporate assumptions regarding default rates, loss severities, the amounts and timing of prepayments and other factors that reflect then-current market conditions. Probable decreases in expected cash flows (i.e., increased credit losses) trigger the recognition of impairment, which is then measured as the present value of the expected principal loss plus any related forgone interest cash flows, discounted at the pool's effective interest rate. Impairments are recognized through the provision for credit losses and an increase in the allowance for loan losses. Probable and significant increases in expected cash flows (e.g., decreased credit losses, the net benefit of modifications) would first reverse any previously recorded allowance for loan losses with any remaining increases recognized prospectively as a yield adjustment over the remaining estimated lives of the underlying loans. The impacts of (i) prepayments, (ii) changes in variable interest rates, and (iii) any other changes in the timing of expected cash flows are generally recognized prospectively as adjustments to interest income.

The Bank continues to modify certain PCI loans. The impact of these modifications is incorporated into the Bank's quarterly assessment of whether a probable and significant change in expected cash flows has occurred, and the loans continue to be accounted for and reported as PCI loans. In evaluating the effect of modifications on expected cash flows, the Bank incorporates the effect of any forgone interest and also considers the potential for redefault. The Bank develops product-specific probability of default estimates, which are used to compute expected credit losses. In developing these probabilities of default, the Bank considers the relationship between the credit quality characteristics of the underlying loans and certain assumptions about home prices and unemployment based upon industry-wide data. The Bank also considers its own historical loss experience to-date based on actual redefaulted modified PCI loans.

The excess of cash flows expected to be collected over the carrying value of the underlying loans is referred to as the accretable yield. This amount is not reported on the Bank's Consolidated balance sheets but is accreted into interest income at a level rate of return over the remaining estimated lives of the underlying pools of loans.

Since the timing and amounts of expected cash flows for the Bank's PCI consumer loan pools are reasonably estimable, interest is being accreted and the loan pools are being reported as performing loans. No interest would be accreted and the PCI loan pools would be reported as nonaccrual loans if the timing and/or amounts of expected cash flows on the loan pools were determined not to be reasonably estimable.

The liquidation of PCI loans, which may include sales of loans, receipt of payment in full from the borrower, or foreclosure, results in removal of the loans from the underlying PCI pool. When the amount of the liquidation proceeds (e.g., cash, real estate), if any, is less than the unpaid principal balance of the loan, the difference is first applied against the PCI pool's nonaccretable difference for principal losses (i.e., the lifetime credit loss estimate established as a purchase accounting adjustment at the acquisition date). When the nonaccretable difference for a particular loan pool has been fully depleted, any excess of the unpaid principal balance of the loan over the liquidation proceeds is written off against the PCI pool's allowance for loan losses. Write-offs of PCI loans also include other adjustments, primarily related to principal forgiveness modifications. Because the Bank's PCI loans are accounted for at a pool level, the Bank does not recognize charge-offs of PCI loans when they reach specified stages of delinquency (i.e., unlike non-PCI consumer loans, these loans are not charged off based on FFIEC standards).

The PCI portfolio affects the Bank's results of operations primarily through: (i) contribution to net interest margin; (ii) expense related to defaults and servicing resulting from the liquidation of the loans; and (iii) any provision for loan losses.

Residential real estate – PCI loans

The table below provides information about the Bank's consumer, excluding credit card, PCI loans.

December 31, (in millions, except ratios)	Home equity		Prime mortgage		Subprime mortgage		Option ARMs		Total PCI	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Carrying value(a)	**$ 7,377**	$ 8,963	**$ 3,965**	$ 4,690	**$ 1,740**	$ 1,945	**$ 7,281**	$ 8,436	**$20,363**	$24,034
Loan delinquency (based on unpaid principal balance)										
Current	**$ 7,203**	$ 8,624	**$ 3,593**	$ 4,226	**$ 1,864**	$ 2,033	**$ 6,606**	$ 7,592	**$19,266**	$22,475
30–149 days past due	**217**	278	**219**	259	**230**	286	**356**	398	**1,022**	1,221
150 or more days past due	**148**	242	**172**	223	**101**	123	**333**	457	**754**	1,045
Total loans	**$ 7,568**	$ 9,144	**$ 3,984**	$ 4,708	**$ 2,195**	$ 2,442	**$ 7,295**	$ 8,447	**$21,042**	$24,741
% of 30+ days past due to total loans	**4.82%**	5.69%	**9.81%**	10.24%	**15.08%**	16.75%	**9.44%**	10.12%	**8.44%**	9.16%
Current estimated LTV ratios (based on unpaid principal balance)(b)(c)										
Greater than 125% and refreshed FICO scores:										
Equal to or greater than 660	**$ 12**	$ 17	**$ 2**	$ 1	**$ —**	$ —	**$ 1**	$ 3	**$ 15**	$ 21
Less than 660	**9**	13	**6**	7	**7**	9	**7**	7	**29**	36
101% to 125% and refreshed FICO scores:										
Equal to or greater than 660	**86**	135	**3**	6	**6**	4	**14**	17	**109**	162
Less than 660	**39**	65	**17**	22	**20**	35	**18**	33	**94**	155
80% to 100% and refreshed FICO scores:										
Equal to or greater than 660	**588**	805	**47**	75	**47**	54	**85**	119	**767**	1,053
Less than 660	**261**	388	**65**	112	**100**	161	**113**	190	**539**	851
Lower than 80% and refreshed FICO scores:										
Equal to or greater than 660	**4,803**	5,548	**2,429**	2,689	**784**	739	**4,710**	5,111	**12,726**	14,087
Less than 660	**1,562**	1,908	**1,250**	1,568	**1,136**	1,327	**2,093**	2,622	**6,041**	7,425
No FICO/LTV available	**208**	265	**165**	228	**95**	113	**254**	345	**722**	951
Total unpaid principal balance	**$ 7,568**	$ 9,144	**$ 3,984**	$ 4,708	**$ 2,195**	$ 2,442	**$ 7,295**	$ 8,447	**$21,042**	$24,741
Geographic region (based on unpaid principal balance)(d)										
California	**$ 4,475**	$ 5,420	**$ 2,166**	$ 2,578	**$ 531**	$ 593	**$ 4,189**	$ 4,798	**$11,361**	$13,389
Florida	**833**	976	**288**	332	**212**	234	**604**	713	**1,937**	2,255
New York	**451**	525	**324**	365	**245**	268	**441**	502	**1,461**	1,660
Illinois	**200**	233	**134**	154	**113**	123	**175**	199	**622**	709
Washington	**326**	419	**80**	98	**37**	44	**143**	177	**586**	738
New Jersey	**174**	210	**112**	134	**78**	88	**219**	258	**583**	690
Massachusetts	**53**	65	**97**	113	**67**	73	**206**	240	**423**	491
Maryland	**40**	48	**86**	95	**87**	96	**157**	178	**370**	417
Virginia	**44**	54	**77**	91	**33**	37	**180**	211	**334**	393
Arizona	**130**	165	**57**	69	**37**	43	**93**	112	**317**	389
All other	**842**	1,029	**563**	679	**755**	843	**888**	1,059	**3,048**	3,610
Total unpaid principal balance	**$ 7,568**	$ 9,144	**$ 3,984**	$ 4,708	**$ 2,195**	$ 2,442	**$ 7,295**	$ 8,447	**$21,042**	$24,741

(a) Carrying value includes the effect of fair value adjustments that were applied to the consumer PCI portfolio at the date of acquisition.
(b) Represents the aggregate unpaid principal balance of loans divided by the estimated current property value. Current property values are estimated, at a minimum, quarterly, based on home valuation models using nationally recognized home price index valuation estimates incorporating actual data to the extent available and forecasted data where actual data is not available. These property values do not represent actual appraised loan level collateral values; as such, the resulting ratios are necessarily imprecise and should be viewed as estimates. Current estimated combined LTV for junior lien home equity loans considers all available lien positions, as well as unused lines, related to the property.
(c) Refreshed FICO scores represent each borrower's most recent credit score, which is obtained by the Bank on at least a quarterly basis.
(d) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.

Approximately 27% of the PCI home equity portfolio are senior lien loans; the remaining balance are junior lien HELOANs or HELOCs. The following table provides delinquency statistics for PCI junior lien home equity loans and lines of credit based on the unpaid principal balance as of December 31, 2019 and 2018.

December 31, (in millions, except ratios)	Total loans		Total 30+ day delinquency rate	
	2019	2018	**2019**	2018
HELOCs:[(a)(b)]	**$ 5,337**	$ 6,531	**3.52%**	4.00%
HELOANs	**220**	280	**3.64**	3.57
Total	**$ 5,557**	$ 6,811	**3.53%**	3.98%

(a) In general, these HELOCs are revolving loans for a 10-year period, after which time the HELOC converts to an interest-only loan with a balloon payment at the end of the loan's term. Substantially all HELOCs are beyond the revolving period.
(b) Includes loans modified into fixed rate amortizing loans.

The table below presents the accretable yield activity for the Bank's PCI consumer loans for the years ended December 31, 2019, 2018 and 2017, and represents the Bank's estimate of gross interest income expected to be earned over the remaining life of the PCI loan portfolios. The table excludes the cost to fund the PCI portfolios, and therefore the accretable yield does not represent net interest income expected to be earned on these portfolios.

Year ended December 31, (in millions, except ratios)	Total PCI		
	2019	2018	2017
Beginning balance	**$ 8,422**	$ 11,159	$ 11,768
Accretion into interest income	**(1,093)**	(1,249)	(1,396)
Changes in interest rates on variable-rate loans	**(575)**	(109)	503
Other changes in expected cash flows[(a)]	**(589)**	(1,379)	284
Balance at December 31	**$ 6,165**	$ 8,422	$ 11,159
Accretable yield percentage	**5.28%**	4.92%	4.53%

(a) Other changes in expected cash flows may vary from period to period as the Bank continues to refine its cash flow model, for example cash flows expected to be collected due to the impact of modifications and changes in prepayment assumptions.

Active and suspended foreclosure

At December 31, 2019 and 2018, the Bank had PCI residential real estate loans with an unpaid principal balance of $721 million and $964 million, respectively, that were not included in REO, but were in the process of active or suspended foreclosure.

Credit card loan portfolio

The credit card portfolio segment includes credit card loans originated and purchased by the Bank. Delinquency rates are the primary credit quality indicator for credit card loans as they provide an early warning that borrowers may be experiencing difficulties (30 days past due); information on those borrowers that have been delinquent for a longer period of time (90 days past due) is also considered. In addition to delinquency rates, the geographic distribution of the loans provides insight as to the credit quality of the portfolio based on the regional economy.

While the borrower's credit score is another general indicator of credit quality, the Bank does not view credit scores as a primary indicator of credit quality because the borrower's credit score tends to be a lagging indicator. The distribution of such scores provides a general indicator of credit quality trends within the portfolio; however, the score does not capture all factors that would be predictive of future credit performance. Refreshed FICO score information, which is obtained at least quarterly, for a statistically significant random sample of the credit card portfolio is indicated in the following table. FICO is considered to be the industry benchmark for credit scores.

The Bank generally originates new card accounts to prime consumer borrowers. However, certain cardholders' FICO scores may decrease over time, depending on the performance of the cardholder and changes in the credit score calculation.

The table below provides information about the Bank's credit card loans.

As of or for the year ended December 31, (in millions, except ratios)	2019	2018
Net charge-offs	**$ 4,848**	$ 4,518
Net charge-off rate	**3.10%**	3.10%
Loan delinquency		
Current and less than 30 days past due and still accruing	**$ 165,767**	$ 153,746
30–89 days past due and still accruing	**1,550**	1,426
90 or more days past due and still accruing	**1,607**	1,444
Total retained credit card loans	**$ 168,924**	$ 156,616
Loan delinquency ratios		
% of 30+ days past due to total retained loans	**1.87%**	1.83%
% of 90+ days past due to total retained loans	**0.95**	0.92
Geographic region(a)		
California	**$ 25,783**	$ 23,757
Texas	**16,728**	15,085
New York	**14,544**	13,601
Florida	**10,830**	9,770
Illinois	**9,579**	8,938
New Jersey	**7,165**	6,739
Ohio	**5,406**	5,094
Pennsylvania	**5,245**	4,996
Colorado	**4,763**	4,309
Michigan	**4,164**	3,912
All other	**64,717**	60,415
Total retained credit card loans	**$ 168,924**	$ 156,616
Percentage of portfolio based on carrying value with estimated refreshed FICO scores		
Equal to or greater than 660	**84.0%**	84.2%
Less than 660	**15.4**	15.0
No FICO available	**0.6**	0.8

(a) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.

Credit card impaired loans and loan modifications

The table below provides information about the Bank's impaired credit card loans. All of these loans are considered to be impaired as they have been modified in TDRs.

December 31, (in millions)	2019	2018
Impaired credit card loans with an allowance[(a)(b)(c)]	$ 1,452	$ 1,319
Allowance for loan losses related to impaired credit card loans	477	440

(a) The carrying value and the unpaid principal balance are the same for credit card impaired loans.
(b) There were no impaired loans without an allowance.
(c) Predominantly all impaired credit card loans are in the U.S.

The following table presents average balances of impaired credit card loans and interest income recognized on those loans.

Year ended December 31, (in millions)	2019	2018	2017
Average impaired credit card loans	$ 1,389	$ 1,260	$ 1,214
Interest income on impaired credit card loans	72	65	59

Loan modifications

The Bank may offer one of a number of loan modification programs to credit card borrowers who are experiencing financial difficulty. Most of the credit card loans have been modified under long-term programs for borrowers who are experiencing financial difficulties. These modifications involve placing the customer on a fixed payment plan, generally for 60 months, and typically include reducing the interest rate on the credit card. Substantially all modifications are considered to be TDRs.

If the cardholder does not comply with the modified payment terms, then the credit card loan continues to age and will ultimately be charged-off in accordance with the Bank's standard charge-off policy. In most cases, the Bank does not reinstate the borrower's line of credit.

New enrollments in these loan modification programs for the years ended December 31, 2019, 2018 and 2017, were $961 million, $866 million and $756 million, respectively. For all periods disclosed, new enrollments were less than 1% of total retained credit card loans.

Financial effects of modifications and redefaults

The following table provides information about the financial effects of the concessions granted on credit card loans modified in TDRs and redefaults for the periods presented.

Year ended December 31, (in millions, except weighted-average data)	2019	2018	2017
Weighted-average interest rate of loans – before TDR	19.07%	17.98%	16.58%
Weighted-average interest rate of loans – after TDR	4.70	5.16	4.88
Loans that redefaulted within one year of modification[(a)]	$ 148	$ 116	$ 93

(a) Represents loans modified in TDRs that experienced a payment default in the periods presented, and for which the payment default occurred within one year of the modification. The amounts presented represent the balance of such loans as of the end of the interim period in which they defaulted.

For credit card loans modified in TDRs, payment default is deemed to have occurred when the borrower misses two consecutive contractual payments. A substantial portion of these loans are expected to be charged-off in accordance with the Bank's standard charge-off policy. Based on historical experience, the estimated weighted-average default rate for modified credit card loans was expected to be 32.89%, 33.38% and 31.54% as of December 31, 2019, 2018 and 2017, respectively.

Wholesale loan portfolio

Wholesale loans include loans made to a variety of clients, ranging from large corporate and institutional clients to high-net-worth individuals.

The primary credit quality indicator for wholesale loans is the internal risk rating assigned to each loan. Risk ratings are used to identify the credit quality of loans and differentiate risk within the portfolio. Risk ratings on loans consider the probability of default ("PD") and the loss given default ("LGD"). The PD is the likelihood that a loan will default. The LGD is the estimated loss on the loan that would be realized upon the default of the borrower and takes into consideration collateral and structural support for each credit facility.

Management considers several factors to determine an appropriate internal risk rating, including the obligor's debt capacity and financial flexibility, the level of the obligor's earnings, the amount and sources for repayment, the level and nature of contingencies, management strength, and the industry and geography in which the obligor operates. The Bank's internal risk ratings generally align with the qualitative characteristics (e.g., borrower capacity to meet financial commitments and vulnerability to changes in the economic environment) defined by S&P and Moody's, however the quantitative characteristics (e.g., PDs and LGDs) may differ as they reflect internal historical experiences and assumptions. The Bank considers internal ratings equivalent to BBB-/Baa3 or higher as investment grade, and these ratings have a lower PD and/or lower LGD than non-investment grade ratings.

Noninvestment-grade ratings are further classified as noncriticized and criticized, and the criticized portion is further subdivided into performing and nonaccrual loans, representing management's assessment of the collectibility of principal and interest. Criticized loans have a higher PD than noncriticized loans. The Bank's definition of criticized aligns with the U.S. banking regulatory definition of criticized exposures, which consist of special mention, substandard and doubtful categories.

Risk ratings are reviewed on a regular and ongoing basis by Credit Risk Management and are adjusted as necessary for updated information affecting the obligor's ability to fulfill its obligations.

As noted above, the risk rating of a loan considers the industry in which the obligor conducts its operations. As part of the overall credit risk management framework, the Bank focuses on the management and diversification of its industry and client exposures, with particular attention paid to industries with actual or potential credit concern. Refer to Note 5 for further detail on industry concentrations.

The table below provides information by class of receivable for the retained loans in the Wholesale portfolio segment. Refer to Note 5 for additional information on industry concentrations.

As of or for the year ended December 31, (in millions, except ratios)	Commercial and industrial		Real estate		Financial institutions		Governments & Agencies		Other[(d)]		Total retained loans	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Loans by risk ratings												
Investment-grade	**$ 60,374**	$ 72,959	**$ 101,354**	$100,107	**$ 40,063**	$ 32,128	**$12,174**	$ 13,434	**$129,208**	$119,945	**$343,173**	$338,573
Noninvestment-grade:												
Noncriticized	**51,324**	51,592	**13,841**	14,876	**15,718**	15,196	**108**	178	**12,142**	11,515	**93,133**	93,357
Criticized performing	**4,071**	3,738	**1,001**	620	**570**	147	**–**	2	**449**	182	**6,091**	4,689
Criticized nonaccrual	**752**	851	**48**	134	**3**	4	**–**	–	**40**	161	**843**	1,150
Total noninvestment-grade	**56,147**	56,181	**14,890**	15,630	**16,291**	15,347	**108**	180	**12,631**	11,858	**100,067**	99,196
Total retained loans	**$116,521**	$129,140	**$ 116,244**	$115,737	**$ 56,354**	$ 47,475	**$12,282**	$ 13,614	**$141,839**	$131,803	**$443,240**	$437,769
% of total criticized to total retained loans	**4.14%**	3.55%	**0.90%**	0.65 %	**1.02%**	0.32%	**–%**	0.01%	**0.34%**	0.26%	**1.56%**	1.33%
% of criticized nonaccrual to total retained loans	**0.65**	0.66	**0.04**	0.12	**0.01**	0.01	**–**	–	**0.03**	0.12	**0.19**	0.26
Loans by geographic distribution[(a)]												
Total non-U.S.	**$ 28,253**	$ 29,572	**$ 4,123**	$ 2,967	**$ 16,795**	$ 18,521	**$ 2,232**	$ 3,150	**$ 49,960**	$ 48,431	**$101,363**	$102,641
Total U.S.	**88,268**	99,568	**112,121**	112,770	**39,559**	28,954	**10,050**	10,464	**91,879**	83,372	**341,877**	335,128
Total retained loans	**$116,521**	$129,140	**$ 116,244**	$115,737	**$ 56,354**	$47,475	**$12,282**	$13,614	**$141,839**	$131,803	**$443,240**	$437,769
Net charge-offs/ (recoveries)	**$ 329**	$ 126	**$ 12**	$ (20)	**$ –**	$ –	**$ –**	$ –	**$ 28**	$ 10	**$ 369**	$ 116
% of net charge-offs/ (recoveries) to end-of-period retained loans	**0.28%**	0.10%	**0.01%**	(0.02)%	**–%**	–%	**–%**	–%	**0.02%**	0.01%	**0.08%**	0.03%
Loan delinquency[(b)]												
Current and less than 30 days past due and still accruing	**$115,395**	$128,012	**$ 116,098**	$115,533	**$ 56,329**	$ 47,449	**$12,253**	$ 13,593	**$141,412**	$130,936	**$441,487**	$435,523
30–89 days past due and still accruing	**339**	109	**94**	67	**20**	12	**28**	17	**387**	703	**868**	908
90 or more days past due and still accruing[(c)]	**35**	168	**4**	3	**2**	10	**1**	4	**–**	3	**42**	188
Criticized nonaccrual	**752**	851	**48**	134	**3**	4	**–**	–	**40**	161	**843**	1,150
Total retained loans	**$116,521**	$129,140	**$ 116,244**	$115,737	**$ 56,354**	$ 47,475	**$12,282**	$ 13,614	**$141,839**	$131,803	**$443,240**	$437,769

(a) The U.S. and non-U.S. distribution is determined based predominantly on the domicile of the borrower.
(b) The credit quality of wholesale loans is assessed primarily through ongoing review and monitoring of an obligor's ability to meet contractual obligations rather than relying on the past due status, which is generally a lagging indicator of credit quality.
(c) Represents loans that are considered well-collateralized and therefore still accruing interest.
(d) Other includes individuals and individual entities (predominantly consists of wealth management clients and includes loans to personal investment companies and personal and testamentary trusts), SPEs and Private education and civic organizations. Refer to Note 15 for more information on SPEs.

The following table presents additional information on the real estate class of loans within the Wholesale portfolio for the periods indicated, which consists primarily of secured commercial loans, of which multifamily is the largest segment. Multifamily lending finances acquisition, leasing and construction of apartment buildings, and includes loans to real estate investment trusts ("REITs"). Other commercial lending largely includes financing for acquisition, leasing and construction, largely for office, retail and industrial real estate, and includes loans to REITs. Included in real estate loans is $8.2 billion and $10.5 billion as of December 31, 2019 and 2018, respectively, of construction and development loans originally purposed for construction and development, general purpose loans for builders, as well as loans for land subdivision and pre-development.

December 31, (in millions, except ratios)	Multifamily		Other Commercial		Total real estate loans	
	2019	2018	**2019**	2018	**2019**	2018
Real estate retained loans	**$ 79,402**	$ 79,184	**$ 36,842**	$ 36,553	**$ 116,244**	$ 115,737
Criticized	**407**	388	**642**	366	**1,049**	754
% of total criticized to total real estate retained loans	**0.51%**	0.49%	**1.74%**	1.00%	**0.90%**	0.65%
Criticized nonaccrual	**$ 38**	$ 57	**$ 10**	$ 77	**$ 48**	$ 134
% of criticized nonaccrual loans to total real estate retained loans	**0.05%**	0.07%	**0.03%**	0.21%	**0.04%**	0.12%

Wholesale impaired retained loans and loan modifications

Wholesale impaired retained loans consist of loans that have been placed on nonaccrual status and/or that have been modified in a TDR. All impaired loans are evaluated for an asset-specific allowance as described in Note 14.

The table below sets forth information about the Bank's wholesale impaired retained loans.

December 31, (in millions)	Commercial and industrial		Real estate		Financial institutions		Other		Total retained loans	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Impaired loans										
With an allowance	**$ 637**	$ 807	**$ 49**	$ 107	**$ 3**	$ 4	**$ 42**	$ 152	**$ 731**	$ 1,070
Without an allowance[(a)]	**177**	140	**—**	27	**—**	—	**4**	13	**181**	180
Total impaired loans	**$ 814**	$ 947	**$ 49**	$ 134	**$ 3**	$ 4	**$ 46**	$ 165	**$ 912** (c)	$ 1,250 (c)
Allowance for loan losses related to impaired loans	**$ 221**	$ 252	**$ 9**	$ 25	**$ 1**	$ 1	**$ 3**	$ 19	**$ 234**	$ 297
Unpaid principal balance of impaired loans[(b)]	**974**	1,043	**72**	203	**4**	4	**54**	473	**1,104**	1,723

(a) When the discounted cash flows, collateral value or market price equals or exceeds the recorded investment in the loan, the loan does not require an allowance. This typically occurs when the impaired loans have been partially charged-off and/or there have been interest payments received and applied to the loan balance.
(b) Represents the contractual amount of principal owed at December 31, 2019 and 2018. The unpaid principal balance differs from the impaired loan balances due to various factors, including charge-offs; interest payments received and applied to the carrying value; net deferred loan fees or costs; and unamortized discount or premiums on purchased loans.
(c) Based upon the domicile of the borrower, largely consists of loans in the U.S.

The following table presents the Bank's average impaired retained loans for the years ended 2019, 2018 and 2017.

Year ended December 31, (in millions)	2019	2018	2017
Commercial and industrial	**$ 1,086**	$ 1,027	$ 1,256
Real estate	**94**	133	165
Financial institutions	**11**	57	48
Other	**168**	199	241
Total[(a)]	**$ 1,359**	$ 1,416	$ 1,710

(a) The related interest income on accruing impaired loans and interest income recognized on a cash basis were not material for the years ended December 31, 2019, 2018 and 2017.

Certain loan modifications are considered to be TDRs as they provide various concessions to borrowers who are experiencing financial difficulty. All TDRs are reported as impaired loans in the tables above. TDRs were $460 million and $576 million as of December 31, 2019 and 2018, respectively. The impact of these modifications, as well as new TDRs, were not material to the Bank for the years ended December 31, 2019, 2018 and 2017.

Note 14 – Allowance for credit losses

The Bank's allowance for loan losses represents management's estimate of probable credit losses inherent in the the Bank's retained loan portfolio, which consists of the two consumer portfolio segments (primarily scored) and the wholesale portfolio segment (risk-rated). The allowance for loan losses includes a formula-based component, an asset-specific component, and a component related to PCI loans, as described below. Management also estimates an allowance for wholesale and certain consumer lending-related commitments using methodologies similar to those used to estimate the allowance on the underlying loans.

The Bank's policies used to determine its allowance for credit losses are described in the following paragraphs.

Determining the appropriateness of the allowance is complex and requires judgment by management about the effect of matters that are inherently uncertain. Subsequent evaluations of the loan portfolio, in light of the factors then prevailing, may result in significant changes in the allowances for loan losses and lending-related commitments in future periods. At least quarterly, the allowance for credit losses is reviewed by the CRO, the Chief Financial Officer ("CFO") and the Controller of JPMorgan Chase. As of December 31, 2019, the Bank deemed the allowance for credit losses to be appropriate and sufficient to absorb probable credit losses inherent in the portfolio.

Formula-based component

The formula-based component is based on a statistical calculation to provide for incurred credit losses in all consumer loans and performing risk-rated loans. All loans restructured in TDRs as well as any impaired risk-rated loans have an allowance assessed as part of the asset-specific component, while PCI loans have an allowance assessed as part of the PCI component. Refer to Note 13 for more information on TDRs, Impaired loans and PCI loans.

Formula-based component - Consumer loans and certain lending-related commitments

The formula-based allowance for credit losses for the consumer portfolio segments is calculated by applying statistical credit loss factors (estimated PD and loss severities) to the recorded investment balances or loan-equivalent amounts of pools of loan exposures with similar risk characteristics over a loss emergence period to arrive at an estimate of incurred credit losses. Estimated loss emergence periods may vary by product and may change over time; management applies judgment in estimating loss emergence periods, using available credit information and trends. In addition, management applies judgment to the statistical loss estimates for each loan portfolio category, using delinquency trends and other risk characteristics to estimate the total incurred credit losses in the portfolio. Management uses additional statistical methods and considers actual portfolio performance, including actual losses recognized on defaulted loans and collateral valuation trends, to review the appropriateness of the primary statistical loss estimate. The economic impact of potential modifications of residential real estate loans is not included in the statistical calculation because of the uncertainty regarding the type and results of such modifications.

The statistical calculation is then adjusted to take into consideration model imprecision, external factors and current economic events that have occurred but that are not yet reflected in the factors used to derive the statistical calculation; these adjustments are accomplished in part by analyzing the historical loss experience for each major product segment. However, it is difficult to predict whether historical loss experience is indicative of future loss levels. Management applies judgment in making this adjustment, taking into account uncertainties associated with current macroeconomic and political conditions, quality of underwriting standards, borrower behavior, and other relevant internal and external factors affecting the credit quality of the portfolio. In certain instances, the interrelationships between these factors create further uncertainties. The application of different inputs into the statistical calculation, and the assumptions used by management to adjust the statistical calculation, are subject to management judgment, and emphasizing one input or assumption over another, or considering other inputs or assumptions, could affect the estimate of the allowance for credit losses for the consumer credit portfolio.

Overall, the allowance for credit losses for consumer portfolios is sensitive to changes in the economic environment (e.g., unemployment rates), delinquency rates, the realizable value of collateral (e.g., housing prices), FICO scores, borrower behavior and other risk factors. While all of these factors are important determinants of overall allowance levels, changes in the various factors may not occur at the same time or at the same rate, or changes may be directionally inconsistent such that improvement in one factor may offset deterioration in another. In addition, changes in these factors would not necessarily be consistent across all geographies or product types. Finally, it is difficult to predict the extent to which changes in these factors would ultimately affect the frequency of losses, the severity of losses or both.

Formula-based component - Wholesale loans and lending-related commitments

The Bank's methodology for determining the allowance for loan losses and the allowance for lending-related commitments involves the early identification of credits that are deteriorating. The formula-based component of the allowance for wholesale loans and lending-related commitments is calculated by applying statistical credit loss factors (estimated PD and LGD) to the recorded investment balances or loan-equivalent over a loss emergence period to arrive at an estimate of incurred credit losses in the portfolio. Estimated loss emergence periods may vary by the funded versus unfunded status of the instrument and may change over time.

The Bank assesses the credit quality of a borrower or counterparty and assigns an internal risk rating. Risk ratings are assigned at origination or acquisition, and if necessary, adjusted for changes in credit quality over the life of the exposure. In assessing the risk rating of a particular loan or lending-related commitment, among the factors considered are the obligor's debt capacity and financial flexibility, the level of the obligor's earnings, the amount and sources for repayment, the level and nature of contingencies, management strength, and the industry and geography in which the obligor operates. These factors are based on an evaluation of historical and current information and involve subjective assessment and interpretation. Determining risk ratings involves significant judgment; emphasizing one factor over another or considering additional factors could affect the risk rating assigned by the Bank.

A PD estimate is determined based on the the Bank's history of defaults over more than one credit cycle.

LGD estimate is a judgment-based estimate assigned to each loan or lending-related commitment. The estimate represents the amount of economic loss if the obligor were to default. The type of obligor, quality of collateral, and the seniority of the Bank's lending exposure in the obligor's capital structure affect LGD.

The Bank applies judgment in estimating PD, LGD, loss emergence period and loan-equivalent used in calculating the allowance for credit losses. Estimates of PD, LGD, loss emergence period and loan-equivalent used are subject to periodic refinement based on any changes to underlying external or Bank-specific historical data. Changes to the time period used for PD and LGD estimates could also affect the allowance for credit losses. The use of different inputs, estimates or methodologies could change the amount of the allowance for credit losses determined appropriate by the Bank.

In addition to the statistical credit loss estimates applied to the wholesale portfolio, management applies its judgment to adjust the statistical estimates for wholesale loans and lending-related commitments, taking into consideration model imprecision, external factors and economic events that have occurred but are not yet reflected in the loss factors. Historical experience of both LGD and PD are considered when estimating these adjustments. Factors related to concentrated and deteriorating industries also are incorporated where relevant. These estimates are based on management's view of uncertainties that relate to current macroeconomic conditions, quality of underwriting standards and other relevant internal and external factors affecting the credit quality of the current portfolio.

Asset-specific component

The asset-specific component of the allowance relates to loans considered to be impaired, which includes loans that have been modified in TDRs as well as risk-rated loans that have been placed on nonaccrual status. To determine the asset-specific component of the allowance, larger risk-rated loans (primarily loans in the wholesale portfolio segment) are evaluated individually, while smaller loans (both risk-rated and scored) are evaluated as pools using historical loss experience for the respective class of assets.

The Bank generally measures the asset-specific allowance as the difference between the recorded investment in the loan and the present value of the cash flows expected to be collected, discounted at the loan's original effective interest rate. Subsequent changes in impairment are reported as an adjustment to the allowance for loan losses. In certain cases, the asset-specific allowance is determined using an observable market price, and the allowance is measured as the difference between the recorded investment in the loan and the loan's fair value. Collateral-dependent loans are charged down to the fair value of collateral less costs to sell. For any of these impaired loans, the amount of the asset-specific allowance required to be recorded, if any, is dependent upon the recorded investment in the loan (including prior charge-offs), and either the expected cash flows or fair value of collateral. Refer to Note 13 for more information about charge-offs and collateral-dependent loans.

The asset-specific component of the allowance for impaired loans that have been modified in TDRs (including forgone interest, principal forgiveness, as well as other concessions) incorporates the effect of the modification on the loan's expected cash flows, which considers the potential for redefault. For residential real estate loans modified in TDRs, the Bank develops product-specific probability of default estimates, which are applied at a loan level to compute expected losses. In developing these probabilities of default, the Bank considers the relationship between the credit quality characteristics of the underlying loans and certain assumptions about home prices and unemployment, based upon industry-wide data. The Bank also considers its own historical loss experience to-date based on actual redefaulted modified loans. For credit card loans modified in TDRs, expected losses incorporate projected redefaults based on the Bank's historical experience by type of modification program. For wholesale loans modified in TDRs, expected losses incorporate management's expectation of the borrower's ability to repay under the modified terms.

Estimating the timing and amounts of future cash flows is highly judgmental as these cash flow projections rely upon estimates such as loss severities, asset valuations, default rates (including redefault rates on modified loans), the amounts and timing of interest or principal payments (including any expected prepayments) or other factors that are reflective of current and expected market conditions. These estimates are, in turn, dependent on factors such as the duration of current overall economic conditions, industry-, portfolio-, or borrower-specific factors, the expected outcome of insolvency proceedings as well as, in certain circumstances, other economic factors, including the level of future home prices. All of these estimates and assumptions require significant management judgment and certain assumptions are highly subjective.

PCI loans

In connection with the acquisition of certain PCI loans, which are accounted for as described in Note 13, the allowance for loan losses for the PCI portfolio is based on quarterly estimates of the amount of principal and interest cash flows expected to be collected over the estimated remaining lives of the loans.

These cash flow projections are based on estimates regarding default rates (including redefault rates on modified loans), loss severities, the amounts and timing of prepayments and other factors that are reflective of current and expected future market conditions. These estimates are dependent on assumptions regarding the level of future home prices, and the duration of current overall economic conditions, among other factors. These estimates and assumptions require significant management judgment and certain assumptions are highly subjective.

Allowance for credit losses and related information

The table below summarizes information about the allowances for loan losses and lending-relating commitments, and includes a breakdown of loans and lending-related commitments by impairment methodology.

(Table continued on next page)

Year ended December 31, (in millions)	2019 Consumer, excluding credit card	Credit card	Wholesale	Total
Allowance for loan losses				
Beginning balance at January 1,	$ 4,145	$ 5,184	$ 4,096	$ 13,425
Gross charge-offs	963	5,436	411	6,810
Gross recoveries	(551)	(588)	(42)	(1,181)
Net charge-offs	412	4,848	369	5,629
Write-offs of PCI loans[a]	151	–	–	151
Provision for loan losses	(383)	5,348	492	5,457
Other	(1)	(1)	6	4
Ending balance at December 31,	$ 3,198	$ 5,683	$ 4,225	$ 13,106
Allowance for loan losses by impairment methodology				
Asset-specific[b]	$ 136	$ 477 [c]	$ 234	$ 847
Formula-based	2,075	5,206	3,991	11,272
PCI	987	–	–	987
Total allowance for loan losses	$ 3,198	$ 5,683	$ 4,225	$ 13,106
Loans by impairment methodology				
Asset-specific	$ 6,166	$ 1,452	$ 912	$ 8,530
Formula-based	305,366	167,472	442,328	915,166
PCI	20,363	–	–	20,363
Total retained loans	$ 331,895	$ 168,924	$ 443,240	$ 944,059
Impaired collateral-dependent loans				
Net charge-offs	$ 57	$ –	$ 25	$ 82
Loans measured at fair value of collateral less cost to sell	2,057	–	81	2,138
Allowance for lending-related commitments				
Beginning balance at January 1,	$ 33	$ –	$ 1,021	$ 1,054
Provision for lending-related commitments	–	–	136	136
Other	–	–	–	–
Ending balance at December 31,	$ 33	$ –	$ 1,157	$ 1,190
Allowance for lending-related commitments by impairment methodology				
Asset-specific	$ –	$ –	$ 102	$ 102
Formula-based	33	–	1,055	1,088
Total allowance for lending-related commitments	$ 33	$ –	$ 1,157	$ 1,190
Lending-related commitments by impairment methodology				
Asset-specific	$ –	$ –	$ 474	$ 474
Formula-based	51,412	650,720	402,113	1,104,245
Total lending-related commitments	$ 51,412	$ 650,720	$ 402,587	$ 1,104,719

(a) Write-offs of PCI loans are recorded against the allowance for loan losses when actual losses for a pool exceed estimated losses that were recorded as purchase accounting adjustments at the time of acquisition. A write-off of a PCI loan is recognized when the underlying loan is removed from a pool.
(b) Includes risk-rated loans that have been placed on nonaccrual status and loans that have been modified in a TDR.
(c) The asset-specific credit card allowance for loan losses is related to loans that have been modified in a TDR; such allowance is calculated based on the loans' original contractual interest rates and does not consider any incremental penalty rates.

(table continued from previous page)

2018				2017			
Consumer, excluding credit card	Credit card	Wholesale	Total	Consumer, excluding credit card	Credit card	Wholesale	Total
$ 4,577	$ 4,884	$ 4,083	$ 13,544	$ 5,195	$ 4,034	$ 4,478	$ 13,707
1,025	5,011	274	6,310	1,779	4,521	212	6,512
(842)	(493)	(158)	(1,493)	(634)	(398)	(93)	(1,125)
183	4,518	116	4,817	1,145	4,123	119	5,387
187	–	–	187	86	–	–	86
(63)	4,818	130	4,885	613	4,973	(278)	5,308
1	–	(1)	–	–	–	2	2
$ 4,145	$ 5,184	$ 4,096	$ 13,425	$ 4,577	$ 4,884	$ 4,083	$ 13,544
$ 196	$ 440 (c)	$ 297	$ 933	$ 246	$ 383 (c)	$ 430	$ 1,059
2,161	4,744	3,799	10,704	2,106	4,501	3,653	10,260
1,788	–	–	1,788	2,225	–	–	2,225
$ 4,145	$ 5,184	$ 4,096	$ 13,425	$ 4,577	$ 4,884	$ 4,083	$ 13,544
$ 6,867	$ 1,319	$ 1,250	$ 9,436	$ 8,071	$ 1,215	$ 1,808	$ 11,094
342,708	155,297	436,516	934,521	333,870	148,172	400,068	882,110
24,034	–	3	24,037	30,576	–	3	30,579
$ 373,609	$ 156,616	$ 437,769	$ 967,994	$ 372,517	$ 149,387	$ 401,879	$ 923,783
$ 24	$ –	$ 21	$ 45	$ 65	$ –	$ 31	$ 96
2,078	–	202	2,280	2,131	–	233	2,364
$ 33	$ –	$ 1,035	$ 1,068	$ 26	$ –	$ 1,052	$ 1,078
–	–	(13)	(13)	7	–	(17)	(10)
–	–	(1)	(1)	–	–	–	–
$ 33	$ –	$ 1,021	$ 1,054	$ 33	$ –	$ 1,035	$ 1,068
$ –	$ –	$ 99	$ 99	$ –	$ –	$ 187	$ 187
33	–	922	955	33	–	848	881
$ 33	$ –	$ 1,021	$ 1,054	$ 33	$ –	$ 1,035	$ 1,068
$ –	$ –	$ 469	$ 469	$ –	$ –	$ 731	$ 731
46,066	605,379	386,270	1,037,715	48,553	572,986	368,528	990,067
$ 46,066	$ 605,379	$ 386,739	$ 1,038,184	$ 48,553	$ 572,986	$ 369,259	$ 990,798

Note 15 – Variable interest entities

Refer to Note 1 for a further description of the Bank's accounting policies regarding consolidation of VIEs.

The following table summarizes the most significant types of Bank-sponsored VIEs. The Bank considers a "sponsored" VIE to include any entity where: (1) The Bank is the primary beneficiary of the structure; (2) the VIE is used by the Bank to securitize Bank assets; (3) the VIE issues financial instruments with the JPMorgan Chase Bank, N.A. name; or (4) the entity is a JPMorgan Chase Bank, N.A.-administered asset-backed commercial paper conduit.

Transaction Type	*Activity*	*Consolidated Financial Statements page reference*
Credit card securitization trusts	Securitization of originated credit card receivables	94-95
Mortgage securitization trusts	Servicing and securitization of both originated and purchased residential mortgages	94-96
Mortgage and other securitization trusts	Securitization of both originated and purchased residential and commercial mortgages, and other consumer loans	94-96
Multi-seller conduits	Assist clients in accessing the financial markets in a cost-efficient manner and structures transactions to meet investor needs	96-97
Municipal bond vehicles	Financing of municipal bond investments	97

The Bank is also involved with VIEs (both third-party and Bank-sponsored), but to a lesser extent, as follows:

- The Bank provides financing and lending-related services to a wide spectrum of clients, including certain third-party-sponsored entities that may meet the definition of a VIE. The Bank does not control the activities of these entities and does not consolidate these entities. The Bank's maximum loss exposure, regardless of whether the entity is a VIE, is generally limited to loans and lending-related commitments which are reported and disclosed in the same manner as any other third-party transaction.
- The Bank is involved with entities that may meet the definition of VIEs; however these entities are generally subject to specialized investment company accounting, which does not require the consolidation of investments, including VIEs.
- The Bank invests in securities generally issued by third parties which may meet the definition of VIEs (e.g., issuers of asset-backed securities). In general, the Bank does not have the power to direct the significant activities of these entities and therefore does not consolidate these entities. Refer to Note 11 for further information on the Bank's investment securities portfolio.
- The Bank also invests in and provides financing and other services to VIEs sponsored by third parties. Refer to page 99 of this Note for more information on the VIEs sponsored by third parties.

Significant Bank-sponsored variable interest entities

Credit card securitizations

The Bank may securitize originated credit card loans, primarily through the Chase Issuance Trust (the "Trust"). The Bank's continuing involvement in credit card securitizations includes servicing the receivables, retaining an undivided seller's interest in the receivables, retaining certain senior and subordinated securities and maintaining escrow accounts.

The Bank is considered to be the primary beneficiary of these Bank-sponsored credit card securitization trusts based on the Bank's ability to direct the activities of these VIEs through its servicing responsibilities and other duties, including making decisions as to the receivables that are transferred into those trusts and as to any related modifications and workouts. Additionally, the nature and extent of the Bank's other continuing involvement with the trusts, as indicated above, obligates the Bank to absorb losses and gives the Bank the right to receive certain benefits from these VIEs that could potentially be significant.

