

**Underlying supplement no. 1-II**

*To the prospectus dated April 8, 2020 and  
the prospectus supplement dated April 8, 2020*

**Registration Statement Nos. 333-236659 and 333-236659-01**

**Dated November 4, 2020**

**Rule 424(b)(2)**

**JPMORGAN CHASE & CO.**

***Notes Linked to One or More Indices or Funds***

**JPMORGAN CHASE FINANCIAL COMPANY LLC**

***Notes, Fully and Unconditionally Guaranteed by JPMorgan Chase & Co., Linked to One or More Indices or Funds***

Each of JPMorgan Chase & Co. and JPMorgan Chase Financial Company LLC may from time to time offer and sell notes that are linked to one or more indices (each, an “Index” and collectively, the “Indices”) or funds (each, a “Fund” and collectively, the “Funds”). This underlying supplement describes potential Indices and Funds to which the notes may be linked and other relevant information. The issuer of the notes, as specified in the relevant terms supplement, is referred to in this underlying supplement as the “Issuer.” The Issuer will be either JPMorgan Chase & Co. or JPMorgan Chase Financial Company LLC. For notes issued by JPMorgan Chase Financial Company LLC, JPMorgan Chase & Co., in its capacity as guarantor of those notes, is referred to in this product supplement as the “Guarantor.”

This underlying supplement supplements the terms described in the accompanying product supplement, the prospectus supplement and the prospectus. A separate term sheet or pricing supplement, as the case may be, will describe terms that apply to specific issuances of the notes, including any changes to description of any relevant Index or Fund specified below. These term sheets and pricing supplements are referred to generally in this underlying supplement as terms supplements. If the terms described in the relevant terms supplement are inconsistent with those described in this underlying supplement, any other accompanying underlying supplement, the accompanying product supplement, the prospectus supplement or the prospectus, the terms described in the relevant terms supplement will control. In addition, if this underlying supplement and the accompanying product supplement or another relevant underlying supplement contain information relating to the same Index or Fund to which the notes are linked, the information contained in the document with the most recent date will control.

**Investing in the notes involves a number of risks. See “Risk Factors” beginning on page S-2 of the prospectus supplement, “Risk Factors” in the accompanying product supplement and “Risk Factors” beginning on page US-3 of this underlying supplement.**

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of the notes or passed upon the accuracy or the adequacy of the relevant terms supplement, this underlying supplement, any other accompanying underlying supplement, the accompanying product supplement, the prospectus supplement or the prospectus. Any representation to the contrary is a criminal offense.

***The notes are not bank deposits, are not insured by the Federal Deposit Insurance Corporation or any other governmental agency, and are not obligations of, or guaranteed by, a bank.***

**J.P.Morgan**

November 4, 2020

## TABLE OF CONTENTS

	<b><u>Page</u></b>
Risk Factor Summary.....	US-1
Risk Factors .....	US-3
Equity Index Descriptions.....	US-36
The Dow Jones Industrial Average™ .....	US-36
The EURO STOXX® Select Dividend 30 Index.....	US-39
The FTSE® 100 Index .....	US-44
The Hang Seng Indices.....	US-47
The MSCI Indices.....	US-56
The MSCI 25/50 Indices.....	US-64
The NASDAQ-100 Index® .....	US-69
The NASDAQ-100® Technology Sector Index <sup>SM</sup> .....	US-74
The Nikkei 225 Index.....	US-77
The Russell Indices .....	US-80
The S&P/ASX 200 Index.....	US-85
The S&P 500® Low Volatility High Dividend Index.....	US-89
The S&P Select Industry Indices.....	US-92
The S&P Select Sector Indices .....	US-99
The S&P U.S. Indices.....	US-103
The STOXX Benchmark Indices .....	US-109
The Swiss Market Index.....	US-116
The TOPIX® Index.....	US-120
Commodity Index Descriptions .....	US-124
The Bloomberg Commodity Indices .....	US-124
The S&P GSCI® Indices .....	US-136
Fund Descriptions .....	US-145
The Invesco QQQ Trust <sup>SM</sup> , Series 1 .....	US-145
The iShares® 20+ Year Treasury Bond ETF .....	US-146
The iShares® ETFs.....	US-151
The Select Sector SPDR® Funds.....	US-158
The SPDR® EURO STOXX 50® ETF .....	US-160
The SPDR® Gold Trust.....	US-161
The SPDR® S&P 500® ETF Trust .....	US-162
The SPDR® S&P® Industry ETFs.....	US-163
The United States Oil Fund, LP .....	US-165
The VanEck Vectors® ETFs .....	US-166
The Vanguard FTSE Emerging Markets ETF .....	US-180

The Issuer and the Guarantor (if applicable) have not authorized anyone to provide any information other than that contained or incorporated by reference in the relevant terms supplement, this underlying supplement, any other accompanying underlying supplement, the accompanying product supplement, the prospectus supplement or the prospectus with respect to the notes offered by the relevant terms supplement and with respect to the Issuer and the Guarantor (if applicable). The Issuer and Guarantor (if applicable) take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. The relevant terms supplement, together with this underlying supplement, any other accompanying underlying supplement, the accompanying product supplement, the prospectus supplement and the prospectus, will contain the terms of the notes and will supersede all other prior or contemporaneous oral statements as well as any other written materials, including preliminary or indicative pricing terms, correspondence, trade ideas, structures for implementation, sample structures, fact sheets, brochures or other educational materials of the Issuer. The information in each of the relevant terms supplement, this underlying supplement, any other accompanying underlying supplement, the accompanying product supplement, the prospectus supplement and the prospectus may be accurate only as of the date of that document.

The notes are not appropriate for all investors and involve a number of risks and important legal and tax consequences that should be discussed with your professional advisers. You should be aware that the regulations of Financial Industry Regulatory Authority, Inc., or FINRA, and the laws of certain jurisdictions (including regulations and laws that require brokers to ensure that investments are suitable for their customers) may limit the availability of the notes. The relevant terms supplement, this underlying supplement, any other accompanying underlying supplement, the accompanying product supplement, the prospectus supplement and the prospectus do not constitute an offer to sell or a solicitation of an offer to buy the notes under any circumstances in which that offer or solicitation is unlawful.

In this underlying supplement “JPMorgan Financial” refers to JPMorgan Chase Financial Company LLC.