The underlying securitized credit card receivables and other assets of the securitization trusts are available only for payment of the beneficial interests issued by the securitization trusts; they are not available to pay the Bank's other obligations or the claims of the Bank's creditors.

The agreements with the credit card securitization trusts require the Bank to maintain a minimum undivided interest in the credit card trusts (generally 5%). As of December 31, 2019 and 2018, the Bank held undivided interests in Bank-sponsored credit card securitization trusts of $5.3 billion and $15.1 billion, respectively. The Bank maintained an average undivided interest in principal receivables owned by those trusts of approximately 50% and 37% for the years ended December 31, 2019 and 2018. The Bank did not retain any senior securities and retained $3.0 billion of subordinated securities in certain of its credit card securitization trusts as of both December 31, 2019 and

2018, respectively. The Bank's undivided interests in the credit card trusts and securities retained are eliminated in consolidation.

Bank-sponsored mortgage and other securitization trusts
The Bank securitizes (or has securitized) originated and purchased residential mortgages, commercial mortgages and other consumer loans. Depending on the particular transaction, as well as the respective business involved, the Bank may act as the servicer of the loans and/or retain certain beneficial interests in the securitization trusts.

The following table presents the total unpaid principal amount of assets held in Bank-sponsored private-label securitization entities, including those in which the Bank has continuing involvement, and those that are consolidated by the Bank. Continuing involvement includes servicing the loans, holding senior interests or subordinated interests (including amounts required to be held pursuant to credit risk retention rules), recourse or guarantee arrangements, and derivative contracts. In certain instances, the Bank's only continuing involvement is servicing the loans. The Bank's maximum loss exposure from retained and purchased interests is the carrying value of these interests. Refer to Securitization activity on page 100 of this Note for further information regarding the Bank's cash flows associated with and interests retained in nonconsolidated VIEs, and pages 100-101 of this Note for information on the Bank's loan sales and securitization activity related to U.S. GSEs and government agencies.

	Principal amount outstanding			The Bank interest in securitized assets in nonconsolidated VIEs[c][d]			
December 31, 2019 (in millions)	Total assets held by securitization VIEs	Assets held in consolidated securitization VIEs	Assets held in nonconsolidated securitization VIEs with continuing involvement	Trading assets	Investment securities	Other financial assets	Total interests held by the Bank
Securitization-related[a]							
Residential mortgage:							
Prime/Alt-A and option ARMs	$ **46,844**	$ **2,759**	$ **37,602**	$ **316**	$ **608**	$ **–**	$ **924**
Subprime	**9,974**	**–**	**9,338**	**–**	**–**	**–**	**–**
Commercial and other[b]	**110,596**	**–**	**31,453**	**159**	**772**	**241**	**1,172**
Total	$ **167,414**	$ **2,759**	$ **78,393**	$ **475**	$ **1,380**	$ **241**	$ **2,096**

	Principal amount outstanding			The Bank interest in securitized assets in nonconsolidated VIEs[c][d]			
December 31, 2018 (in millions)	Total assets held by securitization VIEs	Assets held in consolidated securitization VIEs	Assets held in nonconsolidated securitization VIEs with continuing involvement	Trading assets	Investment securities	Other financial assets	Total interests held by the Bank
Securitization-related[a]							
Residential mortgage:							
Prime/Alt-A and option ARMs	$ 47,051	$ 3,237	$ 36,731	$ 222	$ 613	$ –	$ 835
Subprime	11,260	–	10,605	–	–	–	–
Commercial and other[b]	100,905	–	24,580	244	772	210	1,226
Total	$ 159,216	$ 3,237	$ 71,916	$ 466	$ 1,385	$ 210	$ 2,061

(a) Excludes U.S. GSEs and government agency securitizations, which are not Bank-sponsored. Refer to pages 100–101 of this Note for information on the Bank's loan sales and securitization activity related to U.S. GSEs and government agencies.
(b) Consists of securities backed by commercial real estate loans and non-mortgage-related consumer receivables purchased from third parties.
(c) Excludes the following: retained servicing (refer to Note 16 for a discussion of MSRs); securities retained from loan sales and securitization activity related to U.S. GSEs and government agencies; interest rate and foreign exchange derivatives primarily used to manage interest rate and foreign exchange risks of securitization entities (refer to Note 6 for further information on derivatives). There were no senior and subordinated securities purchased in connection with the Bank's secondary market-making activities at December 31, 2019 and 2018, respectively.
(d) As of December 31, 2019 and 2018, 63% and 48%, respectively, of the Bank's retained securitization interests, which are predominantly carried at fair value and include amounts required to be held pursuant to credit risk retention rules, were risk-rated "A" or better, on an S&P-equivalent basis. The retained interests in prime residential mortgages consisted of $894 million and $826 million of investment-grade and $30 million and $9 million of noninvestment-grade at December 31, 2019 and 2018, respectively. The retained interests in commercial and other securitizations trusts consisted of $803 million and $777 million of investment-grade and $369 million and $448 million of noninvestment-grade retained interests at December 31, 2019 and 2018, respectively.

Residential mortgage
The Bank securitizes originated residential mortgage loans, as well as residential mortgage loans purchased from third parties. The Bank generally retains servicing for all residential mortgage loans originated and may retain servicing for certain mortgage loans purchased. For securitizations of loans serviced by the Bank, it has the power to direct the significant activities of the VIE because it is responsible for decisions related to loan modifications and workouts. The Bank may also retain an interest upon securitization.

In addition, the Bank may engage in trading activities involving securities issued by Bank-sponsored securitization trusts. As a result, the Bank at times retains senior and/or subordinated interests (including residual interests and amounts required to be held pursuant to credit risk retention rules) in residential mortgage securitizations at the time of securitization, and/or reacquires positions in the secondary market in the normal course of business. In certain instances, as a result of the positions retained or reacquired by the Bank, when considered together with the servicing arrangements entered into, the Bank, is deemed to be the primary beneficiary of certain securitization trusts. Refer to the table on page 98 of this Note for more information on consolidated residential mortgage securitizations.

The Bank does not consolidate residential mortgage securitizations (Bank-sponsored or third-party-sponsored) when it is not the servicer (and therefore does not have the power to direct the most significant activities of the trust) or does not hold a beneficial interest in the trust that could potentially be significant to the trust. Refer to the table on page 98 of this Note for more information on the consolidated residential mortgage securitizations, and the table on the previous page of this Note for further information on interests held in nonconsolidated residential mortgage securitizations.

Commercial mortgages and other consumer securitizations
The Bank originates and securitizes commercial mortgage loans, and engages in underwriting and trading activities involving the securities issued by securitization trusts. The Bank may retain unsold senior and/or subordinated interests (including amounts required to be held pursuant to credit risk retention rules) in commercial mortgage securitizations at the time of securitization but, generally, the Bank does not service commercial loan securitizations. For commercial mortgage securitizations the power to direct the significant activities of the VIE generally is held by the servicer or investors in a specified class of securities ("controlling class"). The Bank generally does not retain an interest in the controlling class in its sponsored commercial mortgage securitization transactions. Refer to the table on page 98 of this Note for more information on the consolidated commercial mortgage securitizations, and the table on the previous page of this Note for further information on interests held in nonconsolidated securitizations.

Multi-seller conduits
Multi-seller conduit entities are separate bankruptcy remote entities that provide secured financing, collateralized by pools of receivables and other financial assets, to customers of the Bank. The conduits fund their financing facilities through the issuance of highly rated commercial paper. The primary source of repayment of the commercial paper is the cash flows from the pools of assets. In most instances, the assets are structured with deal-specific credit enhancements provided to the conduits by the customers (i.e., sellers) or other third parties. Deal-specific credit enhancements are generally structured to cover a multiple of historical losses expected on the pool of assets, and are typically in the form of overcollateralization provided by the seller. The deal-specific credit enhancements mitigate the Bank's potential losses on its agreements with the conduits.

To ensure timely repayment of the commercial paper, and to provide the conduits with funding to provide financing to customers in the event that the conduits do not obtain funding in the commercial paper market, each asset pool financed by the conduits has a minimum 100% deal-specific liquidity facility associated with it provided by the Bank. The Bank also provides the multi-seller conduit vehicles with uncommitted program-wide liquidity facilities and program-wide credit enhancement in the form of standby letters of credit. The amount of program-wide credit enhancement required is based upon commercial paper issuance and approximates 10% of the outstanding balance of commercial paper.

The Bank consolidates its Bank-administered multi-seller conduits, as it has both the power to direct the significant activities of the conduits and a potentially significant economic interest in the conduits. As administrative agent and in its role in structuring transactions, the Bank makes decisions regarding asset types and credit quality, and manages the commercial paper funding needs of the conduits. The Bank's interests that could potentially be significant to the VIEs include the fees received as administrative agent and liquidity and program-wide credit enhancement provider, as well as the potential exposure created by the liquidity and credit enhancement facilities provided to the conduits. Refer to page 98 of this Note for further information on consolidated VIE assets and liabilities.

In the normal course of business, the Bank makes markets in and invests in commercial paper issued by Bank-administered multi-seller conduits. The Bank held \$16.3 billion and \$20.1 billion of the commercial paper issued by Bank-administered multi-seller conduits at December 31, 2019 and 2018, respectively, which have been eliminated in consolidation. The Bank's investments reflect its funding needs and capacity and were not driven by market illiquidity. Other than the amounts required to be held pursuant to credit risk retention rules, the Bank is not obligated under any agreement to purchase the commercial paper issued by Bank-administered multi-seller conduits.

The Bank provides deal-specific liquidity as well as program-wide liquidity and credit enhancement to its administered multi-seller conduits, which have been eliminated in consolidation. The administered multi-seller conduits then provide certain of their clients with lending-related commitments. The unfunded commitments were \$8.9 billion and \$8.0 billion at December 31, 2019 and 2018, respectively, and are reported as off-balance sheet lending-related commitments in other unfunded commitments to extend credit. Refer to Note 26 for more information on off-balance sheet lending-related commitments.

Municipal bond vehicles

Municipal bond vehicles or tender option bond ("TOB") trusts allow institutions to finance their municipal bond investments at short-term rates. In a typical TOB transaction, the trust purchases highly rated municipal bond(s) of a single issuer and funds the purchase by issuing two types of securities: (1) puttable floating-rate certificates ("floaters") and (2) inverse floating-rate residual interests ("residuals"). The floaters are typically purchased by money market funds or other short-term investors and may be tendered, with requisite notice, to the TOB trust. The residuals are retained by the investor seeking to finance its municipal bond investment. TOB transactions where the residual is held by a third-party investor are typically known as customer TOB trusts, and non-customer TOB trusts are transactions where the Residual is retained by the Bank. Customer TOB trusts are sponsored by a third party; refer to page 99 of this Note for further information. The Bank serves as sponsor for all non-customer TOB transactions. The Bank may provide various services to a TOB trust, including liquidity or tender option provider, and/or sponsor.

The Bank often serves as the sole liquidity or tender option provider for the TOB trusts. The liquidity provider's obligation to perform is conditional and is limited by certain events ("Termination Events"), which include bankruptcy or failure to pay by the municipal bond issuer or credit enhancement provider, an event of taxability on the municipal bonds or the immediate downgrade of the municipal bond to below investment grade. In addition, the liquidity provider's exposure is typically further limited by the high credit quality of the underlying municipal bonds, the excess collateralization in the vehicle, or, in certain transactions, the reimbursement agreements with the Residual holders.

Holders of the floaters may "put," or tender, their floaters to the TOB trust. If the remarketing agent cannot successfully remarket the floaters to another investor, the liquidity provider either provides a loan to the TOB trust for the TOB trust's purchase of the floaters, or it directly purchases the tendered floaters.

TOB trusts are considered to be variable interest entities. The Bank consolidates non-customer TOB trusts because as the Residual holder, the Bank has the right to make decisions that significantly impact the economic performance of the municipal bond vehicle, and it has the right to receive benefits and bear losses that could potentially be significant to the municipal bond vehicle.

Consolidated VIE assets and liabilities

The following table presents information on assets and liabilities related to VIEs consolidated by the Bank as of December 31, 2019 and 2018.

	Assets				Liabilities		
December 31, 2019 (in millions)	Trading assets	Loans	Other[(b)]	Total assets[(c)]	Beneficial interests in VIE assets[(d)]	Other[(e)]	Total liabilities
VIE program type							
Bank-sponsored credit card trusts	**$ –**	**$ 14,986**	**$ 266**	**$ 15,252**	**$ 6,470**	**$ 6**	**$ 6,476**
Bank-administered multi-seller conduits	**1**	**25,183**	**355**	**25,539**	**9,223**	**55**	**9,278**
Municipal bond vehicles	**1,903**	**–**	**4**	**1,907**	**1,880**	**3**	**1,883**
Mortgage securitization entities[(a)]	**–**	**2,762**	**64**	**2,826**	**241**	**130**	**371**
Other	**279**	**–**	**24**	**303**	**–**	**177**	**177**
Total	**$ 2,183**	**$ 42,931**	**$ 713**	**$ 45,827**	**$ 17,814**	**$ 371**	**$ 18,185**

	Assets				Liabilities		
December 31, 2018 (in millions)	Trading assets	Loans	Other[(b)]	Total assets[(c)]	Beneficial interests in VIE assets[(d)]	Other[(e)]	Total liabilities
VIE program type							
Bank-sponsored credit card trusts	$ –	$ 31,760	$ 491	$ 32,251	$ 13,437	$ 12	$ 13,449
Bank-administered multi-seller conduits	–	24,411	300	24,711	4,842	57	4,899
Municipal bond vehicles	1,779	–	4	1,783	1,749	3	1,752
Mortgage securitization entities[(a)]	–	3,285	40	3,325	281	160	441
Other	131	–	–	131	1	–	1
Total	$ 1,910	$ 59,456	$ 835	$ 62,201	$ 20,310	$ 232	$ 20,542

(a) Includes residential and commercial mortgage securitizations.
(b) Includes assets classified as cash and other assets on the Consolidated balance sheets.
(c) The assets of the consolidated VIEs included in the program types above are used to settle the liabilities of those entities. The assets and liabilities include third-party assets and liabilities of consolidated VIEs and exclude intercompany balances that eliminate in consolidation.
(d) The interest-bearing beneficial interest liabilities issued by consolidated VIEs are classified in the line item on the Consolidated balance sheets titled, “Beneficial interests issued by consolidated variable interest entities.” The holders of these beneficial interests generally do not have recourse to the general credit of the Bank Included in beneficial interests in VIE assets are long-term beneficial interests of $6.7 billion and $13.7 billion at December 31, 2019 and 2018, respectively. Refer to Note 20 for additional information on interest-bearing long-term beneficial interests.
(e) Includes liabilities classified as accounts payable and other liabilities on the Consolidated balance sheets.

VIEs sponsored by third parties

The Bank enters into transactions with VIEs structured by other parties. These include, for example, acting as a derivative counterparty, liquidity provider, investor, underwriter, placement agent, remarketing agent, trustee or custodian. These transactions are conducted at arm's-length, and individual credit decisions are based on the analysis of the specific VIE, taking into consideration the quality of the underlying assets. Where the Bank does not have the power to direct the activities of the VIE that most significantly impact the VIE's economic performance, or a variable interest that could potentially be significant, the Bank generally does not consolidate the VIE, but it records and reports these positions on its Consolidated balance sheets in the same manner it would record and report positions in respect of any other third-party transaction.

Tax credit vehicles

The Bank holds investments in unconsolidated tax credit vehicles, which are limited partnerships and similar entities that own and operate affordable housing, energy, and other projects. These entities are primarily considered VIEs. A third party is typically the general partner or managing member and has control over the significant activities of the tax credit vehicles, and accordingly the Bank does not consolidate tax credit vehicles. The Bank generally invests in these partnerships as a limited partner and earns a return primarily through the receipt of tax credits allocated to the projects. The maximum loss exposure, represented by equity investments and funding commitments, was $8.9 billion and $7.9 billion, of which $3.0 billion and $2.3 billion was unfunded at December 31, 2019 and 2018, respectively. In order to reduce the risk of loss, the Bank assesses each project and withholds varying amounts of its capital investment until the project qualifies for tax credits. Refer to Note 23 for further information on affordable housing tax credits. Refer to Note 26 for more information on off-balance sheet lending-related commitments.

Customer municipal bond vehicles (TOB trusts)

The Bank may provide various services to customer TOB trusts, including liquidity or tender option provider. In certain customer TOB transactions, the Bank as liquidity provider, has entered into a reimbursement agreement with the Residual holder. In those transactions, upon the termination of the vehicle, the Bank has recourse to the third-party Residual holders for any shortfall. The Bank does not have any intent to protect Residual holders from potential losses on any of the underlying municipal bonds. The Bank does not consolidate customer TOB trusts, since the Bank does not have the power to make decisions that significantly impact the economic performance of the municipal bond vehicle. The Bank's maximum exposure as a liquidity provider to customer TOB trusts at December 31, 2019 and 2018, was $5.5 billion and $4.8 billion, respectively. The fair value of assets held by such VIEs at December 31, 2019 and 2018 was $8.6 billion and $7.7 billion, respectively. Refer to Note 26 for more information on off-balance sheet lending-related commitments.

Loan securitizations

The Bank has securitized and sold a variety of loans, including residential mortgage, credit card, and commercial mortgage. The purposes of these securitization transactions were to satisfy investor demand and to generate liquidity for the Bank.

For loan securitizations in which the Bank is not required to consolidate the trust, the Bank records the transfer of the loan receivable to the trust as a sale when all of the following accounting criteria for a sale are met: (1) the transferred financial assets are legally isolated from the Bank's creditors; (2) the transferee or beneficial interest holder can pledge or exchange the transferred financial assets; and (3) The Bank does not maintain effective control over the transferred financial assets (e.g., the Bank cannot repurchase the transferred assets before their maturity and it does not have the ability to unilaterally cause the holder to return the transferred assets).

For loan securitizations accounted for as a sale, the Bank recognizes a gain or loss based on the difference between the value of proceeds received (including cash, beneficial interests, or servicing assets received) and the carrying value of the assets sold. Gains and losses on securitizations are reported in noninterest revenue.

Securitization activity

The following table provides information related to the Bank's securitization activities for the years ended December 31, 2019, 2018 and 2017, related to assets held in Bank-sponsored securitization entities that were not consolidated by the Bank, and where sale accounting was achieved at the time of the securitization.

	2019		2018		2017	
Year ended December 31, (in millions)	Residential mortgage[c]	Commercial and other[d]	Residential mortgage[c]	Commercial and other[d]	Residential mortgage[c]	Commercial and other[d]
Principal securitized	**$ 9,957**	**$ 9,390**	$ 6,431	$ 10,159	$ 5,532	$ 10,252
All cash flows during the period:						
Proceeds received from loan sales as cash or financial instruments[a]	**$ 10,238**	**$ 9,544**	$ 6,449	$ 10,218	$ 5,661	$ 10,337
Servicing fees collected	**287**	**2**	319	2	338	2
Purchases of previously transferred financial assets (or the underlying collateral)[b]	**—**	**—**	—	—	1	—
Cash flows received on interests	**410**	**131**	273	155	383	632

(a) The carrying value of the loans accounted for at fair value approximated the proceeds received upon loan sale. The proceeds received were primarily cash.
(b) Includes cash paid by the Bank to reacquire assets from nonconsolidated entities – for example, loan repurchases due to representation and warranties and servicer "clean-up calls".
(c) Includes prime mortgages only. Excludes loan securitization activity related to U.S. GSEs and government agencies.
(d) Includes commercial mortgage and other consumer loans.

Key assumptions used to value retained interests originated during the year are shown in the table below.

Year ended December 31,	2019	2018	2017
Residential mortgage retained interest:			
Weighted-average life (in years)	**5.2**	6.7	3.8
Weighted-average discount rate	**3.7%**	4.7%	3.0%
Commercial mortgage retained interest:			
Weighted-average life (in years)	**6.5**	4.2	5.3
Weighted-average discount rate	**4.1%**	3.7%	4.7%

Loans and excess MSRs sold to U.S. government-sponsored enterprises and loans in securitization transactions pursuant to Ginnie Mae guidelines

In addition to the amounts reported in the securitization activity tables above, the Bank, in the normal course of business, sells originated and purchased mortgage loans and certain originated excess MSRs on a nonrecourse basis, predominantly to U.S. GSEs. These loans and excess MSRs are sold primarily for the purpose of securitization by the U.S. GSEs, who provide certain guarantee provisions (e.g., credit enhancement of the loans). The Bank also sells loans into securitization transactions pursuant to Ginnie Mae guidelines; these loans are typically insured or guaranteed by another U.S. government agency. The Bank does not consolidate the securitization vehicles underlying these transactions as it is not the primary beneficiary. For a limited number of loan sales, the Bank is obligated to share a portion of the credit risk associated with the sold loans with the purchaser. Refer to Note 26 for additional information about the Bank's loan sales- and securitization-related indemnifications. Refer to Note 16 for additional information about the impact of the Bank's sale of certain excess MSRs.

The following table summarizes the activities related to loans sold to the U.S. GSEs, and loans in securitization transactions pursuant to Ginnie Mae guidelines.

Year ended December 31, (in millions)	2019	2018	2017
Carrying value of loans sold	**$ 92,349**	$ 44,609	$ 64,542
Proceeds received from loan sales as cash	**$ 73**	$ 9	$ 117
Proceeds from loan sales as securities[(a)(b)]	**91,422**	43,671	63,542
Total proceeds received from loan sales[(c)]	**$ 91,495**	$ 43,680	$ 63,659
Gains/(losses) on loan sales[(d)(e)]	**$ 499**	$ (93)	$ 163

(a) Includes securities from U.S. GSEs and Ginnie Mae that are generally sold shortly after receipt or retained as part of the Bank's investment securities portfolio.
(b) Included in level 2 assets.
(c) Excludes the value of MSRs retained upon the sale of loans.
(d) Gains/(losses) on loan sales include the value of MSRs.
(e) The carrying value of the loans accounted for at fair value approximated the proceeds received upon loan sale.

Options to repurchase delinquent loans
In addition to the Bank's obligation to repurchase certain loans due to material breaches of representations and warranties as discussed in Note 26. The Bank also has the option to repurchase delinquent loans that it services for Ginnie Mae loan pools, as well as for other U.S. government agencies under certain arrangements. The Bank typically elects to repurchase delinquent loans from Ginnie Mae loan pools as it continues to service them and/or manage the foreclosure process in accordance with the applicable requirements, and such loans continue to be insured or guaranteed. When the Bank's repurchase option becomes exercisable, such loans must be reported on the Consolidated balance sheets as a loan with a corresponding liability. Refer to Note 13 for additional information.

The following table presents loans the Bank repurchased or had an option to repurchase, real estate owned, and foreclosed government-guaranteed residential mortgage loans recognized on the Bank's Consolidated balance sheets as of December 31, 2019 and 2018. Substantially all of these loans and real estate are insured or guaranteed by U.S. government agencies.

December 31, (in millions)	2019	2018
Loans repurchased or option to repurchase[(a)]	**$ 2,933**	$ 7,010
Real estate owned	**41**	75
Foreclosed government-guaranteed residential mortgage loans[(b)]	**198**	361

(a) Predominantly all of these amounts relate to loans that have been repurchased from Ginnie Mae loan pools.
(b) Relates to voluntary repurchases of loans, which are included in accrued interest and accounts receivable.

Loan delinquencies and liquidation losses

The table below includes information about components of nonconsolidated securitized financial assets held in Bank-sponsored private-label securitization entities, in which the Bank has continuing involvement, and delinquencies as of December 31, 2019 and 2018.

	Securitized assets		90 days past due		Net liquidation losses[(a)]	
As of or for the year ended December 31, (in millions)	2019	2018	2019	2018	2019	2018
Securitized loans						
Residential mortgage:						
Prime/ Alt-A & option ARMs	**$ 37,602**	$ 36,731	**$ 1,673**	$ 2,253	**$ 370**	$ 365
Subprime	**9,338**	10,605	**1,170**	1,567	**367**	(374)
Commercial and other	**31,453**	24,580	**86**	26	**1**	–
Total loans securitized	**$ 78,393**	$ 71,916	**$ 2,929**	$ 3,846	**$ 738**	$ (9)

(a) Includes liquidation gains as a result of private label mortgage settlement payments during the first half of 2018, which were reflected as asset recoveries by trustees.

Note 16 – Goodwill and Mortgage servicing rights

Goodwill

Goodwill is recorded upon completion of a business combination as the difference between the purchase price and the fair value of the net assets acquired. Subsequent to initial recognition, goodwill is not amortized but is tested for impairment during the fourth quarter of each fiscal year, or more often if events or circumstances, such as adverse changes in the business climate, indicate there may be impairment.

The following table presents changes in the carrying amount of goodwill.

Year ended December 31, (in millions)	2019	2018	2017
Balance at beginning of period[(a)]	$ 39,710	$ 39,746	$ 39,527
Changes during the period from:			
Business combinations[(b)]	349	–	199
Other[(c)]	3	(36)	20
Balance at December 31,[(a)]	**$ 40,062**	$ 39,710	$ 39,746

(a) Reflects gross goodwill balances as the Bank has not recognized any impairment losses to date.
(b) For 2019, represents goodwill associated with the acquisition of InstaMed a U.S. technology company specializing in healthcare payments. For 2017, represents goodwill in connection with an acquisition.
(c) Primarily relates to foreign currency adjustments.

Goodwill impairment testing

Goodwill was not impaired at December 31, 2019, 2018 and 2017.

The goodwill impairment test is performed in two steps. In the first step, the current fair value of the Bank is compared with its carrying value. If the fair value is in excess of the carrying value, then the goodwill is considered not to be impaired. If the fair value is less than the carrying value, then a second step is performed. In the second step, the implied current fair value of the goodwill is determined by comparing the fair value of the Bank (as determined in step one) to the fair value of the net assets of the Bank as if it was being acquired in a business combination. The resulting implied current fair value of goodwill is then compared with the carrying value of the Bank's goodwill. If the carrying value of the goodwill exceeds its implied current fair value, then an impairment charge is recognized for the excess. If the carrying value of goodwill is less than its implied current fair value, then no goodwill impairment is recognized.

Declines in business performance, increases in credit losses, increases in capital requirements, as well as deterioration in economic or market conditions, adverse regulatory or legislative changes or increases in the estimated market cost of equity, could cause the estimated fair values of the Bank's, or its associated goodwill to decline in the future, which could result in a material impairment charge to earnings in a future period related to some portion of the associated goodwill.

Mortgage servicing rights

MSRs represent the fair value of expected future cash flows for performing servicing activities for others. The fair value considers estimated future servicing fees and ancillary revenue, offset by estimated costs to service the loans, and generally declines over time as net servicing cash flows are received, effectively amortizing the MSR asset against contractual servicing and ancillary fee income. MSRs are either purchased from third parties or recognized upon sale or securitization of mortgage loans if servicing is retained.

As permitted by U.S. GAAP, the Bank has elected to account for its MSRs at fair value. The Bank treats its MSRs as a single class of servicing assets based on the availability of market inputs used to measure the fair value of its MSR asset and its treatment of MSRs as one aggregate pool for risk management purposes. The Bank estimates the fair value of MSRs using an option-adjusted spread ("OAS") model, which projects MSR cash flows over multiple interest rate scenarios in conjunction with the Bank's prepayment model, and then discounts these cash flows at risk-adjusted rates. The model considers portfolio characteristics, contractually specified servicing fees, prepayment assumptions, delinquency rates, costs to service, late charges and other ancillary revenue, and other economic factors. The Bank compares fair value estimates and assumptions to observable market data where available, and also considers recent market activity and actual portfolio experience.

The fair value of MSRs is sensitive to changes in interest rates, including their effect on prepayment speeds. MSRs typically decrease in value when interest rates decline because declining interest rates tend to increase prepayments and therefore reduce the expected life of the net servicing cash flows that comprise the MSR asset. Conversely, securities (e.g., mortgage-backed securities), principal-only certificates and certain derivatives (i.e., those for which the Bank receives fixed-rate interest payments) increase in value when interest rates decline. The Bank uses combinations of derivatives and securities to manage the risk of changes in the fair value of MSRs. The intent is to offset any interest-rate related changes in the fair value of MSRs with changes in the fair value of the related risk management instruments.

The following table summarizes MSR activity for the years ended December 31, 2019, 2018 and 2017.

As of or for the year ended December 31, (in millions, except where otherwise noted)	2019	2018	2017
Fair value at beginning of period	**$ 6,130**	$ 6,030	$ 6,096
MSR activity:			
Originations of MSRs	**1,384**	931	1,103
Purchase of MSRs	**105**	315	–
Disposition of MSRs[(a)]	**(789)**	(636)	(140)
Net additions	**700**	610	963
Changes due to collection/realization of expected cash flows	**(951)**	(740)	(797)
Changes in valuation due to inputs and assumptions:			
Changes due to market interest rates and other[(b)]	**(893)**	300	(202)
Changes in valuation due to other inputs and assumptions:			
Projected cash flows (e.g., cost to service)	**(333)** (e)	15	(102)
Discount rates	**153**	24	(19)
Prepayment model changes and other[(c)]	**(107)**	(109)	91
Total changes in valuation due to other inputs and assumptions	**(287)**	(70)	(30)
Total changes in valuation due to inputs and assumptions	**(1,180)**	230	(232)
Fair value at December 31,	**$ 4,699**	$ 6,130	$ 6,030
Change in unrealized gains/(losses) included in income related to MSRs held at December 31,	**$ (1,180)**	$ 230	$ (232)
Contractual service fees, late fees and other ancillary fees included in income	**1,639**	1,778	1,886
Third-party mortgage loans serviced at December 31, (in billions)	**522.0**	521.0	555.0
Servicer advances, net of an allowance for uncollectible amounts, at December 31, (in billions)[(d)]	**2.0**	3.0	4.0

(a) Includes excess MSRs transferred to agency-sponsored trusts in exchange for stripped mortgage backed securities ("SMBS"). In each transaction, a portion of the SMBS was acquired by third parties at the transaction date; the Bank acquired the remaining balance of those SMBS as trading securities.
(b) Represents both the impact of changes in estimated future prepayments due to changes in market interest rates, and the difference between actual and expected prepayments.
(c) Represents changes in prepayments other than those attributable to changes in market interest rates.
(d) Represents amounts the Bank pays as the servicer (e.g., scheduled principal and interest, taxes and insurance), which will generally be reimbursed within a short period of time after the advance from future cash flows from the trust or the underlying loans. The Bank's credit risk associated with these servicer advances is minimal because reimbursement of the advances is typically senior to all cash payments to investors. In addition, the Bank maintains the right to stop payment to investors if the collateral is insufficient to cover the advance. However, certain of these servicer advances may not be recoverable if they were not made in accordance with applicable rules and agreements.
(e) The decrease in projected cash flows was largely related to default servicing assumption updates.

The following table presents the components of mortgage fees and related income (including the impact of MSR risk management activities) for the years ended December 31, 2019, 2018 and 2017.

Year ended December 31, (in millions)	2019	2018	2017
Mortgage fees and related income			
Net production revenue	**$ 1,618**	$ 268	$ 636
Net mortgage servicing revenue:			
Operating revenue:			
Loan servicing revenue	**1,533**	1,835	2,014
Changes in MSR asset fair value due to collection/realization of expected cash flows	**(951)**	(740)	(795)
Total operating revenue	**582**	1,095	1,219
Risk management:			
Changes in MSR asset fair value due to market interest rates and other[(a)]	**(893)**	300	(202)
Other changes in MSR asset fair value due to other inputs and assumptions in model[(b)]	**(287)**	(70)	(30)
Change in derivative fair value and other	**1,015**	(341)	(10)
Total risk management	**(165)**	(111)	(242)
Total net mortgage servicing revenue	**417**	984	977
Other	**1**	1	3
Mortgage fees and related income	**$ 2,036**	$ 1,253	$ 1,616

(a) Represents both the impact of changes in estimated future prepayments due to changes in market interest rates, and the difference between actual and expected prepayments.
(b) Represents the aggregate impact of changes in model inputs and assumptions such as projected cash flows (e.g., cost to service), discount rates and changes in prepayments other than those attributable to changes in market interest rates (e.g., changes in prepayments due to changes in home prices).

The table below outlines the key economic assumptions used to determine the fair value of the Bank's MSRs at December 31, 2019 and 2018, and outlines the sensitivities of those fair values to immediate adverse changes in those assumptions, as defined below.

December 31, (in millions, except rates)	2019	2018
Weighted-average prepayment speed assumption (constant prepayment rate)	**11.67%**	8.78%
Impact on fair value of 10% adverse change	**$ (200)**	$ (205)
Impact on fair value of 20% adverse change	**(384)**	(397)
Weighted-average option adjusted spread[(a)]	**7.93%**	7.87%
Impact on fair value of 100 basis points adverse change	**$ (169)**	$ (235)
Impact on fair value of 200 basis points adverse change	**(326)**	(452)

(a) Includes the impact of operational risk and regulatory capital.

Changes in fair value based on variations in assumptions generally cannot be easily extrapolated, because the relationship of the change in the assumptions to the change in fair value are often highly interrelated and may not be linear. In this table, the effect that a change in a particular assumption may have on the fair value is calculated without changing any other assumption. In reality, changes in one factor may result in changes in another, which would either magnify or counteract the impact of the initial change.

Note 17 – Premises and equipment

Premises and equipment, including leasehold improvements, are carried at cost less accumulated depreciation and amortization. The Bank computes depreciation using the straight-line method over the estimated useful life of an asset. For leasehold improvements, the Bank uses the straight-line method computed over the lesser of the remaining term of the leased facility or the estimated useful life of the leased asset.

The Bank capitalizes certain costs associated with the acquisition or development of internal-use software. Once the software is ready for its intended use, these costs are amortized on a straight-line basis over the software's expected useful life and reviewed for impairment on an ongoing basis.

Note 18 – Deposits

At December 31, 2019 and 2018, noninterest-bearing and interest-bearing deposits were as follows.

December 31, (in millions)	2019	2018
U.S. offices		
Noninterest-bearing (included $**22,710** and $17,353 at fair value)[(a)(b)]	**$ 399,038**	$ 389,786
Interest-bearing (included **$2,534** and $2,492 at fair value)[(a)(b)]	**955,393**	890,800
Total deposits in U.S. offices	**1,354,431**	1,280,586
Non-U.S. offices		
Noninterest-bearing (included $**1,980** and $2,367 at fair value)[(a)(b)]	**20,997**	22,731
Interest-bearing (included **$1,438** and $1,159 at fair value)[(a)(b)]	**275,060**	254,094
Total deposits in non-U.S. offices	**296,057**	276,825
Total deposits	**$ 1,650,488**	$1,557,411

(a) Includes structured notes classified as deposits for which the fair value option has been elected. Refer to Note 4 for further discussion.
(b) During the first half of 2019, the Bank reclassified balances related to certain structured notes from interest-bearing to noninterest-bearing deposits as the associated returns are recorded in principal transactions revenue and not in net interest income. This change was applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.

At December 31, 2019 and 2018, time deposits in denominations of $250,000 or more were as follows.

December 31, (in millions)	2019	2018
U.S. offices	**$ 56,184**	$ 36,271
Non-U.S. offices	**51,375**	42,687
Total	**$ 107,559**	$ 78,958

At December 31, 2019, the maturities of interest-bearing time deposits were as follows.

December 31, 2019 (in millions)	U.S.	Non-U.S.	Total
2020	$ 60,615	$ 49,971	$ 110,586
2021	15,756	123	15,879
2022	709	98	807
2023	175	26	201
2024	534	357	891
After 5 years	301	39	340
Total	$ 78,090	$ 50,614	$ 128,704

Note 19 – Leases

Lease commitments

Effective January 1, 2019, the Bank adopted new guidance that requires lessees to recognize on the Consolidated balance sheets all leases with lease terms greater than twelve months as a lease liability with a corresponding right-of-use ("ROU") asset. Accordingly, the Bank recognized operating lease liabilities and ROU assets of $7.8 billion and $7.4 billion, respectively. The adoption of the new lease guidance did not have a material impact on the Bank's Consolidated statements of income. The change in accounting due to the adoption of the new lease guidance did not result in a material change to the future net minimum rental payments/receivables or to the net rental expense when compared to December 31, 2018.

The Bank as lessee

At December 31, 2019, the Bank and its subsidiaries were obligated under a number of noncancelable leases, predominantly operating leases for premises and equipment used primarily for business purposes. These leases generally have terms of 20 years or less, determined based on the contractual maturity of the lease, and include periods covered by options to extend or terminate the lease when the Bank is reasonably certain that it will exercise those options. None of these lease agreements impose restrictions on the Bank's ability to pay dividends, engage in debt or equity financing transactions or enter into further lease agreements. Certain of these leases contain escalation clauses that will increase rental payments based on maintenance, utility and tax increases, which are non-lease components. The Bank elected not to separate lease and non-lease components of a contract for its real estate leases. As such, real estate lease payments represent payments on both lease and non-lease components.

Operating lease liabilities and ROU assets are recognized at the lease commencement date based on the present value of the future minimum lease payments over the lease term. The future lease payments are discounted at a rate that represents the Bank's collateralized borrowing rate for financing instruments of a similar term and are included in accounts payable and other liabilities. The operating lease ROU asset, included in premises and equipment, also includes any lease prepayments made, plus initial direct costs incurred, less any lease incentives received. Rental expense associated with operating leases is recognized on a straight-line basis over the lease term, and generally included in occupancy expense in the Consolidated statements of income.

The following tables provide information related to the Bank's operating leases:

December 31, (in millions, except where otherwise noted)	2019
Right-of-use assets	$ 7,545
Lease liabilities	8,108
Weighted average remaining lease term (in years)	8.9
Weighted average discount rate	3.61%
Supplemental cash flow information	
Cash paid for amounts included in the measurement of lease liabilities - operating cash flows	$ 1,477
Supplemental non-cash flow information	
Right-of-use assets obtained in exchange for operating lease obligations	$ 1,384

Year ended December 31, (in millions)	2019
Rental expense	
Gross rental expense	$ 1,917
Sublease rental income	(156)
Net rental expense	$ 1,761

The following table presents future payments under operating leases as of December 31, 2019:

Year ended December 31, (in millions)	
2020	$ 1,511
2021	1,369
2022	1,184
2023	1,016
2024	893
After 2024	3,660
Total future minimum lease payments	9,633
Less: Imputed interest	(1,525)
Total	$ 8,108

In addition to the table above, as of December 31, 2019, the Bank had additional future operating lease commitments of $920 million that were signed but had not yet commenced. These operating leases will commence between 2020 and 2022 with lease terms up to 25 years.

The Bank as lessor

The Bank provides auto and equipment lease financing to its customers through lease arrangements with lease terms that may contain renewal, termination and/or purchase options. Generally, the Bank's lease financings are operating leases. These assets are recognized in other assets on the Bank's Consolidated balance sheets and are depreciated on a straight-line basis over the lease term to reduce the asset to its estimated residual value. Depreciation expense is included in technology, communications and equipment expense in the Consolidated statements of income. The Bank's lease income is generally recognized on a straight-line basis over the lease term and is included in other income in the Consolidated statements of income.

On a periodic basis, the Bank assesses leased assets for impairment, and if the carrying amount of the leased asset exceeds the undiscounted cash flows from the lease payments and the estimated residual value upon disposition of the leased asset, an impairment loss is recognized.

The risk of loss on auto and equipment leased assets relating to the residual value of the leased assets is monitored through projections of the asset residual values at lease origination and periodic review of residual values, and is mitigated through arrangements with certain manufacturers or lessees.

The following table presents the carrying value of assets subject to leases reported on the Consolidated balance sheets:

December 31, (in millions)	2019	2018
Carrying value of assets subject to operating leases, net of accumulated depreciation	**$ 23,585**	$ 21,408
Accumulated depreciation	**6,121**	5,298

The following table presents the Bank’s operating lease income and the related depreciation expense on the Consolidated statements of income:

Year ended December 31, (in millions)	2019	2018	2017
Operating lease income	**$ 5,448**	$ 4,529	3,604
Depreciation expense	**4,152**	3,517	2,808

The following table presents future receipts under operating leases as of December 31, 2019:

Year ended December 31, (in millions)	
2020	$ 4,160
2021	2,725
2022	1,017
2023	81
2024	36
After 2024	51
Total future minimum lease receipts	$ 8,070

Note 20 – Long-term debt

The Bank issues long-term debt denominated in various currencies, predominantly U.S. dollars, with both fixed and variable interest rates. Included in senior and subordinated debt below are various equity-linked or other indexed instruments, which the Bank has elected to measure at fair value. Changes in fair value are recorded in principal transactions revenue in the Consolidated statements of income, except for unrealized gains/(losses) due to DVA which are recorded in OCI. The following table is a summary of long-term debt carrying values (including unamortized premiums and discounts, issuance costs, valuation adjustments and fair value adjustments, where applicable) by remaining contractual maturity as of December 31, 2019.

By remaining maturity at December 31, (in millions, except rates)		2019				2018
		Under 1 year	1-5 years	After 5 years	Total	Total
Long-term debt payable to JPMorgan Chase & Co. and affiliates						
Senior debt:	Variable rate	$ 482	$ 37,240	$ 47	$ 37,769	$ 20,473
	Interest rates[(a)]	–%	2.15-2.28%	–%	2.15-2.28%	2.99%
Subordinated debt:	Variable rate	$ –	$ 2,500	$ 1,000	$ 3,500	$ 3,500
	Interest rates[(a)]	–%	3.38%	2.85%	2.85-3.38%	3.18-3.69%
	Subtotal	$ 482	$ 39,740	$ 1,047	$ 41,269	$ 23,973
Long-term debt issued to unrelated parties						
Federal Home Loan Banks ("FHLB") advances:	Fixed rate	$ 4	$ 35	$ 96	$ 135	$ 155
	Variable rate	9,500	19,000	–	28,500	44,300
	Interest rates[(a)]	1.88-2.18%	1.67-2.24%	–%	1.67-2.24%	2.36-2.96%
Senior debt:	Fixed rate	$ 746	$ 6,703	$ 11,826	$ 19,275	$ 16,418
	Variable rate	6,786	17,253	8,196	32,235	25,089
	Interest rates[(a)]	7.50%	2.15-9.43%	1.00-7.50%	1.00-9.43%	1.00-7.50%
Subordinated debt:	Fixed rate	$ –	$ 305	$ –	$ 305	$ 301
	Interest rates[(a)]	–%	8.25%	–%	8.25%	8.25%
	Subtotal	$ 17,036	$ 43,296	$ 20,118	$ 80,450	$ 86,263
Total long-term debt[(b)(c)(d)]		$ 17,518	$ 83,036	$ 21,165	$ 121,719 [(f)(g)]	$ 110,236
Long-term beneficial interests:						
	Fixed rate	$ 1,624	$ 1,373	$ –	$ 2,997	$ 7,644
	Variable rate	900	2,572	241	3,713	6,074
	Interest rates	1.49-2.04%	1.94-2.77%	0.84-3.75%	0.84-3.75%	1.27-3.75%
Total long-term beneficial interests[(e)]		$ 2,524	$ 3,945	$ 241	$ 6,710	$ 13,718

(a) The interest rates shown are the range of contractual rates in effect at December 31, 2019 and 2018, respectively, including non-U.S. dollar fixed- and variable-rate issuances, which excludes the effects of the associated derivative instruments used in hedge accounting relationships, if applicable. The use of these derivative instruments modifies the Bank's exposure to the contractual interest rates disclosed in the table above. Including the effects of the hedge accounting derivatives, the range of modified rates in effect at December 31, 2019, for total long-term debt was 1.00% to 9.43%, versus the contractual range of 1.00% to 9.43% presented in the table above. The interest rate ranges shown exclude structured notes accounted for at fair value.