## RISK FACTOR SUMMARY

*Your investment in the notes will involve certain risks. Set forth below is only a summary of the principal risks associated with an investment in notes linked to one or more of the Underlyings. **You should refer to the more detailed discussion of these and other risks set forth under “Risk Factors” in this underlying supplement, as well as the discussion of risks included in the relevant terms supplement, the accompanying product supplement and any accompanying underlying supplement before you decide that an investment in the notes is appropriate for you.***

### Risks Relating to Certain Equity Indices

- JPMorgan Chase & Co. is currently one of the companies that makes up some of the Indices.
- The following Indices are subject to risks associated with the related industry or sector:

Index	Related Industry / Sector
EURO STOXX® Banks Index / STOXX® Europe 600 Banks Index / S&P® Banks Select Industry™ Index / S&P® Regional Banks Select Industry™ Index	Banking industry
S&P® Biotechnology Select Industry™ Index	Biotechnology industry
S&P® Homebuilders Select Industry™ Index	Homebuilding industry
S&P® Metals & Mining Select Industry™ Index	Metals and mining industry
S&P® Oil & Gas Exploration & Production Select Industry™ Index	Oil and gas exploration and production industry
S&P® Retail Select Industry™ Index	Retail industry
Communication Services Select Sector Index	Communication sector
Consumer Discretionary Select Sector Index	Consumer discretionary sector
Consumer Staples Select Sector Index	Consumer staples sector
Energy Select Sector Index	Energy sector
Financial Select Sector Index	Financial sector
Health Care Select Sector Index	Health care sector
Industrials Select Sector Index	Industrial sector
Materials Select Sector Index	Materials sector
Real Estate Select Sector Index	Real estate sector
Technology Select Sector Index / NASDAQ-100®	Technology sector
Technology Sector Index <sup>SM</sup>	
Utilities Select Sector Index	Utility sector

- There is no assurance that the strategy employed by the EURO STOXX® Select Dividend 30 Index will be successful.
- The Russell 2000® Index, the Russell 3000® Index and the S&P SmallCap 600® Index are subject to risks associated with small-capitalization stocks.
- There is no assurance that the strategy employed by the S&P 500® Low Volatility High Dividend will be successful, and the S&P 500® Low Volatility High Dividend Index is subject to concentration risk.
- The S&P MidCap 400® Index is subject to risks associated with mid-capitalization stocks.

### Risks Relating to Certain Commodity Indices

- S&P Dow Jones or Bloomberg may be required to replace a contract underlying an S&P GSCI® Index or a Bloomberg Commodity Index if the existing futures contract is terminated or replaced.
- For notes linked to a Bloomberg Commodity Index, you may in the future have exposure to contracts that are not traded on regulated futures exchanges.
- For notes linked to a Bloomberg Commodity Index, risks associated with that Bloomberg Commodity Index may adversely affect the market price of the notes.
- An S&P GSCI Component Index may be more volatile and susceptible to price fluctuations of commodities than a broader commodities index.
- For notes linked to an S&P GSCI® Index, changes in the composition and valuation of the S&P GSCI™ may adversely affect the market value and/or the payment at maturity.

## Risks Relating to Certain Funds

- JPMorgan Chase & Co. is currently one of the issuers of equity securities held by some of the Funds.
- The following Funds are subject to risks associated with the related industry or sector:

<b>Fund</b>	<b>Related Industry / Sector</b>
iShares® Nasdaq Biotechnology ETF	Biotechnology and pharmaceutical industries
Communication Services Select Sector SPDR® Fund	Communication sector
Consumer Discretionary Select Sector SPDR® Fund	Consumer discretionary sector
Consumer Staples Select Sector SPDR® Fund	Consumer staples sector
Energy Select Sector SPDR® Fund	Energy sector
Financial Select Sector SPDR® Fund	Financial sector
Health Care Select Sector SPDR® Fund	Health care sector
Industrials Select Sector SPDR® Fund	Industrial sector
Materials Select Sector SPDR® Fund	Materials sector
Real Estate Select Sector SPDR® Fund / iShares® U.S. Real Estate ETF	Real estate sector
Technology Select Sector SPDR® Fund / NASDAQ-100® Technology Sector Index <sup>SM</sup>	Technology sector
Utilities Select Sector Index	Utility sector
SPDR® S&P® Bank ETF; the SPDR® S&P® Regional Banking ETF	Banking industry
SPDR® S&P® Biotech ETF	Biotechnology industry
SPDR® S&P® Homebuilders ETF	Homebuilding industry
SPDR® S&P® Metals & Mining ETF	Metals and mining industry
SPDR® S&P® Oil & Gas Exploration & Production ETF	Oil and gas exploration and production industry
SPDR® S&P® Retail ETF	Retail industry
VanEck Vectors® Gold Miners ETF / VanEck Vectors® Junior Gold Miners ETF	Gold and silver mining industries
VanEck Vectors® Oil Services ETF	Oil services sector

- The iShares® Russell 2000 ETF and the iShares® Russell 3000 ETF are subject to risks associated with small-capitalization stocks.
- The performance and market value of each of the SPDR® Gold Trust or the United States Oil Fund, LP, particularly during periods of market volatility, may not correlate with the performance of that Fund's underlying commodity or commodity futures contracts, as well as the net asset value per share.
- The market value of the SPDR® Gold Trust will be affected by the price of gold, which is volatile and affected by numerous factors, and may not correlate with the prices of commodities generally.
- The market value of the United States Oil Fund, LP may be more volatile than an index or fund that provides broad commodity exposure and will be affected by the market price of crude oil.

## RISK FACTORS

*Your investment in the notes will involve certain risks. Investing in the notes is not equivalent to investing in any of the Indices or Funds or any of their component securities, commodities, futures contracts or other assets or market measures. **You should consider carefully the following discussion of risks as well as the discussion of risks included in the relevant terms supplement, the accompanying product supplement and any accompanying underlying supplement before you decide that an investment in the notes is appropriate for you.***

### Risks Relating to Certain Equity Indices

JPMorgan Chase & Co. is currently one of the companies that makes up the Dow Jones Industrial Average™, the MSCI ACWI Index, the MSCI World Index<sup>SM</sup>, the Russell 1000® Index, the Russell 3000® Index, the S&P 500® Index, the S&P® Banks Select Industry™ Index and the Financial Select Sector Index and may be included in the S&P 500 Low Volatility High Dividend Index, but, to the Issuer's and the Guarantor's (if applicable) knowledge, unless otherwise specified in the relevant terms supplement, their securities are not currently included in any other Index.

As a general matter, none of the other issuers the securities of which are included in an Index will be involved in the offering of the notes in any way. As a result, the Issuer and the Guarantor (if applicable) will have no ability to control the actions of the other issuers of those securities, including actions that could affect the value of the securities underlying an Index or your notes. None of those issuers will have any obligation to consider your interests as a holder of the notes in taking any corporate actions that might affect the value of your notes. Unless otherwise specified in the relevant terms supplement, none of the money you pay for the notes will go to any of the other issuers of the securities included in any Index. See the relevant terms supplement for additional information about whether the Issuer or the Guarantor (if applicable) is one of the companies included in an Index.