(b) Included long-term debt of $32.0 billion and $47.7 billion secured by assets totaling $186.1 billion and $207.0 billion at December 31, 2019 and 2018, respectively. The amount of long-term debt secured by assets does not include amounts related to hybrid instruments.

(c) Included $40.3 billion and $26.6 billion of long-term debt accounted for at fair value at December 31, 2019 and 2018, respectively.

(d) Included $3.3 billion and $2.7 billion of outstanding zero-coupon notes at December 31, 2019 and 2018, respectively. The aggregate principal amount of these notes at their respective maturities is $6.5 billion and $5.5 billion, respectively. The aggregate principal amount reflects the contractual principal payment at maturity, which may exceed the contractual principal payment at the Bank's next call date, if applicable.

(e) Included on the Consolidated balance sheets in beneficial interests issued by consolidated VIEs. Excluded short-term commercial paper and other short-term beneficial interests of $11.1 billion and $6.6 billion at December 31, 2019 and 2018, respectively.

(f) At December 31, 2019, long-term debt in the aggregate of $21.6 billion was redeemable at the option of the Bank in whole or in part, prior to maturity, based on the terms specified in the respective instruments.

(g) The aggregate carrying values of debt that matures in each of the five years subsequent to 2019 is $17.5 billion in 2020, $59.4 billion in 2021, $5.0 billion in 2022, $9.2 billion in 2023 and $9.5 billion in 2024.

The weighted-average contractual interest rates for total long-term debt excluding structured notes accounted for at fair value were 2.24% and 2.85% as of December 31, 2019 and 2018, respectively. In order to modify exposure to interest rate movements, the Bank utilizes derivative instruments, primarily interest rate swaps, in conjunction with some of its debt issuances. The use of these instruments modifies the Bank's interest expense on the associated debt. The modified weighted-average interest rates for total long-term debt, including the effects of related derivative instruments, were 2.23% and 2.85% as of December 31, 2019 and 2018, respectively.

The Bank's unsecured debt does not contain requirements that would call for an acceleration of payments, maturities or changes in the structure of the existing debt, provide any limitations on future borrowings or require additional collateral, based on unfavorable changes in the Bank's credit ratings, financial ratios or earnings.

Note 21 – Related party transactions

JPMorgan Chase Bank, N.A. regularly enters into transactions with JPMorgan Chase and its various subsidiaries collectively, JPMorgan Chase affiliates. The following discussion summarizes the more significant types of transactions.

Securities financing activities
Securities financing activities include resale, repurchase, securities borrowed and securities loaned agreements entered into with JPMorgan Chase affiliates. Interest accrued in connection with securities financing agreements is recorded in interest income and interest expense. Refer to Note 12 for further discussion of securities financing activities.

Deposits
JPMorgan Chase affiliates may deposit excess funds into noninterest-bearing, interest-bearing demand or time deposit accounts with the Bank. Interest accrued on interest bearing deposits is recorded in interest expense by the Bank. Refer to Note 18 for further discussion of deposits.

Long-term debt
The Bank issues long-term debt to JPMorgan Chase affiliates as part of JPMorgan Chase's liquidity management strategy. Interest accrued on long-term debt is recorded in interest expense. Refer to Note 20 for further discussion of long-term debt.

Derivative transactions
The Bank executes derivative transactions with JPMorgan Chase affiliates as part of its client driven market-making activities and to facilitate hedging certain risks for its affiliates. To accomplish this, the Bank predominantly enters into offsetting derivative transactions with third-parties and records both the third party and related-party gains and losses in principal transactions revenue. Refer to Note 6 for further discussion of derivatives activities.

Servicing agreements and fee arrangements
Through servicing agreements, the Bank provides and receives operational support and services to and from JPMorgan Chase affiliates. These servicing agreements cover certain occupancy, marketing, communication and technology services, and other shared corporate service costs. The Bank is allocated or allocates a share of the cost of the services over the relevant service period based on the agreed methodology. Fees earned by the Bank for services provided to affiliates are recorded in all other income, and fees incurred by the Bank for services from affiliates are recorded in noninterest expense.

Significant revenue- and expense-related transactions with these related parties are listed below.

Year ended December 31, (in millions)	2019	2018	2017
Interest income and Interest expense			
Interest income	$ 2,726	$ 911	$ 358
Interest expense	3,799	2,498	1,478
Net interest income	(1,073)	(1,587)	(1,120)
Noninterest revenue			
Principal transactions	(8,517)	415	1,871
All other income[(a)]	5,700	4,624	4,220
Total noninterest revenue	(2,817)	5,039	6,091
Noninterest expense[(b)]	4,862	4,938	4,305

Significant balances with these related parties are listed below.

December 31, (in millions)	2019	2018
Assets		
Federal funds sold and securities purchased under resale agreements	$ 89,304	$ 92,313
Accrued interest and accounts receivable	20,163	16,267
All other assets	4,457	4,546
Liabilities		
Deposits[(c)]	87,984	86,651
Federal funds purchased and securities loaned or sold under repurchase agreements	58,016	52,823
Accounts payable and other liabilities	10,993	10,612
Long-term debt	41,269	23,973

(a) Includes fees earned by the Bank for services provided to JPMorgan Chase affiliates of $4.6 billion, $3.4 billion and $3.2 billion for the years ended December 31, 2019, 2018 and 2017, respectively.
(b) Includes fees incurred for services provided by JPMorgan Chase affiliates of $1.7 billion , $1.9 billion and $1.6 billion for the years ended December 31, 2019, 2018 and 2017.
(c) At December 31, 2019 and 2018, includes $20.0 billion and $20.2 billion that was pledged to support extensions of credit and other transactions requiring collateral with JPMorgan Chase as defined by Section 23A under the Federal Reserve Act, which defines the constraints that apply to U.S. banks in certain of their interactions with affiliates.

The following table summarizes information on derivative receivables and payables with JPMorgan Chase affiliates before and after netting adjustments for legally enforceable master netting agreements as of December 31, 2019 and December 31, 2018.

	2019		2018	
December 31, (in millions)	Gross derivative receivable/payable	Net derivative receivable/payable	Gross derivative receivable/payable	Net derivative receivable/payable
Derivative receivables from affiliates	$ 53,231	$ 265	$ 44,162	$ 331
Derivative payables to affiliates	56,532	51	42,131	124

Note 22 – Accumulated other comprehensive income/(loss)

AOCI includes the after-tax change in unrealized gains and losses on investment securities, foreign currency translation adjustments (including the impact of related derivatives), fair value changes of excluded components on fair value hedges, cash flow hedging activities, net loss and prior service costs/(credit) related to the Bank's defined benefit pension and OPEB plans, and fair value option-elected liabilities arising from changes in the Bank's own credit risk (DVA).

Year end December 31, (in millions)	Unrealized gains/(losses) on investment securities	Translation adjustments, net of hedges	Fair value hedges	Cash flow hedges	Defined benefit pension and OPEB plans	DVA on fair value option elected liabilities	Accumulated other comprehensive income/(loss)
Balance at December 31, 2016	$ 1,396	$ (36)	NA	$ (100)	$ (355)	$ (40)	$ 865
Net change	687	(309)	NA	176	11	(55)	510
Balance at December 31, 2017	$ 2,083	$ (345)	NA	$ 76	$ (344)	$ (95)	$ 1,375
Cumulative effect of changes in accounting principles[(a)]	870	(193)	(1)	16	(65)	(21)	606
Net change	(1,806)	57	1	(198)	(1,969)	321	(3,594)
Balance at December 31, 2018	$ 1,147	$ (481)	$ –	$ (106)	$ (2,378)	$ 205	$ (1,613)
Net change	**2,869**	**(4)**	**–**	**167**	**656**	**(319)**	**3,369**
Balance at December 31, 2019	**$ 4,016**	**$ (485)**	$ –	**$ 61**	**$ (1,722)**	**$ (114)**	**$ 1,756**

(a) Represents the adjustment to AOCI as a result of the accounting standards adopted January 1, 2018. Refer to Note 1 for additional information.

The following table presents the pre-tax and after-tax changes in the components of OCI.

	2019			2018			2017		
Year ended December 31, (in millions)	Pretax	Tax effect	After-tax	Pretax	Tax effect	After-tax	Pretax	Tax effect	After-tax
Unrealized gains/(losses) on investment securities:									
Net unrealized gains/(losses) arising during the period	**$ 4,037**	**$ (976)**	**$ 3,061**	$(2,757)	$ 649	$(2,108)	$ 1,012	$ (371)	$ 641
Reclassification adjustment for realized (gains)/losses included in net income[(a)]	**(253)**	**61**	**(192)**	395	(93)	302	73	(27)	46
Net change	**3,784**	**(915)**	**2,869**	(2,362)	556	(1,806)	1,085	(398)	687
Translation adjustments[(b)]:									
Translation	**(126)**	**26**	**(100)**	(797)	118	(679)	844	(616)	228
Hedges	**126**	**(30)**	**96**	964	(228)	736	(847)	310	(537)
Net change	**–**	**(4)**	**(4)**	167	(110)	57	(3)	(306)	(309)
Fair value hedges, net change[(c)]:	**–**	**–**	**–**	1	–	1	NA	NA	NA
Cash flow hedges:									
Net unrealized gains/(losses) arising during the period	**118**	**(29)**	**89**	(243)	58	(185)	147	(55)	92
Reclassification adjustment for realized (gains)/losses included in net income[(d)]	**102**	**(24)**	**78**	(17)	4	(13)	134	(50)	84
Net change	**220**	**(53)**	**167**	(260)	62	(198)	281	(105)	176
Defined benefit pension and OPEB plans:									
Transfer from JPMorgan Chase	**–**	**–**	**–**	(2,123)	500	(1,623)	–	–	–
Prior service credit/(cost) arising during the period	**(5)**	**1**	**(4)**	(29)	7	(22)	–	–	–
Net gain/(loss) arising during the period	**709**	**(171)**	**538**	(500)	120	(380)	38	(14)	24
Reclassification adjustments included in net income[(e)]:									
Amortization of net loss	**166**	**(36)**	**130**	99	(20)	79	34	(12)	22
Amortization of prior service cost/(credit)	**3**	**(1)**	**2**	(23)	5	(18)	(2)	1	(1)
Curtailment (gain)/loss	**–**	**–**	**–**	21	(5)	16	–	–	–
Settlement (gain)/loss	**–**	**–**	**–**	2	–	2	2	(1)	1
Foreign exchange and other	**(27)**	**17**	**(10)**	(26)	3	(23)	(52)	17	(35)
Net change	**846**	**(190)**	**656**	(2,579)	610	(1,969)	20	(9)	11
DVA on fair value option elected liabilities, net change:	**$ (418)**	**$ 99**	**$ (319)**	$ 419	$ (98)	$ 321	$ (86)	$ 31	$ (55)
Total other comprehensive income/(loss)	**$ 4,432**	**$(1,063)**	**$ 3,369**	$(4,614)	$ 1,020	$(3,594)	$ 1,297	$ (787)	$ 510

(a) The pre-tax amount is reported in investment securities gains/(losses) in the Consolidated statements of income.

(b) Reclassifications of pre-tax realized gains/(losses) on translation adjustments and related hedges are reported in other income/expense in the Consolidated statements of income. During the year ended December 31, 2019, the Bank reclassified net pre-tax gains of $6 million to other income. This amount, which related to the liquidation of certain legal entities, is comprised of $4 million related to net investment hedge gains and $2 million related to cumulative translation adjustments. During the year ended December 31, 2018, the Bank reclassified a net pre-tax loss of $174 million to other expense related to the liquidation of certain legal entities, $23 million related to net investment hedge losses and $151 million related to cumulative translation adjustments. During the year ended December 31, 2017, the amount of such reclassifications were not material.

(c) Represents changes in fair value of cross-currency swaps attributable to changes in cross-currency basis spreads, which are excluded from the assessment of hedge effectiveness and recorded in other comprehensive income. The initial cost of cross-currency basis spreads is recognized in earnings as part of the accrual of interest on the cross-currency swap.

(d) The pre-tax amounts are primarily recorded in noninterest revenue, net interest income and compensation expense in the Consolidated statements of income.

(e) The pre-tax amount is reported in other expense in the Consolidated statements of income.

Note 23 – Income taxes

The results of operations of the Bank are included in the consolidated federal, New York State, New York City and other state income tax returns filed by JPMorgan Chase. Pursuant to a tax sharing agreement, JPMorgan Chase allocates to the Bank its share of the consolidated income tax expense or benefit based upon statutory rates applied to the Bank's earnings as if it were filing separate income tax returns. Furthermore, JPMorgan Chase will reimburse the Bank for losses irrespective of whether the Bank would utilize losses on a separate return basis. The Bank uses the separate return adjusted for benefits-for-loss allocation methodology to provide income taxes on all transactions recorded in the Consolidated Financial Statements. Valuation allowances are established when necessary to reduce deferred tax assets to an amount that in the opinion of management, is more likely than not to be realized. State and local income taxes are provided on the Bank's taxable income at the effective income tax rate applicable to the consolidated JPMorgan Chase entity.

The tax sharing arrangement between JPMorgan Chase and the Bank allows for intercompany payments to or from JPMorgan Chase for outstanding current tax assets or liabilities.

Due to the inherent complexities arising from the nature of the Bank's businesses, and from conducting business and being taxed in a substantial number of jurisdictions, significant judgments and estimates are required to be made. Agreement of tax liabilities between the Bank and the many tax jurisdictions in which the Bank files tax returns may not be finalized for several years. Thus, the Bank's final tax-related assets and liabilities may ultimately be different from those currently reported.

Effective tax rate and expense

The following table presents a reconciliation of the applicable statutory U.S. federal income tax rate to the effective tax rate.

Effective tax rate

Year ended December 31,	2019	2018	2017
Statutory U.S. federal tax rate	**21.0%**	21.0%	35.0%
Increase/(decrease) in tax rate resulting from:			
U.S. state and local income taxes, net of U.S. federal income tax benefit	**3.2**	4.0	2.0
Tax-exempt income	**(1.1)**	(1.2)	(2.8)
Non-U.S. earnings	**1.7**	0.7	(2.0) [(a)]
Business tax credits	**(1.2)**	(1.4)	(2.1)
Tax audit resolutions	**(2.5)**	–	(0.4)
Impact of the TCJA	**–**	(1.2)	9.2
Other, net	**0.1**	0.6	–
Effective tax rate	**21.2%**	22.5%	38.9%

(a) Predominantly includes earnings of U.K. subsidiaries that were deemed to be reinvested indefinitely through December 31, 2017.

Impact of the TCJA

2018

The Bank's effective tax rate decreased in 2018 due to the TCJA, including the reduction in the U.S. federal statutory income tax rate as well as a $443 million net tax benefit recorded in 2018 resulting from changes in the estimates related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings. The change in estimate was recorded under SEC Staff Accounting Bulletin No. 118 ("SAB 118") and the accounting under SAB 118 is complete.

2017

The Bank's effective tax rate increased in 2017 driven by a $2.9 billion income tax expense representing the estimated impact of the enactment of the TCJA. The $2.9 billion tax expense was predominantly driven by a deemed repatriation of the Bank's unremitted non-U.S. earnings and adjustments to the value of certain tax-oriented investments partially offset by a benefit from the revaluation of the Bank's net deferred tax liability.

The deemed repatriation of the Bank's unremitted non-U.S. earnings is based on the post-1986 earnings and profits of each controlled foreign corporation. The calculation resulted in an estimated income tax expense of $3.9 billion. Furthermore, accounting for income taxes requires the remeasurement of certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future. The Bank remeasured its deferred tax asset and liability balances in December of 2017 to the new statutory U.S. federal income tax rate of 21% as well as any federal benefit associated with state and local deferred income taxes. The remeasurement resulted in an estimated income tax benefit of $1.4 billion.

Adjustments were also recorded in 2017 to income tax expense for certain tax-oriented investments. These adjustments were due to changes to affordable housing proportional amortization resulting from the reduction of the federal income tax rate under the TCJA. SAB 118 did not apply to these adjustments.

The following table reflects the components of income tax expense/(benefit) included in the Consolidated statements of income.

Income tax expense/(benefit)

Year ended December 31, (in millions)	2019	2018	2017
Current income tax expense/(benefit)			
U.S. federal	**$ 4,121**	$ 3,481	$ 9,611
Non-U.S.	**1,844**	1,785	2,151
U.S. state and local	**1,434**	1,559	818
Total current income tax expense/ (benefit)	**7,399**	6,825	12,580
Deferred income tax expense/(benefit)			
U.S. federal	**789**	1,316	32
Non-U.S.	**14**	(102)	(146)
U.S. state and local	**218**	386	62
Total deferred income tax expense/ (benefit)	**1,021**	1,600	(52)
Total income tax expense	**$ 8,420**	$ 8,425	$ 12,528

Total income tax expense includes $1.1 billion, $11 million and $199 million of tax benefits recorded in 2019, 2018 and 2017, respectively, as a result of tax audit resolutions.

Tax effect of items recorded in Stockholder's equity
The preceding table does not reflect the tax effect of certain items that are recorded each period directly in stockholder's equity. The tax effect of all items recorded directly to stockholder's equity resulted in a decrease of $1.1 billion in 2019 and an increase of $902 million in 2018, and a decrease of $785 million in 2017.

Results from Non-U.S. earnings
The following table presents the U.S. and non-U.S. components of income before income tax expense.

Year ended December 31, (in millions)	2019	2018	2017
U.S.	**$ 32,766**	$ 30,380	$ 24,800
Non-U.S.[(a)]	**6,993**	6,998	7,368
Income before income tax expense	**$ 39,759**	$ 37,378	$ 32,168

(a) For purposes of this table, non-U.S. income is defined as income generated from operations located outside the U.S.

Prior to December 31, 2017, U.S. federal income taxes had not been provided on the undistributed earnings of certain non-U.S. subsidiaries, to the extent that such earnings had been reinvested abroad for an indefinite period of time. The Bank is no longer maintaining the indefinite reinvestment assertion on the undistributed earnings of those non-U.S. subsidiaries in light of the enactment of the TCJA. The U.S. federal and state and local income taxes associated with the undistributed and previously untaxed earnings of those non-U.S. subsidiaries was included in the deemed repatriation charge recorded as of December 31, 2017. The Bank will recognize any taxes it may incur on global intangible low tax income as income tax expense in the period in which the tax is incurred.

Affordable housing tax credits
The Bank recognized $1.5 billion and $1.5 billion and $1.7 billion of tax credits and other tax benefits associated with investments in affordable housing projects within income tax expense for the years 2019, 2018 and 2017, respectively. The amount of amortization of such investments reported in income tax expense was $1.1 billion, $1.2 billion and $1.6 billion, respectively. The carrying value of these investments, which are reported in other assets on the Bank's Consolidated balance sheets, was $8.6 billion and $7.8 billion at December 31, 2019 and 2018, respectively. The amount of commitments related to these investments, which are reported in accounts payable and other liabilities on the Bank's Consolidated balance sheets, was $2.8 billion and $2.3 billion at December 31, 2019 and 2018, respectively.

Deferred taxes
Deferred income tax expense/(benefit) results from differences between assets and liabilities measured for financial reporting purposes versus income tax return purposes. Deferred tax assets are recognized if, in management's judgment, their realizability is determined to be more likely than not. If a deferred tax asset is determined to be unrealizable, a valuation allowance is established. The significant components of deferred tax assets and liabilities are reflected in the following table.

December 31, (in millions)	2019	2018
Deferred tax assets		
Allowance for loan losses	$ 3,390	$ 3,422
Employee benefits	–	98
Accrued expenses and other	2,223	2,238
Non-U.S. operations	766	528
Tax attribute carryforwards	308	52
Gross deferred tax assets	6,687	6,338
Valuation allowance	(330)	(47)
Deferred tax assets, net of valuation allowance	$ 6,357	$ 6,291
Deferred tax liabilities		
Depreciation and amortization	$ 1,877	$ 1,589
Mortgage servicing rights, net of hedges	2,354	2,586
Leasing transactions	5,543	4,615
Other, net	3,013	1,966
Gross deferred tax liabilities	12,787	10,756
Net deferred tax (liabilities)/assets	$ (6,430)	$ (4,465)

The Bank has recorded deferred tax assets of $308 million at December 31, 2019, in connection with U.S. federal and non-U.S. net operating loss ("NOL") carryforwards and foreign tax credit ("FTC") carryforwards. At December 31, 2019, total U.S. federal NOL carryforwards were approximately $129 million and non-U.S. NOL carryforwards were approximately $61 million, and FTC carryforwards were $257 million. If not utilized, a portion of the the U.S. federal NOL carryforwards will expire between 2030 and 2036 whereas others have an unlimited carryforward period. Similarly, certain non-U.S. NOL carryforwards will expire between 2029 and 2037 whereas others have an unlimited carryforward period. The FTC carryforwards will expire in 2029.

The valuation allowance at December 31, 2019, was due to FTC carryforwards and certain non-U.S. deferred tax assets, including NOL carryforwards.

Unrecognized tax benefits

At December 31, 2019, 2018 and 2017, the Bank's unrecognized tax benefits, excluding related interest expense and penalties, were $2.8 billion, $3.6 billion and $3.6 billion, respectively, of which $1.9 billion,$2.9 billion and $2.7 billion, respectively, if recognized, would reduce the annual effective tax rate. Included in the amount of unrecognized tax benefits are certain items that would not affect the effective tax rate if they were recognized in the Consolidated statements of income. These unrecognized items include the tax effect of certain temporary differences, the portion of gross state and local unrecognized tax benefits that would be offset by the benefit from associated U.S. federal income tax deductions, and the portion of gross non-U.S. unrecognized tax benefits that would have offsets in other jurisdictions. JPMorgan Chase is presently under audit by a number of taxing authorities, most notably by the Internal Revenue Service as summarized in the Tax examination status table below.

As the Bank is presently under audit by a number of taxing authorities, it is reasonably possible that over the next 12 months the resolution of these examinations may increase or decrease the gross balance of unrecognized tax benefits by as much as $0.5 billion. Upon settlement of an audit, the change in the unrecognized tax benefit would result from payment or income statement recognition.

The following table presents a reconciliation of the beginning and ending amount of unrecognized tax benefits.

Year ended December 31, (in millions)	2019	2018	2017
Balance at January 1,	$ 3,645	$ 3,562	$ 2,736
Increases based on tax positions related to the current period	541	659	865
Increases based on tax positions related to prior periods	77	564	494
Decreases based on tax positions related to prior periods	(426)	(880)	(206)
Decreases related to cash settlements with taxing authorities	(1,076)	(260)	(327)
Balance at December 31,	$ 2,761	$ 3,645	$ 3,562

After-tax interest expense/(benefit) and penalties related to income tax liabilities recognized in income tax expense were $(100) million, $148 million and $83 million in 2019, 2018 and 2017, respectively.

At December 31, 2019 and 2018, in addition to the liability for unrecognized tax benefits, the Bank had accrued $539 million and $668 million, respectively, for income tax-related interest and penalties.

Tax examination status

The Bank is continually under examination by the Internal Revenue Service, by taxing authorities throughout the world, and by many state and local jurisdictions throughout the U.S. The following table summarizes the status of significant income tax examinations of the Bank and its consolidated subsidiaries as of December 31, 2019.

	Periods under examination	Status
JPMorgan Chase - U.S.	2011 - 2013	Field Examination completed; JPMorgan Chase intends to file amended returns
JPMorgan Chase - U.S.	2014 - 2016	Field Examination
JPMorgan Chase - New York State	2012 - 2014	Field Examination
JPMorgan Chase - New York City	2012 - 2014	Field Examination
JPMorgan Chase - California	2011 - 2012	Field Examination
JPMorgan Chase - U.K.	2006 - 2017	Field examination of certain select entities

Note 24 – Restricted cash, other restricted assets and intercompany funds transfers

Restricted cash and other restricted assets

Certain of the Bank's cash and other assets are restricted as to withdrawal or usage. These restrictions are imposed by various regulatory authorities based on the particular activities of the Bank.

The business of the Bank is subject to examination and regulation by the OCC. The Bank is a member of the U.S. Federal Reserve System, and its deposits in the U.S. are insured by the FDIC, subject to applicable limits.

The Federal Reserve requires depository institutions to maintain cash reserves with a Federal Reserve Bank. The average required amount of reserve balances is deposited by the Bank. In addition, the Bank is required to maintain cash reserves at certain non-US central banks.

The Bank is also subject to rules and regulations established by other U.S. and non U.S. regulators. As part of its compliance with the respective regulatory requirements, the Bank's broker-dealer J.P. Morgan Securities plc in the U.K. is subject to certain restrictions on cash and other assets.

The following table presents the components of the Bank's restricted cash:

December 31, (in billions)		2019		2018
Cash reserves – Federal Reserve Banks	$	**26.6**	$	22.1
Segregated for the benefit of securities and cleared derivative customers		**7.6**		7.1
Cash reserves at non-U.S. central banks and held for other general purposes		**3.9**		4.1
Total restricted cash[(a)]	**$**	**38.1**	$	33.3

(a) Comprises $36.8 billion and $32.1 billion in deposits with banks, and $1.3 billion and $1.2 billion in cash and due from banks on the Consolidated balance sheets as of December 31, 2019 and 2018, respectively.

Also, as of December 31, 2019 and 2018, the Bank had cash pledged with clearing organizations for the benefit of customers of $4.4 billion and $4.8 billion, respectively.

Intercompany funds transfers

Restrictions imposed by U.S. federal law prohibit JPMorgan Chase & Co. and certain of its affiliates from borrowing from the Bank and other banking subsidiaries unless the loans are secured in specified amounts. Such secured loans provided by the Bank to any particular affiliate, together with certain other transactions with such affiliate (collectively referred to as "covered transactions"), are generally limited to 10% of the Bank's total capital, as determined by the risk-based capital guidelines; the aggregate amount of covered transactions between the Bank and all affiliates is limited to 20% of the Bank's total capital.

In addition to dividend restrictions set forth in statutes and regulations, the OCC, and under certain circumstances the FDIC, have authority under the Financial Institutions Supervisory Act to prohibit or to limit the payment of dividends by the banking organizations they supervise, including the Bank if, in the banking regulator's opinion, payment of a dividend would constitute an unsafe or unsound practice in light of the financial condition of the banking organization.

At January 1, 2020, the Bank could pay, in the aggregate, approximately $9 billion in dividends to JPMorgan Chase without the prior approval of its relevant banking regulators. The capacity to pay dividends in 2020 will be supplemented by the Bank's earnings during the year.

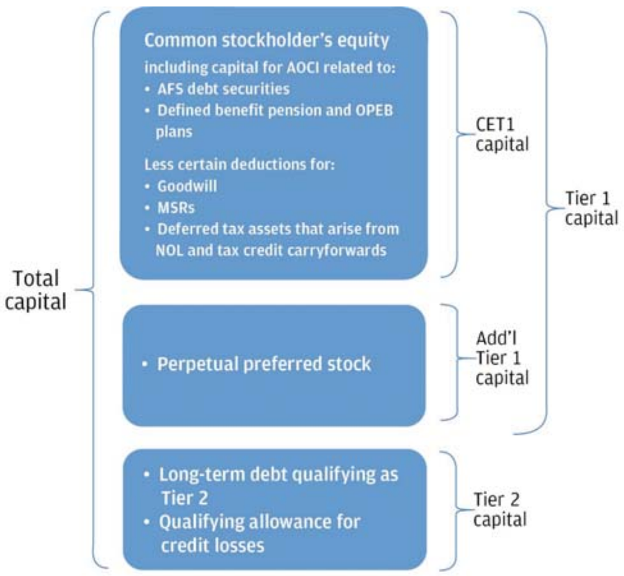
Note 25 – Regulatory capital

The Bank's banking regulator, the OCC, establishes capital requirements, including well-capitalized standards for national banks.

Basel III overview

The capital rules under Basel III establish minimum capital ratios and overall capital adequacy standards for banks, including JPMorgan Chase Bank, N.A. Two comprehensive approaches are prescribed for calculating risk-weighted assets ("RWA"): a standardized approach ("Basel III Standardized"), and an advanced approach ("Basel III Advanced"). Effective January 1, 2019, the capital adequacy of the Bank is evaluated against the fully phased-in measures under Basel III that represents the lower of the Standardized or Advanced approaches. During 2018, the required capital measures were subject to the transitional rules and as of December 31, 2018 were the same on a fully phased-in and on a transitional basis.

The three components of regulatory capital under the Basel III rules are as illustrated below:



Risk-weighted assets

Basel III establishes capital requirements for calculating credit risk RWA and market risk RWA, and in the case of Basel III Advanced, operational risk RWA. Key differences in the calculation of credit risk RWA between the Standardized and Advanced approaches are that for Basel III Advanced, credit risk RWA is based on risk-sensitive approaches which largely rely on the use of internal credit models and parameters, whereas for Basel III Standardized, credit risk RWA is generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. Market risk RWA is calculated on a generally consistent basis between Basel III Standardized and Basel III Advanced. In addition to the RWA calculated under these approaches, the Bank may supplement such amounts to incorporate management judgment and feedback from its bank regulators.

Supplementary leverage ratio ("SLR")

Basel III also includes a requirement for Advanced Approach banking organizations to calculate the SLR. The SLR is defined as Tier 1 capital under Basel III divided by the Bank's total leverage exposure. Total leverage exposure is calculated by taking the Bank's total average on-balance sheet assets, less amounts permitted to be deducted for Tier 1 capital, and adding certain off-balance sheet exposures, such as undrawn commitments and derivatives potential future exposure.

Risk-based capital regulatory minimums

The Bank is subject to Basel III capital rules which include minimum capital ratio requirements that were subject to phase-in periods ("transitional period") through the end of 2018. While the required capital remained subject to the transitional rules during 2018, the Bank's capital ratios as of December 31, 2018 were equivalent whether calculated on a transitional or fully phased-in basis.

The Bank is required to hold additional amounts of capital to serve as a "capital conservation buffer". The capital conservation buffer is intended to be used to absorb losses in times of financial or economic stress. The capital conservation buffer was subject to a phase-in period that began January 1, 2016 and continued through the end of 2018. Effective January 1, 2019, the Bank is required to hold a 2.5% capital conservation buffer.

As an expansion of the capital conservation buffer, the Bank is also required to hold additional levels of capital in the form of a countercyclical capital buffer. The Federal Reserve's framework for setting the countercyclical capital buffer takes into account the macro financial environment in which large, internationally active banks function. As of December 31, 2019, the U.S. countercyclical capital buffer remained at 0%. The Federal Reserve will continue to review the buffer at least annually. The buffer can be increased if the Federal Reserve, FDIC and OCC determine that systemic risks are meaningfully above normal and can be calibrated up to an additional 2.5% of RWA subject to a 12-month implementation period.

Failure to maintain regulatory capital equal to or in excess of the risk-based regulatory capital minimum plus the capital conservation buffer and any countercyclical buffer may result in limitations to the amount of capital that the Bank may distribute.

Under the risk-based capital and leverage-based guidelines of the OCC, the Bank is required to maintain minimum ratios for CET1, Tier 1, Total, Tier 1 leverage and the SLR. Failure to meet these minimum requirements could cause the OCC to take action.

The following table presents the minimum and well-capitalized ratios to which the Bank was subject as of December 31, 2019.

	Minimum capital ratios[(a)(b)(c)]	Well-capitalized ratios[(d)]
Capital ratios		
CET1	7.0%	6.5%
Tier 1	8.5	8.0
Total	10.5	10.0
Tier 1 leverage	4.0	5.0
SLR	6.0	6.0

Note: The table above is as defined by the regulations issued by the OCC and FDIC and to which the Bank is subject.

(a) Represents requirements for the Bank. The CET1 minimum capital ratio includes a capital conservation buffer of 2.5%.
(b) For the period ended December 31, 2018, the CET1, Tier 1, Total and Tier 1 leverage minimum capital ratios applicable to the Bank were 6.375%, 7.875%, 9.875% and 4.0%, respectively.
(c) Represents minimum SLR requirement of 3.0%, as well as, supplementary leverage buffer of 3.0% for the Bank.
(d) Represents requirements for the Bank pursuant to regulations issued under the FDIC Improvement Act.

The following tables present the risk-based and leverage-based capital metrics for the Bank under both the Basel III Standardized and Basel III Advanced Approaches. As of December 31, 2019 and 2018, the Bank was well-capitalized and met all capital requirements to which it was subject.

	Basel III Standardized		Basel III Advanced	
	Fully Phased-in	**Transitional**	**Fully Phased-in**	**Transitional**
(in millions, except ratios)	**Dec 31, 2019**	Dec 31, 2018	**Dec 31, 2019**	Dec 31, 2018
Regulatory capital				
CET1 capital	**$ 206,848**	$ 211,671	**$ 206,848**	$ 211,671
Tier 1 capital	**206,851**	211,671	**206,851**	211,671
Total capital	**224,390**	229,952	**214,091**	220,025
Assets				
Risk-weighted	**1,457,689**	1,446,529	**1,269,991**	1,283,146
Adjusted average[(a)]	**2,353,432**	2,250,480	**2,353,432**	2,250,480
Capital ratios[(b)]				
CET1	**14.2%**	14.6%	**16.3%**	16.5%
Tier 1	**14.2**	14.6	**16.3**	16.5
Total	**15.4**	15.9	**16.9**	17.1
Tier 1 leverage[(c)]	**8.8**	9.4	**8.8**	9.4

(a) Adjusted average assets, for purposes of calculating the Tier 1 leverage ratio, includes total quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill and other intangible assets.
(b) For each of the risk-based capital ratios, the capital adequacy of the Bank is evaluated against the lower of the two ratios as calculated under Basel III approaches (Standardized or Advanced).
(c) The Tier 1 leverage ratio is not a risk-based measure of capital.

	December 31, 2019	December 31, 2018
(in millions, except ratios)	**Basel III Advanced Fully Phased-in**	**Basel III Advanced Fully Phased-in**
Total leverage exposure	**$ 3,044,509**	$ 2,915,541
SLR	**6.8%**	7.3%

Note 26 – Off–balance sheet lending-related financial instruments, guarantees, and other commitments

The Bank provides lending-related financial instruments (e.g., commitments and guarantees) to address the financing needs of its customers and clients. The contractual amount of these financial instruments represents the maximum possible credit risk to the Bank should the customer or client draw upon the commitment or the Bank be required to fulfill its obligation under the guarantee, and should the customer or client subsequently fail to perform according to the terms of the contract. Most of these commitments and guarantees are refinanced, extended, cancelled, or expire without being drawn or a default occurring. As a result, the total contractual amount of these instruments is not, in the Bank's view, representative of its expected future credit exposure or funding requirements.

To provide for probable credit losses inherent in wholesale and certain consumer lending-commitments, an allowance for credit losses on lending-related commitments is maintained. Refer to Note 14 for further information regarding the allowance for credit losses on lending-related commitments. The following table summarizes the contractual amounts and carrying values of off-balance sheet lending-related financial instruments, guarantees and other commitments at December 31, 2019 and 2018. The amounts in the table below for credit card and home equity lending-related commitments represent the total available credit for these products. The Bank has not experienced, and does not anticipate, that all available lines of credit for these products will be utilized at the same time. The Bank can reduce or cancel credit card lines of credit by providing the borrower notice or, in some cases as permitted by law, without notice. In addition, the Bank typically closes credit card lines when the borrower is 60 days or more past due. The Bank may reduce or close HELOCs when there are significant decreases in the value of the underlying property, or when there has been a demonstrable decline in the creditworthiness of the borrower.

Off-balance sheet lending-related financial instruments, guarantees and other commitments

By remaining maturity at December 31, (in millions)	Contractual amount 2019 Expires in 1 year or less	Expires after 1 year through 3 years	Expires after 3 years through 5 years	Expires after 5 years	Total	2018 Total	Carrying value[h] 2019	2018
Lending-related								
Consumer, excluding credit card:								
Home equity	$ 680	$ 1,187	$ 2,548	$ 16,704	$ 21,119	$ 20,901	$ 12	$ 12
Residential mortgage[a]	9,086	–	–	12	9,098	5,481	–	–
Auto	8,296	600	197	195	9,288	8,011	2	2
Consumer & business banking	9,994	646	105	1,162	11,907	11,673	19	19
Total consumer, excluding credit card	28,056	2,433	2,850	18,073	51,412	46,066	33	33
Credit card	650,720	–	–	–	650,720	605,379	–	–
Total consumer[b]	678,776	2,433	2,850	18,073	702,132	651,445	33	33
Wholesale:								
Other unfunded commitments to extend credit[c]	57,383	129,413	168,136	10,791	365,723	350,401	937	851
Standby letters of credit and other financial guarantees[c][d]	15,919	11,126	5,117	1,745	33,907	33,513	618	521
Other letters of credit[c]	2,734	183	40	–	2,957	2,825	4	3
Total wholesale[b]	76,036	140,722	173,293	12,536	402,587	386,739	1,559	1,375
Total lending-related	$ 754,812	$ 143,155	$ 176,143	$ 30,609	$ 1,104,719	$ 1,038,184	$ 1,592	$ 1,408
Other guarantees and commitments								
Securities lending indemnification agreements and guarantees[e]	$ 222,601	$ –	$ –	$ –	$ 222,601	$ 193,065	$ –	$ –
Derivatives qualifying as guarantees	1,924	221	11,299	40,242	53,686	55,641	164	399
Unsettled resale and securities borrowed agreements	74,394	400	–	–	74,794	87,700	–	–
Unsettled repurchase and securities loaned agreements	57,062	561	–	–	57,623	44,422	–	–
Loan sale and securitization-related indemnifications:								
Mortgage repurchase liability	NA	NA	NA	NA	NA	NA	59	89
Loans sold with recourse	NA	NA	NA	NA	647	671	11	7
Exchange & clearing house guarantees and commitments[f]	101,157	–	–	–	101,157	38,651	–	–
Other guarantees and commitments[g]	1,742	567	199	2,325	4,833	7,045	(75)	(78)

(a) Includes certain commitments to purchase loans from correspondents.
(b) Predominantly all consumer and wholesale lending-related commitments are in the U.S.
(c) At December 31, 2019 and 2018, reflected the contractual amount net of risk participations totaling $76 million and $282 million, respectively, for other unfunded commitments to extend credit; $9.8 billion and $10.4 billion, respectively, for standby letters of credit and other financial guarantees; and $546 million and $385 million, respectively, for other letters of credit. In regulatory filings with the Federal Reserve these commitments are shown gross of risk participations.
(d) At December 31, 2019 and 2018, included commitments to affiliates of zero and $15 million, respectively.
(e) At December 31, 2019 and 2018, collateral held by the Bank in support of securities lending indemnification agreements was $234.4 billion and $202.7 billion, respectively. Securities lending collateral primarily consists of cash, G7 government securities, and securities issued by U.S. GSEs and government agencies.
(f) At December 31, 2019 and 2018, includes guarantees to the Fixed Income Clearing Corporation under the sponsored member repo program and commitments and guarantees associated with the Bank's membership in certain clearing houses.
(g) At December 31, 2019 and 2018, included unfunded equity investment commitments of $48 million and $15 million, respectively. In addition, at both December 31, 2019 and 2018, included letters of credit hedged by derivative transactions and managed on a market risk basis of $2.3 billion and $3.2 billion.
(h) For lending-related products, the carrying value represents the allowance for lending-related commitments and the guarantee liability; for derivative-related products, the carrying value represents the fair value.

Other unfunded commitments to extend credit

Other unfunded commitments to extend credit generally consist of commitments for working capital and general corporate purposes, extensions of credit to support commercial paper facilities and bond financings in the event that those obligations cannot be remarketed to new investors, as well as committed liquidity facilities to clearing organizations. The Bank also issues commitments under multipurpose facilities which could be drawn upon in several forms, including the issuance of a standby letter of credit.

Guarantees

U.S. GAAP requires that a guarantor recognize, at the inception of a guarantee, a liability in an amount equal to the fair value of the obligation undertaken in issuing the guarantee. U.S. GAAP defines a guarantee as a contract that contingently requires the guarantor to pay a guaranteed party based upon: (a) changes in an underlying asset, liability or equity security of the guaranteed party; or (b) a third party's failure to perform under a specified agreement. The Bank considers the following off-balance sheet arrangements to be guarantees under U.S. GAAP: standby letters of credit and other financial guarantees, securities lending indemnifications, certain indemnification agreements included within third-party contractual arrangements, certain derivative contracts and the guarantees under the sponsored member repo program.

As required by U.S. GAAP, the Bank initially records guarantees at the inception date fair value of the obligation assumed (e.g., the amount of consideration received or the net present value of the premium receivable). For certain types of guarantees, The Bank records this fair value amount in other liabilities with an offsetting entry recorded in cash (for premiums received), or other assets (for premiums receivable). Any premium receivable recorded in other assets is reduced as cash is received under the contract, and the fair value of the liability recorded at inception is amortized into income as lending and deposit-related fees over the life of the guarantee contract. For indemnifications provided in sales agreements, a portion of the sale proceeds is allocated to the guarantee, which adjusts the gain or loss that would otherwise result from the transaction. For these indemnifications, the initial liability is amortized to income as the Bank's risk is reduced (i.e., over time or when the indemnification expires). Any contingent liability that exists as a result of issuing the guarantee or indemnification is recognized when it becomes probable and reasonably estimable. The contingent portion of the liability is not recognized if the estimated amount is less than the carrying amount of the liability recognized at inception (adjusted for any amortization). The contractual amount and carrying value of guarantees and indemnifications are included in the table on page 119. For additional information on the guarantees, see below.

Standby letters of credit and other financial guarantees

Standby letters of credit and other financial guarantees are conditional lending commitments issued by the Bank to guarantee the performance of a client or customer to a third party under certain arrangements, such as commercial paper facilities, bond financings, acquisition financings, trade and similar transactions.