In the event that the Issuer's or the Guarantor's (if applicable) securities are included in an Index, the Issuer and the Guarantor (if applicable) will have no obligation to consider your interests as a holder of the notes in taking any action that might affect the value of your notes.

**For notes linked in whole or in part to the EURO STOXX® Banks Index, the STOXX® Europe 600 Banks Index, the S&P® Banks Select Industry™ Index or the S&P® Regional Banks Select Industry™ Index, risks associated with the banking industry will affect the value of the notes.**

All or substantially all of the equity securities included in the EURO STOXX® Banks Index, the STOXX® Europe 600 Banks Index, the S&P® Banks Select Industry™ Index and the S&P® Regional Banks Select Industry™ Index are issued by companies whose primary line of business is directly associated with the banking industry. As a result, the value of the securities may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

The performance of bank stocks may be affected by extensive governmental regulation, which may limit both the amounts and types of loans and other financial commitments they can make, the interest rates and fees they can charge and the amount of capital they must maintain. Profitability is largely dependent on the availability and cost of capital funds and can fluctuate significantly when interest rates change. Credit losses resulting from financial difficulties of borrowers can negatively impact banking companies. Banks may also be subject to severe price competition. Competition is high among banking companies and failure to maintain or increase market share may result in lost market value.

These factors could affect the banking industry and could affect the value of the equity securities included in the EURO STOXX® Banks Index, the STOXX® Europe 600 Banks Index, the S&P® Banks Select Industry™ Index or the S&P® Regional Banks Select Industry™ Index and the level of the EURO STOXX® Banks Index, the STOXX® Europe 600 Banks Index, the S&P® Banks Select Industry™ Index or the S&P® Regional Banks Select Industry™ Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the EURO STOXX® Select Dividend 30 Index, there is no assurance that the strategy employed by the EURO STOXX® Select Dividend 30 Index will be successful.**

The EURO STOXX® Select Dividend 30 Index is composed of 30 of the highest dividend-paying stocks selected from the components of the EURO STOXX® Index, which provides a broad representation of the developed markets in the Eurozone. There is, however, no assurance that the EURO STOXX® Select Dividend 30 Index will outperform any other index or strategy that tracks Eurozone stocks selected using other criteria. Although the EURO STOXX® Select Dividend 30 Index measures the performance of high dividend-yielding companies, the EURO STOXX® Select Dividend 30 Index is a price return index and, therefore, the return on the EURO STOXX® Select Dividend 30 Index will not include any dividends paid on the securities that make up the EURO STOXX® Select Dividend 30 Index. In addition, the EURO STOXX® Select Dividend 30 Index is constructed pursuant to a weighting methodology in which the weights of components reflect their indicated annual net dividend yields. It is possible that the stock selection and weighting methodology of the EURO STOXX® Select Dividend 30 Index will adversely affect its return (for example, by providing exposure to stocks that do not perform as well as other stocks with lower dividend yields) and, consequently, the value of the EURO STOXX® Select Dividend 30 Index and of the notes. An investment in the notes may also underperform an investment linked to the EURO STOXX® Index as a whole.

**For notes linked in whole or in part to the Russell 2000® Index, the Russell 3000® Index or the S&P SmallCap 600® Index, an investment in the notes will be subject to risks associated with small-capitalization stocks.**

The stocks that constitute the Russell 2000® Index and the S&P SmallCap 600® Index and some of the stocks that constitute the Russell 3000® Index are issued by companies with relatively small market capitalization. The stock prices of smaller companies may be more volatile than stock prices of large-capitalization companies. Small-capitalization companies may be less able to withstand adverse economic, market, trade and competitive conditions relative to larger companies. These companies tend to be less well-established than large market capitalization companies. Small-capitalization companies are less likely to pay dividends on their stocks, and the presence of a dividend payment could be a factor that limits downward stock price pressure under adverse market conditions.

**For notes linked in whole or in part to the S&P 500® Low Volatility High Dividend Index, there is no assurance that the strategy employed by the S&P 500® Low Volatility High Dividend will be successful.**

The S&P 500® Low Volatility High Dividend Index is designed to measure the performance of the 50 least-volatile among the 75 highest dividend-yielding companies in the S&P 500® Index, subject to sector and individual constituent concentration limits. There is, however, no assurance that the S&P 500® Low Volatility High Dividend Index will exhibit low volatility or provide higher risk-weighted returns than the S&P 500® Index or any other index or strategy. Although the S&P 500® Low Volatility High Dividend Index measures the performance of high dividend-yielding companies, the S&P 500® Low Volatility High Dividend Index is a price return index and, therefore, the return on the S&P 500® Low Volatility High Dividend Index will not include any dividends paid on the securities that make up the S&P 500® Low Volatility High Dividend Index. In addition, the S&P 500® Low Volatility High Dividend Index is constructed pursuant to a weighting methodology in which the weights of components reflect their dividend yields. It is possible that the stock selection and weighting methodology of the S&P 500® Low Volatility High Dividend Index will adversely affect its return (for example, by providing exposure to stocks that do not perform as well as other stocks with higher volatility or with lower dividend yields) and, consequently, the closing level of the S&P 500® Low Volatility High Dividend Index and the value of the notes. The S&P 500® Low Volatility High Dividend Index may also underperform the S&P 500® Index as a whole.

**For notes linked in whole or in part to the S&P 500® Low Volatility High Dividend Index, the S&P 500® Low Volatility High Dividend Index is subject to concentration risk.**

The S&P 500® Low Volatility High Dividend Index is designed to measure the performance of the 50 least-volatile among the 75 highest dividend-yielding companies in the S&P 500® Index, subject to sector and individual constituent concentration limits. Because volatility and dividend yield vary by industry and sector, the S&P 500® Low Volatility High Dividend Index may be concentrated to a significant degree in securities of issuers located in a single industry or sector or a small number of industries or sectors. By concentrating its investments in an industry or sector, the S&P 500® Low Volatility High Dividend Index may face more risks than if it were diversified broadly over numerous industries or sectors. Accordingly, the S&P 500® Low Volatility High Dividend Index may be more adversely affected by negative economic, political or regulatory occurrences affecting its constituents and the relevant industries and sectors than a more broadly diversified stock index.

**For notes linked in whole or in part to the S&P® Biotechnology Select Industry™ Index, risks associated with the biotechnology industry will affect the value of the notes.**

All or substantially all of the equity securities included in the S&P® Biotechnology Select Industry™ Index are issued by companies whose primary line of business is directly associated with the biotechnology industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Biotechnology companies invest heavily in research and development, which may not necessarily lead to commercially successful products. These companies are also subject to increased governmental regulation, which may delay or inhibit the release of new products. Many biotechnology companies are dependent upon their ability to use and enforce intellectual property rights and patents. Any impairment of these rights may have adverse financial consequences. Biotechnology stocks, especially those of smaller, less-seasoned companies, tend to be more volatile than the overall market. Biotechnology companies can be significantly affected by technological change and obsolescence, product liability lawsuits and consequential high insurance costs.