The following table summarizes the contractual amount and carrying value of standby letters of credit and other financial guarantees and other letters of credit arrangements as of December 31, 2019 and 2018.

Standby letters of credit, other financial guarantees and other letters of credit

December 31, (in millions)	2019 Standby letters of credit and other financial guarantees	2019 Other letters of credit	2018 Standby letters of credit and other financial guarantees	2018 Other letters of credit
Investment-grade[(a)]	**$ 26,646**	**$ 2,136**	$ 26,420	$ 2,079
Noninvestment-grade[(a)]	**7,261**	**821**	7,093	746
Total contractual amount	**$ 33,907**	**$ 2,957**	$ 33,513	$ 2,825
Allowance for lending-related commitments	**$ 216**	**$ 4**	$ 167	$ 3
Guarantee liability	402	–	354	–
Total carrying value	**$ 618**	**$ 4**	$ 521	$ 3
Commitments with collateral	**$ 17,582**	**$ 726**	$ 17,400	$ 583

(a) The ratings scale is based on the Bank's internal risk ratings. Refer to Note 13 for further information on internal risk ratings.

Securities lending indemnifications

Through the Bank's securities lending program, counterparties' securities, via custodial and non-custodial arrangements, may be lent to third parties. As part of this program, the Bank provides an indemnification in the lending agreements which protects the lender against the failure of the borrower to return the lent securities. To minimize its liability under these indemnification agreements, the Bank obtains cash or other highly liquid collateral with a market value exceeding 100% of the value of the securities on loan from the borrower. Collateral is marked to market daily to help assure that collateralization is adequate. Additional collateral is called from the borrower if a shortfall exists, or collateral may be released to the borrower in the event of overcollateralization. If a borrower defaults, the Bank would use the collateral held to purchase replacement securities in the market or to credit the lending client or counterparty with the cash equivalent thereof.

The cash collateral held by the Bank may be invested on behalf of the client in indemnified resale agreements, whereby the Bank indemnifies the client against the loss of principal invested. To minimize its liability under these agreements, the Bank obtains collateral with a market value exceeding 100% of the principal invested.

Derivatives qualifying as guarantees

The Bank transacts in certain derivative contracts that have the characteristics of a guarantee under U.S. GAAP. These contracts include written put options that require the Bank to purchase assets upon exercise by the option holder at a specified price by a specified date in the future. The Bank may enter into written put option contracts in order to meet client needs, or for other trading purposes. The terms of written put options are typically five years or less.

Derivatives deemed to be guarantees also includes stable value contracts, commonly referred to as "stable value products", that require the Bank to make a payment of the difference between the market value and the book value of a counterparty's reference portfolio of assets in the event that market value is less than book value and certain other conditions have been met. Stable value products are transacted in order to allow investors to realize investment returns with less volatility than an unprotected portfolio. These contracts are typically longer-term or may have no stated maturity, but allow the Bank to elect to terminate the contract under certain conditions.

The notional value of derivatives guarantees generally represents the Bank's maximum exposure. However, exposure to certain stable value products is contractually limited to a substantially lower percentage of the notional amount.

The fair value of derivative guarantees reflects the probability, in the Bank's view, of whether the Bank will be required to perform under the contract. The Bank reduces exposures to these contracts by entering into offsetting transactions, or by entering into contracts that hedge the market risk related to the derivative guarantees.

The following table summarizes the derivatives qualifying as guarantees as of December 31, 2019 and 2018.

(in millions)	**December 31, 2019**	December 31, 2018
Notional amounts		
Derivative guarantees	**$ 53,686**	$ 55,641
Stable value contracts with contractually limited exposure	**28,877**	28,637
Maximum exposure of stable value contracts with contractually limited exposure	**2,967**	2,963
Fair value		
Derivative payables	**164**	399

In addition to derivative contracts that meet the characteristics of a guarantee, the Bank is both a purchaser and seller of credit protection in the credit derivatives market. Refer to Note 6 for a further discussion of credit derivatives.

Unsettled securities financing agreements

In the normal course of business, the Bank enters into resale and securities borrowed agreements. At settlement, these commitments result in the Bank advancing cash to and receiving securities collateral from the counterparty. The Bank also enters into repurchase and securities loaned agreements. At settlement, these commitments result in the Bank receiving cash from and providing securities collateral to the counterparty. Such agreements settle at a future date. These agreements generally do not meet the definition of a derivative, and therefore, are not recorded on the Consolidated balance sheets until settlement date. These agreements predominantly have regular-way settlement terms. Refer to Note 12 for a further discussion of securities financing agreements.

Loan sales- and securitization-related indemnifications

Mortgage repurchase liability

In connection with the Bank's mortgage loan sale and securitization activities with U.S. GSEs the Bank has made representations and warranties that the loans sold meet certain requirements, and that may require the Bank to repurchase mortgage loans and/or indemnify the loan purchaser if such representations and warranties are breached by the Bank. Further, although the Bank's securitizations are predominantly nonrecourse, the Bank does provide recourse servicing in certain limited cases where it agrees to share credit risk with the owner of the mortgage loans. To the extent that repurchase demands that are received relate to loans that the Bank purchased from third parties that remain viable, the Bank typically will have the right to seek a recovery of related repurchase losses from the third party. Generally, the maximum amount of future payments the Bank would be required to make for breaches of these representations and warranties would be equal to the unpaid principal balance of such loans that are deemed to have defects that were sold to purchasers (including securitization-related SPEs) plus, in certain circumstances, accrued interest on such loans and certain expenses.

Private label securitizations
The liability related to repurchase demands associated with private label securitizations is separately evaluated by the Bank in establishing its litigation reserves.

Refer to Note 28 for additional information regarding litigation.

Loans sold with recourse
The Bank provides servicing for mortgages and certain commercial lending products on both a recourse and nonrecourse basis. In nonrecourse servicing, the principal credit risk to the Bank is the cost of temporary servicing advances of funds (i.e., normal servicing advances). In recourse servicing, the servicer agrees to share credit risk with the owner of the mortgage loans, such as Fannie Mae or Freddie Mac or a private investor, insurer or guarantor. Losses on recourse servicing predominantly occur when foreclosure sales proceeds of the property underlying a defaulted loan are less than the sum of the outstanding principal balance, plus accrued interest on the loan and the cost of holding and disposing of the underlying property. The Bank's securitizations are predominantly nonrecourse, thereby effectively transferring the risk of future credit losses to the purchaser of the mortgage-backed securities issued by the trust. At December 31, 2019 and 2018, the unpaid principal balance of loans sold with recourse totaled $647 million and $671 million, respectively. The carrying value of the related liability that the Bank has recorded in accounts payable and other liabilities on the Consolidated balance sheets, which is representative of the Bank's view of the likelihood it will have to perform under its recourse obligations, was $11 million and $7 million at December 31, 2019 and 2018, respectively.

Other off-balance sheet arrangements

Indemnification agreements – general
In connection with issuing securities to investors outside the U.S., the Bank may agree to pay additional amounts to the holders of the securities in the event that, due to a change in tax law, certain types of withholding taxes are imposed on payments on the securities. The terms of the securities may also give the Bank the right to redeem the securities if such additional amounts are payable. The Bank may also enter into indemnification clauses in connection with the licensing of software to clients ("software licensees") or when it sells a business or assets to a third party ("third-party purchasers"), pursuant to which it indemnifies software licensees for claims of liability or damages that may occur subsequent to the licensing of the software, or third-party purchasers for losses they may incur due to actions taken by the Bank prior to the sale of the business or assets. It is difficult to estimate the Bank's maximum exposure under these indemnification arrangements, since this would require an assessment of future changes in tax law and future claims that may be made against the Bank that have not yet occurred. However, based on historical experience, management expects the risk of loss to be remote.

Merchant charge-backs
Under the rules of payment networks, the Bank, in its role as a merchant acquirer, retains a contingent liability for disputed processed credit and debit card transactions that result in a charge-back to the merchant. If a dispute is resolved in the cardholder's favor, the Bank will (through the cardholder's issuing bank) credit or refund the amount to the cardholder and will charge back the transaction to the merchant. If the Bank is unable to collect the amount from the merchant, the Bank will bear the loss for the amount credited or refunded to the cardholder. The Bank mitigates this risk by withholding future settlements, retaining cash reserve accounts or obtaining other collateral. In addition, the Bank recognizes a valuation allowance that covers the payment or performance risk to the Bank related to charge-backs.

For the years ended December 31, 2019, 2018 and 2017, the Bank processed an aggregate volume of $1,511.5 billion, $1,366.1 billion, and $1,191.7 billion, respectively, and the related losses from merchant charge-backs were not material.

Clearing Services – Client Credit Risk
The Bank provides clearing services for clients by entering into securities purchases and sales and derivative contracts with CCPs, including ETDs such as futures and options, as well as OTC-cleared derivative contracts. As a clearing member, the Bank stands behind the performance of its clients, collects cash and securities collateral (margin) as well as any settlement amounts due from or to clients, and remits them to the relevant CCP or client in whole or part. There are two types of margin: variation margin is posted on a daily basis based on the value of clients' derivative contracts and initial margin is posted at inception of a derivative contract, generally on the basis of the potential changes in the variation margin requirement for the contract.

As a clearing member, the Bank is exposed to the risk of nonperformance by its clients, but is not liable to clients for the performance of the CCPs. Where possible, the Bank seeks to mitigate its risk to the client through the collection of appropriate amounts of margin at inception and throughout the life of the transactions. The Bank can also cease providing clearing services if clients do not adhere to their obligations under the clearing agreement. In the event of nonperformance by a client, the Bank would close out the client's positions and access available margin. The CCP would utilize any margin it holds to make itself whole, with any remaining shortfalls required to be paid by the Bank as a clearing member.

The Bank reflects its exposure to nonperformance risk of the client through the recognition of margin receivables from clients and margin payables to CCPs; the clients' underlying securities or derivative contracts are not reflected in the Bank's Consolidated Financial Statements.

It is difficult to estimate the Bank's maximum possible exposure through its role as a clearing member, as this would require an assessment of transactions that clients may execute in the future. However, based upon historical experience, and the credit risk mitigants available to the Bank, management believes it is unlikely that the Bank will have to make any material payments under these arrangements and the risk of loss is expected to be remote.

Refer to Note 6 for information on the derivatives that the Bank executes for its own account and records in its Consolidated Financial Statements.

Exchange & Clearing House Memberships
The Bank is a member of several securities and derivative exchanges and clearing houses, both in the U.S. and other countries, and it provides clearing services to its clients. Membership in some of these organizations requires the Bank to pay a pro rata share of the losses incurred by the organization as a result of the default of another member. Such obligations vary with different organizations. These obligations may be limited to the amount (or a multiple of the amount) of the Bank's contribution to the guarantee fund maintained by a clearing house or exchange as part of the resources available to cover any losses in the event of a member default. Alternatively, these obligations may also include a pro rata share of the residual losses after applying the guarantee fund. Additionally, certain clearing houses require the Bank as a member to pay a pro rata share of losses that may result from the clearing house's investment of guarantee fund contributions and initial margin, unrelated to and independent of the default of another member. Generally a payment would only be required should such losses exceed the resources of the clearing house or exchange that are contractually required to absorb the losses in the first instance. In certain cases, it is difficult to estimate the Bank's maximum possible exposure under these membership agreements, since this would require an assessment of future claims that may be made against the Bank that have not yet occurred. However, based on historical experience, management expects the risk of loss to the Bank to be remote. Where the Bank's maximum possible exposure can be estimated, the amount is disclosed in the table on page 119, in the Exchange & clearing house guarantees and commitments line.

Sponsored member repo program
In 2018 the Bank commenced the sponsored member repo program, wherein the Bank acts as a sponsoring member to clear eligible overnight resale and repurchase agreements through the Government Securities Division of the Fixed Income Clearing Corporation ("FICC") on behalf of clients that become sponsored members under the FICC's rules. The Bank also guarantees to the FICC the prompt and full payment and performance of its sponsored member clients' respective obligations under the FICC's rules. The Bank minimizes its liability under these overnight guarantees by obtaining a security interest in the cash or high-quality securities collateral that the clients place with the clearing house; therefore, the Bank expects the risk of loss to be remote. The Bank's maximum possible exposure, without taking into consideration the associated collateral, is included in the Exchange & clearing house guarantees and commitments line on page 119. Refer to Note 12 for additional information on credit risk mitigation practices on resale agreements and the types of collateral pledged under repurchase agreements.

Guarantees of subsidiaries and affiliates
In the normal course of business, the Bank may provide counterparties with guarantees of certain of the trading and other obligations of its subsidiaries and affiliates on a contract-by-contract basis, as negotiated with the Bank's counterparties. The obligations of the subsidiaries are included on the Bank's Consolidated balance sheets or are reflected as off-balance sheet commitments; therefore, the Bank has not recognized a separate liability for these guarantees. As at December 31, 2019 and 2018, guarantees of obligations of affiliates provided by the Bank were not material. The Bank believes that the occurrence of any event that would trigger payments under these guarantees is remote.

Note 27 – Pledged assets and collateral

Pledged assets

The Bank pledges financial assets that it owns to maintain potential borrowing capacity at discount windows with Federal Reserve banks, various other central banks and FHLBs. Additionally, the Bank pledges assets for other purposes, including to collateralize repurchase and other securities financing agreements, to cover short sales and to collateralize derivative contracts and deposits and borrowings of affiliates. Certain of these pledged assets may be sold or repledged or otherwise used by the secured parties and are parenthetically identified on the Consolidated balance sheets as assets pledged.

The following table presents the Bank's pledged assets.

December 31, (in billions)		2019		2018
Assets that may be sold or repledged or otherwise used by secured parties	**$**	**69.7**	$	63.5
Assets that may not be sold or repledged or otherwise used by secured parties		**37.7**		39.3
Assets pledged at Federal Reserve banks and FHLBs		**478.9**		475.4
Total pledged assets	**$**	**586.3**	$	578.2

Total pledged assets do not include assets of consolidated VIEs; these assets are used to settle the liabilities of those entities. Refer to Note 15 for additional information on assets and liabilities of consolidated VIEs. Refer to Note 12 for additional information on the Bank's securities financing activities. Refer to Note 20 for additional information on the Bank's long-term debt. The significant components of the Bank's pledged assets were as follows.

December 31, (in billions)		2019		2018
Investment securities	**$**	**41.7**	$	65.9
Loans		**460.3**		439.9
Trading assets and other		**84.3**		72.4
Total pledged assets	**$**	**586.3**	$	578.2

Collateral

The Bank accepts financial assets as collateral that it is permitted to sell or repledge, deliver or otherwise use. This collateral is generally obtained under resale and other securities financing agreements, prime brokerage-related held-for-investment customer receivables and derivative contracts. Collateral is generally used under repurchase and other securities financing agreements, to cover short sales, and to collateralize derivative contracts and deposits.

The following table presents the fair value of collateral accepted.

December 31, (in billions)		2019		2018
Collateral permitted to be sold or repledged, delivered, or otherwise used	**$**	**670.7**	$	880.0
Collateral sold, repledged, delivered or otherwise used		**532.3**		714.6

Note 28 - Litigation

Contingencies

As of December 31, 2019, JPMorgan Chase and its subsidiaries, including but not limited to JPMorgan Chase Bank, N.A., are defendants, putative defendants or respondents in numerous legal proceedings, including private, civil litigations and regulatory/government investigations. The litigations range from individual actions involving a single plaintiff to class action lawsuits with potentially millions of class members. Investigations involve both formal and informal proceedings, by both governmental agencies and self-regulatory organizations. These legal proceedings are at varying stages of adjudication, arbitration or investigation, and involve each of JPMorgan Chase's lines of business and several geographies and a wide variety of claims (including common law tort and contract claims and statutory antitrust, securities and consumer protection claims), some of which present novel legal theories.

JPMorgan Chase believes the estimate of the aggregate range of reasonably possible losses, in excess of reserves established, for its legal proceedings is from $0 to approximately $1.3 billion at December 31, 2019. This estimated aggregate range of reasonably possible losses was based upon information available as of that date for those proceedings in which JPMorgan Chase believes that an estimate of reasonably possible loss can be made. For certain matters, JPMorgan Chase does not believe that such an estimate can be made, as of that date. JPMorgan Chase's estimate of the aggregate range of reasonably possible losses involves significant judgment, given:

- the number, variety and varying stages of the proceedings, including the fact that many are in preliminary stages,
- the existence in many such proceedings of multiple defendants, including JPMorgan Chase and JPMorgan Chase Bank, N.A., whose share of liability (if any) has yet to be determined,
- the numerous yet-unresolved issues in many of the proceedings, including issues regarding class certification and the scope of many of the claims, and
- the attendant uncertainty of the various potential outcomes of such proceedings, including where JPMorgan Chase has made assumptions concerning future rulings by the court or other adjudicator, or about the behavior or incentives of adverse parties or regulatory authorities, and those assumptions prove to be incorrect.

In addition, the outcome of a particular proceeding may be a result which JPMorgan Chase did not take into account in its estimate because JPMorgan Chase had deemed the likelihood of that outcome to be remote. Accordingly, JPMorgan Chase's estimate of the aggregate range of reasonably possible losses will change from time to time, and actual losses may vary significantly.

Set forth below are descriptions of JPMorgan Chase's material legal proceedings in which JPMorgan Chase and its subsidiaries (which in certain instances include JPMorgan Chase Bank, N.A.) are involved or have been named as parties.

Federal Republic of Nigeria Litigation. JPMorgan Chase Bank, N.A. operated an escrow and depository account for the Federal Government of Nigeria ("FGN") and two major international oil companies. The account held approximately $1.1 billion in connection with a dispute among the clients over rights to an oil field. Following the settlement of the dispute, JPMorgan Chase Bank, N.A. paid out the monies in the account in 2011 and 2013 in accordance with directions received from its clients. In November 2017, the Federal Republic of Nigeria ("FRN") commenced a claim in the English High Court for approximately $875 million in payments made out of the accounts. The FRN, claiming to be the same entity as the FGN, alleges that the payments were instructed as part of a complex fraud not involving JPMorgan Chase Bank, N.A., but that JPMorgan Chase Bank, N.A. was or should have been on notice that the payments may be fraudulent. JPMorgan Chase Bank, N.A. applied for summary judgment and was unsuccessful. The claim is ongoing and no trial date has been set.

Foreign Exchange Investigations and Litigation. JPMorgan Chase previously reported settlements with certain government authorities relating to its foreign exchange ("FX") sales and trading activities and controls related to those activities. FX-related investigations and inquiries by government authorities, including competition authorities, are ongoing, and JPMorgan Chase is cooperating with and working to resolve those matters. In May 2015, JPMorgan Chase pleaded guilty to a single violation of federal antitrust law. In January 2017, JPMorgan Chase was sentenced, with judgment entered thereafter and a term of probation ending in January 2020. The term of probation has concluded, with JPMorgan Chase remaining in good standing throughout the probation period. The Department of Labor has granted JPMorgan Chase a five-year exemption of disqualification that allows JPMorgan Chase and its affiliates to continue to rely on the Qualified Professional Asset Manager exemption under the Employee Retirement Income Security Act ("ERISA") until January 2023. JPMorgan Chase will need to reapply in due course for a further exemption to cover the remainder of the ten-year disqualification period. In addition, JPMorgan Chase has paid fines totaling approximately $265 million in connection with the settlement of FX-related investigations conducted by the European Commission and the Swiss Competition Commission which were announced in May

2019 and June 2019, respectively. Separately, in February 2017 the South Africa Competition Commission referred its FX investigation of JPMorgan Chase and other banks to the South Africa Competition Tribunal, which is conducting civil proceedings concerning that matter.

In August 2018, the United States District Court for the Southern District of New York granted final approval to JPMorgan Chase's settlement of a consolidated class action brought by U.S.-based plaintiffs, which principally alleged violations of federal antitrust laws based on an alleged conspiracy to manipulate foreign exchange rates and also sought damages on behalf of persons who transacted in FX futures and options on futures. Certain members of the settlement class filed requests to the Court to be excluded from the class, and certain of them filed a complaint against JPMorgan Chase and a number of other foreign exchange dealers in November 2018. A number of these actions remain pending. Further, putative class actions have been filed against JPMorgan Chase and a number of other foreign exchange dealers on behalf of certain consumers who purchased foreign currencies at allegedly inflated rates and purported indirect purchasers of FX instruments; these actions also remain pending in the District Court. In addition, some FX-related individual and putative class actions based on similar alleged underlying conduct have been filed outside the U.S., including in the U.K., Israel and Australia.

*Interchange Litigation. G*roups of merchants and retail associations filed a series of class action complaints alleging that Visa and Mastercard, as well as certain banks, conspired to set the price of credit and debit card interchange fees and enacted related rules in violation of antitrust laws. In 2012, the parties initially settled the cases for a cash payment, a temporary reduction of credit card interchange, and modifications to certain credit card network rules. In 2017, after the approval of that settlement was reversed on appeal, the case was remanded to the District Court for further proceedings consistent with the appellate decision.

The original class action was divided into two separate actions, one seeking primarily monetary relief and the other seeking primarily injunctive relief. In September 2018, the parties to the class action seeking monetary relief finalized an agreement which amends and supersedes the prior settlement agreement. Pursuant to this settlement, the defendants collectively contributed an additional $900 million to the approximately $5.3 billion previously held in escrow from the original settlement. In December 2019, the amended agreement was approved by the District Court. Certain merchants filed notices of appeal of the District Court's approval order. Based on the percentage of merchants that opted out of the amended class settlement, $700 million has been returned to the defendants from the settlement escrow in accordance with the settlement agreement. The class action seeking primarily injunctive relief continues separately.

In addition, certain merchants have filed individual actions raising similar allegations against Visa and Mastercard, as well as against JPMorgan Chase and other banks, and those actions are proceeding.

LIBOR and Other Benchmark Rate Investigations and Litigation. JPMorgan Chase has responded to inquiries from various governmental agencies and entities around the world relating primarily to the British Bankers Association's London Interbank Offered Rate ("LIBOR") for various currencies and the European Banking Federation's Euro Interbank Offered Rate ("EURIBOR"). The Swiss Competition Commission's investigation relating to EURIBOR, to which JPMorgan Chase and other banks are subject, continues. In December 2016, the European Commission issued a decision against JPMorgan Chase and other banks finding an infringement of European antitrust rules relating to EURIBOR. JPMorgan Chase has filed an appeal of that decision with the European General Court, and that appeal is pending.

In addition, JPMorgan Chase has been named as a defendant along with other banks in a series of individual and putative class actions related to benchmarks, including U.S. dollar LIBOR during the period that it was administered by the BBA and, in a separate consolidated putative class action, during the period that it was administered by ICE Benchmark Administration. These actions have been filed, or consolidated for pre-trial purposes, in the United States District Court for the Southern District of New York. In these actions, plaintiffs make varying allegations that in various periods, starting in 2000 or later, defendants either individually or collectively manipulated various benchmark rates by submitting rates that were artificially low or high. Plaintiffs allege that they transacted in loans, derivatives or other financial instruments whose values are affected by changes in these rates and assert a variety of claims including antitrust claims seeking treble damages. These actions are in various stages of litigation.

In actions related to U.S. dollar LIBOR during the period that it was administered by the BBA, the District Court dismissed certain claims, including antitrust claims brought by some plaintiffs whom the District Court found did not have standing to assert such claims, and permitted certain claims to proceed, including antitrust, Commodity Exchange Act, Section 10(b) of the Securities Exchange Act and common law claims. The plaintiffs whose antitrust claims were dismissed for lack of standing have filed an appeal. The District Court granted class certification of antitrust claims related to bonds and interest rate swaps sold directly by the defendants and denied class certification motions filed by other plaintiffs. JPMorgan Chase's settlements of putative class actions related to Swiss franc LIBOR, the Singapore Interbank Offered Rate and the Singapore Swap Offer Rate ("SIBOR"), the Australian Bank Bill Swap Reference Rate, and certain of the putative class actions related to U.S.

dollar LIBOR remain subject to court approval. In the class actions related to SIBOR and Swiss franc LIBOR, the District Court concluded that the Court lacked subject matter jurisdiction, and plaintiffs' appeals of those decisions are pending.

Metals and U.S. Treasuries Investigations and Litigation and Related Inquiries. Various authorities, including the Department of Justice's Criminal Division, are conducting investigations relating to trading practices in the metals markets and related conduct. JPMorgan Chase also is responding to related requests concerning similar trading-practices issues in markets for other financial instruments, such as U.S. Treasuries. JPMorgan Chase continues to cooperate with these investigations and is currently engaged in discussions with various regulators about resolving their respective investigations. There is no assurance that such discussions will result in settlements. Several putative class action complaints have been filed in the United States District Court for the Southern District of New York against JPMorgan Chase and certain former employees, alleging a precious metals futures and options price manipulation scheme in violation of the Commodity Exchange Act. Some of the complaints also allege unjust enrichment and deceptive acts or practices under the General Business Law of the State of New York. The Court consolidated these putative class actions in February 2019. JPMorgan Chase is also a defendant in a consolidated action filed in the United States District Court for the Southern District of New York alleging monopolization of silver futures in violation of the Sherman Act.

Wendel. Since 2012, the French criminal authorities have been investigating a series of transactions entered into by senior managers of Wendel Investissement ("Wendel") during the period from 2004 through 2007 to restructure their shareholdings in Wendel. JPMorgan Chase Bank, N.A., Paris branch provided financing for the transactions to a number of managers of Wendel in 2007. JPMorgan Chase has cooperated with the investigation. The investigating judges issued an *ordonnance de renvoi* in November 2016, referring JPMorgan Chase Bank, N.A. to the French *tribunal correctionnel* for alleged complicity in tax fraud. No date for trial has been set by the court. In January 2018, the Paris Court of Appeal issued a decision cancelling the *mise en examen* of JPMorgan Chase Bank, N.A. The Court of Cassation, France's highest court, ruled in September 2018 that a *mise en examen* is a prerequisite for an *ordonnance de renvoi* and in January 2020 ordered the annulment of the *ordonnance de renvoi* referring JPMorgan Chase Bank, N.A. to the French *tribunal correctionnel*. In addition, a number of the managers have commenced civil proceedings against JPMorgan Chase Bank, N.A. The claims are separate, involve different allegations and are at various stages of proceedings.

* * *

In addition to the various legal proceedings discussed above, JPMorgan Chase and its subsidiaries, including in certain cases, JPMorgan Chase Bank, N.A., are named as defendants or are otherwise involved in a substantial number of other legal proceedings. JPMorgan Chase and JPMorgan Chase Bank, N.A., each believe it has meritorious defenses to the claims asserted against it in its currently outstanding legal proceedings and it intends to defend itself vigorously. Additional legal proceedings may be initiated from time to time in the future.

JPMorgan Chase Bank, N.A. has established reserves for several hundred of its currently outstanding legal proceedings. In accordance with the provisions of U.S. GAAP for contingencies, JPMorgan Chase Bank, N.A. accrues for a litigation-related liability when it is probable that such a liability has been incurred and the amount of the loss can be reasonably estimated. JPMorgan Chase Bank, N.A. evaluates its outstanding legal proceedings each quarter to assess its litigation reserves, and makes adjustments in such reserves, upwards or downward, as appropriate, based on management's best judgment after consultation with counsel. JPMorgan Chase Bank, N.A.'s legal expense/(benefit) was $206 million, $75 million and $(135) million for the years ended December 31, 2019, 2018 and 2017, respectively. Where a particular litigation matter involves one or more subsidiaries or affiliates of JPMorgan Chase, JPMorgan Chase determines the appropriate allocation of legal expense among those subsidiaries or affiliates (including, where applicable, JPMorgan Chase Bank, N.A.). There is no assurance that JPMorgan Chase Bank N.A.'s litigation reserves will not need to be adjusted in the future.

In view of the inherent difficulty of predicting the outcome of legal proceedings, particularly where the claimants seek very large or indeterminate damages, or where the matters present novel legal theories, involve a large number of parties or are in early stages of discovery, JPMorgan Chase Bank, N.A. cannot state with confidence what will be the eventual outcomes of the currently pending matters, the timing of their ultimate resolution or the eventual losses, fines, penalties or consequences related to those matters. JPMorgan Chase Bank, N.A. believes, based upon its current knowledge and after consultation with counsel, consideration of the material legal proceedings described above and after taking into account its current litigation reserves and its estimated aggregate range of possible losses, that the other legal proceedings currently pending against it should not have a material adverse effect on JPMorgan Chase's Bank, N.A.'s consolidated financial condition. JPMorgan Chase Bank, N.A. notes, however, that in light of the uncertainties involved in such proceedings, there is no assurance that the ultimate resolution of these matters will not significantly exceed the reserves it has currently accrued or that a matter will not have material reputational consequences. As a result, the outcome of a particular matter may be material to JPMorgan Chase Bank, N.A.'s operating results for a particular period, depending on, among other factors, the size of the loss or liability imposed and the level of JPMorgan Chase Bank, N.A.'s income for that period.

Note 29 – Business changes and developments

Internal transfers of legal entities under common control

From time to time there may be transfers of legal entities under common control between the Bank and JPMorgan Chase. Such transfers are accounted for at historical cost in accordance with U.S. GAAP and are reflected in the Consolidated Financial Statements prospectively when the impact of the transfers are not material to the Bank's Consolidated Financial Statements. Other than the Merger discussed in Note 1, there were no significant internal transfers of legal entities between the Bank and JPMorgan Chase for the years ended December 31, 2019, 2018 and 2017.

Subsequent events

The Bank has performed an evaluation of events that have occurred subsequent to December 31, 2019, and through February 25, 2020 (the date the financial statements were available to be issued). There have been no material subsequent events that occurred during such period that would require disclosure or recognition in the Bank's Consolidated Financial Statements as of December 31, 2019.

Supplementary information:
Glossary of Terms and Acronyms

2019 Form 10-K: JPMorgan Chase & Co.'s Annual report on Form 10-K for year ended December 31, 2019, filed with the U.S. Securities and Exchange Commission.

ABS: Asset-backed securities

AFS: Available-for-sale

AOCI: Accumulated other comprehensive income/(loss)

ARM: Adjustable rate mortgage(s)

Bank: JPMorgan Chase Bank N.A.

Beneficial interests issued by consolidated VIEs: Represents the interest of third-party holders of debt, equity securities, or other obligations, issued by VIEs that the Bank consolidates.

Benefit obligation: Refers to the projected benefit obligation for pension plans and the accumulated postretirement benefit obligation for OPEB plans.

BHC: Bank holding company

CCP: "Central counterparty" is a clearing house that interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer and thereby ensuring the future performance of open contracts. A CCP becomes counterparty to trades with market participants through novation, an open offer system, or another legally binding arrangement.

CDS: Credit default swaps

CECL: Financial Instruments - Credit Losses, commonly referred to as the Current Expected Credit Losses framework

CET1 Capital: Common equity Tier 1 capital

CFO: Chief Financial Officer

CFTC: Commodity Futures Trading Commission

Chase Bank USA, N.A.: Chase Bank USA, National Association

CLO: Collateralized loan obligations

CLTV: Combined loan-to-value

Collateral-dependent: A loan is considered to be collateral-dependent when repayment of the loan is expected to be provided solely by the underlying collateral, rather than by cash flows from the borrower's operations, income or other resources.

Credit derivatives: Financial instruments whose value is derived from the credit risk associated with the debt of a third-party issuer (the reference entity) which allow one party (the protection purchaser) to transfer that risk to another party (the protection seller). Upon the occurrence of a credit event by the reference entity, which may include, among other events, the bankruptcy or failure to pay its obligations, or certain restructurings of the debt of the reference entity, neither party has recourse to the reference entity. The protection purchaser has recourse to the protection seller for the difference between the face value of the CDS contract and the fair value at the time of settling the credit derivative contract. The determination as to whether a credit event has occurred is generally made by the relevant International Swaps and Derivatives Association ("ISDA") Determinations Committee.

Criticized: Criticized loans, lending-related commitments and derivative receivables that are classified as special mention, substandard and doubtful categories for regulatory purposes.

CRO: Chief Risk Officer

CVA: Credit valuation adjustment

DVA: Debit valuation adjustment

EC: European Commission

Embedded derivatives: are implicit or explicit terms or features of a financial instrument that affect some or all of the cash flows or the value of the instrument in a manner similar to a derivative. An instrument containing such terms or features is referred to as a "hybrid." The component of the hybrid that is the non-derivative instrument is referred to as the "host." For example, callable debt is a hybrid instrument that contains a plain vanilla debt instrument (i.e., the host) and an embedded option that allows the issuer to redeem the debt issue at a specified date for a specified amount (i.e., the embedded derivative). However, a floating rate instrument is not a hybrid composed of a fixed-rate instrument and an interest rate swap.

ERISA: Employee Retirement Income Security Act of 1974

ETD: "Exchange-traded derivatives": Derivative contracts that are executed on an exchange and settled via a central clearing house.

Fannie Mae: Federal National Mortgage Association

FASB: Financial Accounting Standards Board

FDIA: Federal Depository Insurance Act

FDIC: Federal Deposit Insurance Corporation

Federal Reserve: The Board of the Governors of the Federal Reserve System

FFIEC: Federal Financial Institutions Examination Council

FHA: Federal Housing Administration

FHLB: Federal Home Loan Bank

FICC: The Fixed Income Clearing Corporation

FICO score: A measure of consumer credit risk provided by credit bureaus, typically produced from statistical models by Fair Isaac Corporation utilizing data collected by the credit bureaus.

Free standing derivatives: a derivative contract entered into either separate and apart from any of the Bank's other financial instruments or equity transactions. Or, in conjunction with some other transaction and is legally detachable and separately exercisable.

FVA: Funding valuation adjustment

FX: Foreign exchange

G7: Group of Seven nations: Countries in the G7 are Canada, France, Germany, Italy, Japan, the U.K. and the U.S.

G7 government bonds: Bonds issued by the government of one of the G7 nations.

Ginnie Mae: Government National Mortgage Association

HELOAN: Home equity loan

HELOC: Home equity line of credit

Home equity – senior lien: Represents loans and commitments where the Bank holds the first security interest on the property.

Home equity – junior lien: Represents loans and commitments where the Bank holds a security interest that is subordinate in rank to other liens.

HTM: Held-to-maturity

IDI: Insured depository institutions

Impaired loan: Impaired loans are loans measured at amortized cost, for which it is probable that the Bank will be unable to collect all amounts due, including principal and interest, according to the contractual terms of the agreement. Impaired loans include the following:

- All wholesale nonaccrual loans
- All TDRs (both wholesale and consumer), including ones that have returned to accrual status

Investment-grade: An indication of credit quality based on the Bank's internal risk assessment. The Bank considers ratings of BBB-/Baa3 or higher as investment-grade.

ISDA: International Swaps and Derivatives Association

JPMorgan Chase: JPMorgan Chase & Co.

LGD: Loss given default

LIBOR: London Interbank Offered Rate

LTIP: Long-term incentive plan

LTV: "Loan-to-value": For residential real estate loans, the relationship, expressed as a percentage, between the principal amount of a loan and the appraised value of the collateral (i.e., residential real estate) securing the loan.

Origination date LTV ratio

The LTV ratio at the origination date of the loan. Origination date LTV ratios are calculated based on the actual appraised values of collateral (i.e., loan-level data) at the origination date.

Current estimated LTV ratio

An estimate of the LTV as of a certain date. The current estimated LTV ratios are calculated using estimated collateral values derived from a nationally recognized home price index measured at the metropolitan statistical area ("MSA") level. These MSA-level home price indices consist of actual data to the extent available and forecasted data where actual data is not available. As a result, the estimated collateral values used to calculate these ratios do not represent actual appraised loan-level collateral values; as such, the resulting LTV ratios are necessarily imprecise and should therefore be viewed as estimates.

Combined LTV ratio

The LTV ratio considering all available lien positions, as well as unused lines, related to the property. Combined LTV ratios are used for junior lien home equity products.

Master netting agreement: A single agreement with a counterparty that permits multiple transactions governed by that agreement to be terminated or accelerated and settled through a single payment in a single currency in the event of a default (e.g., bankruptcy, failure to make a required payment or securities transfer or deliver collateral or margin when due).

Measurement alternative: Measures equity securities without readily determinable fair values at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer.

Merger: On May 18, 2019, JPMorgan Chase merged its wholly-owned subsidiary, Chase Bank USA, N.A. with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank.

MBS: Mortgage-backed securities

Moody's: Moody's Investor Services

Mortgage product types:

Alt-A

Alt-A loans are generally higher in credit quality than subprime loans but have characteristics that would disqualify the borrower from a traditional prime loan. Alt-A lending characteristics may include one or more of the following: (i) limited documentation; (ii) a high CLTV ratio; (iii) loans secured by non-owner occupied properties; or (iv) a debt-to-income ratio above normal limits. A substantial proportion of the Bank's Alt-A loans are those where a borrower does not provide complete documentation of his or her assets or the amount or source of his or her income.

Option ARMs

The option ARM real estate loan product is an adjustable-rate mortgage loan that provides the borrower with the option each month to make a fully amortizing, interest-only or minimum payment. The minimum payment on an option ARM loan is based on the interest rate charged during the introductory period. This introductory rate is usually significantly below the fully indexed rate. The fully indexed rate is calculated using an index rate plus a margin. Once the introductory period ends, the contractual interest rate charged on the loan increases to the fully indexed rate and adjusts monthly to reflect movements in the index. The minimum payment is typically insufficient to cover interest accrued in the prior month, and any unpaid interest is deferred and added to the principal balance of the loan. Option ARM loans are subject to payment recast, which converts the loan to a variable-rate fully amortizing loan upon meeting specified loan balance and anniversary date triggers.

Prime

Prime mortgage loans are made to borrowers with good credit records who meet specific underwriting requirements, including prescriptive requirements related to income and overall debt levels. New prime mortgage borrowers provide full documentation and generally have reliable payment histories.

Subprime

Subprime loans are loans that, prior to mid-2008, were offered to certain customers with one or more high risk characteristics, including but not limited to: (i) unreliable or poor payment histories; (ii) a high LTV ratio of greater than 80% (without borrower-paid mortgage insurance); (iii) a high debt-to-income ratio; (iv) an occupancy type for the loan is other than the borrower's primary residence; or (v) a history of delinquencies or late payments on the loan.

MSA: Metropolitan statistical areas

MSR: Mortgage servicing rights

NA: Data is not applicable or available for the period presented.

NAV: Net Asset Value

Net interchange income includes the following components:

- **Interchange income**: Fees earned by credit and debit card issuers on sales transactions.
- **Reward costs**: The cost to the Bank for points earned by cardholders enrolled in credit card rewards programs.
- **Partner payments**: Payments to co-brand credit card partners based on the cost of loyalty program rewards earned by cardholders on credit card transactions.

Net mortgage servicing revenue: Includes operating revenue earned from servicing third-party mortgage loans, which is recognized over the period in which the service is provided; changes in the fair value of MSRs; the impact of risk management activities associated with MSRs; and gains and losses on securitization of excess mortgage servicing. Net mortgage servicing revenue also includes gains and losses on sales and lower of cost or fair value adjustments of certain repurchased loans insured by U.S. government agencies.

Net production revenue: Includes fees and income recognized as earned on mortgage loans originated with the intent to sell, and the impact of risk management activities associated with the mortgage pipeline and warehouse loans. Net production revenue also includes gains and losses on sales and lower of cost or fair value adjustments on mortgage loans held-for-sale (excluding certain repurchased loans insured by U.S. government agencies), and changes in the fair value of financial instruments measured under the fair value option.

NOL: Net operating loss

Nonaccrual loans: Loans for which interest income is not recognized on an accrual basis. Loans (other than credit card loans and certain consumer loans insured by U.S. government agencies) are placed on nonaccrual status when full payment of principal and interest is not expected, regardless of delinquency status, or when principal and interest have been in default for a period of 90 days or more unless the loan is both well-secured and in the process of collection. Collateral-dependent loans are typically maintained on nonaccrual status.

OAS: Option-adjusted spread

OCC: Office of the Comptroller of the Currency

OCI: Other comprehensive income/(loss)

OPEB: Other postretirement employee benefit

OTTI: Other-than-temporary impairment

Over-the-counter ("OTC") derivatives: Derivative contracts that are negotiated, executed and settled bilaterally between two derivative counterparties, where one or both counterparties is a derivatives dealer.

Over-the-counter cleared ("OTC-cleared") derivatives: Derivative contracts that are negotiated and executed bilaterally, but subsequently settled via a central clearing house, such that each derivative counterparty is only exposed to the default of that clearing house.

PCI: "Purchased credit-impaired" loans represents certain loans that were acquired and deemed to be credit-impaired on the acquisition date in accordance with the guidance of the FASB. The guidance allows purchasers to aggregate credit-impaired loans acquired in the same fiscal quarter into one or more pools, provided that the loans have common risk characteristics(e.g., product type, LTV ratios, FICO scores, past due status, geographic location). A pool is then accounted for as a single asset with a single composite interest rate and an aggregate expectation of cash flows.

PD: Probability of default

Principal transactions revenue: Principal transactions revenue is driven by many factors, including:

- the bid-offer spread, which is the difference between the price at which a market participant is willing and able to sell an instrument to the Bank and the price at which another market participant is willing and able to buy it from the Bank, and vice versa; and
- realized and unrealized gains and losses on financial instruments and commodities transactions, including those accounted for under the fair value option, primarily used in client-driven market-making activities, and on private equity investments.
  - Realized gains and losses result from the sale of instruments, closing out or termination of transactions, or interim cash payments.
  - Unrealized gains and losses result from changes in valuation.

In connection with its client-driven market-making activities, the Bank transacts in debt and equity instruments, derivatives and commodities, including physical commodities inventories and financial instruments that reference commodities.

Principal transactions revenue also includes realized and unrealized gains and losses related to:

- derivatives designated in qualifying hedge accounting relationships, primarily fair value hedges of commodity and foreign exchange risk;
- derivatives used for specific risk management purposes, primarily to mitigate credit risk and foreign exchange risk.

PSUs: Performance share units

REIT: "Real estate investment trust": A special purpose investment vehicle that provides investors with the ability to participate directly in the ownership or financing of real-estate related assets by pooling their capital to purchase and manage income property (i.e., equity REIT) and/or mortgage loans (i.e., mortgage REIT). REITs can be publicly or privately held and they also qualify for certain favorable tax considerations.

REO: Real estate owned

Retained loans: Loans that are held-for-investment (i.e., excludes loans held-for-sale and loans at fair value).

RHS: Rural Housing Service of the U.S. Department of Agriculture

Risk-rated portfolio: Credit loss estimates are based on estimates of the probability of default ("PD") and loss severity given a default. The probability of default is the likelihood that a borrower will default on its obligation; the loss given default ("LGD") is the estimated loss on the loan that would be realized upon the default and takes into consideration collateral and structural support for each credit facility.

ROU assets: Right-of-use assets

RSU(s): Restricted stock units

RWA: "Risk-weighted assets": Basel III establishes two comprehensive approaches for calculating RWA (a Standardized approach and an Advanced approach) which include capital requirements for credit risk, market risk, and in the case of Basel III Advanced, also operational risk. Key differences in the calculation of credit risk RWA between the Standardized and Advanced approaches are that for Basel III Advanced, credit risk RWA is based on risk-sensitive approaches which largely rely on the use of internal credit models and parameters, whereas for Basel III Standardized, credit risk RWA is generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. Market risk RWA is calculated on a generally consistent basis between Basel III Standardized and Basel III Advanced.

Scored portfolio: The scored portfolio predominantly includes residential real estate loans, credit card loans and certain auto and business banking loans where credit loss estimates are based on statistical analysis of credit losses over discrete periods of time. The statistical analysis uses portfolio modeling, credit scoring and decision-support tools.

S&P: Standard and Poor's 500 Index

SAR(s): Stock appreciation rights

SEC: Securities and Exchange Commission

Securities financing agreements: Include resale, repurchase, securities borrowed and securities loaned agreements

SLR: Supplementary leverage ratio

SMBS: Stripped mortgage-backed securities

SPEs: Special purpose entities

Structured notes: Structured notes are financial instruments whose cash flows are linked to the movement in one or more indexes, interest rates, foreign exchange rates, commodities prices, prepayment rates, or other market variables. The notes typically contain embedded (but not separable or detachable) derivatives. Contractual cash flows for principal, interest, or both can vary in amount and timing throughout the life of the note based on non-traditional indexes or non-traditional uses of traditional interest rates or indexes.

TDR: "Troubled debt restructuring" is deemed to occur when the Bank modifies the original terms of a loan agreement by granting a concession to a borrower that is experiencing financial difficulty.

U.K.: United Kingdom

Unaudited: Financial statements and information that have not been subjected to auditing procedures sufficient to permit an independent certified public accountant to express an opinion.

U.S.: United States of America

U.S. government agencies: U.S. government agencies include, but are not limited to, agencies such as Ginnie Mae and FHA, and do not include Fannie Mae and Freddie Mac which are U.S. government-sponsored enterprises ("U.S. GSEs"). In general, obligations of U.S. government agencies are fully and explicitly guaranteed as to the timely payment of principal and interest by the full faith and credit of the U.S. government in the event of a default.

U.S. GAAP: Accounting principles generally accepted in the U.S.

U.S. GSE(s): "U.S. government-sponsored enterprises" are quasi-governmental, privately-held entities established or chartered by the U.S. government to serve public purposes as specified by the U.S. Congress to improve the flow of credit to specific sectors of the economy and provide certain essential services to the public. U.S. GSEs include Fannie Mae and Freddie Mac, but do not include Ginnie Mae or FHA. U.S. GSE obligations are not explicitly guaranteed as to the timely payment of principal and interest by the full faith and credit of the U.S. government.

U.S. Treasury: U.S. Department of the Treasury

VA: U.S. Department of Veterans Affairs

VCG: Valuation Control Group

VGF: Valuation Governance Forum

VIEs: Variable interest entities

Warehouse loans: Consist of prime mortgages originated with the intent to sell that are accounted for at fair value and classified as trading assets.

STATUTORY CONSENTS

As a national banking association organised under the federal laws of the United States of America, the guarantor is empowered to give guarantees. Each issue of structured products will have the benefit of the guarantee.

NO MATERIAL ADVERSE CHANGE AND LITIGATION

Save as disclosed in this base listing document, there has been no material adverse change in the guarantor's financial position since the date of the most recently published audited consolidated financial statements of the guarantor that would have a material adverse effect on the guarantor's ability to perform its obligations in the context of any issue of structured products.

Save as disclosed in this base listing document, we and the guarantor are not aware, to the best of our and the guarantor's knowledge and belief, of any litigation or claims of material importance in the context of any issue of structured products pending or threatened against us or the guarantor.

FINANCIAL INFORMATION ABOUT THE GUARANTOR

As at the date of this base listing document, PricewaterhouseCoopers LLP, auditor of the guarantor, has given and has not withdrawn its written consent to the inclusion in this base listing document of its audit report dated 25 February 2020 (which relates to the guarantor's financial statements for the year ended 31 December 2019 comprising consolidated balance sheets at 31 December 2019 and 2018 and the related consolidated statements of income, changes in stockholder's equity, comprehensive income and cash flows for each of the three years ended 31 December 2019) in the form and context in which it is included. Its report was not prepared for incorporation in this base listing document.

PricewaterhouseCoopers LLP does not have any shareholding in the guarantor or any of the guarantor's subsidiaries, nor does it have the right (whether legally enforceable or not) to subscribe for or to nominate persons to subscribe for securities of the guarantor or any of the guarantor's subsidiaries.

OUR SERVICE OF PROCESS AGENT

We have authorised J.P. Morgan Securities (Asia Pacific) Limited, 23-29/F, Chater House, 8 Connaught Road Central, Hong Kong to accept on our behalf and on behalf of the guarantor service of process and any other notices required to be served on either us or the guarantor in Hong Kong.

OUR AUTHORISED REPRESENTATIVES

Our authorised representatives are Elaine Hue Mei Chan, Executive Director (who can be contacted at J.P. Morgan Securities (Asia Pacific) Limited, 23-29/F, Chater House, 8 Connaught Road Central, Hong Kong) and Yao Khoon, Shuy, Executive Director (who can be contacted at J.P. Morgan Securities (Asia Pacific) Limited, the Quayside, 77 Hoi Bun Road, Kwun Tong, Hong Kong). The guarantor's authorised representative is Camille Modiano, Managing Director who can be contacted at J.P. Morgan Securities (Asia Pacific) Limited, 23-29/F, Chater House, 8 Connaught Road Central, Hong Kong.

ANNEX 1

TERMS AND CONDITIONS OF THE CASH-SETTLED STOCK WARRANTS

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global warrant certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of Warrants may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of Warrants. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The Warrants (which expression shall, unless the context otherwise requires, include any further warrants issued pursuant to Condition 13) relating to the Shares of the Company are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**") made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Warrantholders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the Warrants represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

Warrants represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of warrants deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Warrantholders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the Warrants after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of Warrants may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the Warrants. The expression "**Warrantholder**" shall be construed accordingly.

(E) Trading in Warrants on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended prior to the Expiry Date in accordance with the requirements of the Stock Exchange.

2 Warrant Rights and Exercise Expenses

(A) Every Board Lot entitles the Warrantholder, upon compliance with Condition 4, to payment of the Cash Settlement Amount (as defined in Condition 4(C)).

(B) The Warrantholder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the Warrants (the "**Exercise Expenses**"). To effect such payment, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 4(C).

3 Automatic Exercise

(A) Any Warrant in respect of which the Cash Settlement Amount which would be payable by the Issuer if exercised on the Expiry Date shall be deemed to be automatically exercised on the Expiry Date ("**Automatic Exercise**").

(B) Any Warrant which has not been automatically exercised in accordance with Condition 3(A) shall expire immediately without value thereafter and all rights of the Warrantholder and obligations of the Issuer with respect to such Warrant shall cease.

(C) In these Conditions, "**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

4 Exercise of Warrants

(A) Warrants may only be exercised in Board Lots or integral multiples thereof.

(B) Following the Expiry Date the Issuer will, with effect from the first Business Day following the Expiry Date cancel the Global Warrant Certificate.

(C) Subject to an Automatic Exercise in accordance with Condition 3(A), the Issuer will as soon as practicable and not later than the third CCASS Settlement Day after the later of: (i) the Expiry Date; and (ii) the day on which the Average Price is determined in accordance with these Conditions (the "**Settlement Date**") in accordance with these Conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all Warrants exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Warrantholder as appearing in the register kept by or on behalf of the Issuer.

Subject to adjustment as provided in Condition 6, "**Cash Settlement Amount**" means:

In the case of a series of call Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Average Price} - \text{Exercise Price}) \times \text{one Board Lot}}{\text{Number of Warrant(s) per Entitlement}}$$

In the case of a series of put Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Exercise Price} - \text{Average Price}) \times \text{one Board Lot}}{\text{Number of Warrant(s) per Entitlement}}$$

"**Average Price**" shall be the arithmetic mean of the closing prices of one Share (as derived from the Daily Quotation Sheet of the Stock Exchange, subject to any adjustment to such closing prices as may be necessary to reflect any event as contemplated in Condition 6 such as capitalisation, rights issue, distribution or the like) in respect of each Valuation Date.

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by Hong Kong Securities Clearing Company Limited from time to time.

"**Entitlement**" means the number of Shares to which the Warrants relate, as specified in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 6.

"**Market Disruption Event**" means:

(i) the occurrence or existence on any Valuation Date during the one-half hour period that ends at the close of trading of any suspension of, or limitation imposed on, trading (by reason of movements in price exceeding limits permitted by the Stock Exchange or otherwise) on the Stock Exchange in (1) the Shares; or (2) any options or futures contracts relating to the Shares if, in any such case, such suspension or limitation is, in the determination of the Issuer and/or Agent, material;

(ii) the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "BLACK" rainstorm signal on any day which either (i) result in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "BLACK" rainstorm signal having been issued; or

(iii) a limitation or closure of the Stock Exchange due to unforeseen circumstances.

"**Valuation Date**" means, subject as provided above in relation to a Market Disruption Event, each of the five Business Days immediately preceding the Expiry Date.

If the Agent determines, in its sole discretion, that a Market Disruption Event has occurred on any Valuation Date, then that Valuation Date shall be postponed until the first succeeding Business Day on which there is no Market Disruption Event irrespective of whether that postponed Valuation Date would fall on a Business Day that already is or is deemed to be a Valuation Date. For the avoidance of doubt, in the event that a Market Disruption Event has occurred and a Valuation Date is postponed as aforesaid, the closing price of the Shares on the first succeeding Business Day will be used more than once in determining the Average Price, so that in no event shall there be less than five closing prices used to determine the Average Price.

If the postponement of a Valuation Date as aforesaid would result in the Valuation Date falling on or after the Expiry Date, then:

(i) the Business Day immediately preceding the Expiry Date (the "**Last Valuation Date**") shall be deemed to be the Valuation Date notwithstanding the Market Disruption Event; and

(ii) the Agent shall determine the closing price of the Shares on the basis of its good faith estimate of the price that would have prevailed on the Last Valuation Date but for the Market Disruption Event.

Any payment made pursuant to this Condition 4(C) shall be delivered at the risk and expense of the Warrantholder to the Warrantholder, or such bank, broker or agent in Hong Kong (if any) as recorded on the register.

(D) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Warrantholder for any interest in respect of the amount due or any loss or damage that such Warrantholder may suffer as a result of the existence of a Settlement Disruption Event.

(E) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Warrantholder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Warrantholder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 4(C) above.

5 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the Warrants and will not assume any obligation or duty to or any relationship or agency or trust for the Warrantholder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the Warrants are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Warrantholder in accordance with Condition 10.

6 Adjustments

Adjustments may be made by the Agent to the terms of the Warrants (including, but not limited to, the Exercise Price and the Entitlement) on the basis of the following provisions:

(A) (i) If and whenever the Company shall, by way of Rights (as defined below), offer new Shares for subscription at a fixed subscription price to the holders of existing Shares pro rata to existing holdings (a "**Rights Offer**"), the Entitlement shall be adjusted on the Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{1 + M}{1 + (R/S) \times M}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Rights Share price, being the closing price of an existing Share, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Shares are traded on a cum-Rights basis

R: Subscription price per new Share specified in the Rights Offer plus an amount equal to any dividends or other benefits foregone to exercise the Rights

M: Number of new Shares (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to subscribe

For the purposes of these Conditions, "**Rights**" means the right(s) attached to each existing Share or needed to acquire one new Share (as the case may be) which are given to a holder of existing Shares to subscribe at a fixed subscription price for new Shares pursuant to the Rights Offer (whether by the exercise of one Right, a part of a Right or an aggregate number of Rights).

(ii) The Exercise Price (which shall be rounded to the nearest 0.001) shall be adjusted by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same day that the Entitlement is adjusted.

(iii) For the purposes of Conditions 6(A) and 6(B), the Agent may determine that no adjustment will be made if the adjustment to the Entitlement is one per cent. or less of the Entitlement immediately prior to the adjustment, all as determined by the Agent.

(B) If and whenever the Company shall make an issue of Shares credited as fully paid to holders of Shares generally by way of capitalisation of profits or reserves (other than pursuant to a scrip dividend or similar scheme for the time being operated by the Company or otherwise in lieu of a cash dividend) (and without any payment or other consideration being made or given by such holders) (a "Bonus Issue"), the Entitlement will be adjusted, subject to Condition 6(A)(iii), on the Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

Adjusted Entitlement = Adjustment Factor x E

Where:

Adjustment Factor = 1 + N

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

N: Number of additional Shares (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to receive

In addition, the Issuer shall adjust the Exercise Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same day that the Entitlement is adjusted.

(C) If and whenever the Company shall subdivide its outstanding share capital into a greater number of shares (a "**Subdivision**") or consolidate its outstanding share capital into a smaller number of shares (a "**Consolidation**"), then:

(i) in the case of a Subdivision, the Entitlement shall be increased whereas the Exercise Price (which shall be rounded to the nearest 0.001) shall be decreased in the same ratio as the Subdivision; and

(ii) in the case of a Consolidation, the Entitlement shall be decreased whereas the Exercise Price (which shall be rounded to the nearest 0.001) shall be increased in the same ratio as the Consolidation,

in each case on the day on which the relevant Subdivision or Consolidation (as the case may be) shall have taken effect.

(D) If it is announced that the Company is to or may merge or consolidate with or into any other corporation (including becoming, by agreement or otherwise, a subsidiary of or controlled by any person or corporation) (except where the Company is the surviving corporation in a merger) or that it is to or may sell or transfer all or substantially all of its assets, the rights attaching to the Warrants may in the absolute discretion of the Agent be amended no later than the Business Day preceding the consummation of such merger, consolidation, sale or transfer (each a "**Restructuring Event**") (as determined by the Agent in its absolute discretion).

The rights attaching to the Warrants after the adjustment shall, after such Restructuring Event, relate to the number of shares of the corporation(s) resulting from or surviving such Restructuring Event or other securities (the "**Substituted Securities**") and/or cash offered in substitution for the affected Shares, as the case may be, to which the holder of such number of Shares to which the Warrants related immediately before such Restructuring Event would have been entitled upon such Restructuring Event. Thereafter the provisions hereof shall apply to such Substituted Securities, provided that any Substituted Securities may, in the absolute discretion of the Agent, be deemed to be replaced by an amount in the relevant currency equal to the market value or, if no market value is available, fair value, of such Substituted Securities in each case as determined by the Agent as soon as practicable after such Restructuring Event is effected.

For the avoidance of doubt, any remaining Shares shall not be affected by this paragraph (D) and, where cash is offered in substitution for Shares or is deemed to replace Substituted Securities as described above, references in these Conditions to the Shares shall include any such cash.

(E) No adjustment will be made for an ordinary cash dividend (whether or not it is offered with a scrip alternative) ("**Ordinary Dividend**"). For any other forms of cash distribution ("**Cash Distribution**") announced by the Company, such as a cash bonus, special dividend or extraordinary dividend, no adjustment will be made unless the value of the Cash Distribution accounts for 2 per cent. or more of the Share's closing price on the day of announcement by the Company.

If and whenever the Company shall make a Cash Distribution credited as fully paid to the holders of Shares generally, the Entitlement shall be adjusted to take effect on the Business Day on which trading in the Shares becomes ex-entitlement in respect of the relevant Cash Distribution in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{S - OD}{S - OD - CD}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Cash Distribution Share price, being the closing price of an existing Share, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Shares are traded on a cum-Cash Distribution basis

CD: The Cash Distribution per Share

OD: The Ordinary Dividend per Share, provided that the Ordinary Dividend and the Cash Distribution have the same ex-entitlement date. For the avoidance of doubt, the OD shall be zero if the Ordinary Dividend and the Cash Distribution have different ex-entitlement dates

In addition, the Issuer shall adjust the Exercise Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same date that the Entitlement is adjusted.

(F) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the Warrants as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(G) The Issuer and/or the Agent shall determine any adjustment or amendment and its determination shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after the determination thereof.

7 Purchase by the Issuer

The Issuer and any of its affiliates may purchase Warrants at any time on or after the date of their issue and any Warrants which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

8 Global Warrant Certificate

A global warrant certificate (the "**Global Warrant Certificate**") representing the Warrants will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Warrant Certificate will not be exchangeable for definitive warrant certificates.

9 Meeting of Warrantholder and Modification

(A) *Meetings of Warrantholder.* Notices for convening meetings to consider any matter affecting the Warrantholder's interests will be given to the Warrantholder in accordance with the provisions of Condition 10.

Every question submitted to a meeting of the Warrantholder shall be decided by poll. A meeting may be convened by the Issuer or by the Warrantholder holding not less than 10 per cent. of the Warrants for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Warrantholder) holding or representing not less than 25 per cent. of the Warrants for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Warrantholder) being or representing Warrantholder whatever the number of Warrants so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Warrantholder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Warrantholder shall be binding on all the holders of the Warrants, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Warrantholder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Warrantholders, effect any modification of the terms and conditions of the Warrants or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Warrantholders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 10.

10 Notices

All notices in English and Chinese to the Warrantholder will be validly given if published on the website of the Hong Kong Exchanges and Clearing Limited. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Warrantholders.

11 Liquidation

In the event of a liquidation or dissolution or winding up of the Company or the appointment of a receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the undertaking, property or assets of the Company, all unexercised Warrants will lapse and shall cease to be valid for any purpose, in the case of a voluntary liquidation, on the effective date of the resolution and, in the case of an involuntary liquidation or dissolution, on the date of the relevant court order or, in the case of the appointment of a liquidator or receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the undertaking, property or assets, on the date when such appointment is effective but subject (in any such case) to any contrary mandatory requirement of law.

12 Delisting of Company

(A) If at any time the Shares cease to be listed on the Stock Exchange, the Issuer shall give effect to these Conditions in such manner and make such adjustments to the rights attaching to the Warrants as it shall, in its absolute discretion, consider appropriate to ensure, so far as it is reasonably able to do so, that the interests of the Warrantholder generally are not materially prejudiced as a consequence of such delisting (without considering the individual circumstances of the Warrantholder or the tax or other consequences that may result in any particular jurisdiction).

(B) Without prejudice to the generality of Condition 12(A), where the Shares are or, upon the delisting, become, listed on any other stock exchange, these Conditions may, in the absolute discretion of the Issuer, be amended to the extent necessary to allow for the substitution of that other stock exchange in place of the Stock Exchange and the Issuer may, without the consent of the Warrantholder, make such adjustments to the entitlements of the Warrantholder on exercise (including, if appropriate, by converting foreign currency amounts at prevailing market rates into the relevant currency) as it shall consider appropriate in the circumstances.

(C) Any adjustment, amendment or determination made by the Issuer pursuant to this Condition 12 shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after they are determined.

13 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Warrantholder, to create and issue further warrants, upon such terms as to issue price, commencement of the exercise period and otherwise as the Issuer may determine so as to form a single series with the Warrants.

14 Illegality or Impracticability

The Issuer is entitled to terminate the Warrants if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or it will become illegal or impracticable:

(A) for it to perform its obligations under the Warrants, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the Warrants due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Warrantholder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each Warrant held by such Warrantholder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made to each Warrantholder in such manner as shall be notified to the Warrantholders in accordance with Condition 10.

15 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

16 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the Warrants.

17 Governing Law

The Warrants, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of the Hong Kong Special Administrative Region of the People's Republic of China ("**Hong Kong**"). The Issuer, the Guarantor and the Warrantholder (by its acquisition of the Warrants) shall be deemed to have submitted for all purposes in connection with the Warrants, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

18 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED FOREIGN STOCK WARRANTS

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global warrant certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of Warrants may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of Warrants. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The Warrants (which expression shall, unless the context otherwise requires, include any further warrants issued pursuant to Condition 13) relating to the Shares of the Company are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**") made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Warrantholders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the Warrants represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

Warrants represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of warrants deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Warrantholders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the Warrants after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of Warrants may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the Warrants. The expression "**Warrantholder**" shall be construed accordingly.

(E) Trading in Warrants on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended prior to the Expiry Date in accordance with the requirements of the Stock Exchange.

2 Warrant Rights and Exercise Expenses

(A) Every Board Lot entitles the Warrantholder, upon compliance with Condition 4, to payment of the Cash Settlement Amount (as defined in Condition 4(C)).

(B) The Warrantholder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the Warrants (the "**Exercise Expenses**"). To effect such payment, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 4(C).

3 Automatic Exercise

(A) Any Warrant in respect of which the Cash Settlement Amount which would be payable by the Issuer if exercised on the Expiry Date shall be deemed to be automatically exercised on the Expiry Date ("**Automatic Exercise**").

(B) Any Warrant which has not been automatically exercised in accordance with Condition 3(A) shall expire immediately without value thereafter and all rights of the Warrantholder and obligations of the Issuer with respect to such Warrant shall cease.

(C) In these Conditions, "**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

4 Exercise of Warrants

(A) Warrants may only be exercised in Board Lots or integral multiples thereof.

(B) Following the Expiry Date the Issuer will, with effect from the first Business Day following the Expiry Date cancel the Global Warrant Certificate.

(C) Subject to an Automatic Exercise in accordance with Condition 3(A), the Issuer will as soon as practicable and not later than the third CCASS Settlement Day after the later of: (i) the Expiry Date; and (ii) the day on which the Average Price is determined in accordance with these Conditions (the "**Settlement Date**") in accordance with these Conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all Warrants exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Warrantholder as appearing in the register kept by or on behalf of the Issuer.

Subject to adjustment as provided in Condition 6, "**Cash Settlement Amount**" means:

In the case of a series of call Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Average Price} - \text{Exercise Price}) \times \text{one Board Lot}}{\text{Number of Warrant(s) per Entitlement}}$$

(if applicable) either (i) converted from the Underlying Currency into the Settlement Currency at the Exchange Rate or, as the case may be, (ii) converted from the Underlying Currency into the Interim Currency at the First Exchange Rate and then converted from the Interim Currency into the Settlement Currency at the Second Exchange Rate.

In the case of a series of put Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Exercise Price} - \text{Average Price}) \times \text{one Board Lot}}{\text{Number of Warrant(s) per Entitlement}}$$

(if applicable) either (i) converted from the Underlying Currency into the Settlement Currency at the Exchange Rate or, as the case may be, (ii) converted from the Underlying Currency into the Interim Currency at the First Exchange Rate and then converted from the Interim Currency into the Settlement Currency at the Second Exchange Rate.

"**Average Price**" shall be the arithmetic mean of the official closing prices of one Share (as published by the Underlying Exchange, subject to any adjustment to such closing prices as may be necessary to reflect any event as contemplated in Condition 6 such as capitalisation, rights issue, distribution or the like) in respect of each Valuation Date.

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by Hong Kong Securities Clearing Company Limited from time to time.

"**Entitlement**" means the number of Shares to which the Warrants relate, as specified in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 6.

"**Exchange Rate**", if applicable, has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document;

"**First Exchange Rate**", if applicable, has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document;

"**Interim Currency**", if applicable, has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document;

"**Market Disruption Event**" means:

(i) the occurrence or existence on any Valuation Date during the one-half hour period that ends at the close of trading of any suspension of, or limitation imposed on, trading (by reason of movements in price exceeding limits permitted by the Underlying Exchange or otherwise) on the Underlying Exchange in (1) the Shares; or (2) any options or futures contracts relating to the Shares if, in any such case, such suspension or limitation is, in the determination of the Issuer and/or Agent, material; or

(ii) a closure of the Underlying Exchange or a disruption or limitation in trading on the Underlying Exchange due to any other unforeseen circumstances;

"**Second Exchange Rate**", if applicable, has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document;

"**Underlying Currency**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document;

"**Underlying Exchange**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document;

"**Underlying Exchange Business Day**" means a day (excluding Saturdays, Sundays or public holidays) on which the Underlying Exchange is scheduled to open for dealings during its regular trading sessions;

"**Valuation Date**" means, subject as provided above in relation to a Market Disruption Event, each of the five Underlying Exchange Business Days immediately preceding the Expiry Date.

If the Agent determines, in its sole discretion, that a Market Disruption Event has occurred on any Valuation Date, then that Valuation Date shall be postponed until the first succeeding Underlying Exchange Business Day on which there is no Market Disruption Event irrespective of whether that postponed Valuation Date would fall on an Underlying Exchange Business Day that already is or is deemed to be a Valuation Date. For the avoidance of doubt, in the event that a Market Disruption Event has occurred and a Valuation Date is postponed as aforesaid, the official closing price of the Shares on the first succeeding Underlying Exchange Business Day will be used more than once in determining the Average Price, so that in no event shall there be less than five official closing prices used to determine the Average Price.

If the postponement of a Valuation Date as aforesaid would result in the Valuation Date falling on or after the Expiry Date, then:

(i) the Underlying Exchange Business Day immediately preceding the Expiry Date (the "**Last Valuation Date**") shall be deemed to be the Valuation Date notwithstanding the Market Disruption Event; and

(ii) the Agent shall determine the official closing price of the Shares on the basis of its good faith estimate of the price that would have prevailed on the Last Valuation Date but for the Market Disruption Event.

Any payment made pursuant to this Condition 4(C) shall be delivered at the risk and expense of the Warrantholder to the Warrantholder, or such bank, broker or agent in Hong Kong (if any) as recorded on the register.

(D) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Warrantholder for any interest in respect of the amount due or any loss or damage that such Warrantholder may suffer as a result of the existence of a Settlement Disruption Event.

(E) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Warrantholder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Warrantholder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 4(C) above.

5 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the Warrants and will not assume any obligation or duty to or any relationship or agency or trust for the Warrantholder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the Warrants are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Warrantholder in accordance with Condition 10.

6 Adjustments

Adjustments may be made by the Agent to the terms of the Warrants (including, but not limited to, the Exercise Price and the Entitlement) on the basis of the following provisions:

(A) (i) If and whenever the Company shall, by way of Rights (as defined below), offer new Shares for subscription at a fixed subscription price to the holders of existing Shares pro rata to existing holdings (a "**Rights Offer**"), the Entitlement shall be adjusted on the Underlying Exchange Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{1 + M}{1 + (R/S) \times M}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Rights Share price, being the official closing price of an existing Share as published by the Underlying Exchange on the last Underlying Exchange Business Day on which the Shares are traded on a cum-Rights basis

R: Subscription price per new Share specified in the Rights Offer plus an amount equal to any dividends or other benefits foregone to exercise the Rights

M: Number of new Share(s) (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to subscribe

For the purposes of these Conditions, "**Rights**" means the right(s) attached to each existing Share or needed to acquire one new Share (as the case may be) which are given to a holder of existing Shares to subscribe at a fixed subscription price for new Shares pursuant to the Rights Offer (whether by the exercise of one Right, a part of a Right or an aggregate number of Rights).

(ii) The Exercise Price shall be adjusted by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same day that the Entitlement is adjusted.

(iii) For the purposes of Conditions 6(A) and 6(B), the Agent may determine that no adjustment will be made if the adjustment to the Entitlement is one per cent. or less of the Entitlement immediately prior to the adjustment, all as determined by the Agent.

(B) If and whenever the Company shall make an issue of Shares credited as fully paid to holders of Shares generally by way of capitalisation of profits or reserves (other than pursuant to a scrip dividend or similar scheme for the time being operated by the Company or otherwise in lieu of a cash dividend and without any payment or other consideration being made or given by such holders) (a "**Bonus Issue**"), the Entitlement will be adjusted, subject to Condition 6(A)(iii), on the Underlying Exchange Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

Adjusted Entitlement = Adjustment Factor x E

Where:

Adjustment Factor = 1 + N

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

N: Number of additional Share(s) (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to receive

In addition, the Issuer shall adjust the Exercise Price by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same day that the Entitlement is adjusted.

(C) If and whenever the Company shall subdivide its outstanding share capital into a greater number of shares (a "**Subdivision**") or consolidate its outstanding share capital into a smaller number of shares (a "**Consolidation**"), then:

(i) in the case of a Subdivision, the Entitlement shall be increased whereas the Exercise Price shall be decreased in the same ratio as the Subdivision; and

(ii) in the case of a Consolidation, the Entitlement shall be decreased whereas the Exercise Price shall be increased in the same ratio as the Consolidation,

in each case on the day on which the relevant Subdivision or Consolidation (as the case may be) shall have taken effect.

(D) If it is announced that the Company is to or may merge or consolidate with or into any other corporation (including becoming, by agreement or otherwise, a subsidiary of or controlled by any person or corporation) (except where the Company is the surviving corporation in a merger) or that it is to or may sell or transfer all or substantially all of its assets, the rights attaching to the Warrants may in the absolute discretion of the Agent be amended no later than the Underlying Exchange Business Day preceding the consummation of such merger, consolidation, sale or transfer (each a "**Restructuring Event**") (as determined by the Agent in its absolute discretion).

The rights attaching to the Warrants after the adjustment shall, after such Restructuring Event, relate to the number of shares of the corporation(s) resulting from or surviving such Restructuring Event or other securities (the "**Substituted Securities**") and/or cash offered in substitution for the affected Shares, as the case may be, to which the holder of such number of Shares to which the Warrants related immediately before such Restructuring Event would have been entitled upon such Restructuring Event. Thereafter the provisions hereof shall apply to such Substituted Securities, provided that any Substituted Securities may, in the absolute discretion of the Agent, be deemed to be replaced by an amount in the relevant currency equal to the market value or, if no market value is available, fair value, of such Substituted Securities in each case as determined by the Agent as soon as practicable after such Restructuring Event is effected.

For the avoidance of doubt, any remaining Shares shall not be affected by this paragraph (D) and, where cash is offered in substitution for Shares or is deemed to replace Substituted Securities as described above, references in these Conditions to the Shares shall include any such cash.

(E) No adjustment will be made for an ordinary cash dividend (whether or not it is offered with a scrip alternative) ("**Ordinary Dividend**"). For any other forms of cash distribution ("**Cash Distribution**") announced by the Company, such as a cash bonus, special dividend or extraordinary dividend, no adjustment will be made unless the value of the Cash Distribution accounts for 2 per cent. or more of the Share's official closing price on the day of announcement by the Company.

If and whenever the Company shall make a Cash Distribution credited as fully paid to the holders of Shares generally, the Entitlement shall be adjusted to take effect on the Underlying Exchange Business Day on which trading in the Shares becomes ex-entitlement in respect of the relevant Cash Distribution in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{S - OD}{S - OD - CD}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Cash Distribution Share price, being the official closing price of an existing Share as published by the Underlying Exchange on the last Underlying Exchange Business Day on which the Shares are traded on a cum-Cash Distribution basis

CD: The Cash Distribution per Share

OD: The Ordinary Dividend per Share, provided that the Ordinary Dividend and the Cash Distribution have the same ex-entitlement date. For the avoidance of doubt, the OD shall be zero if the Ordinary Dividend and the Cash Distribution have different ex-entitlement dates

In addition, the Issuer shall adjust the Exercise Price by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same date that the Entitlement is adjusted.

(F) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the Warrants as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(G) The Issuer and/or the Agent shall determine any adjustment or amendment and its determination shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after the determination thereof.

7 Purchase by the Issuer

The Issuer and any of its affiliates may purchase Warrants at any time on or after the date of their issue and any Warrants which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

8 Global Warrant Certificate

A global warrant certificate (the "**Global Warrant Certificate**") representing the Warrants will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Warrant Certificate will not be exchangeable for definitive warrant certificates.

9 Meeting of Warrantholder and Modification

(A) *Meetings of Warrantholder.* Notices for convening meetings to consider any matter affecting the Warrantholder's interests will be given to the Warrantholder in accordance with the provisions of Condition 10.

Every question submitted to a meeting of the Warrantholder shall be decided by poll. A meeting may be convened by the Issuer or by the Warrantholder holding not less than 10 per cent. of the Warrants for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Warrantholder) holding or representing not less than 25 per cent. of the Warrants for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Warrantholder) being or representing Warrantholder whatever the number of Warrants so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Warrantholder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Warrantholder shall be binding on all the holders of the Warrants, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Warrantholder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Warrantholders, effect any modification of the terms and conditions of the Warrants or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Warrantholders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 10.

10 Notices

All notices in English and Chinese to the Warrantholder will be validly given if published on the website of the Hong Kong Exchanges and Clearing Limited. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Warrantholders.

11 Liquidation

In the event of a liquidation or dissolution or winding up of the Company or the appointment of a receiver or administrator or analogous person under any applicable law in respect of the whole or substantially the whole of the undertaking, property or assets of the Company, all unexercised Warrants will lapse and shall cease to be valid for any purpose, in the case of a voluntary liquidation, on the effective date of the resolution and, in the case of an involuntary liquidation or dissolution, on the date of the relevant court order or, in the case of the appointment of a liquidator or receiver or administrator or analogous person under any applicable law in respect of the whole or substantially the whole of the undertaking, property or assets, on the date when such appointment is effective but subject (in any such case) to any contrary mandatory requirement of law.

12 Delisting of Company

(A) If at any time the Shares cease to be listed on the Underlying Exchange, the Issuer shall give effect to these Conditions in such manner and make such adjustments to the rights attaching to the Warrants as it shall, in its absolute discretion, consider appropriate to ensure, so far as it is reasonably able to do so, that the interests of the Warrantholder generally are not materially prejudiced as a consequence of such delisting (without considering the individual circumstances of the Warrantholder or the tax or other consequences that may result in any particular jurisdiction).

(B) Without prejudice to the generality of Condition 12(A), where the Shares are or, upon the delisting, become, listed on any other stock exchange, these Conditions may, in the absolute discretion of the Issuer, be amended to the extent necessary to allow for the substitution of that other stock exchange in place of the Underlying Exchange and the Issuer may, without the consent of the Warrantholder, make such adjustments to the entitlements of the Warrantholder on exercise (including, if appropriate, by converting foreign currency amounts at prevailing market rates into the relevant currency) as it shall consider appropriate in the circumstances.

(C) Any adjustment, amendment or determination made by the Issuer pursuant to this Condition 12 shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after they are determined.

13 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Warrantholder, to create and issue further warrants, upon such terms as to issue price, commencement of the exercise period and otherwise as the Issuer may determine so as to form a single series with the Warrants.

14 Illegality or Impracticability

The Issuer is entitled to terminate the Warrants if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or it will become illegal or impracticable:

(A) for it to perform its obligations under the Warrants, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the Warrants due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Warrantholder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each Warrant held by such Warrantholder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made to each Warrantholder in such manner as shall be notified to the Warrantholders in accordance with Condition 10.

15 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

16 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the Warrants.

17 Governing Law

The Warrants, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of the Hong Kong Special Administrative Region of the People's Republic of China ("**Hong Kong**"). The Issuer, the Guarantor and the Warrantholder (by its acquisition of the Warrants) shall be deemed to have submitted for all purposes in connection with the Warrants, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

18 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED WARRANTS OVER SINGLE UNIT TRUST

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global warrant certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of Warrants may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of Warrants. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The Warrants (which expression shall, unless the context otherwise requires, include any further warrants issued pursuant to Condition 13) relating to the Units of the Trust are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**") made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Warrantholders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the Warrants represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

Warrants represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of warrants deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Warrantholders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the Warrants after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of Warrants may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the Warrants. The expression "**Warrantholder**" shall be construed accordingly.

(E) Trading in Warrants on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended prior to the Expiry Date in accordance with the requirements of the Stock Exchange.

2 Warrant Rights and Exercise Expenses

(A) Every Board Lot entitles the Warrantholder, upon compliance with Condition 4, to payment of the Cash Settlement Amount (as defined in Condition 4(C)).

(B) The Warrantholder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the Warrants (the "**Exercise Expenses**"). To effect such payment, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 4(C).

3 Automatic Exercise

(A) Any Warrant in respect of which the Cash Settlement Amount which would be payable by the Issuer if exercised on the Expiry Date shall be deemed to be automatically exercised on the Expiry Date ("**Automatic Exercise**").

(B) Any Warrant which has not been automatically exercised in accordance with Condition 3(A) shall expire immediately without value thereafter and all rights of the Warrantholder and obligations of the Issuer with respect to such Warrant shall cease.

(C) In these Conditions, "**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

4 Exercise of Warrants

(A) Warrants may only be exercised in Board Lots or integral multiples thereof.

(B) Following the Expiry Date the Issuer will, with effect from the first Business Day following the Expiry Date cancel the Global Warrant Certificate.

(C) Subject to an Automatic Exercise in accordance with Condition 3(A), the Issuer will as soon as practicable and not later than the third CCASS Settlement Day after the later of: (i) the Expiry Date; and (ii) the day on which the Average Price is determined in accordance with these Conditions (the "**Settlement Date**") in accordance with these Conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all Warrants exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Warrantholder as appearing in the register kept by or on behalf of the Issuer.

Subject to adjustment as provided in Condition 6, "**Cash Settlement Amount**" means:

In the case of a series of call Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Average Price} - \text{Exercise Price}) \times \text{one Board Lot}}{\text{Number of Warrant(s) per Entitlement}}$$

In the case of a series of put Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Exercise Price} - \text{Average Price}) \times \text{one Board Lot}}{\text{Number of Warrant(s) per Entitlement}}$$

"**Average Price**" shall be the arithmetic mean of the closing prices of one Unit (as derived from the Daily Quotation Sheet of the Stock Exchange, subject to any adjustment to such closing prices as may be necessary to reflect any event as contemplated in Condition 6 such as capitalisation, rights issue, distribution or the like) in respect of each Valuation Date.

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by Hong Kong Securities Clearing Company Limited from time to time.

"**Entitlement**" means the number of Units to which the Warrants relate, as specified in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 6.

"**Market Disruption Event**" means:

(i) the occurrence or existence on any Valuation Date during the one-half hour period that ends at the close of trading of any suspension of, or limitation imposed on, trading (by reason of movements in price exceeding limits permitted by the Stock Exchange or otherwise) on the Stock Exchange in (1) the Units; or (2) any options or futures contracts relating to the Units if, in any such case, such suspension or limitation is, in the determination of the Issuer and/or Agent, material;

(ii) the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "**BLACK**" rainstorm signal on any day which either (i) result in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "**BLACK**" rainstorm signal having been issued; or

(iii) a limitation or closure of the Stock Exchange due to unforeseen circumstances.

"**Valuation Date**" means, subject as provided above in relation to a Market Disruption Event, each of the five Business Days immediately preceding the Expiry Date.

If the Agent determines, in its sole discretion, that a Market Disruption Event has occurred on any Valuation Date, then that Valuation Date shall be postponed until the first succeeding Business Day on which there is no Market Disruption Event irrespective of whether that postponed Valuation Date would fall on a Business Day that already is or is deemed to be a Valuation Date. For the avoidance of doubt, in the event that a Market Disruption Event has occurred and a Valuation Date is postponed as aforesaid, the closing price of the Units on the first succeeding Business Day will be used more than once in determining the Average Price, so that in no event shall there be less than five closing prices used to determine the Average Price.

If the postponement of a Valuation Date as aforesaid would result in the Valuation Date falling on or after the Expiry Date, then:

(i) the Business Day immediately preceding the Expiry Date (the "**Last Valuation Date**") shall be deemed to be the Valuation Date notwithstanding the Market Disruption Event; and

(ii) the Agent shall determine the closing price of the Units on the basis of its good faith estimate of the price that would have prevailed on the Last Valuation Date but for the Market Disruption Event.

Any payment made pursuant to this Condition 4(C) shall be delivered at the risk and expense of the Warrantholder to the Warrantholder, or such bank, broker or agent in Hong Kong (if any) as recorded on the register.

(D) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Warrantholder for any interest in respect of the amount due or any loss or damage that such Warrantholder may suffer as a result of the existence of a Settlement Disruption Event.

(E) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Warrantholder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Warrantholder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 4(C) above.

5 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the Warrants and will not assume any obligation or duty to or any relationship or agency or trust for the Warrantholder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the Warrants are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Warrantholder in accordance with Condition 10.

6 Adjustments

Adjustments may be made by the Agent to the terms of the Warrants (including, but not limited to, the Exercise Price and the Entitlement) on the basis of the following provisions:

(A) (i) If and whenever the Trust shall, by way of Rights (as defined below), offer new Units for subscription at a fixed subscription price to the holders of existing Units pro rata to existing holdings (a "**Rights Offer**"), the Entitlement shall be adjusted on the Business Day on which the trading in the Units of the Trust becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{1 + M}{1 + (R/S) \times M}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Rights Unit price, being the closing price of an existing Unit, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Units are traded on a cum-rights basis

R: Subscription price per new Unit specified in the Rights Offer plus an amount equal to any distributions or other benefits foregone to exercise the Rights

M: Number of new Unit(s) (whether a whole or a fraction) per existing Unit each holder of an existing Unit is entitled to subscribe

For the purposes of these Conditions, "**Rights**" means the right(s) attached to each existing Unit or needed to acquire one new Unit (as the case may be) which are given to a holder of existing Units to subscribe at a fixed subscription price for new Units pursuant to the Rights Offer (whether by the exercise of one Right, a part of a Right or an aggregate number of Rights).

(ii) The Exercise Price (which shall be rounded to the nearest 0.001) shall be adjusted by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same day that the Entitlement is adjusted.

(iii) For the purposes of Conditions 6(A) and 6(B), the Agent may determine that no adjustment will be made if the adjustment to the Entitlement is one per cent. or less of the Entitlement immediately prior to the adjustment, all as determined by the Agent.

(B) If and whenever the Trust shall make an issue of Units credited as fully paid to holders of Units generally by way of capitalisation of profits or reserves (other than pursuant to a scrip distribution or similar scheme for the time being operated by the Trust or otherwise in lieu of a cash distribution) (and without any payment or other consideration being made or given by such holders) (a "**Bonus Issue**"), the Entitlement will be adjusted, subject to Condition 6(A)(iii), on the Business Day on which the trading in the Units of the Trust becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = 1 + N$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

N: Number of additional Units (whether a whole or a fraction) per existing Unit each holder of an existing Unit is entitled to receive

In addition, the Issuer shall adjust the Exercise Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same day that the Entitlement is adjusted.

(C) If and whenever the Trust shall subdivide its Units or any class of its outstanding Units into a greater number of units (a "**Subdivision**") or consolidate the Units or any class of its outstanding Units into a smaller number of units (a "**Consolidation**"), then:

(i) in the case of a Subdivision, the Entitlement shall be increased whereas the Exercise Price (which shall be rounded to the nearest 0.001) shall be decreased in the same ratio as the Subdivision; and

(ii) in the case of a Consolidation, the Entitlement shall be decreased whereas the Exercise Price (which shall be rounded to the nearest 0.001) shall be increased in the same ratio as the Consolidation,

in each case on the day on which the relevant Subdivision or Consolidation (as the case may be) shall have taken effect.