These factors could affect the biotechnology industry and could affect the value of the equity securities included in the S&P® Biotechnology Select Industry™ Index and the level of the S&P® Biotechnology Select Industry™ Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the S&P® Homebuilders Select Industry™ Index, risks associated with the homebuilding industry will affect the value of the notes.**

All or substantially all of the equity securities included in the S&P® Homebuilders Select Industry™ Index are issued by companies whose primary line of business is directly associated with the homebuilding industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Homebuilding companies can be significantly affected by the national, regional and local real estate markets. Homebuilding companies are also sensitive to interest rate fluctuations, which can cause changes in the availability of mortgage capital and directly affect the purchasing power of potential homebuyers. Homebuilding companies can be significantly affected by changes in government spending, consumer confidence, demographic patterns and the level of new and existing home sales.

These factors could affect the homebuilding industry and could affect the value of the equity securities included in the S&P® Homebuilders Select Industry™ Index and the level of the S&P® Homebuilders Select Industry™ Index during the term of the notes, which may adversely affect the value of your notes.



**For notes linked in whole or in part to the S&P® Metals & Mining Select Industry™ Index, risks associated with the metals and mining industry will affect the value of the notes.**

All or substantially all of the equity securities included in the S&P® Metals & Mining Select Industry™ Index are issued by companies whose primary line of business is directly associated with the metals and mining industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Metals and mining companies can be significantly affected by events relating to international political and economic developments, energy conservation, the success of exploration projects, commodity prices, and tax and other government regulations. Investments in metals and mining companies may be speculative and may be subject to greater price volatility than investments in other types of companies. Risks of metals and mining investments include: changes in international monetary policies or economic and political conditions that can affect the supply of precious metals and consequently the value of metals and mining company investments; the United States or foreign governments may pass laws or regulations limiting metals investments for strategic or other policy reasons; and increased environmental or labor costs may depress the value of metals and mining investments.

These factors could affect the metals and mining industry and could affect the value of the equity securities included in the S&P® Metals & Mining Select Industry™ Index and the level of the S&P® Metals & Mining Select Industry™ Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the S&P® Oil & Gas Exploration & Production Select Industry™ Index, risks associated with the oil and gas exploration and production industry will affect the value of the notes.**

All or substantially all of the equity securities included in the S&P® Oil & Gas Exploration & Production Select Industry™ Index are issued by companies whose primary line of business is directly associated with the oil and gas exploration and production industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Issuers in energy-related industries can be significantly affected by fluctuations in energy prices and supply and demand of energy fuels caused by geopolitical events, energy conservation or use of alternative fuel sources, the success of exploration projects, weather or meteorological events, taxes, increased governmental or environmental regulation, resource depletion, rising interest rates, declines in domestic or foreign production, accidents or catastrophic events, or terrorist threats or attacks, among others. Markets for various energy-related commodities can have significant volatility, and are subject to control or manipulation by large producers or purchasers. Companies in the energy sector may need to make substantial expenditures, and to incur significant amounts of debt, in order to maintain or expand their reserves through exploration of new sources of supply, through the development of existing sources, through acquisitions, or through long-term contracts to acquire reserves. Factors adversely affecting producers, refiners, distributors, or others in the energy sector may affect adversely companies that service or supply those entities, either because demand for those services or products is curtailed, or those services or products come under price pressure.

Oil and gas companies develop and produce crude oil and natural gas and provide drilling and other energy resources production and distribution related services. Stock prices for these types of companies are affected by supply and demand both for their specific product or service and for energy products in general. The price of oil and gas, exploration and production spending, government regulation, world events and economic conditions will likewise affect the performance of these companies. Correspondingly, securities of companies in the energy field are subject to swift price and supply fluctuations caused by events relating to international politics, energy conservation, the success of exploration projects, and tax and other governmental regulatory policies. Weak demand for the

companies' products or services or for energy products and services in general, as well as negative developments in these other areas, would adversely impact the S&P® Oil & Gas Exploration & Production Select Industry™ Index's performance. Oil and gas exploration and production can be significantly affected by natural disasters as well as changes in exchange rates, interest rates, government regulation, world events and economic conditions. These companies may be at risk for environmental damage claims.

These factors could affect the oil and gas exploration and production industry and could affect the value of the equity securities included in the S&P® Oil & Gas Exploration & Production Select Industry™ Index and the level of the S&P® Oil & Gas Exploration & Production Select Industry™ Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the S&P® Retail Select Industry™ Index, risks associated with the retail industry will affect the value of the notes.**

All or substantially all of the equity securities included in the S&P® Retail Select Industry™ Index are issued by companies whose primary line of business is directly associated with the retail industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Retail companies can be significantly affected by the performance of the domestic and international economy, consumer confidence and spending, intense competition, changes in demographics, and changing consumer tastes and preferences.

The success of consumer product manufacturers and retailers is tied closely to the performance of the overall global economy, interest rates, competition and consumer confidence. Success depends heavily on disposable household income and consumer spending. Also, companies in the consumer discretionary sector may be subject to severe competition, which may have an adverse impact on their respective profitability. Changes in demographics and consumer tastes can also affect the demand for, and success of, consumer products and services in the marketplace.

Consumer staples companies are subject to government regulation affecting their products which may negatively impact these companies' performance. For instance, government regulations may affect the permissibility of using various food additives and production methods of companies that make food products, which could affect company profitability. Tobacco companies may be adversely affected by the adoption of proposed legislation and/or by litigation. Also, the success of food, beverage, household and personal product companies may be strongly affected by consumer interest, marketing campaigns and other factors affecting supply and demand, including performance of the overall domestic and global economy, interest rates, competition and consumer confidence and spending.

These factors could affect the retail industry and could affect the value of the equity securities included in the S&P® Retail Select Industry™ Index and the level of the S&P® Retail Select Industry™ Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Communication Services Select Sector Index, risks associated with the communications sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Communication Services Select Sector Index are issued by companies whose primary line of business is directly associated with the communications sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Communication services companies are particularly vulnerable to the potential obsolescence of products and services due to technological advancement and the innovation of competitors. Companies in the communication services sector may also be affected by other competitive pressures, such as

pricing competition, as well as research and development costs, substantial capital requirements and government regulation. Additionally, fluctuating domestic and international demand, shifting demographics and often unpredictable changes in consumer tastes can drastically affect a communication services company's profitability. While all companies may be susceptible to network security breaches, certain companies in the communication services sector may be particular targets of hacking and potential theft of proprietary or consumer information or disruptions in service, which could have a material adverse effect on their businesses.