(D) If it is announced that the Trust is to or may merge or consolidate with or into any other trust or corporation (including becoming, by agreement or otherwise, a subsidiary of or controlled by any person or corporation) (except where the Trust is the surviving entity in a merger) or that it is to or may sell or transfer all or substantially all of its assets, the rights attaching to the Warrants may in the absolute discretion of the Agent be amended no later than the Business Day preceding the consummation of such merger, consolidation, sale or transfer (each a "**Restructuring Event**") (as determined by the Agent in its absolute discretion).

The rights attaching to the Warrants after the adjustment shall, after such Restructuring Event, relate to the number of units of the trust(s) resulting from or surviving such Restructuring Event or other securities (the "**Substituted Securities**") and/or cash offered in substitution for the affected Units, as the case may be, to which the holder of such number of Units to which the Warrants related immediately before such Restructuring Event would have been entitled upon such Restructuring Event. Thereafter the provisions hereof shall apply to such Substituted Securities, provided that any Substituted Securities may, in the absolute discretion of the Agent, be deemed to be replaced by an amount in the relevant currency equal to the market value or, if no market value is available, fair value, of such Substituted Securities in each case as determined by the Agent as soon as practicable after such Restructuring Event is effected.

For the avoidance of doubt, any remaining Units shall not be affected by this paragraph (D) and, where cash is offered in substitution for Units or is deemed to replace Substituted Securities as described above, references in these Conditions to the Units shall include any such cash.

(E) No adjustment will be made for an ordinary cash distribution (whether or not it is offered with a scrip alternative) ("**Ordinary Distribution**"). For any other forms of cash distribution ("**Cash Distribution**") announced by the Trust, such as a cash bonus, special distribution or extraordinary distribution, no adjustment will be made unless the value of the Cash Distribution accounts for 2 per cent. or more of the Unit's closing price on the day of announcement by the Trust.

If and whenever the Trust shall make a Cash Distribution credited as fully paid to the holders of Units generally, the Entitlement shall be adjusted to take effect on the Business Day on which trading in the Units becomes ex-entitlement in respect of the relevant Cash Distribution in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{S - OD}{S - OD - CD}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Cash Distribution Unit price, being the closing price of an existing Unit, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Units are traded on a cum-Cash Distribution basis

CD: The Cash Distribution per Unit

OD: The Ordinary Distribution per Unit, provided that the Ordinary Distribution and the Cash Distribution have the same ex-entitlement date. For the avoidance of doubt, the OD shall be zero if the Ordinary Distribution and the Cash Distribution have different ex-entitlement dates

In addition, the Issuer shall adjust the Exercise Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Exercise Price shall take effect on the same date that the Entitlement is adjusted.

(F) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the Warrants as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(G) The Issuer and/or the Agent shall determine any adjustment or amendment and its determination shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after the determination thereof.

7 Purchase by the Issuer

The Issuer and any of its affiliates may purchase Warrants at any time on or after the date of their issue and any Warrants which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

8 Global Warrant Certificate

A global warrant certificate (the "**Global Warrant Certificate**") representing the Warrants will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Warrant Certificate will not be exchangeable for definitive warrant certificates.

9 Meeting of Warrantholder and Modification

(A) *Meetings of Warrantholder.* Notices for convening meetings to consider any matter affecting the Warrantholder's interests will be given to the Warrantholder in accordance with the provisions of Condition 10.

Every question submitted to a meeting of the Warrantholder shall be decided by poll. A meeting may be convened by the Issuer or by the Warrantholder holding not less than 10 per cent. of the Warrants for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Warrantholder) holding or representing not less than 25 per cent. of the Warrants for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Warrantholder) being or representing Warrantholder whatever the number of Warrants so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Warrantholder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Warrantholder shall be binding on all the holders of the Warrants, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Warrantholder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Warrantholders, effect any modification of the terms and conditions of the Warrants or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Warrantholders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 10.

10 Notices

All notices in English and Chinese to the Warrantholder will be validly given if published on the website of the Hong Kong Exchanges and Clearing Limited. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Warrantholders.

11 Termination or Liquidation

In the event of a Termination or the liquidation or dissolution of the trustee of the Trust (including any successor trustee appointed from time to time) ("**Trustee**") (in its capacity as trustee of the Trust) or the appointment of a liquidator, receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the Trustee's undertaking, property or assets all unexercised Warrants will lapse and shall cease to be valid for any purpose. In the case of a Termination the unexercised Warrants will lapse and shall cease to be valid on the effective date of the Termination, in the case of a voluntary liquidation, on the effective date of the resolution and, in the case of an involuntary liquidation or dissolution, on the date of the relevant court order or, in the case of the appointment of a liquidator or receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the Trustee's undertaking, property or assets, on the date when such appointment is effective but subject (in any such case) to any contrary mandatory requirement of law.

For the purpose of this Condition 11, "**Termination**" means (i) the Trust is terminated, or the Trustee or the manager of the Trust (including any successor manager appointed from time to time) ("**Manager**") is required to terminate the Trust under the trust deed ("**Trust Deed**") constituting the Trust or applicable law, or the termination of the Trust commences; (ii) the Trust is held or is conceded by the Trustee or the Manager not to have been constituted or to have been imperfectly constituted; (iii) the Trustee ceases to be authorised under the Trust to hold the property of the Trust in its name and perform its obligations under the Trust Deed; or (iv) the Trust ceases to be authorised as an authorised collective investment scheme under the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong).

12 Delisting of Trust

(A) If at any time the Units cease to be listed on the Stock Exchange, the Issuer shall give effect to these Conditions in such manner and make such adjustments to the rights attaching to the Warrants as it shall, in its absolute discretion, consider appropriate to ensure, so far as it is reasonably able to do so, that the interests of the Warrantholder generally are not materially prejudiced as a consequence of such delisting (without considering the individual circumstances of the Warrantholder or the tax or other consequences that may result in any particular jurisdiction).

(B) Without prejudice to the generality of Condition 12(A), where the Units are or, upon the delisting, become, listed on any other stock exchange, these Conditions may, in the absolute discretion of the Issuer, be amended to the extent necessary to allow for the substitution of that other stock exchange in place of the Stock Exchange and the Issuer may, without the consent of the Warrantholder, make such adjustments to the entitlements of the Warrantholder on exercise (including, if appropriate, by converting foreign currency amounts at prevailing market rates into the relevant currency) as it shall consider appropriate in the circumstances.

(C) Any adjustment, amendment or determination made by the Issuer pursuant to this Condition 12 shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after they are determined.

13 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Warrantholder, to create and issue further warrants, upon such terms as to issue price, commencement of the exercise period and otherwise as the Issuer may determine so as to form a single series with the Warrants.

14 Illegality or Impracticability

The Issuer is entitled to terminate the Warrants if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or it will become illegal or impracticable:

(A) for it to perform its obligations under the Warrants, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the Warrants due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Warrantholder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each Warrant held by such Warrantholder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made to each Warrantholder in such manner as shall be notified to the Warrantholders in accordance with Condition 10.

15 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

16 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the Warrants.

17 Governing Law

The Warrants, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of the Hong Kong Special Administrative Region of the People's Republic of China ("**Hong Kong**"). The Issuer, the Guarantor and the Warrantholder (by its acquisition of the Warrants) shall be deemed to have submitted for all purposes in connection with the Warrants, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

18 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED INDEX WARRANTS

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global warrant certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of Warrants may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of Warrants. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The Warrants (which expression shall, unless the context otherwise requires, include any further warrants issued pursuant to Condition 11) relating to the Index as published by the Index Compiler are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**"), made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Warrantholders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the Warrants represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

Warrants represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of warrants deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Warrantholders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the Warrants after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of Warrants may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the Warrants. The expression "**Warrantholder**" shall be construed accordingly.

(E) Trading in Warrants on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended prior to the Expiry Date in accordance with the requirements of the Stock Exchange.

2 Warrant Rights and Exercise Expenses

(A) Every Board Lot entitles the Warrantholder, upon compliance with Condition 4, to payment of the Cash Settlement Amount (as defined in Condition 4(C)).

(B) The Warrantholder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the Warrants (the "**Exercise Expenses**"). To effect such payments, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 4(C).

3 Automatic Exercise

(A) Any Warrant in respect of which the Cash Settlement Amount which would be payable by the Issuer if exercised on the Expiry Date shall be deemed to be automatically exercised on the Expiry Date ("**Automatic Exercise**").

(B) Any Warrant which has not been automatically exercised in accordance with Condition 3(A) shall expire immediately without value thereafter and all rights of the Warrantholder and obligations of the Issuer with respect to such Warrant shall cease.

(C) In these Conditions, "**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

4 Exercise of Warrants

(A) Warrants may only be exercised in Board Lots or integral multiples thereof.

(B) Following the Expiry Date the Issuer will, with effect from the first Business Day following the Expiry Date cancel the Global Warrant Certificate.

(C) Subject to an Automatic Exercise in accordance with Condition 3(A), the Issuer will as soon as practicable and not later than the third CCASS Settlement Day after the later of: (i) the Expiry Date; and (ii) the day on which the Closing Level is determined in accordance with these Conditions (the "**Settlement Date**") in accordance with these Conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all Warrants exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Warrantholder as appearing in the register kept by or on behalf of the Issuer.

Subject to adjustment as provided in Condition 6, "**Cash Settlement Amount**" means for every Board Lot, an amount calculated by the Issuer in accordance with the following formula, either (i) converted (if applicable) into the Settlement Currency at the Exchange Rate or, as the case may be, (ii) converted into the Interim Currency at the First Exchange Rate and then (if applicable) converted into Settlement Currency at the Second Exchange Rate:

In the case of a series of call Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{(\text{Closing Level} - \text{Strike Level}) \times \text{one Board Lot} \times \text{Index Currency Amount}}{\text{Divisor}}$$

In the case of a series of put Warrants:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{(\text{Strike Level} - \text{Closing Level}) \times \text{one Board Lot} \times \text{Index Currency Amount}}{\text{Divisor}}$$

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by Hong Kong Securities Clearing Company Limited from time to time.

"**Index Business Day**" means a day on which the Index Exchange is scheduled to open for trading for its regular trading sessions.

"**Index Exchange**" means the Stock Exchange or any other exchange as specified in the relevant Launch Announcement and Supplemental Listing Document.

"**Market Disruption Event**" means:

(1) the occurrence or existence, on the Valuation Date during the one-half hour period that ends at the close of trading on the Index Exchange, of any of:

  (i) the suspension or material limitation of the trading of a material number of constituent securities that comprise the Index; or

  (ii) the suspension or material limitation of the trading of options or futures contracts relating to the Index on any exchanges on which such contracts are traded; or

  (iii) the imposition of any exchange controls in respect of any currencies involved in determining the Cash Settlement Amount;

  for the purpose of paragraph (1), (x) the limitation of the number of hours or days of trading will not constitute a Market Disruption Event if it results from an announced change in the regular business hours of any relevant exchange, and (y) a limitation on trading imposed by reason of the movements in price exceeding the levels permitted by any relevant exchange will constitute a Market Disruption Event; or

(2) where the Index Exchange is the Stock Exchange, the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "**BLACK**" rainstorm signal on any day which either (i) results in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior

to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "**BLACK**" rainstorm signal having been issued;

(3) the limitation or closure of the Index Exchange due to any unforeseen circumstances; or

(4) any circumstances beyond the control of the Issuer in which the Closing Level or, if applicable, the Exchange Rate, the First Exchange Rate or the Second Exchange Rate (as the case may be) cannot be determined by the Issuer in the manner set out in these Conditions or in such other manner as the Issuer considers appropriate at such time after taking into account all the relevant circumstances.

"**Settlement Currency**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Valuation Date**" means the date specified as such in the relevant Launch Announcement and Supplemental Listing Document. If the Issuer determines, in its sole discretion, that a Marker Disruption Event has occurred on the Valuation Date, then the Issuer shall determine the Closing Level on the basis of its good faith estimate of the Closing Level that would have prevailed on that day but for the occurrence of the Market Disruption Event provided that the Issuer, if applicable, may, but shall not be obliged to, determine such Closing Level by having regard to the manner in which futures contracts relating to the Index are calculated.

Any payment made pursuant to this Condition 4(C) shall be delivered at the risk and expense of the Warrantholder to the Warrantholder, or such bank, broker or other agent in Hong Kong (if any) as is recorded on the register.

(D) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Warrantholder for any interest in respect of the amount due or any loss or damage that such Warrantholder may suffer as a result of the existence of a Settlement Disruption Event.

(E) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Warrantholder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Warrantholder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 4(C) above.

5 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the Warrants and will not assume any obligation or duty to or any relationship or agency or trust for the Warrantholder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the Warrants are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Warrantholder in accordance with Condition 10.

6 Adjustments

(A) If the Index is (i) not calculated and announced by the Index Compiler but is calculated and published by a successor to the Index Compiler (the "**Successor Index Compiler**") acceptable to the Agent or (ii) replaced by a successor index using, in the determination of the Agent, the same or a substantially similar formula for and method of calculation as used in the calculation of the Index, then the Index will be deemed to be the index so calculated and announced by the Successor Index Compiler or that successor index, as the case may be.

(B) If (i) on or prior to the Valuation Date, the Index Compiler or (if applicable) the Successor Index Compiler makes a material change in the formula for or the method of calculating the Index or in any other way materially modifies the Index (other than a modification prescribed in that formula or method to maintain the Index in the event of changes in constituent securities, contracts or commodities and other routine events), or (ii) on the Valuation Date, the Index Compiler or (if applicable) the Successor Index Compiler fails to calculate and publish the Index (other than as a result of a Market Disruption Event), then the Agent shall determine the Closing Level using, in lieu of a published level for the Index, the level for the Index as at the Valuation Date as determined by the Agent in accordance with the formula for and method of calculating the Index last in effect prior to the change or failure, but using only those securities, contracts or commodities that comprised the Index immediately prior to that change or failure (other than those securities that have since ceased to be listed on the relevant exchange).

(C) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the Warrants as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(D) All determinations made by the Agent pursuant hereto will be conclusive and binding on the Warrantholders. The Issuer will give, or procure that there is given, notice as soon as practicable of any determinations by publication in accordance with Condition 10.

7 Purchase by the Issuer

The Issuer and any of its affiliates may purchase Warrants at any time on or after the date of their issue and any Warrants which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

8 Global Warrant Certificate

A global warrant certificate (the "**Global Warrant Certificate**") representing the Warrants will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Warrant Certificate will not be exchangeable for definitive warrant certificates.

9 Meeting of Warrantholder and Modification

(A) *Meetings of Warrantholder.* Notices for convening meetings to consider any matter affecting the Warrantholder's interests will be given to the Warrantholder in accordance with the provisions of Condition 10.

Every question submitted to a meeting of the Warrantholder shall be decided by poll. A meeting may be convened by the Issuer or by the Warrantholder holding not less than 10 per cent. of the Warrants for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Warrantholder) holding or representing not less than 25 per cent. of the Warrants for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Warrantholder) being or representing Warrantholder whatever the number of Warrants so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Warrantholder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Warrantholder shall be binding on all the holders of the Warrants, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Warrantholder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Warrantholders, effect any modification of the terms and conditions of the Warrants or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Warrantholders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 10.

10 Notices

All notices in English and Chinese to the Warrantholder will be validly given if published on the website of the Hong Kong Exchanges and Clearing Limited. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Warrantholders.

11 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Warrantholder, to create and issue further warrants, upon such terms as to issue price, commencement of the exercise period and otherwise as the Issuer may determine so as to form a single series with the Warrants.

12 Illegality or Impracticability

The Issuer is entitled to terminate the Warrants if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or it will become illegal or impracticable:

(A) for it to perform its obligations under the Warrants, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the Warrants due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Warrantholder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each Warrant held by such Warrantholder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made to each Warrantholder in such manner as shall be notified to the Warrantholders in accordance with Condition 10.

13 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

14 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the Warrants.

15 Governing Law

The Warrants, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of the Hong Kong Special Administrative Region of the People's Republic of China ("**Hong Kong**"). The Issuer, the Guarantor and the Warrantholder (by its acquisition of the Warrants) shall be deemed to have submitted for all purposes in connection with the Warrants, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

16 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED STOCK INLINE WARRANTS

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global warrant certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of Inline Warrants may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of Inline Warrants. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The Inline Warrants (which expression shall, unless the context otherwise requires, include any further warrants issued pursuant to Condition 13) relating to the Shares of the Company are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**") made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Warrantholders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the Inline Warrants represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and *pari passu* with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

Inline Warrants represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of warrants deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Warrantholders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the Inline Warrants after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of Inline Warrants may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the Inline Warrants. The expression "**Warrantholder**" shall be construed accordingly.

(E) Trading in Inline Warrants on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended prior to the Expiry Date in accordance with the requirements of the Stock Exchange.

2 Inline Warrant Rights and Exercise Expenses

(A) Every Board Lot entitles the Warrantholder, upon compliance with Condition 4, to payment of the Cash Settlement Amount (as defined in Condition 4(C)).

(B) The Warrantholder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the Inline Warrants (the "**Exercise Expenses**"). To effect such payment, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 4(C).

3 Automatic Exercise

(A) All Inline Warrants shall be deemed to be automatically exercised on the Expiry Date.

(B) In these Conditions, "**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

4 Exercise of Inline Warrants

(A) Inline Warrants may only be exercised in Board Lots or integral multiples thereof.

(B) Following the Expiry Date the Issuer will, with effect from the first Business Day following the Expiry Date cancel the Global Warrant Certificate.

(C) The Issuer will as soon as practicable and not later than the third CCASS Settlement Day after the later of: (i) the Expiry Date; and (ii) the day on which the Average Price is determined in accordance with these Conditions (the "**Settlement Date**") in accordance with these Conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all Inline Warrants exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Warrantholder as appearing in the register kept by or on behalf of the Issuer.

Subject to adjustment as provided in Condition 6, "**Cash Settlement Amount**" means EITHER:

(1) if the Average Price is at or below the Upper Strike Price and at or above the Lower Strike Price:

Cash Settlement Amount per Board Lot	=	Maximum Payoff Amount per Inline Warrant x one Board Lot

OR

(2) if the Average Price is above the Upper Strike Price or below the Lower Strike Price,

$$\text{Cash Settlement Amount per Board Lot} = \text{Minimum Payoff Amount per Inline Warrant} \times \text{one Board Lot}$$

"**Average Price**" shall be the arithmetic mean of the closing prices of one Share (as derived from the Daily Quotation Sheet of the Stock Exchange, subject to any adjustment to such closing prices as may be necessary to reflect any event as contemplated in Condition 6 such as capitalisation, rights issue, distribution or the like) in respect of each Valuation Date.

"**CCASS Settlement Day**" has the meaning ascribed to the term "Settlement Day" in the CCASS Rules, subject to such modification and amendment prescribed by Hong Kong Securities Clearing Company Limited from time to time.

"**Lower Strike Price**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 6.

"**Market Disruption Event**" means:

(i) the occurrence or existence on any Valuation Date during the one-half hour period that ends at the close of trading of any suspension of, or limitation imposed on, trading (by reason of movements in price exceeding limits permitted by the Stock Exchange or otherwise) on the Stock Exchange in (1) the Shares; or (2) any options or futures contracts relating to the Shares if, in any such case, such suspension or limitation is, in the determination of the Issuer and/or Agent, material;

(ii) the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "BLACK" rainstorm signal on any day which either (i) result in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "BLACK" rainstorm signal having been issued; or

(iii) a limitation or closure of the Stock Exchange due to unforeseen circumstances.

"**Maximum Payoff Amount per Inline Warrant**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Minimum Payoff Amount per Inline Warrant**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Upper Strike Price**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 6.

"**Valuation Date**" means, subject as provided above in relation to a Market Disruption Event, each of the five Business Days immediately preceding the Expiry Date.

If the Agent determines, in its sole discretion, that a Market Disruption Event has occurred on any Valuation Date, then that Valuation Date shall be postponed until the first succeeding Business Day on which there is no Market Disruption Event irrespective of whether that postponed Valuation Date would fall on a Business Day that already is or is deemed to be a Valuation Date. For the avoidance of doubt, in the event that a Market Disruption Event has occurred and a Valuation Date is postponed as aforesaid, the closing price of the Shares on the first succeeding Business Day will be used more than once in determining the Average Price, so that in no event shall there be less than five closing prices used to determine the Average Price.

If the postponement of a Valuation Date as aforesaid would result in the Valuation Date falling on or after the Expiry Date, then:

(i) the Business Day immediately preceding the Expiry Date (the "**Last Valuation Date**") shall be deemed to be the Valuation Date notwithstanding the Market Disruption Event; and

(ii) the Agent shall determine the closing price of the Shares on the basis of its good faith estimate of the price that would have prevailed on the Last Valuation Date but for the Market Disruption Event.

Any payment made pursuant to this Condition 4(C) shall be delivered at the risk and expense of the Warrantholder to the Warrantholder, or such bank, broker or agent in Hong Kong (if any) as recorded on the register.

(D) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Warrantholder for any interest in respect of the amount due or any loss or damage that such Warrantholder may suffer as a result of the existence of a Settlement Disruption Event.

(E) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Warrantholder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Warrantholder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 4(C) above.

5 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the Inline Warrants and will not assume any obligation or duty to or any relationship or agency or trust for the Warrantholder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the Inline Warrants are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Warrantholder in accordance with Condition 10.

6 Adjustments

(A) If and whenever the Company shall, by way of Rights (as defined below), offer new Shares for subscription at a fixed subscription price to the holders of existing Shares pro rata to existing holdings (a "**Rights Offer**"), the Upper Strike Price and the Lower Strike Price (which shall be rounded to the nearest 0.001) shall be adjusted on the Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

Adjusted Upper Strike Price = Existing Upper Strike Price ÷ Adjustment Factor

Adjusted Lower Strike Price = Existing Lower Strike Price ÷ Adjustment Factor

Where:

$$\text{Adjustment Factor} = \frac{1+M}{1 + (R/S) \times M}$$

S: Cum-Rights Share price, being the closing price of an existing Share, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Shares are traded on a cum-Rights basis

R: Subscription price per new Share specified in the Rights Offer plus an amount equal to any dividends or other benefits foregone to exercise the Rights

M: Number of new Shares (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to subscribe

Provided that no adjustment will be made if the Adjustment Factor is equal to or less than 1.

For the purposes of these Conditions, "**Rights**" means the right(s) attached to each existing Share or needed to acquire one new Share (as the case may be) which are given to a holder of existing Shares to subscribe at a fixed subscription price for new Shares pursuant to the Rights Offer (whether by the exercise of one Right, a part of a Right or an aggregate number of Rights).

For the avoidance of doubt, the entitlement of the Inline Warrants is always 1 Share and no adjustment will be made to the entitlement.

(B) If and whenever the Company shall make an issue of Shares credited as fully paid to holders of Shares generally by way of capitalisation of profits or reserves (other than pursuant to a scrip dividend or similar scheme for the time being operated by the Company or otherwise in lieu of a cash dividend) (and without any payment or other consideration being made or given by such holders) (a "**Bonus Issue**"), the Upper Strike Price and the Lower Strike Price (which shall be rounded to the nearest 0.001) will be adjusted on the Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

Adjusted Upper Strike Price = Existing Upper Strike Price ÷ Adjustment Factor

Adjusted Lower Strike Price = Existing Lower Strike Price ÷ Adjustment Factor

Where:

Adjustment Factor = 1 + N

N: Number of additional Shares (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to receive

For the avoidance of doubt, the entitlement of the Inline Warrants is always 1 Share and no adjustment will be made to the entitlement.

(C) If and whenever the Company shall subdivide its outstanding share capital into a greater number of shares (a "**Subdivision**") or consolidate its outstanding share capital into a smaller number of shares (a "**Consolidation**"), then:

(i) in the case of a Subdivision, the Upper Strike Price and the Lower Strike Price (which shall be rounded to the nearest 0.001) shall be decreased in the same ratio as the Subdivision; and

(ii) in the case of a Consolidation, the Upper Strike Price and the Lower Strike Price (which shall be rounded to the nearest 0.001) shall be increased in the same ratio as the Consolidation,

in each case on the day on which the relevant Subdivision or Consolidation (as the case may be) shall have taken effect.

For the avoidance of doubt, the entitlement of the Inline Warrants is always 1 Share and no adjustment will be made to the entitlement.

(D) If it is announced that the Company is to or may merge or consolidate with or into any other corporation (including becoming, by agreement or otherwise, a subsidiary of or controlled by any person or corporation) (except where the Company is the surviving corporation in a merger) or that it is to or may sell or transfer all or substantially all of its assets, the rights attaching to the Inline Warrants may in the absolute discretion of the Agent be amended no later than the Business Day preceding the consummation of such merger, consolidation, sale or transfer (each a "**Restructuring Event**") (as determined by the Agent in its absolute discretion) so that the interests of the holders generally are not materially prejudiced as a consequence of such Restructuring Event (without considering the individual circumstances of any holder or the tax or other consequences that may result in any particular jurisdiction).

For the avoidance of doubt, the entitlement of the Inline Warrants is always 1 Share and no adjustment will be made to the entitlement.

(E) No adjustment will be made for an ordinary cash dividend (whether or not it is offered with a scrip alternative) ("**Ordinary Dividend**"). For any other forms of cash distribution ("**Cash Distribution**") announced by the Company, such as a cash bonus, special dividend or extraordinary dividend, no adjustment will be made unless the value of the Cash Distribution accounts for 2 per cent. or more of the Share's closing price on the day of announcement by the Company.

If and whenever the Company shall make a Cash Distribution credited as fully paid to the holders of Shares generally, the Upper Strike Price and the Lower Strike Price (which shall be rounded to the nearest 0.001) shall be adjusted to take effect on the Business Day on which trading in the Shares becomes ex-entitlement in respect of the relevant Cash Distribution in accordance with the following formula:

Adjusted Upper Strike Price = Existing Upper Strike Price ÷ Adjustment Factor

Adjusted Lower Strike Price = Existing Lower Strike Price ÷ Adjustment Factor

Where:

$$\text{Adjustment Factor} = \frac{S - OD}{S - OD - CD}$$

S: Cum-Cash Distribution Share price, being the closing price of an existing Share, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Shares are traded on a cum-Cash Distribution basis

CD: The Cash Distribution per Share

OD: The Ordinary Dividend per Share, provided that the Ordinary Dividend and the Cash Distribution have the same ex-entitlement date. For the avoidance of doubt, the OD shall be zero if the Ordinary Dividend and the Cash Distribution have different ex-entitlement dates

For the avoidance of doubt, the entitlement of the Inline Warrants is always 1 Share and no adjustment will be made to the entitlement.

(F) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the Inline Warrants as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

For the avoidance of doubt, the entitlement of the Inline Warrants is always 1 Share and no adjustment will be made to the entitlement.

(G) The Issuer and/or the Agent shall determine any adjustment or amendment and its determination shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after the determination thereof.

7 Purchase by the Issuer

The Issuer and any of its affiliates may purchase Inline Warrants at any time on or after the date of their issue and any Inline Warrants which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

8 Global Warrant Certificate

A global warrant certificate (the "**Global Warrant Certificate**") representing the Inline Warrants will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Warrant Certificate will not be exchangeable for definitive warrant certificates.

9 Meeting of Warrantholder and Modification

(A) *Meetings of Warrantholder*. Notices for convening meetings to consider any matter affecting the Warrantholder's interests will be given to the Warrantholder in accordance with the provisions of Condition 10.

Every question submitted to a meeting of the Warrantholder shall be decided by poll. A meeting may be convened by the Issuer or by the Warrantholder holding not less than 10 per cent. of the Inline Warrants for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Warrantholder) holding or representing not less than 25 per cent. of the Inline Warrants for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Warrantholder) being or representing Warrantholder whatever the number of Inline Warrants so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Warrantholder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Warrantholder shall be binding on all the holders of the Inline Warrants, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Warrantholder being held if passed unanimously.

(B) *Modification*. The Issuer may, without the consent of the Warrantholders, effect any modification of the terms and conditions of the Inline Warrants or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Warrantholders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 10.

10 Notices

All notices in English and Chinese to the Warrantholder will be validly given if published on the website of the Hong Kong Exchanges and Clearing Limited. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Warrantholders.

11 Liquidation

In the event of a liquidation or dissolution or winding up of the Company or the appointment of a receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the undertaking, property or assets of the Company, all unexercised Inline Warrants will lapse and shall cease to be valid for any purpose, in the case of a voluntary liquidation, on the effective date of the resolution and, in the case of an involuntary liquidation or dissolution, on the date of the relevant court order or, in the case of the appointment of a liquidator or receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the undertaking, property or assets, on the date when such appointment is effective but subject (in any such case) to any contrary mandatory requirement of law.

12 Delisting of Company

(A) If at any time the Shares cease to be listed on the Stock Exchange, the Issuer shall give effect to these Conditions in such manner and make such adjustments to the rights attaching to the Inline Warrants as it shall, in its absolute discretion, consider appropriate to ensure, so far as it is reasonably able to do so, that the interests of the Warrantholder generally are not materially prejudiced as a consequence of such delisting (without considering the individual circumstances of the Warrantholder or the tax or other consequences that may result in any particular jurisdiction).

(B) Without prejudice to the generality of Condition 12(A), where the Shares are or, upon the delisting, become, listed on any other stock exchange, these Conditions may, in the absolute discretion of the Issuer, be amended to the extent necessary to allow for the substitution of that other stock exchange in place of the Stock Exchange and the Issuer may, without the consent of the Warrantholder, make such adjustments to the entitlements of the Warrantholder on exercise (including, if appropriate, by converting foreign currency amounts at prevailing market rates into the relevant currency) as it shall consider appropriate in the circumstances.

(C) Any adjustment, amendment or determination made by the Issuer pursuant to this Condition 12 shall be conclusive and binding on the Warrantholder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Warrantholder in accordance with Condition 10 as soon as practicable after they are determined.

13 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Warrantholder, to create and issue further warrants, upon such terms as to issue price, commencement of the exercise period and otherwise as the Issuer may determine so as to form a single series with the Inline Warrants.

14 Illegality or Impracticability

The Issuer is entitled to terminate the Inline Warrants if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or it will become illegal or impracticable:

(A) for it to perform its obligations under the Inline Warrants, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the Inline Warrants due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Warrantholder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each Inline Warrant held by such Warrantholder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made to each Warrantholder in such manner as shall be notified to the Warrantholders in accordance with Condition 10.

15 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

16 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the Inline Warrants.

17 Governing Law

The Inline Warrants, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of the Hong Kong Special Administrative Region of the People's Republic of China ("**Hong Kong**"). The Issuer, the Guarantor and the Warrantholder (by its acquisition of the Inline Warrants) shall be deemed to have submitted for all purposes in connection with the Inline Warrants, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

18 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED INDEX INLINE WARRANTS

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global warrant certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of Inline Warrants may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of Inline Warrants. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The Inline Warrants (which expression shall, unless the context otherwise requires, include any further warrants issued pursuant to Condition 11) relating to the Index as published by the Index Compiler are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**"), made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Warrantholders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the Inline Warrants represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and *pari passu* with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

Inline Warrants represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of warrants deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Warrantholders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the Inline Warrants after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of Inline Warrants may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the Inline Warrants. The expression "**Warrantholder**" shall be construed accordingly.

(E) Trading in Inline Warrants on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended prior to the Expiry Date in accordance with the requirements of the Stock Exchange.

2 Inline Warrant Rights and Exercise Expenses

(A) Every Board Lot entitles the Warrantholder, upon compliance with Condition 4, to payment of the Cash Settlement Amount (as defined in Condition 4(C)).

(B) The Warrantholder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the Inline Warrants (the "**Exercise Expenses**"). To effect such payments, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 4(C).

3 Automatic Exercise

(A) All Inline Warrants shall be deemed to be automatically exercised on the Expiry Date.

(B) In these Conditions, "**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

4 Exercise of Inline Warrants

(A) Inline Warrants may only be exercised in Board Lots or integral multiples thereof.

(B) Following the Expiry Date the Issuer will, with effect from the first Business Day following the Expiry Date cancel the Global Warrant Certificate.

(C) The Issuer will as soon as practicable and not later than the third CCASS Settlement Day after the later of: (i) the Expiry Date; and (ii) the day on which the Closing Level is determined in accordance with these Conditions (the "**Settlement Date**") in accordance with these Conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all Inline Warrants exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Warrantholder as appearing in the register kept by or on behalf of the Issuer.

Subject to adjustment as provided in Condition 6, "**Cash Settlement Amount**" means EITHER:

(1) if the Closing Level is at or below the Upper Strike Level and at or above the Lower Strike Level:

Cash Settlement Amount per Board Lot	=	Maximum Payoff Amount per Inline Warrant x one Board Lot

OR

(2) if the Closing Level is above the Upper Strike Level or below the Lower Strike Level:

$$\text{Cash Settlement Amount per Board Lot} = \text{Minimum Payoff Amount per Inline Warrant} \times \text{one Board Lot}$$

either (i) converted (if applicable) into the Settlement Currency at the Exchange Rate or, as the case may be, (ii) converted into the Interim Currency at the First Exchange Rate and then (if applicable) converted into Settlement Currency at the Second Exchange Rate;

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by Hong Kong Securities Clearing Company Limited from time to time.

"**Index Business Day**" means a day on which the Index Exchange is scheduled to open for trading for its regular trading sessions.

"**Index Exchange**" means the Stock Exchange or any other exchange as specified in the relevant Launch Announcement and Supplemental Listing Document.

"**Lower Strike Level**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Market Disruption Event**" means:

(1) the occurrence or existence, on the Valuation Date during the one-half hour period that ends at the close of trading on the Index Exchange, of any of:

(i) the suspension or material limitation of the trading of a material number of constituent securities that comprise the Index; or

(ii) the suspension or material limitation of the trading of options or futures contracts relating to the Index on any exchanges on which such contracts are traded; or

(iii) the imposition of any exchange controls in respect of any currencies involved in determining the Cash Settlement Amount;

for the purpose of paragraph (1), (x) the limitation of the number of hours or days of trading will not constitute a Market Disruption Event if it results from an announced change in the regular business hours of any relevant exchange, and (y) a limitation on trading imposed by reason of the movements in price exceeding the levels permitted by any relevant exchange will constitute a Market Disruption Event; or

(2) where the Index Exchange is the Stock Exchange, the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "**BLACK**" rainstorm signal on any day which either (i) results in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "**BLACK**" rainstorm signal having been issued;

(3) the limitation or closure of the Index Exchange due to any unforeseen circumstances; or

(4) any circumstances beyond the control of the Issuer in which the Closing Level or, if applicable, the Exchange Rate, the First Exchange Rate or the Second Exchange Rate (as the case may be) cannot be determined by the Issuer in the manner set out in these Conditions or in such other manner as the Issuer considers appropriate at such time after taking into account all the relevant circumstances.

"**Maximum Payoff Amount per Inline Warrant**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Minimum Payoff Amount per Inline Warrant**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Settlement Currency**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Upper Strike Level**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Valuation Date**" means the date specified as such in the relevant Launch Announcement and Supplemental Listing Document. If the Issuer determines, in its sole discretion, that a Marker Disruption Event has occurred on the Valuation Date, then the Issuer shall determine the Closing Level on the basis of its good faith estimate of the Closing Level that would have prevailed on that day but for the occurrence of the Market Disruption Event provided that the Issuer, if applicable, may, but shall not be obliged to, determine such Closing Level by having regard to the manner in which futures contracts relating to the Index are calculated.

Any payment made pursuant to this Condition 4(C) shall be delivered at the risk and expense of the Warrantholder to the Warrantholder, or such bank, broker or other agent in Hong Kong (if any) as is recorded on the register.

(D) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Warrantholder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Warrantholder for any interest in respect of the amount due or any loss or damage that such Warrantholder may suffer as a result of the existence of a Settlement Disruption Event.

(E) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Warrantholder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Warrantholder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 4(C) above.

5 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the Inline Warrants and will not assume any obligation or duty to or any relationship or agency or trust for the Warrantholder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the Inline Warrants are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Warrantholder in accordance with Condition 10.

6 Adjustments

(A) If the Index is (i) not calculated and announced by the Index Compiler but is calculated and published by a successor to the Index Compiler (the "**Successor Index Compiler**") acceptable to the Agent or (ii) replaced by a successor index using, in the determination of the Agent, the same or a substantially similar formula for and method of calculation as used in the calculation of the Index, then the Index will be deemed to be the index so calculated and announced by the Successor Index Compiler or that successor index, as the case may be.

(B) If (i) on or prior to the Valuation Date, the Index Compiler or (if applicable) the Successor Index Compiler makes a material change in the formula for or the method of calculating the Index or in any other way materially modifies the Index (other than a modification prescribed in that formula or method to maintain the Index in the event of changes in constituent securities, contracts or commodities and other routine events), or (ii) on the Valuation Date, the Index Compiler or (if applicable) the Successor Index Compiler fails to calculate and publish the Index (other than as a result of a Market Disruption Event), then the Agent shall determine the Closing Level using, in lieu of a published level for the Index, the level for the Index as at the Valuation Date as determined by the Agent in accordance with the formula for and method of calculating the Index last in effect prior to the change or failure, but using only those securities, contracts or commodities that comprised the Index immediately prior to that change or failure (other than those securities that have since ceased to be listed on the relevant exchange).

(C) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the Inline Warrants as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(D) All determinations made by the Agent pursuant hereto will be conclusive and binding on the Warrantholders. The Issuer will give, or procure that there is given, notice as soon as practicable of any determinations by publication in accordance with Condition 10.

7 Purchase by the Issuer

The Issuer and any of its affiliates may purchase Inline Warrants at any time on or after the date of their issue and any Inline Warrants which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

8 Global Warrant Certificate

A global warrant certificate (the "**Global Warrant Certificate**") representing the Inline Warrants will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Warrant Certificate will not be exchangeable for definitive warrant certificates.

9 Meeting of Warrantholder and Modification

(A) Meetings of Warrantholder. Notices for convening meetings to consider any matter affecting the Warrantholder's interests will be given to the Warrantholder in accordance with the provisions of Condition 10.

Every question submitted to a meeting of the Warrantholder shall be decided by poll. A meeting may be convened by the Issuer or by the Warrantholder holding not less than 10 per cent. of the Inline Warrants for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Warrantholder) holding or representing not less than 25 per cent. of the Inline Warrants for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Warrantholder) being or representing Warrantholder whatever the number of Inline Warrants so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Warrantholder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Warrantholder shall be binding on all the holders of the Inline Warrants, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Warrantholder being held if passed unanimously.

(B) Modification. The Issuer may, without the consent of the Warrantholders, effect any modification of the terms and conditions of the Inline Warrants or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Warrantholders generally (without considering the circumstances of any individual Warrantholder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Warrantholders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 10.

10 Notices

All notices in English and Chinese to the Warrantholder will be validly given if published on the website of the Hong Kong Exchanges and Clearing Limited. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Warrantholders.

11 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Warrantholder, to create and issue further warrants, upon such terms as to issue price, commencement of the exercise period and otherwise as the Issuer may determine so as to form a single series with the Inline Warrants.

12 Illegality or Impracticability

The Issuer is entitled to terminate the Inline Warrants if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or it will become illegal or impracticable:

(A) for it to perform its obligations under the Inline Warrants, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the Inline Warrants due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Warrantholder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each Inline Warrant held by such Warrantholder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made to each Warrantholder in such manner as shall be notified to the Warrantholders in accordance with Condition 10.

13 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

14 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the Inline Warrants.

15 Governing Law

The Inline Warrants, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of the Hong Kong Special Administrative Region of the People's Republic of China ("Hong Kong"). The Issuer, the Guarantor and the Warrantholder (by its acquisition of the Inline Warrants) shall be deemed to have submitted for all purposes in connection with the Inline Warrants, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

16 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED CALLABLE BULL/BEAR CONTRACTS OVER SINGLE STOCK

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of CBBCs may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of CBBCs. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The CBBCs (which expression shall, unless the context otherwise requires, include any further CBBCs issued pursuant to Condition 12) relating to the Shares of the Company are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**") made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Holders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the CBBCs represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

CBBCs represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of CBBCs deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Holders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the CBBCs after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of CBBCs may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the CBBCs. The expression "**Holder**" shall be construed accordingly.

(E) Trading in CBBCs on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended immediately upon the occurrence of a Mandatory Call Event or at the close of trading for the Trading Day immediately preceding the Expiry Date (whichever is earlier) in accordance with the requirements of the Stock Exchange.

2 CBBC Rights and Exercise Expenses

(A) Every Board Lot entitles the Holder, upon compliance with Condition 3, to payment of the Cash Settlement Amount.

(B) The Holder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the CBBCs (the "**Exercise Expenses**"). To effect such payment, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 3(E).

(C) For the purposes of these Conditions:

"**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

"**Cash Settlement Amount**" means, subject to adjustment as provided in Condition 5:

(a) following a Mandatory Call Event:

(i) in the case of a series of Category R CBBCs, the Residual Value; or

(ii) in the case of a series of Category N CBBCs, zero; and

(b) at expiry:

(i) in the case of a series of bull CBBCs:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Closing Price} - \text{Strike Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

(ii) in the case of a series of bear CBBCs:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Strike Price} - \text{Closing Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

For the avoidance of doubt, if the Cash Settlement Amount is a negative figure, it shall be deemed to be zero.

"**Category N CBBCs**" means a series of CBBCs where the Call Price is equal to the Strike Price.

"**Category R CBBCs**" means a series of CBBCs where the Call Price is different from the Strike Price.

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by HKSCC from time to time.

"**Closing Price**" means the closing price of one Share (as derived from the Daily Quotation Sheet of the Stock Exchange, subject to any adjustment to such closing price as may be necessary to reflect any event as contemplated in Condition 5 such as capitalisation, rights issue, distribution or the like) on the Valuation Date.

"**Day of Notification**" means the Trading Day immediately following the day on which the Mandatory Call Event occurs.

"**Entitlement**" means the number of Shares to which the CBBCs relate, as specified in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 5.

"**HKEX**" means Hong Kong Exchanges and Clearing Limited.

"**HKSCC**" means Hong Kong Securities Clearing Company Limited.

"**Hong Kong**" means the Hong Kong Special Administrative Region of the People's Republic of China.

"**Mandatory Call Event**" occurs when the Spot Price is, at any time on any Trading Day during the Observation Period:

(a) in the case of a series of bull CBBCs, at or below the Call Price; and

(b) in the case of a series of bear CBBCs, at or above the Call Price.

"**Market Disruption Event**" means:

(1) the occurrence or existence on any Trading Day during the one-half hour period that ends at the close of trading of any suspension of, or limitation imposed on, trading (by reason of movements in price exceeding limits permitted by the Stock Exchange or otherwise) on the Stock Exchange in (1) the Shares; or (2) any options or futures contracts relating to the Shares if, in any such case, such suspension or limitation is, in the determination of the Issuer and/or Agent, material;

(2) the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "**BLACK**" rainstorm signal by the Hong Kong Observatory on any day which (i) results in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "**BLACK**" rainstorm signal having been issued; or

(3) a limitation or closure of the Stock Exchange due to any unforeseen circumstances.