These factors could affect the communications sector and could affect the value of the equity securities included in the Communication Services Select Sector Index and the level of the Communication Services Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Consumer Discretionary Select Sector Index, risks associated with the consumer discretionary sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Consumer Discretionary Select Sector Index are issued by companies whose primary line of business is directly associated with the consumer discretionary sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

The success of consumer product manufacturers and retailers is tied closely to the performance of the overall domestic and global economy, interest rates, competition and consumer confidence. Success depends heavily on disposable household income and consumer spending. Also, companies in the consumer discretionary sector may be subject to severe competition, which may have an adverse impact on their respective profitability. Changes in demographics and consumer tastes can also affect the demand for, and success of, consumer products and services in the marketplace.

These factors could affect the consumer discretionary sector and could affect the value of the equity securities included in the Consumer Discretionary Select Sector Index and the level of the Consumer Discretionary Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Consumer Discretionary Select Sector Index, in September 2018, there were changes to the GICS® consumer discretionary sector and these changes in exposure could adversely affect the value of the notes.**

After the close of business on September 28, 2018, the GICS® consumer discretionary sector was updated to (a) expand the internet & direct marketing retail industry to include companies providing online marketplaces for consumer products and services and e-commerce companies regardless of whether they hold inventory and (b) discontinue the media industry (which was moved to the renamed GICS® communication services sector). The Consumer Discretionary Select Sector Index is designed to measure the performance of the GICS® consumer discretionary sector and has reflected these changes to the GICS® consumer discretionary sector since that date. This change could adversely affect the performance of the Consumer Discretionary Select Sector Index and, in turn, the value of the notes.

**For notes linked in whole or in part to the Consumer Staples Select Sector Index, risks associated with the consumer staples sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Consumer Staples Select Sector Index are issued by companies whose primary line of business is directly associated with the consumer staples sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Consumer staples companies are subject to government regulation affecting their products, which may negatively impact these companies' performance. For instance, government regulations may affect the permissibility of using various food additives and production methods of companies that make food products, which could affect company profitability. Tobacco companies may be adversely affected by the adoption of proposed legislation and/or by litigation. Also, the success of food, beverage, household and personal product companies may be strongly affected by consumer interest, marketing campaigns and other factors affecting supply and demand, including performance of the overall domestic and global economy, interest rates, competition and consumer confidence and spending.

These factors could affect the consumer staples sector and could affect the value of the equity securities included in the Consumer Staples Select Sector Index and the level of the Consumer Staples Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Energy Select Sector Index, risks associated with the energy sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Energy Select Sector Index are issued by companies whose primary line of business is directly associated with the energy sector, including the following industries: oil, gas and consumable fuels; and energy equipment and services. The Energy Select Sector Index is concentrated in the energy sector, which means the Energy Select Sector Index will be more affected by the performance of the energy sector than a fund or index that was more diversified.

Issuers in energy-related industries can be significantly affected by fluctuations in energy prices and supply and demand of energy fuels. Markets for various energy-related commodities can have significant volatility, and are subject to control or manipulation by large producers or purchasers. Companies in the energy sector may need to make substantial expenditures, and to incur significant amounts of debt, in order to maintain or expand their reserves. Oil and gas exploration and production can be significantly affected by natural disasters as well as changes in exchange rates, interest rates, government regulation, world events and economic conditions. These companies may be at risk for environmental damage claims.

These factors could affect the energy sector and could affect the value of the equity securities included in the Energy Select Sector Index and the level of the Energy Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Financial Select Sector Index, risks associated with the financial sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Financial Select Sector Index are issued by companies whose primary line of business is directly associated with the financial sector, including the following industries: diversified financial services; insurance; banks; capital markets; real estate investment trusts ("REITs"); consumer finance; thrifts and mortgage finance; and real estate management and development. The Financial Select Sector Index is concentrated in the financial sector, which means the Financial Select Sector Index will be more affected by the performance of the financial sector than a fund or index that was more diversified.

Financial services companies are subject to extensive governmental regulation which may limit both the amounts and types of loans and other financial commitments they can make, the interest rates and fees they can charge, the scope of their activities, the prices they can charge and the amount of capital they must maintain. Profitability is largely dependent on the availability and cost of capital funds, and can fluctuate significantly when interest rates change or due to increased competition. In addition, deterioration of the credit markets generally may cause an adverse impact in a broad range of markets, including U.S. and international credit and interbank money markets generally, thereby affecting a wide range of financial institutions and markets. Certain events in the financial sector may cause an unusually high degree of volatility in the financial markets, both domestic and foreign, and cause certain financial services companies to incur large losses. Securities of financial services companies may experience a

dramatic decline in value when such companies experience substantial declines in the valuations of their assets, take action to raise capital (such as the issuance of debt or equity securities), or cease operations.

Credit losses resulting from financial difficulties of borrowers and financial losses associated with investment activities can negatively impact the financial sector. Insurance companies may be subject to severe price competition. Adverse economic, business or political developments could adversely affect financial institutions engaged in mortgage finance or other lending or investing activities directly or indirectly connected to the value of real estate. The Financial Select Sector Index's exposure to real estate securities is limited to mortgage REITs.

These factors could affect the financial sector and could affect the value of the equity securities included in the Financial Select Sector Index and the level of the Financial Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Financial Select Sector Index, in September 2016, the Financial Select Sector Index ceased providing exposure to the real estate sector and this change in exposure could adversely affect the value of the notes.**

In September 2016, the Financial Select Sector Index was reconstituted to eliminate the stocks of real estate management and development companies and REITs (other than mortgage REITs) ("real estate stocks"). As a result, the Financial Select Sector Index no longer provides exposure to real estate stocks. Consequently, the Financial Select Sector Index is less diversified, and is more concentrated in the financial sector, than it was before this change to its composition. This change could adversely affect the performance of the Financial Select Sector Index and, in turn, the value of the notes.

**For notes linked in whole or in part to the Health Care Select Sector Index, risks associated with the health care sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Health Care Select Sector Index are issued by companies whose primary line of business is directly associated with the health care sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Companies in the health care sector are subject to extensive government regulation and their profitability can be significantly affected by restrictions on government reimbursement for medical expenses, rising costs of medical products and services, pricing pressure (including price discounting), limited product lines and an increased emphasis on the delivery of healthcare through outpatient services. Companies in the health care sector are heavily dependent on obtaining and defending patents, which may be time consuming and costly, and the expiration of patents may also adversely affect the profitability of these companies. Health care companies are also subject to extensive litigation based on product liability and similar claims. In addition, their products can become obsolete due to industry innovation, changes in technologies or other market developments. Many new products in the health care sector require significant research and development and may be subject to regulatory approvals, all of which may be time consuming and costly with no guarantee that any product will come to market.

These factors could affect the health care sector and could affect the value of the equity securities included in the Health Care Select Sector Index and the level of the Health Care Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Industrials Select Sector Index, risks associated with the industrial sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Industrials Select Sector Index are issued by companies whose primary line of business is directly associated with the industrial sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single

economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Industrial companies are affected by supply and demand both for their specific product or service and for industrial sector products in general. Government regulation, world events, exchange rates and economic conditions, technological developments and liabilities for environmental damage and general civil liabilities will likewise affect the performance of these companies. Aerospace and defense companies, a component of the industrial sector, can be significantly affected by government spending policies because companies involved in this industry rely, to a significant extent, on U.S. and foreign government demand for their products and services. Thus, the financial condition of, and investor interest in, aerospace and defense companies are heavily influenced by governmental defense spending policies, which are typically under pressure from efforts to control the U.S. (and other) government budgets. Transportation securities, a component of the industrial sector, are cyclical and have occasional sharp price movements, which may result from changes in the economy, fuel prices, labor agreements and insurance costs.

These factors could affect the industrial sector and could affect the value of the equity securities held by the Industrials Select Sector Index and the level of the Industrials Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Materials Select Sector Index, risks associated with the materials sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Materials Select Sector Index are issued by companies whose primary line of business is directly associated with the materials sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Many materials companies are significantly affected by the level and volatility of commodity prices, exchange rates, import controls, worldwide competition, environmental policies and consumer demand. At times, worldwide production of industrial materials has exceeded demand as a result of over-building or economic downturns, leading to poor investment returns or losses. Other risks may include liabilities for environmental damage and general civil liabilities, depletion of resources, and mandated expenditures for safety and pollution control. The materials sector may also be affected by economic cycles, technical progress, labor relations and government regulations.

These factors could affect the materials sector and could affect the value of the equity securities included in the Materials Select Sector Index and the level of the Materials Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Real Estate Select Sector Index, risks associated with the real estate sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Real Estate Select Sector Index are issued by companies whose primary line of business is directly associated with the real estate sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers. There are special risks associated with investment in securities of companies engaged in real property markets, including, without limitation REITs and real estate operating companies.

An investment in a real property company may be subject to risks similar to those associated with direct ownership of real estate, including, by way of example, the possibility of declines in the value of real estate, losses from casualty or condemnation, and changes in local and general economic conditions, supply and demand, interest rates, environmental liability, zoning laws, regulatory limitations on rents, property taxes, and operating expenses. An investment in a real property company is subject to

additional risks, such as poor performance by the manager of the real property company, adverse changes in tax laws, difficulties in valuing and disposing of real estate, and the effect of general declines in stock prices. Some real property companies have limited diversification because they invest in a limited number of properties, a narrow geographic area, or a single type of property. Also, the organizational documents of a real property company may contain provisions that make changes in control of the company difficult and time-consuming.

REITs are subject to the risks associated with investing in the securities of real property companies. In particular, REITs may be affected by changes in the values of the underlying properties that they own or operate. Further, REITs are dependent upon specialized management skills, and their investments may be concentrated in relatively few properties, or in a small geographic area or a single property type. REITs are also subject to heavy cash flow dependency and, as a result, are particularly reliant on the proper functioning of capital markets, as well as defaults by borrowers and self-liquidation. A variety of economic and other factors may adversely affect a lessee's ability to meet its obligations to a REIT. In the event of a default by a lessee, the REIT may experience delays in enforcing its rights as a lessor and may incur substantial costs associated with protecting its investments. In addition, a REIT could possibly fail to qualify for favorable tax treatment under the Internal Revenue Code, or to maintain its exemptions from registration under the 1940 Act, which could have adverse consequences for the Real Estate Select Sector Index. Investments in REITs are also subject to the risks affecting equity markets generally.

These factors could affect the real estate sector and could affect the value of the equity securities included in the Real Estate Select Sector Index and the level of the Real Estate Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Technology Select Sector Index or the NASDAQ-100® Technology Sector Index<sup>SM</sup>, risks associated with the technology sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Technology Select Sector Index and the NASDAQ-100® Technology Sector Index<sup>SM</sup> are issued by companies whose primary line of business is directly associated with the technology sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Market or economic factors impacting technology companies and companies that rely heavily on technological advances could have a major effect on the value of those companies. The value of stocks of technology companies and companies that rely heavily on technology is particularly vulnerable to rapid changes in technology product cycles, rapid product obsolescence, government regulation and competition, both domestically and internationally, including competition from foreign competitors with lower production costs. Stocks of technology companies and companies that rely heavily on technology, especially those of smaller, less-seasoned companies, tend to be more volatile than the overall market. Technology companies are heavily dependent on patent and intellectual property rights, the loss or impairment of which may adversely affect profitability. Additionally, companies in the technology sector may face dramatic and often unpredictable changes in growth rates and competition for the services of qualified personnel.

These factors could affect the technology sector and could affect the value of the equity securities included in the Technology Select Sector Index or the NASDAQ-100® Technology Sector Index<sup>SM</sup> and the level of the Technology Select Sector Index or the NASDAQ-100® Technology Sector Index<sup>SM</sup> during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Technology Select Sector Index, in September 2018, the Technology Select Sector Index ceased providing exposure to the communication services sector and this change in exposure could adversely affect the value of the notes.**

In September 2018, the Technology Select Sector Index was reconstituted to eliminate the telecommunication services industry group, the internet software & services sub-industry, the home entertainment software sub-industry and companies operating online marketplaces for consumer products and services. As a result, the Technology Select Sector Index no longer provides exposure to communication services stocks. Consequently, the Financial Select Sector Index is less diversified, and is more concentrated in the information technology sector, than it was before this change to its composition. This change could adversely affect the performance of the Technology Select Sector Index and, in turn, the value of the notes.

**For notes linked in whole or in part to the Utilities Select Sector Index, risks associated with the utilities sector will affect the value of the notes.**

All or substantially all of the equity securities included in the Utilities Select Sector Index are issued by companies whose primary line of business is directly associated with the utilities sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Utility companies are affected by supply and demand, operating costs, government regulation, environmental factors, liabilities for environmental damage and general civil liabilities and rate caps or rate changes. Although rate changes of a regulated utility usually fluctuate in approximate correlation with financing costs, due to political and regulatory factors, rate changes ordinarily occur only following a delay after the changes in financing costs. This factor will tend to favorably affect a regulated utility company's earnings and dividends in times of decreasing costs, but conversely, will tend to adversely affect earnings and dividends when costs are rising. The value of regulated utility equity securities may tend to have an inverse relationship to the movement of interest rates. Certain utility companies have experienced full or partial deregulation in recent years. These utility companies are frequently more similar to industrial companies in that they are subject to greater competition and have been permitted by regulators to diversify outside of their original geographic regions and their traditional lines of business. These opportunities may permit certain utility companies to earn more than their traditional regulated rates of return. Some companies, however, may be forced to defend their core business and may be less profitable. In addition, natural disasters, terrorist attacks, government intervention or other factors may render a utility company's equipment unusable or obsolete and negatively impact profitability.