"**Maximum Trade Price**" means the highest Spot Price (subject to any adjustment to such Spot Price as may be necessary to reflect any event as contemplated in Condition 5 such as capitalisation, rights issue, distribution or the like) during the MCE Valuation Period.

"**MCE Valuation Period**" means the period commencing from and including the moment upon which the Mandatory Call Event occurs (the trading session during which the Mandatory Call Event occurs is the "**1st Session**") and up to the end of the trading session on the Stock Exchange immediately following the 1st Session ("**2nd Session**") unless, in the determination of the Issuer in its good faith, the 2nd Session for any reason (including, without limitation, a Market Disruption Event occurring and subsisting in the 2nd Session) does not contain any continuous period of 1 hour or more than 1 hour during which trading in the Shares is permitted on the Stock Exchange with no limitation imposed, the MCE Valuation Period shall be extended to the end of the subsequent trading session following the 2nd Session during which trading in the Shares is permitted on the Stock Exchange with no limitation imposed for a continuous period of at least 1 hour notwithstanding the existence or continuance of a Market Disruption Event in such postponed trading session, unless the Issuer determines in its good faith that each trading session on each of the four Trading Days immediately following the day on which the Mandatory Call Event occurs does not contain any continuous period of 1 hour or more than 1 hour during which trading in the Shares is permitted on the Stock Exchange with no limitation imposed. In that case:

(a) the period commencing from the 1st Session up to, and including, the last trading session on the Stock Exchange of the fourth Trading Day immediately following the date on which the Mandatory Call Event occurs shall be deemed to be the MCE Valuation Period; and

(b) the Issuer shall determine the Maximum Trade Price or the Minimum Trade Price (as the case may be) having regard to the then prevailing market conditions, the last reported Spot Price of the Shares and such other factors as the Issuer may determine to be relevant in its good faith.

For the avoidance of doubt, all Spot Prices available throughout the extended MCE Valuation Period shall be taken into account to determine the Maximum Trade Price or the Minimum Trade Price (as the case may be) for the calculation of the Residual Value.

For the purposes of this definition:

(A) the pre-opening session, the morning session and, in the case of half day trading, the closing auction session (if applicable) of the same day; and

(B) the afternoon session and the closing auction session (if applicable) of the same day,

shall each be considered as one trading session.

"**Minimum Trade Price**" means the lowest Spot Price (subject to any adjustment to such Spot Price as may be necessary to reflect any event as contemplated in Condition 5 such as capitalisation, rights issue, distribution or the like) during the MCE Valuation Period.

"**Observation Period**" means the period commencing from and including the Observation Commencement Date (Hong Kong time) and ending at and including the close of trading (Hong Kong time) on the Trading Day immediately preceding the Expiry Date.

"**Post MCE Trades**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document, subject to such modification and amendment prescribed by the Stock Exchange from time to time.

"**Residual Value**" means, subject to adjustment as provided in Condition 5:

(a) in the case of a series of bull CBBCs:

$$\text{Residual Value per Board Lot} = \frac{\text{Entitlement} \times (\text{Minimum Trade Price} - \text{Strike Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

(b) in the case of a series of bear CBBCs:

$$\text{Residual Value per Board Lot} = \frac{\text{Entitlement} \times (\text{Strike Price} - \text{Maximum Trade Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

"**Settlement Date**" means the third CCASS Settlement Day after (i) the end of the MCE Valuation Period or (ii) the later of: (a) the Expiry Date; and (b) the day on which the Closing Price is determined in accordance with these Conditions (as the case may be).

"**Spot Price**" means:

(a) in respect of a continuous trading session of the Stock Exchange, the price per Share concluded by means of automatic order matching on the Stock Exchange as reported in the official realtime dissemination mechanism for the Stock Exchange during such continuous trading session of the Stock Exchange in accordance with the Trading Rules, excluding direct business (as defined in the Trading Rules); and

(b) in respect of a pre-opening session or a closing auction session (if applicable) of the Stock Exchange (as the case may be), the final Indicative Equilibrium Price (IEP) (as defined in the Trading Rules) of the Share (if any) calculated at the end of the pre-order matching period of such pre-opening session or closing auction session (if applicable) (as the case may be) in accordance with the Trading Rules, excluding direct business (as defined in the Trading Rules),

subject to such modification and amendment prescribed by the Stock Exchange from time to time.

"**Trading Day**" means a day on which the Stock Exchange is scheduled to be open for trading for its regular trading sessions.

"**Trading Rules**" means the Rules and Regulations of the Exchange prescribed by the Stock Exchange from time to time.

"**Valuation Date**" means the Trading Day immediately preceding the Expiry Date unless the Issuer determines, in its sole discretion, that a Market Disruption Event has occurred, then that day shall be postponed until the first succeeding Trading Day on which there is no Market Disruption Event, unless the Issuer determines that there is a Market Disruption Event occurring on each of the four Trading Days immediately following the original date which (but for the Market Disruption Event) would have been the Valuation Date. In that case:

(i) the fourth Trading Day immediately following the original date shall be deemed to be the Valuation Date (regardless of the Market Disruption Event); and

(ii) the Issuer shall determine the Closing Price having regard to the then prevailing market conditions, the last reported trading price of the Share on the Stock Exchange and such other factors as the Issuer determines to be relevant.

3 Exercise of CBBCs

(A) CBBCs may only be exercised in Board Lots or integral multiples thereof.

(B) If no Mandatory Call Event has occurred during the Observation Period, the CBBCs will be deemed to be automatically exercised on the Expiry Date.

(C) (i) Subject to Condition 3(C)(ii), following the occurrence of a Mandatory Call Event, the CBBCs will terminate automatically and the Issuer shall have no further obligation under the CBBCs except for the payment of the Cash Settlement Amount (if any) following the Mandatory Call Event on the relevant Settlement Date. The Issuer will give notice to the Holders in accordance with Condition 9. Trading in the CBBCs will be suspended immediately upon the occurrence of a Mandatory Call Event and any Post MCE Trades will be cancelled and will not be recognised by the Stock Exchange.

(ii) A Mandatory Call Event is irrevocable unless it is triggered as a result of any of the following events:

(1) system malfunction or other technical errors of HKEX (such as the setting up of wrong Call Price and other parameters); or

(2) manifest errors caused by the relevant third party price source where applicable;

and

(a) in the case of paragraph (1) above, such event is reported by the Stock Exchange to the Issuer and the Issuer and the Stock Exchange mutually agree that such Mandatory Call Event is to be revoked; and

(b) in the case of paragraph (2) above, such event is reported by the Issuer to the Stock Exchange and the Issuer and the Stock Exchange mutually agree that such Mandatory Call Event is to be revoked,

in each case:

(aa) such mutual agreement must be reached no later than 30 minutes before the commencement of trading (including the pre-opening session) (Hong Kong time) or such other time frame as prescribed by the Stock Exchange from time to time on the Day of Notification;

(bb) the Mandatory Call Event so triggered will be reversed; and

(cc) all cancelled trades (if any) will be reinstated and trading of the CBBCs will resume no later than the Trading Day immediately following the Day of Notification in accordance with the rules prescribed by the Stock Exchange from time to time.

(D) Upon exercise following a Mandatory Call Event or on the Expiry Date in accordance with these Conditions, the Issuer will, with effect from the first Business Day following the MCE Valuation Period or the Expiry Date, as the case may be, cancel the Global Certificate.

(E) Upon exercise following a Mandatory Call Event or on the Expiry Date in accordance with these Conditions, the Issuer will as soon as practicable and not later than the Settlement Date in accordance with these conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all CBBCs exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Holder as appearing in the register kept by or on behalf of the Issuer.

Any payment made pursuant to this Condition 3(E) shall be delivered at the risk and expense of the Holder to the Holder, or such bank, broker or agent in Hong Kong (if any) as recorded on the register.

(F) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Holder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Holder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Holder for any interest in respect of the amount due or any loss or damage that such Holder may suffer as a result of the existence of a Settlement Disruption Event.

(G) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Holder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Holder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 3(E) above.

4 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the CBBCs and will not assume any obligation or duty to or any relationship or agency or trust for the Holder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the CBBCs are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Holder in accordance with Condition 9.

5 Adjustments

Adjustments may be made by the Agent to the terms of the CBBCs (including, but not limited to, the Call Price, Strike Price and the Entitlement) on the basis of the following provisions:

(A) (i) If and whenever the Company shall, by way of Rights (as defined below), offer new Shares for subscription at a fixed subscription price to the holders of existing Shares pro rata to existing holdings (a "**Rights Offer**"), the Entitlement shall be adjusted on the Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{1 + M}{1 + (R/S) \times M}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Rights Share price, being the closing price of an existing Share, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Shares are traded on a cum-Rights basis

R: Subscription price per new Share specified in the Rights Offer plus an amount equal to any dividends or other benefits foregone to exercise the Rights

M: Number of new Shares (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to subscribe

For the purposes of these Conditions, "**Rights**" means the right(s) attached to each existing Share or needed to acquire one new Share (as the case may be) which are given to a holder of existing Shares to subscribe at a fixed subscription price for new Shares pursuant to the Rights Offer (whether by the exercise of one Right, a part of a Right or an aggregate number of Rights).

(ii) The Call Price and Strike Price (which shall be rounded to the nearest 0.001) shall be adjusted by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Call Price and Strike Price shall take effect on the same day that the Entitlement is adjusted.

(iii) For the purposes of Conditions 5(A) and 5(B), the Agent may determine that no adjustment will be made if the adjustment to the Entitlement is one per cent. or less of the Entitlement immediately prior to the adjustment, all as determined by the Agent.

(B) If and whenever the Company shall make an issue of Shares credited as fully paid to holders of Shares generally by way of capitalisation of profits or reserves (other than pursuant to a scrip dividend or similar scheme for the time being operated by the Company or otherwise in lieu of a cash dividend) (and without any payment or other consideration being made or given by such holders) (a "**Bonus Issue**"), the Entitlement will be adjusted, subject to Condition 5(A)(iii), on the Business Day on which the trading in the Shares of the Company becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = 1 + N$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

N: Number of additional Shares (whether a whole or a fraction) per existing Share each holder of an existing Share is entitled to receive

In addition, the Issuer shall adjust the Call Price and Strike Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Call Price and Strike Price shall take effect on the same day that the Entitlement is adjusted.

(C) If and whenever the Company shall subdivide its outstanding share capital into a greater number of shares (a "**Subdivision**") or consolidate its outstanding share capital into a smaller number of shares (a "**Consolidation**"), then:

(i) in the case of a Subdivision, the Entitlement shall be increased whereas the Call Price and Strike Price (which shall be rounded to the nearest 0.001) shall be decreased in the same ratio as the Subdivision; and

(ii) in the case of a Consolidation, the Entitlement shall be decreased whereas the Call Price and Strike Price (which shall be rounded to the nearest 0.001) shall be increased in the same ratio as the Consolidation,

in each case on the day on which the relevant Subdivision or Consolidation (as the case may be) shall have taken effect.

(D) If it is announced that the Company is to or may merge or consolidate with or into any other corporation (including becoming, by agreement or otherwise, a subsidiary of or controlled by any person or corporation) (except where the Company is the surviving corporation in a merger) or that it is to or may sell or transfer all or substantially all of its assets, the rights attaching to the CBBCs may in the absolute discretion of the Agent be amended no later than the Business Day preceding the consummation of such merger, consolidation, sale or transfer (each a "**Restructuring Event**") (as determined by the Agent in its absolute discretion).

The rights attaching to the CBBCs after the adjustment shall, after such Restructuring Event, relate to the number of shares of the corporation(s) resulting from or surviving such Restructuring Event or other securities (the "**Substituted Securities**") and/or cash offered in substitution for the affected Shares, as the case may be, to which the holder of such number of Shares to which the CBBCs related immediately before such Restructuring Event would have been entitled upon such Restructuring Event. Thereafter the provisions hereof shall apply to such Substituted Securities, provided that any Substituted Securities may, in the absolute discretion of the Agent, be deemed to be replaced by an amount in the relevant currency equal to the market value or, if no market value is available, fair value, of such Substituted Securities in each case as determined by the Agent as soon as practicable after such Restructuring Event is effected.

For the avoidance of doubt, any remaining Shares shall not be affected by this paragraph (D) and where cash is offered in substitution for Shares or is deemed to replace Substituted Securities as described above, references in these Conditions to the Shares shall include any such cash.

(E) No adjustment will be made for an ordinary cash dividend (whether or not it is offered with a scrip alternative) ("**Ordinary Dividend**"). For any other forms of cash distribution ("**Cash Distribution**") announced by the Company, such as a cash bonus, special dividend or extraordinary dividend, no adjustment will be made unless the value of the Cash Distribution accounts for 2 percent. or more of the Share's closing price on the day of announcement by the Company.

If and whenever the Company shall make a Cash Distribution credited as fully paid to the holders of Shares generally, the Entitlement shall be adjusted to take effect on the Business Day on which trading in the Shares becomes ex-entitlement in respect of the relevant Cash Distribution in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{S - OD}{S - OD - CD}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Cash Distribution price, being the closing price of an existing Share, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Shares are traded on a cum-Cash Distribution basis

CD: The Cash Distribution per Share

OD: The Ordinary Dividend per Share, provided that the Ordinary Dividend and the Cash Distribution have the same ex-entitlement date. For the avoidance of doubt, the OD shall be zero if the Ordinary Dividend and the Cash Distribution have different ex-entitlement dates

In addition, the Issuer shall adjust the Strike Price and Call Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Strike Price and Call Price shall take effect on the same date that the Entitlement is adjusted.

(F) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the CBBCs as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of Holders generally (without considering the circumstances of any individual Holder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(G) The Issuer and/or the Agent shall determine any adjustment or amendment and its determination shall be conclusive and binding on the Holder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Holder in accordance with Condition 9 as soon as practicable after the determination thereof.

6 Purchase by the Issuer

The Issuer and any of its affiliates may purchase CBBCs at any time on or after the date of their issue and any CBBCs which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

7 Global Certificate

A global certificate (the "**Global Certificate**") representing the CBBCs will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Certificate will not be exchangeable for definitive certificates.

8 Meeting of Holder and Modification

(A) *Meetings of Holder.* Notices for convening meetings to consider any matter affecting the Holder's interests will be given to the Holder in accordance with the provisions of Condition 9.

Every question submitted to a meeting of the Holder shall be decided by poll. A meeting may be convened by the Issuer or by the Holder holding not less than 10 per cent. of the CBBCs for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Holder) holding or representing not less than 25 per cent. of the CBBCs for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Holder) being or representing Holder whatever the number of CBBCs so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Holder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Holder shall be binding on all the holders of the CBBCs, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Holder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Holders, effect any modification of the terms and conditions of the CBBCs or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Holders generally (without considering the circumstances of any individual Holder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Holders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 9.

9 Notices

All notices in English and Chinese to the Holder will be validly given if published on the HKEX website. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Holders.

10 Liquidation

In the event of a liquidation or dissolution or winding up of the Company or the appointment of a receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the undertaking, property or assets of the Company, all unexercised CBBCs will lapse and shall cease to be valid for any purpose, in the case of a voluntary liquidation, on the effective date of the resolution and, in the case of an involuntary liquidation or dissolution, on the date of the relevant court order or, in the case of the appointment of a liquidator or receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the undertaking, property or assets, on the date when such appointment is effective but subject (in any such case) to any contrary mandatory requirement of law.

11 Delisting of Company

(A) If at any time the Shares cease to be listed on the Stock Exchange, the Issuer shall give effect to these Conditions in such manner and make such adjustments to the rights attaching to the CBBCs as it shall, in its absolute discretion, consider appropriate to ensure, so far as it is reasonably able to do so, that the interests of the Holder generally are not materially prejudiced as a consequence of such delisting (without considering the individual circumstances of the Holder or the tax or other consequences that may result in any particular jurisdiction).

(B) Without prejudice to the generality of Condition 11(A), where the Shares are or, upon the delisting, become, listed on any other stock exchange, these Conditions may, in the absolute discretion of the Issuer, be amended to the extent necessary to allow for the substitution of that other stock exchange in place of the Stock Exchange and the Issuer may, without the consent of the Holder, make such adjustments to the entitlements of the Holder on exercise (including, if appropriate, by converting foreign currency amounts at prevailing market rates into the relevant currency) as it shall consider appropriate in the circumstances.

(C) Any adjustment, amendment or determination made by the Issuer pursuant to this Condition 11 shall be conclusive and binding on the Holder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Holder in accordance with Condition 9 as soon as practicable after they are determined.

12 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Holder, to create and issue further callable bull/bear contracts, upon such terms as to issue price and otherwise as the Issuer may determine so as to form a single series with the CBBCs.

13 Illegality or Impracticability

The Issuer is entitled to terminate the CBBCs if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or will become illegal or impracticable:

(A) for it to perform its obligations under the CBBCs, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

  (i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

  (ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

  (each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the CBBCs due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Holder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each CBBC held by such Holder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made in such manner as shall be notified to the Holders in accordance with Condition 9.

14 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

15 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions of the CBBCs has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the CBBCs.

16 Governing Law

The CBBC, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of Hong Kong. The Issuer, the Guarantor and the Holder (by its acquisition of the CBBCs) shall be deemed to have submitted for all purposes in connection with the CBBCs, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

17 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED CALLABLE BULL/BEAR CONTRACTS OVER INDEX

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of CBBCs may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of CBBCs. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The CBBCs (which expression shall, unless the context otherwise requires, include any further CBBCs issued pursuant to Condition 10) relating to the Index as published by the Index Compiler are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**"), made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Holders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the CBBCs represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

CBBCs represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of CBBCs deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Holders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the CBBCs after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of CBBCs may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the CBBCs. The expression "**Holder**" shall be construed accordingly.

(E) Trading in CBBCs on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended immediately upon the occurrence of a Mandatory Call Event or at the close of trading for the Trading Day immediately preceding the Expiry Date (whichever is earlier) in accordance with the requirements of the Stock Exchange.

2 CBBC Rights and Exercise Expenses

(A) Every Board Lot entitles the Holder, upon compliance with Condition 3, to payment of the Cash Settlement Amount.

(B) The Holder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the CBBCs (the "**Exercise Expenses**"). To effect such payments, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 3(E).

(C) For the purposes of these Conditions:

"**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

"**Cash Settlement Amount**" means, subject to adjustment as provided in Condition 5, an amount calculated by the Issuer in accordance with the following formula converted (if applicable) (i) into the Settlement Currency at the Exchange Rate or, as the case may be, (ii) into the Interim Currency at the First Exchange Rate and then (if applicable) converted into the Settlement Currency at the Second Exchange Rate:

(a) a Mandatory Call Event:

(i) in the case of a series of Category R CBBCs, the Residual Value; or

(ii) in the case of a series of Category N CBBCs, zero; and

(b) at expiry:

(i) in the case of a series of bull CBBCs:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{(\text{Closing Level} - \text{Strike Level}) \times \text{one Board Lot} \times \text{Index Currency Amount}}{\text{Divisor}}$$

(ii) in the case of a series of bear CBBCs:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{(\text{Strike Level} - \text{Closing Level}) \times \text{one Board Lot} \times \text{Index Currency Amount}}{\text{Divisor}}$$

For the avoidance of doubt, if the Cash Settlement Amount is a negative figure, it shall be deemed to be zero.

"**Category N CBBCs**" means a series of CBBCs where the Call Level is equal to the Strike Level.

"**Category R CBBCs**" means a series of CBBCs where the Call Level is different from the Strike Level.

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by HKSCC from time to time.

"**Day of Notification**" means the Trading Day immediately following the day on which the Mandatory Call Event occurs.

"**HKEX**" means Hong Kong Exchanges and Clearing Limited.

"**HKSCC**" means Hong Kong Securities Clearing Company Limited.

"**Hong Kong**" means the Hong Kong Special Administrative Region of the People's Republic of China.

"**Index Business Day**" means a day on which the Index Exchange is scheduled to open for trading for its regular trading sessions.

"**Index Exchange**" means the Stock Exchange or any other exchange as specified in the relevant Launch Announcement and Supplemental Listing Document.

"**Mandatory Call Event**" occurs when the Spot Level is, at any time on any Index Business Day during the Observation Period:

(a) in the case of a series of bull CBBCs, at or below the Call Level; and

(b) in the case of a series of bear CBBCs, at or above the Call Level.

"**Market Disruption Event**" means:

(1) the occurrence or existence, on any Index Business Day during the one-half hour period that ends at the close of trading on the Index Exchange of any of:

    (i) the suspension or material limitation of the trading of a material number of constituent securities that comprise the Index; or

    (ii) the suspension or material limitation of the trading of options or futures contracts relating to the Index on any exchange on which such contracts are traded; or

    (iii) the imposition of any exchange controls in respect of any currency involved in determining the Cash Settlement Amount.

    For the purposes of this paragraph (1), (x) the limitation of the number of hours or days of trading will not constitute a Market Disruption Event if it results from an announced change in the regular business hours of any relevant exchange, and (y) a limitation on trading imposed by reason of the movements in price exceeding the levels permitted by any relevant exchange will constitute a Market Disruption Event; or

(2) where the Index Exchange is the Stock Exchange, the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "**BLACK**" rainstorm signal on any day which (i) results in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening

for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "**BLACK**" rainstorm signal having been issued; or

(3) a limitation or closure of the Index Exchange due to any unforeseen circumstances; or

(4) any circumstances beyond the control of the Issuer in which the Closing Level or, if applicable, the Exchange Rate, the First Exchange Rate or the Second Exchange Rate (as the case may be) cannot be determined by the Issuer in the manner set out in these Conditions or in such other manner as the Issuer considers appropriate at such time after taking into account all the relevant circumstances.

"**Maximum Index Level**" means the highest Spot Level during the MCE Valuation Period.

"**MCE Valuation Period**" means:

(a) in respect of an Index Exchange located in Hong Kong, the period commencing from and including the moment upon which the Mandatory Call Event occurs (the trading session during which the Mandatory Call Event occurs is the "**1st Session**") and up to the end of the trading session on the Index Exchange immediately following the 1st Session ("**2nd Session**") unless, in the determination of the Issuer in its good faith, the 2nd Session for any reason (including, without limitation, a Market Disruption Event occurring and subsisting in the 2nd Session) does not contain any continuous period of 1 hour or more than 1 hour during which Spot Levels are available, the MCE Valuation Period shall be extended to the end of the subsequent trading session on the Index Exchange following the 2nd Session during which Spot Level(s) is/are available for a continuous period of at least 1 hour notwithstanding the existence or continuance of a Market Disruption Event in such postponed trading session, unless the Issuer determines in its good faith that each trading session on each of the four Index Business Days immediately following the day on which the Mandatory Call Event occurs does not contain any continuous period of 1 hour or more than 1 hour during which Spot Level(s) is/are available. In that case:

(i) the period commencing from the 1st Session up to, and including, the last trading session of the fourth Index Business Day on the Index Exchange immediately following the date on which the Mandatory Call Event occurs shall be deemed to be the MCE Valuation Period; and

(ii) the Issuer shall determine the Maximum Index Level or the Minimum Index Level (as the case may be) having regard to the then prevailing market conditions, the last reported Spot Level of the Index and such other factors as the Issuer may determine to be relevant in its good faith.

For the avoidance of doubt, all Spot Levels available throughout the extended MCE Valuation Period shall be taken into account to determine the Maximum Index Level or the Minimum Index Level (as the case may be) for the calculation of the Residual Value.

For the purposes of this definition:

(A) the pre-opening session, the morning session and, in the case of half day trading, the closing auction session (if applicable) of the same day; and

(B) the afternoon session and the closing auction session (if applicable) of the same day, shall each be considered as one trading session.

(b) in respect of an Index Exchange located outside Hong Kong, the period specified in the relevant Launch Announcement and Supplemental Listing Document.

"**Minimum Index Level**" means the lowest Spot Level during the MCE Valuation Period.

"**Observation Period**" means the period commencing from and including the Observation Commencement Date (Hong Kong time) and ending at and including the close of trading (Hong Kong time) on the Trading Day immediately preceding the Expiry Date.

"**Post MCE Trades**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document, subject to such modification and amendment prescribed by the Stock Exchange from time to time.

"**Residual Value**" means, subject to adjustment as provided in Condition 5, an amount calculated by the Issuer in accordance with the following formula converted (if applicable) (i) into the Settlement Currency at the Exchange Rate or, as the case may be, (ii) into the Interim Currency at the First Exchange Rate and then (if applicable) converted into the Settlement Currency at the Second Exchange Rate:

(a) in the case of a series of bull CBBCs:

$$\text{Residual Value per Board Lot} = \frac{(\text{Minimum Index Level} - \text{Strike Level}) \times \text{one Board Lot} \times \text{Index Currency Amount}}{\text{Divisor}}$$

(b) in the case of a series of bear CBBCs:

$$\text{Residual Value per Board Lot} = \frac{(\text{Strike Level} - \text{Maximum Index Level}) \times \text{one Board Lot} \times \text{Index Currency Amount}}{\text{Divisor}}$$

"**Settlement Currency**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document.

"**Settlement Date**" means the third CCASS Settlement Day after (i) the end of the MCE Valuation Period or (ii) the later of: (a) the Expiry Date; and (b) the day on which the Closing Level is determined in accordance with these Conditions (as the case may be).

"**Spot Level**" means the spot level of the Index as complied and published by the Index Compiler or, as the case may be, the Successor Index Compiler.

"**Trading Day**" means a day on which the Stock Exchange is scheduled to be open for trading for its regular trading sessions.

"**Trading Rules**" means the Rules and Regulations of the Exchange prescribed by the Stock Exchange from time to time.

"**Valuation Date**" means the date specified as such in the relevant Launch Announcement and Supplemental Listing Document. If the Issuer determines, in its sole discretion, that a Market Disruption Event has occurred on the Valuation Date, then the Issuer shall determine the Closing Level on the basis of its good faith estimate of the Closing Level that would have prevailed on that day but for the occurrence of the Market Disruption Event provided that the Issuer, if applicable, may, but shall not be obliged to, determine such Closing Level by having regard to the manner in which futures contracts relating to the Index are calculated.

3 Exercise of CBBCs

(A) CBBCs may only be exercised in Board Lots or integral multiples thereof.

(B) If no Mandatory Call Event has occurred during the Observation Period, the CBBCs will be deemed to be automatically exercised on the Expiry Date.

(C) (i) Subject to Condition 3(C)(ii), following the occurrence of a Mandatory Call Event, the CBBCs will terminate automatically and the Issuer shall have no further obligation under the CBBCs except for the payment of the Cash Settlement Amount (if any) following the Mandatory Call Event on the relevant Settlement Date. The Issuer will give notice to the Holders in accordance with Condition 9. Trading in the CBBCs will be suspended immediately upon the occurrence of a Mandatory Call Event and any Post MCE Trades will be cancelled and will not be recognised by the Stock Exchange.

(ii) A Mandatory Call Event is irrevocable unless it is triggered as a result of any of the following events:

(1) system malfunction or other technical errors of HKEX (such as the setting up of wrong Call Level and other parameters); or

(2) manifest errors caused by the relevant third party price source where applicable;

and

(a) in the case of paragraph (1) above, such event is reported by the Stock Exchange to the Issuer and the Issuer and the Stock Exchange mutually agree that such Mandatory Call Event is to be revoked; and

(b) in the case of paragraph (2) above, such event is reported by the Issuer to the Stock Exchange and the Issuer and the Stock Exchange mutually agree that such Mandatory Call Event is to be revoked,

in each case:

(aa) such mutual agreement must be reached no later than 30 minutes before the commencement of trading (including the pre-opening session) (Hong Kong time) or such other time frame as prescribed by the Stock Exchange from time to time on the Day of Notification;

(bb) the Mandatory Call Event so triggered will be reversed; and (cc) all cancelled trades (if any) will be reinstated and trading of the CBBCs will resume no later than the Trading Day immediately following the Day of Notification in accordance with the rules prescribed by the Stock Exchange from time to time.

(D) Upon exercise following a Mandatory Call Event or on the Expiry Date in accordance with these Conditions, the Issuer will, with effect from the first Business Day following the MCE Valuation Period or the Expiry Date, as the case may be, cancel the Global Certificate.

(E) Upon exercise following a Mandatory Call Event or on the Expiry Date in accordance with these Conditions, the Issuer will as soon as practicable and not later than the Settlement Date in accordance with these Conditions procure payment of the aggregate Cash Settlement Amounts (following deduction of determined Exercise Expenses) for all CBBCs exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Holder as appearing in the register kept by or on behalf of the Issuer.

Any payment made pursuant to this Condition 3(E) shall be delivered at the risk and expense of the Holder to the Holder, or such bank, broker or other agent in Hong Kong (if any) as is recorded on the register.

(F) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Holder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Holder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Holder for any interest in respect of the amount due or any loss or damage that such Holder may suffer as a result of the existence of a Settlement Disruption Event.

(G) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Holder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Holder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 3(E) above.

4 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the CBBCs and will not assume any obligation or duty to or any relationship or agency or trust for the Holder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the CBBCs are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Holder in accordance with Condition 9.

5 Adjustments

(A) If the Index is (i) not calculated and announced by the Index Compiler but is calculated and published by a successor to the Index Compiler (the "**Successor Index Compiler**") acceptable to the Agent or (ii) replaced by a successor index using, in the determination of the Agent, the same or a substantially similar formula for and method of calculation as used in the calculation of the Index, then the Index will be deemed to be the index so calculated and announced by the Successor Index Compiler or that successor index, as the case may be.

(B) If (i) on or prior to the Valuation Date, the Index Compiler or (if applicable) the Successor Index Compiler makes a material change in the formula for or the method of calculating the Index or in any other way materially modifies the Index (other than a modification prescribed in that formula or method to maintain the Index in the event of changes in constituent securities, contracts or commodities and other routine events), or (ii) on the Valuation Date, the Index Compiler or (if applicable) the Successor Index Compiler fails to calculate and publish the Index (other than as a result of a Market Disruption Event), then the Agent shall determine the Closing Level using, in lieu of a published level for the Index, the level for the Index as at the Valuation Date as determined by the Agent in accordance with the formula for and method of calculating the Index last in effect prior to the change or failure, but using only those securities, contracts or commodities that comprised the Index immediately prior to that change or failure (other than those securities that have since ceased to be listed on the relevant exchange).

(C) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the CBBCs as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not materially prejudicial to the interests of Holders generally (without considering the circumstances of any individual Holder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(D) All determinations made by the Agent pursuant hereto will be conclusive and binding on the Holders. The Issuer will give, or procure that there is given, notice as soon as practicable of any determinations by publication in accordance with Condition 9.

6 Purchase by the Issuer

The Issuer and any of its affiliates may purchase CBBCs at any time on or after the date of their issue and any CBBCs which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

7 Global Certificate

A global certificate (the "**Global Certificate**") representing the CBBCs will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Certificate will not be exchangeable for definitive certificates.

8 Meeting of Holder and Modification

(A) *Meetings of Holder.* Notices for convening meetings to consider any matter affecting the Holder's interests will be given to the Holder in accordance with the provisions of Condition 9.

Every question submitted to a meeting of the Holder shall be decided by poll. A meeting may be convened by the Issuer or by the Holder holding not less than 10 per cent. of the CBBCs for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Holder) holding or representing not less than 25 per cent. of the CBBCs for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Holder) being or representing Holder whatever the number of CBBCs so held or represented.

A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Holder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Holder shall be binding on all the holders of the CBBCs, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Holder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Holders, effect any modification of the terms and conditions of the CBBCs or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Holders generally (without considering the circumstances of any individual Holder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Holders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 9.

9 Notices

All notices in English and Chinese to the Holder will be validly given if published on the HKEX website. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Holders.

10 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Holder, to create and issue further callable bull/bear contracts, upon such terms as to issue price and otherwise as the Issuer may determine so as to form a single series with the CBBCs.

11 Illegality or Impracticability

The Issuer is entitled to terminate the CBBCs if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or will become illegal or impracticable:

(A) for it to perform its obligations under the CBBCs, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

   (i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

   (ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

   (each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the CBBCs due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Holder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each CBBC held by such Holder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made in such manner as shall be notified to the Holders in accordance with Condition 9.

12 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

13 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the CBBCs.

14 Governing Law

The CBBCs, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of Hong Kong. The Issuer, the Guarantor and the Holder (by its acquisition of the CBBCs) shall be deemed to have submitted for all purposes in connection with the CBBCs, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

15 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent
J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

TERMS AND CONDITIONS OF THE CASH-SETTLED CALLABLE BULL/BEAR CONTRACTS OVER SINGLE UNIT TRUST

The relevant Conditions will, together with the supplemental provisions contained in the relevant launch announcement and supplemental listing document and subject to completion and amendment, be endorsed on the back of the global certificate. The applicable launch announcement and supplemental listing document in relation to the issue of any series of CBBCs may specify other terms and conditions which shall, to the extent so specified or to the extent inconsistent with the relevant Conditions, replace or modify the relevant Conditions for the purpose of such series of CBBCs. Capitalised terms used in the relevant Conditions and not otherwise defined therein shall have the meanings given to them in the relevant launch announcement and supplemental listing document.

1 Form; Status; Guarantee; Transfer and Title

(A) The CBBCs (which expression shall, unless the context otherwise requires, include any further CBBCs issued pursuant to Condition 12) relating to the Units of the Trust are issued in registered form subject to and with the benefit of the amended and restated instrument dated 3 May 2010 (the "**Instrument**") made by J.P. Morgan Structured Products B.V. (the "**Issuer**") and JPMorgan Chase Bank, National Association (the "**Guarantor**") and the guarantee dated 2 April 2020 (the "**Guarantee**") made by the Guarantor.

Copies of the Instrument and the Guarantee are available for inspection at the office of J.P. Morgan Securities (Asia Pacific) Limited as specified below. The Holders (as hereinafter defined) are entitled to the benefit of, are bound by and are deemed to have notice of, all the provisions of the Instrument and the Guarantee.

(B) The settlement obligation of the Issuer in respect of the CBBCs represent general unsecured contractual obligations of the Issuer and of no other person which rank, and will rank, equally among themselves and pari passu with all other present and future unsecured and unsubordinated contractual obligations of the Issuer, except for obligations accorded preference by mandatory provisions of applicable law.

CBBCs represent general contractual obligations of the Issuer, and are not, nor is it the intention (expressed, implicit or otherwise) of the Issuer to create by the issue of CBBCs deposit liabilities of the Issuer or a debt obligation of any kind.

In the Guarantee, the Guarantor has, subject to the terms of the Guarantee, unconditionally and irrevocably guaranteed to the Holders the due and punctual settlement in full of all obligations due and owing by the Issuer arising under the issuance of the CBBCs after taking account of any set off, combination of accounts, netting or similar arrangement from time to time exercisable by the Issuer against any person to whom obligations are from time to time being owed, when and as due (whether at maturity, by acceleration or otherwise).

(C) Transfers of CBBCs may be effected only in Board Lots or integral multiples thereof in the Central Clearing and Settlement System ("**CCASS**") in accordance with the General Rules of CCASS and the CCASS Operational Procedures in effect from time to time ("**CCASS Rules**").

(D) Each person who is for the time being shown in the register kept by or on behalf of the Issuer outside of Hong Kong as the holder shall be treated by the Issuer, the Guarantor and the Agent as the absolute owner and holder of the CBBCs. The expression "**Holder**" shall be construed accordingly.

(E) Trading in CBBCs on The Stock Exchange of Hong Kong Limited (the "**Stock Exchange**") shall be suspended immediately upon the occurrence of a Mandatory Call Event or at the close of trading for the Trading Day immediately preceding the Expiry Date (whichever is earlier) in accordance with the requirements of the Stock Exchange.

2 CBBC Rights and Exercise Expenses

(A) Every Board Lot entitles the Holder, upon compliance with Condition 3, to payment of the Cash Settlement Amount.

(B) The Holder will be required to pay any charges or expenses including any taxes or duties which are incurred or withheld in respect of the exercise of the CBBCs (the "**Exercise Expenses**"). To effect such payment, an amount equivalent to the Exercise Expenses will be deducted by the Issuer from the Cash Settlement Amount in accordance with Condition 3(E).

(C) For the purposes of these Conditions:

"**Business Day**" means a day (excluding Saturdays) on which the Stock Exchange is scheduled to open for dealings in Hong Kong and banks are open for business in Hong Kong.

"**Cash Settlement Amount**" means, subject to adjustment as provided in Condition 5:

(a) following a Mandatory Call Event:

(i) in the case of a series of Category R CBBCs, the Residual Value; or

(ii) in the case of a series of Category N CBBCs, zero; and

(b) at expiry:

(i) in the case of a series of bull CBBCs:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Closing Price} - \text{Strike Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

(ii) in the case of a series of bear CBBCs:

$$\text{Cash Settlement Amount per Board Lot (if any) payable at expiry} = \frac{\text{Entitlement} \times (\text{Strike Price} - \text{Closing Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

For the avoidance of doubt, if the Cash Settlement Amount is a negative figure, it shall be deemed to be zero.

"**Category N CBBCs**" means a series of CBBCs where the Call Price is equal to the Strike Price.

"**Category R CBBCs**" means a series of CBBCs where the Call Price is different from the Strike Price.

"**CCASS Settlement Day**" has the meaning ascribed to the term "**Settlement Day**" in the CCASS Rules, subject to such modification and amendment prescribed by HKSCC from time to time.

"**Closing Price**" means the closing price of one Unit (as derived from the Daily Quotation Sheet of the Stock Exchange, subject to any adjustment to such closing prices as may be necessary to reflect any event as contemplated in Condition 5 such as capitalisation, rights issue, distribution or the like) on the Valuation Date.

"**Day of Notification**" means the Trading Day immediately following the day on which the Mandatory Call Event occurs.

"**Entitlement**" means the number of Units to which the CBBCs relate, as specified in the relevant Launch Announcement and Supplemental Listing Document, subject to any adjustment in accordance with Condition 5.

"**HKEX**" means Hong Kong Exchanges and Clearing Limited.

"**HKSCC**" means Hong Kong Securities Clearing Company Limited.

"**Hong Kong**" means the Hong Kong Special Administrative Region of the People's Republic of China.

"**Mandatory Call Event**" occurs when the Spot Price is, at any time on any Trading Day during the Observation Period:

(a) in the case of a series of bull CBBCs, at or below the Call Price; and

(b) in the case of a series of bear CBBCs, at or above the Call Price.

"**Market Disruption Event**" means:

(1) the occurrence or existence on any Trading Day during the one-half hour period that ends at the close of trading of any suspension of, or limitation imposed on, trading (by reason of movements in price exceeding limits permitted by the Stock Exchange or otherwise) on the Stock Exchange in (1) the Units; or (2) any options or futures contracts relating to the Units if, in any such case, such suspension or limitation is, in the determination of the Issuer and/or Agent, material;

(2) the issuance of the tropical cyclone warning signal number 8 or above or the issuance of a "**BLACK**" rainstorm signal by the Hong Kong Observatory on any day which (i) results in the Stock Exchange being closed for trading for the entire day; or (ii) results in the Stock Exchange being closed prior to its regular time for close of trading for the relevant day (for the avoidance of doubt, in the case when the Stock Exchange is scheduled to open for the morning trading session only, closed prior to its regular time for close of trading for the morning session), PROVIDED THAT there shall be no Market Disruption Event solely by reason of the Stock Exchange opening for trading later than its regular time for opening of trading on any day as a result of the tropical cyclone warning signal number 8 or above or the "**BLACK**" rainstorm signal having been issued; or;

(3) a limitation or closure of the Stock Exchange due to any unforeseen circumstances.

"**Maximum Trade Price**" means the highest Spot Price (subject to any adjustment to such Spot Price as may be necessary to reflect any event as contemplated in Condition 5 such as capitalisation, rights issue, distribution or the like) during the MCE Valuation Period.

"**MCE Valuation Period**" means the period commencing from and including the moment upon which the Mandatory Call Event occurs (the trading session during which the Mandatory Call Event occurs is the "**1st Session**") and up to the end of the trading session on the Stock Exchange immediately following the 1st Session ("**2nd Session**") unless, in the determination of the Issuer in its good faith, the 2nd Session for any reason (including, without limitation, a Market Disruption Event occurring and subsisting in the 2nd Session) does not contain any continuous period of 1 hour or more than 1 hour during which trading in the Units is permitted on the Stock Exchange with no limitation imposed, the MCE Valuation Period shall be extended to the end of the subsequent trading session following the 2nd Session during which trading in the Units is permitted on the Stock Exchange with no limitation imposed for a continuous period of at least 1 hour notwithstanding the existence or continuance of a Market Disruption Event in such postponed trading session, unless the Issuer determines in its good faith that each trading session on each of the four Trading Days immediately following the day on which the Mandatory Call Event occurs does not contain any continuous period of 1 hour or more than 1 hour during which trading in the Units is permitted on the Stock Exchange with no limitation imposed. In that case:

(a) the period commencing from the 1st Session up to, and including, the last trading session on the Stock Exchange of the fourth Trading Day immediately following the date on which the Mandatory Call Event occurs shall be deemed to be the MCE Valuation Period; and

(b) the Issuer shall determine the Maximum Trade Price or the Minimum Trade Price (as the case may be) having regard to the then prevailing market conditions, the last reported Spot Price of the Units and such other factors as the Issuer may determine to be relevant in its good faith.

For the avoidance of doubt, all Spot Prices available throughout the extended MCE Valuation Period shall be taken into account to determine the Maximum Trade Price or the Minimum Trade Price (as the case may be) for the calculation of the Residual Value.

For the purposes of this definition:

(A) the pre-opening session, the morning session and, in the case of half day trading, the closing auction session (if applicable) of the same day; and

(B) the afternoon session and the closing auction session (if applicable) of the same day,

shall each be considered as one trading session.

"**Minimum Trade Price**" means the lowest Spot Price (subject to any adjustment to such Spot Price as may be necessary to reflect any event as contemplated in Condition 5 such as capitalisation, rights issue, distribution or the like) during the MCE Valuation Period.

"**Observation Period**" means the period commencing from and including the Observation Commencement Date (Hong Kong time) and ending at and including the close of trading (Hong Kong time) on the Trading Day immediately preceding the Expiry Date.

"**Post MCE Trades**" has the meaning given to it in the relevant Launch Announcement and Supplemental Listing Document, subject to such modification and amendment prescribed by the Stock Exchange from time to time.