Among the risks that may affect utility companies are the following: risks of increases in fuel and other operating costs; the high cost of borrowing to finance capital construction during inflationary periods; restrictions on operations and increased costs and delays associated with compliance with environmental and nuclear safety regulations; and the difficulties involved in obtaining natural gas for resale or fuel for generating electricity at reasonable prices. Other risks include those related to the construction and operation of nuclear power plants, the effects of energy conservation and the effects of regulatory changes.

These factors could affect the utilities sector and could affect the value of the equity securities included in the Utilities Select Sector Index and the level of the Utilities Select Sector Index during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the S&P MidCap 400® Index, an investment in the notes will be subject to risks associated with mid-capitalization stocks.**

The stocks that constitute the S&P MidCap 400® Index are issued by mid-capitalization companies. Mid-capitalization companies may be less able to withstand adverse economic, market, trade and competitive conditions relative to larger companies. Mid-capitalization companies are less likely to pay dividends on their stocks, and the presence of a dividend payment could be a factor that limits downward stock price pressure under adverse market conditions.



## **Risks Relating to Certain Commodity Indices**

**The Issuer, the Guarantor (if applicable) and their affiliates have no affiliation with S&P Dow Jones Indices LLC (“S&P Dow Jones”), UBS Securities LLC (collectively with its affiliate, “UBS”) or Bloomberg Index Services Limited (“BISL” and collectively with its affiliates, “Bloomberg”) and are not responsible for their public disclosure of information.**

The Issuer, the Guarantor (if applicable) and their affiliates are not affiliated with S&P Dow Jones, UBS or Bloomberg in any way (except for arrangements discussed below in “Commodity Index Descriptions — The S&P GSCI® Indices — License Agreement” and “Commodity Index Descriptions — The Bloomberg Commodity Indices — License Agreement”) and have no ability to control S&P Dow Jones, UBS or Bloomberg, including any errors in or discontinuation of disclosure regarding its methods or policies relating to the calculation of the Bloomberg Commodity Indices (as defined under “Commodity Index Descriptions — The Bloomberg Commodity Indices” in this underlying supplement) or the S&P GSCI® Indices (as defined under “Commodity Index Descriptions — The S&P GSCI® Indices” in this underlying supplement). None of S&P Dow Jones, UBS or Bloomberg is under any obligation to continue to calculate any of the S&P GSCI® Indices or Bloomberg Commodity Indices nor are they required to calculate any successor index. If any of S&P Dow Jones, UBS or Bloomberg discontinues or suspends the calculation of a relevant index, it may become difficult to determine the market value of the notes or the amount payable at maturity. The calculation agent may designate a successor index selected in its sole discretion. If the calculation agent determines in its sole discretion that no successor index comparable to such index exists, the amount you receive at maturity may be determined by the calculation agent in its sole discretion.

**S&P Dow Jones or Bloomberg may be required to replace a contract underlying an S&P GSCI® Index or a Bloomberg Commodity Index if the existing futures contract is terminated or replaced.**

A futures contract known as a “Designated Contract” has been selected as the reference contract for the underlying physical commodity included in each S&P GSCI® Index or Bloomberg Commodity Index. Data concerning this Designated Contract will be used to calculate each S&P GSCI® Index and Bloomberg Commodity Index. The termination or replacement of a futures contract on an established exchange occurs infrequently; however, if one or more Designated Contracts were to be terminated or replaced by an exchange, a comparable futures contract would be selected by the S&P GSCI® Index Committee or Bloomberg, as the case may be, if available, to replace each such Designated Contract. The termination or replacement of any Designated Contract may have an adverse impact on the level of the relevant S&P GSCI® Index or Bloomberg Commodity Index. Suspension or disruptions of market trading in the commodity and related futures markets may adversely affect the value of the notes.

**For notes linked in whole or in part to a Bloomberg Commodity Index, you may in the future have exposure to contracts that are not traded on regulated futures exchanges.**

At present, the Bloomberg Commodity Indices are composed exclusively of regulated futures contracts; however, the Bloomberg Commodity Indices may in the future include over-the-counter contracts (such as swaps and forward contracts) traded on trading facilities that are subject to lesser degrees of regulation or, in some cases, no substantive regulation. As a result, trading in such contracts, and the manner in which prices and volumes are reported by the relevant trading facilities, may not be subject to the same provisions of, and the protections afforded by, the Commodity Exchange Act, as amended, or other applicable statutes and related regulations that govern trading on regulated futures exchanges. In addition, many electronic trading facilities have only recently initiated trading and do not have significant trading histories. As a result, the trading of contracts on such facilities and the inclusion of such contracts in a Bloomberg Commodity Index may expose you to certain risks not presented by most exchange-traded futures contracts, including risks related to the liquidity and price histories of the relevant contracts.

**For notes linked to a Bloomberg Commodity Index, risks associated with that Bloomberg Commodity Index may adversely affect the market price of the notes.**

Because the Bloomberg Commodity Index<sup>SM</sup> and the Bloomberg Commodity Index 3 Month Forward<sup>SM</sup> reflect the return on exchange-traded futures contracts on 25 different physical commodities and because the single-commodity sub-indices and the forward-month single-commodity sub-indices of Bloomberg Commodity Index<sup>SM</sup> each reflect the return on exchange-traded futures contract on a single physical commodity, notes linked to one or more of the Bloomberg Commodity Indices may be less diversified than other funds or investment portfolios investing in a broader range of products and, therefore, could experience greater volatility. Additionally, the annual composition of the Bloomberg Commodity Indices will be calculated in reliance upon historical price, liquidity and production data that are subject to potential errors in data sources or errors that may affect the weighting of components of the Bloomberg Commodity Indices. Any discrepancies that require revision are not applied retroactively but will be reflected in the weighting calculations of the Bloomberg Commodity Indices for the following year. However, Bloomberg may not discover every discrepancy. Furthermore, the annual weightings for the Bloomberg Commodity Indices are determined each year in the third or fourth quarter and announced as promptly as practicable following the calculation by Bloomberg under the supervision of the Product, Risk & Operations Committee, which has a significant degree of discretion in exercising its supervisory duties with respect to the Bloomberg Commodity Indices and has no obligation to take the needs of any parties to transactions involving the Bloomberg Commodity Indices into consideration when reweighting or making any other changes to the Bloomberg Commodity Indices. Finally, subject to the minimum/maximum diversification limits described in “Commodity Index Descriptions — The Bloomberg Commodity Indices — Diversification Rules,” the commodities underlying the exchange-traded futures contracts included in the Bloomberg Commodity Index<sup>SM</sup> and the Bloomberg Commodity Index 3 Month Forward<sup>SM</sup> from time to time are concentrated in a limited number of sectors, particularly energy and agriculture, and the single-commodity sub-indices and the forward-month single-commodity sub-indices of Bloomberg Commodity Index<sup>SM</sup> are each limited to a single commodity. An investment in the notes may therefore carry risks similar to a concentrated securities investment in a limited number of industries or sectors or in a single commodity.