"**Residual Value**" means, subject to adjustment as provided in Condition 5:

(a) in the case of a series of bull CBBCs:

$$\text{Residual Value per Board Lot} = \frac{\text{Entitlement} \times (\text{Minimum Trade Price} - \text{Strike Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

(b) in the case of a series of bear CBBCs:

$$\text{Residual Value per Board Lot} = \frac{\text{Entitlement} \times (\text{Strike Price} - \text{Maximum Trade Price}) \times \text{one Board Lot}}{\text{Number of CBBC(s) per Entitlement}}$$

"**Settlement Date**" means the third CCASS Settlement Day after (i) the end of the MCE Valuation Period or (ii) the later of: (a) the Expiry Date; and (b) the day on which the Closing Price is determined in accordance with these Conditions (as the case may be).

"**Spot Price**" means:

(a) in respect of a continuous trading session of the Stock Exchange, the price per Unit concluded by means of automatic order matching on the Stock Exchange as reported in the official realtime dissemination mechanism for the Stock Exchange during such continuous trading session of the Stock Exchange in accordance with the Trading Rules, excluding direct business (as defined in the Trading Rules); and

(b) in respect of a pre-opening session or a closing auction session (if applicable) of the Stock Exchange (as the case may be), the final Indicative Equilibrium Price (IEP) (as defined in the Trading Rules) of the Unit (if any) calculated at the end of the pre-order matching period of such pre-opening session or closing auction session (if applicable) (as the case may be) in accordance with the Trading Rules, excluding direct business (as defined in the Trading Rules),

subject to such modification and amendment prescribed by the Stock Exchange from time to time.

"**Trading Day**" means a day on which the Stock Exchange is scheduled to be open for trading for its regular trading sessions.

"**Trading Rules**" means the Rules and Regulations of the Exchange prescribed by the Stock Exchange from time to time.

"**Valuation Date**" means the Trading Day immediately preceding the Expiry Date unless the Issuer determines, in its sole discretion, that a Market Disruption Event has occurred, then that day shall be postponed until the first succeeding Trading Day on which there is no Market Disruption Event, unless the Issuer determines that there is a Market Disruption Event occurring on each of the four Trading Days immediately following the original date which (but for the Market Disruption Event) would have been the Valuation Date. In that case:

(i) the fourth Trading Day immediately following the original date shall be deemed to be the Valuation Date (regardless of the Market Disruption Event); and

(ii) the Issuer shall determine the Closing Price having regard to the then prevailing market conditions, the last reported trading price of the Unit on the Stock Exchange and such other factors as the Issuer determines to be relevant.

3 Exercise of CBBCs

(A) CBBCs may only be exercised in Board Lots or integral multiples thereof.

(B) If no Mandatory Call Event has occurred during the Observation Period, the CBBCs will be deemed to be automatically exercised on the Expiry Date.

(C) (i) Subject to Condition 3(C)(ii), following the occurrence of a Mandatory Call Event, the CBBCs will terminate automatically and the Issuer shall have no further obligation under the CBBCs except for the payment of the Cash Settlement Amount (if any) following the Mandatory Call Event on the relevant Settlement Date. The Issuer will give notice to the Holders in accordance with Condition 9. Trading in the CBBCs will be suspended immediately upon the occurrence of a Mandatory Call Event and any Post MCE Trades will be cancelled and will not be recognised by the Stock Exchange.

(ii) A Mandatory Call Event is irrevocable unless it is triggered as a result of any of the following events:

(1) system malfunction or other technical errors of HKEX (such as the setting up of wrong Call Price and other parameters); or

(2) manifest errors caused by the relevant third party price source where applicable;

and

(a) in the case of paragraph (1) above, such event is reported by the Stock Exchange to the Issuer and the Issuer and the Stock Exchange mutually agree that such Mandatory Call Event is to be revoked; and

(b) in the case of paragraph (2) above, such event is reported by the Issuer to the Stock Exchange and the Issuer and the Stock Exchange mutually agree that such Mandatory Call Event is to be revoked,

in each case:

(aa) such mutual agreement must be reached no later than 30 minutes before the commencement of trading (including the pre-opening session) (Hong Kong time) or such other time frame as prescribed by the Stock Exchange from time to time on the Day of Notification;

(bb) the Mandatory Call Event so triggered will be reversed; and

(cc) all cancelled trades (if any) will be reinstated and trading of the CBBCs will resume no later than the Trading Day immediately following the Day of Notification in accordance with the rules prescribed by the Stock Exchange from time to time.

(D) Upon exercise following a Mandatory Call Event or on the Expiry Date in accordance with these Conditions, the Issuer will, with effect from the first Business Day following the MCE Valuation Period or the Expiry Date, as the case may be, cancel the Global Certificate.

(E) Upon exercise following a Mandatory Call Event or on the Expiry Date in accordance with these Conditions, the Issuer will as soon as practicable and not later than the Settlement Date in accordance with these conditions procure payment of the aggregate Cash Settlement Amount (following deduction of determined Exercise Expenses) for all CBBCs exercised or deemed exercised, electronically through CCASS by crediting the relevant bank account of the Holder as appearing in the register kept by or on behalf of the Issuer.

Any payment made pursuant to this Condition 3(E) shall be delivered at the risk and expense of the Holder to the Holder, or such bank, broker or agent in Hong Kong (if any) as recorded on the register.

(F) If as a result of an event beyond the control of the Issuer ("**Settlement Disruption Event**"), it is not possible for the Issuer to procure payment electronically through CCASS by crediting the relevant bank account of the Holder on the original Settlement Date, the Issuer shall use its reasonable endeavours to procure payment electronically through CCASS by crediting the relevant bank account of the Holder as soon as reasonably practicable after the original Settlement Date. The Issuer will not be liable to the Holder for any interest in respect of the amount due or any loss or damage that such Holder may suffer as a result of the existence of a Settlement Disruption Event.

(G) These Conditions shall not be construed so as to give rise to any relationship of agency or trust between the Guarantor, the Issuer or its agent or nominee and the Holder and neither the Guarantor, the Issuer nor its agent or nominee shall owe any duty of a fiduciary nature to the Holder.

None of the Issuer, the Guarantor or the Agent shall have any responsibility for any errors or omissions in the calculation and dissemination of any variables published by a third party and used in any calculation made pursuant to these terms and conditions or in the calculation of the Cash Settlement Amount arising from such errors or omissions.

The Issuer's obligations to pay the Cash Settlement Amount shall be discharged by payment in accordance with Condition 3(E) above.

4 Agent

(A) The Agent will be acting as agent of the Issuer in respect of the CBBCs and will not assume any obligation or duty to or any relationship or agency or trust for the Holder.

(B) The Issuer reserves the right, subject to the appointment of a successor, at any time to vary or terminate the appointment of the initial Agent and to appoint another agent provided that it will at all times maintain an agent in Hong Kong for so long as the CBBCs are listed on the Stock Exchange. Notice of any such termination or appointment will be given to the Holder in accordance with Condition 9.

5 Adjustments

Adjustments may be made by the Agent to the terms of the CBBCs (including, but not limited to, the Call Price, Strike Price and the Entitlement) on the basis of the following provisions:

(A) (i) If and whenever the Trust shall, by way of Rights (as defined below), offer new Units for subscription at a fixed subscription price to the holders of existing Units pro rata to existing holdings (a "**Rights Offer**"), the Entitlement shall be adjusted on the Business Day on which the trading in the Units of the Trust becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{1 + M}{1 + (R/S) \times M}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Rights Unit price, being the closing price of an existing Unit, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Units are traded on a cum-Rights basis

R: Subscription price per new Unit specified in the Rights Offer plus an amount equal to any distributions or other benefits foregone to exercise the Rights

M: Number of new Unit(s) (whether a whole or a fraction) per existing Unit each holder of an existing Unit is entitled to subscribe

For the purposes of these Conditions, "**Rights**" means the right(s) attached to each existing Unit or needed to acquire one new Unit (as the case may be) which are given to a holder of existing Units to subscribe at a fixed subscription price for new Units pursuant to the Rights Offer (whether by the exercise of one Right, a part of a Right or an aggregate number of Rights).

(ii) The Call Price and Strike Price (which shall be rounded to the nearest 0.001) shall be adjusted by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Call Price and Strike Price shall take effect on the same day that the Entitlement is adjusted.

(iii) For the purposes of Conditions 5(A) and 5(B), the Agent may determine that no adjustment will be made if the adjustment to the Entitlement is one per cent. or less of the Entitlement immediately prior to the adjustment, all as determined by the Agent.

(B) If and whenever the Trust shall make an issue of Units credited as fully paid to holders of Units generally by way of capitalisation of profits or reserves (other than pursuant to a scrip distribution or similar scheme for the time being operated by the Trust or otherwise in lieu of a cash distribution) (and without any payment or other consideration being made or given by such holders) (a "**Bonus Issue**"), the Entitlement will be adjusted, subject to Condition 5(A)(iii), on the Business Day on which the trading in the Units of the Trust becomes ex-entitlement in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = 1 + N$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

N: Number of additional Unit(s) (whether a whole or a fraction) per existing Unit each holder of an existing Unit is entitled to receive

In addition, the Issuer shall adjust the Call Price and Strike Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Call Price and Strike Price shall take effect on the same day that the Entitlement is adjusted.

(C) If and whenever the Trust shall subdivide its Units or any class of its outstanding Units into a greater number of units (a "**Subdivision**") or consolidate the Units or any class of its outstanding Units into a smaller number of units (a "**Consolidation**"), then:

(i) in the case of a Subdivision, the Entitlement shall be increased whereas the Call Price and Strike Price (which shall be rounded to the nearest 0.001) shall be decreased in the same ratio as the Subdivision; and

(ii) in the case of a Consolidation, the Entitlement shall be decreased whereas the Call Price and Strike Price (which shall be rounded to the nearest 0.001) shall be increased in the same ratio as the Consolidation,

in each case on the day on which the relevant Subdivision or Consolidation (as the case may be) shall have taken effect.

(D) If it is announced that the Trust is to or may merge or consolidate with or into any other trust or corporation (including becoming, by agreement or otherwise, a subsidiary of or controlled by any person or corporation) (except where the Trust is the surviving entity in a merger) or that it is to or may sell or transfer all or substantially all of its assets, the rights attaching to the CBBCs may in the absolute discretion of the Agent be amended no later than the Business Day preceding the consummation of such merger, consolidation, sale or transfer (each a "**Restructuring Event**") (as determined by the Agent in its absolute discretion).

The rights attaching to the CBBCs after the adjustment shall, after such Restructuring Event, relate to the number of units of the trust(s) resulting from or surviving such Restructuring Event or other securities (the "**Substituted Securities**") and/or cash offered in substitution for the affected Units, as the case may be, to which the holder of such number of Units to which the CBBCs related immediately before such Restructuring Event would have been entitled upon such Restructuring Event. Thereafter the provisions hereof shall apply to such Substituted Securities, provided that any Substituted Securities may, in the absolute discretion of the Agent, be deemed to be replaced by an amount in the relevant currency equal to the market value or, if no market value is available, fair value, of such Substituted Securities in each case as determined by the Agent as soon as practicable after such Restructuring Event is effected.

For the avoidance of doubt, any remaining Units shall not be affected by this paragraph (D) and, where cash is offered in substitution for Units or is deemed to replace Substituted Securities as described above, references in these Conditions to the Units shall include any such cash.

(E) No adjustment will be made for an ordinary cash distribution (whether or not it is offered with a scrip alternative) ("**Ordinary Distribution**"). For any other forms of cash distribution ("**Cash Distribution**") announced by the Trust, such as a cash bonus, special distribution or extraordinary distribution, no adjustment will be made unless the value of the Cash Distribution accounts for 2 percent. or more of the Unit's closing price on the day of announcement by the Trust.

If and whenever the Trust shall make a Cash Distribution credited as fully paid to the holders of Units generally, the Entitlement shall be adjusted to take effect on the Business Day on which trading in the Units becomes ex-entitlement in respect of the relevant Cash Distribution in accordance with the following formula:

$$\text{Adjusted Entitlement} = \text{Adjustment Factor} \times E$$

Where:

$$\text{Adjustment Factor} = \frac{S - OD}{S - OD - CD}$$

E: Existing Entitlement immediately prior to the relevant event giving rise to the adjustment

S: Cum-Cash Distribution Unit price, being the closing price of an existing Unit, as derived from the Daily Quotation Sheet of the Stock Exchange on the last Business Day on which the Units are traded on a cum-Cash Distribution basis

CD: The Cash Distribution per Unit

OD: The Ordinary Distribution per Unit, provided that the Ordinary Distribution and the Cash Distribution have the same ex-entitlement date. For the avoidance of doubt, the OD shall be zero if the Ordinary Distribution and the Cash Distribution have different ex- entitlement dates

In addition, the Issuer shall adjust the Strike Price and Call Price (which shall be rounded to the nearest 0.001) by the reciprocal of the Adjustment Factor, where the reciprocal of the Adjustment Factor means one divided by the relevant Adjustment Factor. The adjustment to the Strike Price and Call Price shall take effect on the same date that the Entitlement is adjusted.

(F) Without prejudice to and notwithstanding any prior adjustment(s) made pursuant to the applicable Conditions, the Issuer and/or the Agent may (but shall not be obliged to) make such other adjustments to the terms and conditions of the CBBCs as appropriate where any event (including the events as contemplated in the applicable Conditions) occurs and irrespective of, in substitution for, or in addition to the provisions contemplated in the applicable Conditions, provided that such adjustment is: (i) not prejudicial to the interests of Holders generally (without considering the circumstances of any individual Holder or the tax or other consequences of such adjustment in any particular jurisdiction); or (ii) determined by the Issuer and/or Agent in good faith to be appropriate and commercially reasonable.

(G) The Issuer and/or the Agent shall determine any adjustment or amendment and its determination shall be conclusive and binding on the Holder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Holder in accordance with Condition 9 as soon as practicable after the determination thereof.

6 Purchase by the Issuer

The Issuer and any of its affiliates may purchase CBBCs at any time on or after the date of their issue and any CBBCs which are so purchased may be surrendered for cancellation or offered from time to time in one or more transactions in the over-the-counter market or otherwise at prevailing market prices or in negotiated transactions, at the discretion of the Issuer or any such affiliate, as the case may be.

7 Global Certificate

A global certificate (the "**Global Certificate**") representing the CBBCs will be deposited within CCASS and registered in the name of HKSCC Nominees Limited (or its successors). The Global Certificate will not be exchangeable for definitive certificates.

8 Meeting of Holder and Modification

(A) *Meetings of Holder.* Notices for convening meetings to consider any matter affecting the Holder's interests will be given to the Holder in accordance with the provisions of Condition 9. Every question submitted to a meeting of the Holder shall be decided by poll. A meeting may be convened by the Issuer or by the Holder holding not less than 10 per cent. of the CBBCs for the time being remaining unexercised. The quorum at any such meeting for passing an Extraordinary Resolution will be two or more persons (including any nominee appointed by the Holder) holding or representing not less than 25 per cent. of the CBBCs for the time being remaining unexercised, or at any adjourned meeting two or more persons (including any nominee appointed by the Holder) being or representing Holder whatever the number of CBBCs so held or represented. A resolution will be an Extraordinary Resolution when it has been passed at a duly convened meeting by not less than three-quarters of the votes cast by such Holder as, being entitled to do so, vote in person or by proxy.

An Extraordinary Resolution passed at any meeting of the Holder shall be binding on all the holders of the CBBCs, whether or not they are present at the meeting.

Resolutions can be passed in writing without a meeting of the Holder being held if passed unanimously.

(B) *Modification.* The Issuer may, without the consent of the Holders, effect any modification of the terms and conditions of the CBBCs or the Instrument which, in the opinion of the Issuer, is:

(i) not materially prejudicial to the interests of the Holders generally (without considering the circumstances of any individual Holder or the tax or other consequences of such modification in any particular jurisdiction);

(ii) of a formal, minor or technical nature;

(iii) made to correct a manifest error; or

(iv) necessary in order to comply with mandatory provisions of the laws or regulations of Hong Kong.

Any such modification shall be binding on the Holders and shall be notified to them by the Agent as soon as practicable thereafter in accordance with Condition 9.

9 Notices

All notices in English and Chinese to the Holder will be validly given if published on the HKEX website. In such circumstances, the Issuer shall not be required to dispatch copies of the notice to the Holders.

10 Termination or Liquidation

In the event of a Termination or the liquidation or dissolution of the trustee of the Trust (including any successor trustee appointed from time to time) ("**Trustee**") (in its capacity as trustee of the Trust) or the appointment of a liquidator, receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the Trustee's undertaking, property or assets all unexercised CBBCs will lapse and shall cease to be valid for any purpose. In the case of a Termination the unexercised CBBCs will lapse and shall cease to be valid on the effective date of the Termination, in the case of a voluntary liquidation, on the effective date of the resolution and, in the case of an involuntary liquidation or dissolution, on the date of the relevant court order or, in the case of the appointment of a liquidator or receiver or administrator or analogous person under applicable law in respect of the whole or substantially the whole of the Trustee's undertaking, property or assets, on the date when such appointment is effective but subject (in any such case) to any contrary mandatory requirement of law.

For the purpose of this Condition 10, "**Termination**" means (i) the Trust is terminated, or the Trustee or the manager of the Trust (including any successor manager appointed from time to time) ("**Manager**") is required to terminate the Trust under the trust deed ("**Trust Deed**") constituting the Trust or applicable law, or the termination of the Trust commences; (ii) the Trust is held or is conceded by the Trustee or the Manager not to have been constituted or to have been imperfectly constituted; (iii) the Trustee ceases to be authorised under the Trust to hold the property of the Trust in its name and perform its obligations under the Trust Deed; or (iv) the Trust ceases to be authorised as an authorised collective investment scheme under the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong).

11 Delisting of Trust

(A) If at any time the Units cease to be listed on the Stock Exchange, the Issuer shall give effect to these Conditions in such manner and make such adjustments to the rights attaching to the CBBCs as it shall, in its absolute discretion, consider appropriate to ensure, so far as it is reasonably able to do so, that the interests of the Holder generally are not materially prejudiced as a consequence of such delisting (without considering the individual circumstances of the Holder or the tax or other consequences that may result in any particular jurisdiction).

(B) Without prejudice to the generality of Condition 11(A), where the Units are or, upon the delisting, become, listed on any other stock exchange, these Conditions may, in the absolute discretion of the Issuer, be amended to the extent necessary to allow for the substitution of that other stock exchange in place of the Stock Exchange and the Issuer may, without the consent of the Holder, make such adjustments to the entitlements of the Holder on exercise (including, if appropriate, by converting foreign currency amounts at prevailing market rates into the relevant currency) as it shall consider appropriate in the circumstances.

(C) Any adjustment, amendment or determination made by the Issuer pursuant to this Condition 11 shall be conclusive and binding on the Holder save in the case of manifest error. Notice of any adjustments or amendments shall be given to the Holder in accordance with Condition 9 as soon as practicable after they are determined.

12 Further Issues

The Issuer shall be at liberty from time to time, without the consent of the Holder, to create and issue further CBBCs, upon such terms as to issue price and otherwise as the Issuer may determine so as to form a single series with the CBBCs.

13 Illegality or Impracticability

The Issuer is entitled to terminate the CBBCs if it determines in good faith and in a commercially reasonable manner that, for reasons beyond its control, it has become or will become illegal or impracticable:

(A) for it to perform its obligations under the CBBCs, or for the Guarantor to perform its obligations under the Guarantee, in whole or in part as a result of:

(i) the adoption of, or any change in, any relevant law or regulation (including any tax law); or

(ii) the promulgation of, or any change in, the interpretation by any court, tribunal, governmental, administrative, legislative, regulatory or judicial authority or power with competent jurisdiction of any relevant law or regulation (including any tax law),

(each of (i) and (ii), a "**Change in Law Event**"); or

(B) for it or any of its affiliates to maintain the Issuer's hedging arrangements with respect to the CBBCs due to a Change in Law Event.

Upon the occurrence of a Change in Law Event, the Issuer will, if and to the extent permitted by the applicable law or regulation, pay to each Holder a cash amount that the Issuer determines in good faith and in a commercially reasonable manner to be the fair market value in respect of each CBBC held by such Holder immediately prior to such termination (ignoring such illegality or impracticability) less the cost to the Issuer of unwinding any related hedging arrangement as determined by the Issuer in its sole and absolute discretion. Payment will be made in such manner as shall be notified to the Holders in accordance with Condition 9.

14 Good Faith and Commercially Reasonable Manner

Any exercise of discretion by the Issuer or the Agent under these Conditions will be made in good faith and in a commercially reasonable manner.

15 Contracts (Rights of Third Parties) Ordinance

A person who is not a party to these Conditions has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of the CBBCs.

16 Governing Law

The CBBC, the Guarantee and the Instrument will be governed by and construed in accordance with the laws of Hong Kong. The Issuer, the Guarantor and the Holder (by its acquisition of the CBBCs) shall be deemed to have submitted for all purposes in connection with the CBBCs, the Guarantee and the Instrument to the non-exclusive jurisdiction of the courts of Hong Kong.

17 Language

A Chinese translation of these Conditions is available upon request during usual business hours on any weekday (Saturdays, Sundays and holidays excepted) at the offices of the Agent. In the event of any inconsistency between the English version and Chinese translation of these Conditions, the English version shall prevail and be governing.

Agent

J.P. Morgan Securities (Asia Pacific) Limited
23-29/F, Chater House
8 Connaught Road Central
Hong Kong

ANNEX 2

FORM OF GUARANTEE

Form of Guarantee

The following is the form of the Guarantee dated April 2, 2020 made by JPMorgan Chase Bank, National Association:

"J.P. Morgan Structured Products B.V. Hong Kong Structured Products Programme (the "**Programme**").

J.P. Morgan Structured Products B.V., a private company with limited liability (*besloten vennootschap met beperkte aansprakelijkheid*) incorporated under the laws of The Netherlands ("**Obligor**"), from time to time issues standard warrants, inline warrants, callable bull/bear contracts and equity linked instruments (collectively, the "**Structured Products**") (all holders of Structured Products, the "**Beneficiaries**"), (a) pursuant to an amended and restated instrument dated as of May 3rd 2010 between the Obligor and JPMorgan Chase Bank, National Association, a national banking association organised under the federal laws of the United States of America (the "**Guarantor**"), (b) with the benefit of this guarantee (the "**Guarantee**") and (c) under the terms and conditions set out in the base listing document for the Programme to be dated on or about April 2, 2020 (the "**Base Listing Document**") and the Launch Announcement and Supplemental Listing Document (as defined in the Base Listing Document) to be prepared for each series of Structured Products (the foregoing, together, as amended and/or supplemented and/or restated from time to time, the "**Programme Documents**").

This Guarantee is made by way of deed poll by the Guarantor in favour of the Beneficiaries and dated as of April 2, 2020. This Guarantee amends, supplants and replaces in its entirety, for all Structured Products issued by the Obligor under the Programme on or after April 2, 2020 (the "**Effective Date**"), the guarantee referenced in the base listing document for the Programme dated April 8, 2019 (the "**Original Guarantee**") save as provided in the immediately following sentence. The Original Guarantee applies to all Structured Products issued under the Programme on or after April 8, 2019 and before the Effective Date and to any Structured Products which are expressed to be consolidated and form a single series with any Structured Products issued prior to the Effective Date.

Now, therefore, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Guarantor hereby agrees as follows:

(1) **Guarantee.** The Guarantor, subject to the terms hereof and except as specifically set forth herein, absolutely and unconditionally guarantees to the Beneficiaries, the timely and complete payment and performance, as and when due, whether by acceleration or otherwise, of all obligations and liabilities, whether now in existence or hereafter arising, of the Obligor to the Beneficiaries, under the Structured Products from and after the Effective Date and strictly in accordance with the Programme Documents, during the period from and including the Effective Date until no further obligations remain outstanding under such Structured Products (such obligations and liabilities the payment and performance of which are guaranteed by the Guarantor, the "**Obligations**"). If the Obligor fails to meet any of its Obligations in full as and when due, the Guarantor shall meet or cause to be met such Obligation to such Beneficiary strictly in accordance with all terms and provisions of such Obligation under the applicable Programme Documents (including, without limitation, place of payment), as if such Obligation were met by the Obligor.

(2) **Guarantee of Obligation, not Collection.** This Guarantee is a guarantee of payment and performance and not of collection only. The Beneficiaries shall not be required to exhaust any right or remedy or to take any action against the Obligor or any other person or entity or any collateral as a condition to payment by the Guarantor hereunder.

(3) **Guarantee Irrevocable.** This Guarantee is a continuing guarantee of all Obligations now or hereafter existing and shall remain in full force and effect until complete payment and performance of all Obligations and until no Structured Products enjoying the benefit of this Guarantee remains outstanding and no further Structured Products may be issued under the Programme. Notwithstanding anything to the contrary contained herein, this Guarantee shall not apply if, and to the extent that, the Guarantor or the Beneficiaries have so agreed in writing.

(4) **Nature of Guarantee.** The Guarantor guarantees that the Obligations shall be timely performed and paid strictly in accordance with all applicable terms of the Programme Documents. The Guarantor's liability hereunder is irrespective of:

(a) any change in the amount, time, manner or place of payment or performance of, or in any other term of, any Obligation, or any other amendment or waiver of or any consent to departure from any term of any Obligation;

(b) any release or amendment or waiver of, or consent to departure from, any other guarantee or support document, or any exchange, release or non-perfection of any collateral for any Obligation;

(c) the absence of any demand on the Obligor or any other person for payment or performance of any Obligation;

(d) the absence of any action to enforce any Obligation or any collateral therefor;

(e) any lack of validity, regularity or enforceability of any Programme Document or Obligation;

(f) the rendering of any judgment against the Obligor or any action to enforce the same;

(g) any liquidation, bankruptcy or insolvency of the Obligor or any proceeding relating thereto;

(h) any consolidation, merger, conveyance or transfer by the Obligor or other event which would afford to a guarantor relief, legal or equitable, from its obligation under the guarantee or other security; and

(i) any lack or limitation of status or of corporate power of the Obligor, or any incapacity or disability of any signatory for the Obligor, or of any other guarantor or obligor in respect of any Obligation, or any change whatsoever in the objects, capital structure, or business of the Obligor;

provided, however, that except as expressly set forth herein, (i) the Guarantor shall not be liable hereunder: (A) for any Obligation which the Obligor is excused from under and in accordance with the terms of the Programme Documents; (B) for any amount or performance in excess of the amount or performance actually due and owing by the Obligor to a Beneficiary, including but not limited to any set-off to which the Obligor would be entitled; or (C) if the Obligor is prohibited, unable or otherwise fails to make any payment, or any portion thereof or to perform any other obligation, because or arising out of an act of war, insurrection or civil strife; an action by the government or any governmental authority or instrumentality thereof (whether de jure or de facto); legal constraint; terrorism; riots; or catastrophe; and (ii) any and all defences available to a guarantor under applicable law are reserved by the Guarantor and any defences, set-offs and counterclaims of the Obligor shall be available to the Guarantor to the same extent as such defences, set-offs or counterclaims are available to the Obligor and may be asserted by the Guarantor in respect of its obligations hereunder, in each case whether or not asserted by the Obligor.

(5) **Formalities.** The Guarantor hereby waives diligence, presentment, demand of payment, any right to require a proceeding against the Obligor, protest or notice with respect to the Obligations or the amounts payable by the Obligor under the Programme Documents and all demands whatsoever, and covenants that this Guarantee shall not be discharged except by complete payment and performance of the Obligations. The grant of time or other indulgence to the Obligor shall in no manner release the Guarantor from any of its obligations hereunder.

(6) **Reinstatement.** This Guarantee shall continue to be effective or be reinstated, as the case may be, if at any time any payment and performance of any of the Obligations is rescinded or must otherwise be returned by a Beneficiary upon the insolvency, bankruptcy or reorganisation of the Obligor or otherwise, all as though the payment and performance had not been made.

(7) **Subrogation.** The Guarantor (1) shall have the right to assume the rights and payment obligations of the Obligor to such Beneficiary, together with any right of the Obligor to cure any event of default by or relating to the Obligor, notwithstanding any notice of default/termination previously sent by such Beneficiary to the Obligor, and thereby rescind any notice of default/termination given by such Beneficiary, and (2) shall be subrogated to all rights of the Beneficiaries against the Obligor in respect of any amounts paid by the Guarantor pursuant to the provisions of this Guarantee; provided, however, that the Guarantor shall not be entitled to enforce or to receive any payments arising out of, or based upon, such right of subrogation until all amounts due and payable by the Obligor to the Beneficiaries in respect of the Obligations, up to the time of such subrogation, have been paid in full.

(8) **Representations/Warranties.** The Guarantor represents and warrants to each Beneficiary that, as of the date hereof:

(a) it is a national banking association, duly formed and validly existing under the federal laws of the United States of America;

(b) it has the full power and authority to execute and deliver this Guarantee and to perform its obligations hereunder; it has taken all necessary action to authorise such execution, delivery and performance; and this Guarantee has been duly executed and delivered by the Guarantor and the execution, delivery and performance of this Guarantee by the Guarantor does not contravene or constitute a default under any statute, regulation or rule of any applicable governmental authority or under any provision of the Guarantor's certificate of incorporation or by-laws or any contractual restriction binding on the Guarantor;

(c) this Guarantee constitutes a legal, valid and binding obligation of the Guarantor, enforceable against the Guarantor in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, receivership or other similar laws affecting the rights of creditors generally or by general principles of equity; and

(d) no authorisation, approval or consent of, and no filing or registration with, any governmental authority is necessary for the execution, delivery or performance by the Guarantor of this Guarantee or for the validity or enforceability hereof.

(9) **Captions.** The headings and captions in this Guarantee are for convenience only and shall not affect the interpretation or construction of this Guarantee.

(10) **Not Insured.** This Guarantee is not insured by the Federal Deposit Insurance Corporation of the United States of America.

(11) A person who is not a Beneficiary has no right under the Contracts (Rights of Third Parties) Ordinance (Cap. 623 of the Laws of Hong Kong) to enforce or to enjoy the benefit of any term of this Guarantee.

(12) **Integration.** This Guarantee alone sets forth the entire understanding of the Guarantor and each Beneficiary relating to the guarantee of the Obligations and constitutes the entire contract between the parties relating to the subject matter hereof and supersedes any and all previous agreements and understandings, oral or written, express or implied, relating to the subject matter hereof.

(13) **Service of Process.** The Guarantor agrees that service of process in Hong Kong may be made on it at the offices of J.P. Morgan Securities (Asia Pacific) Limited, which is currently at 23-29/F, Chater House, 8 Connaught Road Central, Hong Kong. Nothing in this Guarantee shall affect the right to serve process in any other manner permitted by law.

(14) **GOVERNING LAW.** THIS GUARANTEE AND ALL MATTERS ARISING OUT OF OR RELATING TO THIS GUARANTEE SHALL BE GOVERNED BY, AND THIS GUARANTEE SHALL BE CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION OF THE PEOPLE'S REPUBLIC OF CHINA ("**HONG KONG**"). THE GUARANTOR AGREES TO THE NON-EXCLUSIVE JURISDICTION OF THE COURTS OF HONG KONG OVER ANY DISPUTES ARISING UNDER OR RELATING TO THIS GUARANTEE.

IN WITNESS WHEREOF, the Guarantor has caused this Guarantee to be duly executed and delivered by its authorized officer as of the date first above written.

Dated as of April 2, 2020"

ANNEX 3

PURCHASE AND SALE

General

No action has been or will be taken by the Issuer or the Managers that would permit a public offering (other than Hong Kong) of any series of structured products or possession or distribution of any offering material in relation to any structured products in any jurisdiction where action for that purpose is required. No offers, sales, re-sales, transfers or deliveries of any structured products, or distribution of any offering material relating to structured products, may be made in or from any jurisdiction except in circumstances which will result in compliance with any applicable laws and regulations and will not impose any obligations on the Issuer.

United States of America

The structured products which are subject to the base listing document and the relevant launch announcement and supplemental listing document and the Guarantee have not been and will not be registered under the U.S. Securities Act of 1933, as amended (the "**Securities Act**"), or any state securities law. Trading in the structured products has not been approved by the U.S. Commodity Futures Trading Commission under the U.S. Commodities Exchange Act, as amended, any U.S. federal or state banking authority or any other U.S. or foreign regulatory authority. The Guarantee has not been and will not be registered under the rules of the U.S. Office of the Comptroller of the Currency (the "**OCC**"). The Issuer has not registered, and does not intend to register, as an investment company under the U.S. Investment Company Act of 1940, as amended (the "**Investment Company Act**"). Accordingly, the structured products may not be legally or beneficially owned by any U.S. Person at any time nor offered, sold, transferred, pledged, assigned, delivered, exercised or redeemed at any time within the United States or to, or for the account or benefit of, any U.S. Person. The structured products and the Guarantee are being offered and sold only to non-U.S. Persons in offshore transactions in accordance with Regulation S under the Securities Act ("**Regulation S**"). Each of the Managers has represented and agreed, and any other entity who is appointed by the Issuer as a manager in connection with an issue of the structured products will represent and agree, that it, its affiliates, and any person acting on its or their behalf has not offered or sold and will not offer or sell the structured products at any time, directly or indirectly, within the United States or to, or for the account or benefit of, any U.S. Person, and that neither it, its affiliates nor any persons acting on its or their behalf have engaged or will engage in any directed selling efforts with respect to such structured products, and it and they have complied and will comply with the offering restrictions requirement of Regulation S. The Guarantee may also be offered or sold in reliance upon the exemption from the registration requirements of the Securities Act provided by Section 3(a)(2) thereof and will be offered and sold pursuant to an exemption from the registration requirements of the OCC (including in compliance with Regulation S as such regulation is incorporated into the regulations of the OCC pursuant to 12 C.F.R. Section 16.5(g)). The terms used in this paragraph have the meanings given to them under Regulation S.

Each of the Managers has also agreed, and any other entity who is appointed by the Issuer in connection with an issue of the structured products will agree, that, at or prior to confirmation of a sale of the structured products, it, its affiliates, and any person acting on its or their behalf will have sent to each distributor, dealer or person receiving a selling concession, fee or other remuneration that purchases such structured products from it (whether upon original issuance or in any secondary transaction) a written confirmation or notice stating that the purchaser is subject to the same restrictions on offers and sales and setting forth the restrictions on offers and sales of such structured products within the United States or to, or for the account or benefit of, any U.S. Person.

As used in this section, "United States" means the United States of America, its territories or possessions, any state of the United States, the District of Columbia or any other enclave of the United States government, its agencies or instrumentalities, and "U.S. person" means (a) any person who is a U.S. person as defined in Regulation S or (b) any person or entity other than one of the following:

(i) a natural person who is not a resident of the United States;

(ii) a partnership, corporation or other entity, other than an entity organised principally for passive investment, organised under the laws of a jurisdiction other than the United States and which has its principal place of business in a jurisdiction other than the United States;

(iii) an estate or trust, the income of which is not subject to United States income tax regardless of source;

(iv) an entity organised principally for passive investment such as a pool, investment company or other similar entity, provided that units of participation in the entity held by U.S. persons represent in the aggregate less than 10% of the beneficial interest in the entity, and that such entity was not formed principally for the purpose of facilitating investment by U.S. persons; or

(v) a pension plan for the employees, officers or principals of an entity organised and with its principal place of business outside the United States.

No ownership by U.S. Persons

The structured products and the Guarantee may not be legally or beneficially owned by U.S. Persons at any time. Each holder and each beneficial owner of a structured product hereby represents, as a condition to purchasing or owning the structured product or any beneficial interest therein, that neither it nor any person for whose account or benefit the structured products are being purchased is located in the United States, is a U.S. Person or was solicited to purchase the structured products while present in the United States. Each holder and each beneficial owner of a structured product hereby agrees not to offer, sell or deliver any of the structured products at any time, directly or indirectly in the United States or to any U.S. Person.

ERISA Restrictions

In addition, unless otherwise specified in the launch announcement and supplemental listing document relating to a series of structured products, each purchaser (or transferee) and any person directing such purchase (or transfer) will represent and warrant, or will be deemed to have represented and warranted, on each day from the date on which the purchaser (or transferee) acquires the structured products through and including the date on which the purchaser (or transferee) disposes of its interest in the structured products, that the purchaser (or transferee) is not an "employee benefit plan" (as defined in Section 3(3) of Title I of the Employee Retirement Income Security Act of 1974, as amended ("**ERISA**")) that is subject to the fiduciary responsibility provisions of ERISA, a "plan" that is subject to Section 4975 of the Code, any entity whose underlying assets include "plan assets" by reason of any such employee plan's or plan's investment in the entity, or a governmental, church, non-U.S. or other plan that is subject to any law or regulation that is substantially similar to the provisions of Section 406 of ERISA or Section 4975 of the Code.

European Economic Area and the United Kingdom

Each of the Issuer and the Managers represents and agrees, and each further dealer appointed in respect of the structured products will be required to represent and agree, that it has not offered, sold or otherwise made available and will not offer, sell, or otherwise make available any structured products which are the subject of the offering as contemplated by the base listing document to any retail investor in the European Economic Area or in the United Kingdom. For the purposes of this provision:

a) the expression "**retail investor**" means a person who is one (or more) of the following:

   i. a retail client as defined in point (11) of Article 4(1) of Directive 2014/65/EU (as amended, "**MiFID II**"); or

   ii. a customer within the meaning of Directive 2016/97/EU (as amended, the Insurance Distribution Directive), where that customer would not qualify as a professional client as defined in point (10) of Article 4(1) of MiFID II; or

   iii. not a qualified investor as defined in Regulation (EU) 2017/1129 (as amended and superseded, the "**Prospectus Regulation**"); and

b) the expression "**offer**" includes the communication in any form and by any means of sufficient information on the terms of the offer and the structured products, to be offered so as to enable an investor to decide to purchase or subscribe the structured products.

In respect of the United Kingdom, the Issuer further represents, warrants and agrees, and each dealer appointed in respect of the structured products will be required to further represent, warrant and agree, that:

(a) in respect to structured products having a maturity of less than one year: (i) it is a person whose ordinary activities involve it in acquiring, holding, managing or disposing of investments (as principal or agent) for the purposes of its business; and (ii) it has not offered or sold and will not offer or sell any structured products other than to persons whose ordinary activities involve them in acquiring, holding, managing or disposing of investments (as principal or agent) for the purposes of their businesses or who it is reasonable to expect will acquire, hold, manage or dispose of investments (as principal or agent) for the purposes of their businesses where the issue of the structured products would otherwise constitute a contravention of Section 19 of Financial Services and Markets Act, as amended (the "**FSMA**") by the Issuer;

(b) it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of Section 21 (financial promotion) of the FSMA received by it in connection with the issue or sale of any structured products in circumstances in which Section 21(1) of the FSMA does not apply to the Issuer or the Guarantor; and

(c) it has complied with and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to any structured products in, from or otherwise involving the United Kingdom.

The Netherlands

For selling restrictions in respect of The Netherlands, see "**European Economic Area**" above and the additional restrictions set forth below.

Regulatory capacity to offer structured products in The Netherlands: Each Manager has represented and agreed, and any other entity who is appointed by the Issuer as a manager in connection with an issue of the structured products which are the subject of the offering contemplated by the base listing document will represent and agree, that it has not offered to the public or sold, and will not offer to the public or sell, any of the structured products which are the subject of the offering contemplated by the base listing document in The Netherlands if it does not have the requisite Dutch regulatory capacity to make such offers or sales in The Netherlands.

General

The offer and sale of structured products will also be subject to such other restrictions and requirements as may be set out in the relevant Launch Announcement and Supplemental Listing Document.

Persons interested in acquiring structured products should inform themselves and obtain appropriate professional advice as to (i) the legal requirements within the countries of their nationality, residence, ordinary residence or domicile for such acquisition; (ii) any foreign exchange restrictions or exchange control requirements which they might encounter on the acquisition of structured products or their redemption; or (iii) the acquisition, holding or disposal of structured products.

ANNEX 4

A BRIEF GUIDE TO CREDIT RATINGS

Information set out in this Annex 4 is based on, extracted or reproduced from the website of S&P at *https://www.spglobal.com/ratings/en* and the website of Moody's at *https://www.moodys.com,* as of the day immediately preceding the date of this base listing document. Information appearing on those websites does not form part of this base listing document, and we accept no responsibility for the accuracy or completeness of the information appearing on those websites, except that we have accurately extracted and reproduced such information in this Annex 4 and take responsibility for such extraction and reproduction. We have not separately verified such information. There can be no assurance that such information will not be revised by the relevant rating agency in the future and we have no responsibility to notify you of such change. If you are unsure about any information provided in this Annex 4 and/or what a credit rating means, you should seek independent professional advice.

What is a credit rating?

A credit rating is a forward looking opinion by a credit rating agency of a company's overall ability to meet its financial obligations. The focus is on the company's capacity to pay its debts as they become due. The rating does not necessarily apply to any specific obligation.

What do the credit ratings mean?

Below are guidelines issued by S&P and Moody's on what each of their investment-grade ratings means, as of the day immediately preceding the date of this base listing document.

S&P long-term issuer credit ratings

AAA

An obligor rated 'AAA' has extremely strong capacity to meet its financial commitments. 'AAA' is the highest issuer credit rating assigned by S&P.

AA

An obligor rated 'AA' has very strong capacity to meet its financial commitments.

A

An obligor rated 'A' has strong capacity to meet its financial commitments but is somewhat susceptible to adverse economic conditions and changes in circumstances.

BBB

An obligor rated 'BBB' has adequate capacity to meet its financial commitments, but is more subject to adverse economic conditions.

Plus (+) or minus (-)

The above ratings (except for 'AAA') may be modified by the addition of a plus or minus sign to show relative standing within the major rating categories.

Please refer to *https://www.spglobal.com/ratings/en/about/understanding-ratings* for further details.

Moody's long-term ratings definitions

Aaa

Obligations rated Aaa are judged to be of the highest quality, subject to the lowest level of credit risk.

Aa

Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.

A

Obligations rated A are judged to be upper-medium grade and are subject to low credit risk.

Baa

Obligations rated Baa are judged to be medium-grade and subject to moderate credit risk and as such may possess certain speculative characteristics.

Modifiers "1", "2" and "3"

Moody's appends numerical modifiers 1, 2 and 3 to each of the above generic rating classifications (except for Aaa). The modifier 1 indicates that the obligation ranks in the higher end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of that generic rating category.

Please refer to *https://www.moodys.com/Pages/amr002002.aspx* for further details.

Rating Outlooks

A rating outlook indicates the potential direction of a long-term credit rating over the intermediate term (for example, this is typically six months to two years for S&P). A rating outlook issued by S&P or Moody's will usually indicate whether the potential direction is likely to be "positive", "negative", "stable" or "developing". Please refer to the abovementioned websites of the relevant credit rating agencies for further details regarding rating outlooks published by the relevant credit rating agencies.

PARTIES

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8 Connaught Road Central
Hong Kong

Liquidity Provider

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8 Connaught Road Central
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to the Issuer and the Guarantor
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Guarantor's Auditor

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Independent Auditor
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United States of America