**For notes linked to a Bloomberg Commodity Index, trading and other transactions by UBS and its affiliates in the futures contracts constituting the Bloomberg Commodity Indices and the underlying commodities may affect the level of the Bloomberg Commodity Indices.**

UBS and its affiliates actively trade futures contracts and options on futures contracts on the commodities underlying the Bloomberg Commodity Indices. UBS and its affiliates also actively enter into or trade market securities, swaps, options, derivatives, and related instruments that are linked to the performance of the Bloomberg Commodity Indices, the futures contracts underlying the Bloomberg Commodity Indices or the commodities underlying these futures contracts. Certain of UBS's affiliates may underwrite or issue other securities or financial instruments indexed to the Bloomberg Commodity Indices and related indices, and UBS and certain of its affiliates may license the Bloomberg Commodity Indices for publication or for use by unaffiliated third parties.

These activities could present conflicts of interest and could affect the levels of the Bloomberg Commodity Indices. For instance, a market maker in a financial instrument linked to the performance of a Bloomberg Commodity Index may expect to hedge some or all of its position in that financial instrument. Purchase (or selling) activity in the underlying components of a Bloomberg Commodity Index in order to hedge the market maker's position in the financial instrument may affect the market price of the futures contracts included in such Bloomberg Commodity Index, which in turn may affect the level of such Bloomberg Commodity Index and the value of your notes. With respect to any of the activities described above, none of UBS or its respective affiliates has any obligation to take the needs of any buyers, sellers or holders of the notes into consideration at any time.

**For notes linked to one or more S&P GSCI Component Indices, any such index may be more volatile and susceptible to price fluctuations of commodities than a broader commodities index.**

Each of the S&P GSCI Component Indices (as defined under “Commodity Index Descriptions — The S&P GSCI® Indices” in this underlying supplement) may be more volatile and susceptible to price fluctuations than a broader commodities index, such as the S&P GSCI™ or the Bloomberg Commodity Index<sup>SM</sup>. In contrast to the S&P GSCI™ and Bloomberg Commodity Index<sup>SM</sup>, which include contracts on the principal physical commodities that are actively traded, each of the S&P GSCI Component Indices is composed of contracts covering only a single physical commodity or only physical commodities in a single sector. As a result, price volatility in the contracts included in the S&P GSCI™ or the Bloomberg Commodity Index<sup>SM</sup> will likely have a greater impact on each S&P GSCI Component Index than it would on the broader S&P GSCI™ or Bloomberg Commodity Index<sup>SM</sup>, and each S&P GSCI Component Index individually will be more susceptible to fluctuations and declines in value of the physical commodities included in such index. In addition, the S&P GSCI Component Indices may be less representative of the economy and commodity markets as a whole and might therefore not serve as a reliable benchmark for commodity market performance generally.

**For notes linked to an S&P GSCI® Index, changes in the composition and valuation of the S&P GSCI™ may adversely affect the market value and/or the payment at maturity.**

The composition of the S&P GSCI® Indices may change over time, as additional futures contracts satisfy the eligibility criteria of the S&P GSCI™ or futures contracts currently included in the S&P GSCI™ fail to satisfy such criteria. Those changes could impact the composition and valuation of the S&P GSCI® Indices. The weighting factors applied to each commodity included in the S&P GSCI™ change annually, based on changes in commodity production statistics. In addition, S&P Dow Jones may modify the methodology for determining the composition and weighting of the S&P GSCI™ and for calculating their value in order to assure that the S&P GSCI™ represents a measure of the performance over time of the markets for the underlying commodities represented by the S&P GSCI™ and its sub-indices. A number of modifications to the methodology for determining the contracts to be included in each S&P GSCI® Index, and for valuing each S&P GSCI® Index, have been made in the past several years and further modifications may be made in the future. Such changes could adversely affect the market value and/or the payment at maturity.

### **Risks Relating to Certain Funds**

**JPMorgan Chase & Co. is currently one of the issuers of equity securities held by the Financial Select Sector SPDR® Fund, the SPDR® S&P® Bank ETF, the SPDR® S&P 500® ETF Trust and the iShares® Russell 3000 ETF, but, to the Issuer’s and the Guarantor’s (if applicable) knowledge, unless otherwise specified in the relevant terms supplement, their securities are not currently held by any other Fund.**

As a general matter, none of the other issuers the securities of which are held by a Fund will be involved in the offering of the notes in any way. As a result, the Issuer and the Guarantor (if applicable) will have no ability to control the actions of the other issuers of those securities, including actions that could affect the value of the securities held by a Fund or your notes. None of those issuers will have any obligation to consider your interests as a holder of the notes in taking any corporate actions that might affect the value of your notes. Unless otherwise specified in the relevant terms supplement, none of the money you pay for the notes will go to the investment adviser of any Fund or any of the other issuers of the securities held by any Fund. See the relevant terms supplement for additional information about whether the Issuer or the Guarantor (if applicable) is one of the companies held by a Fund.

In the event that the Issuer’s or the Guarantor’s (if applicable) securities are held by a Fund, the Issuer and the Guarantor (if applicable) will have no obligation to consider your interests as a holder of the notes in taking any action that might affect the price of that Fund or the value of your notes.

**For notes linked in whole or in part to the iShares® Nasdaq Biotechnology ETF, an investment in the notes will be subject to risks associated with the biotechnology and pharmaceutical industries.**

All or substantially all of the equity securities held by the iShares® Nasdaq Biotechnology ETF are issued by companies whose primary line of business is directly associated with the biotechnology or pharmaceutical industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting these industries than a different investment linked to securities of a more broadly diversified group of issuers.

Companies in the biotechnology industry spend heavily on research and development, and their products or services may not prove commercially successful or may become obsolete quickly. The biotechnology industry is subject to a significant amount of governmental regulation, and changes in governmental policies and the need for regulatory approvals may have a material adverse effect on this industry. Companies in the biotechnology industry are subject to risks of new technologies and competitive pressures and are heavily dependent on patents and intellectual property rights. The loss or impairment of these rights may adversely affect the profitability of these companies.

Companies in the pharmaceutical industry are subject to competitive forces that may make it difficult to raise prices of their products and, in fact, may result in price discounting. The profitability of some companies in the pharmaceutical industry may be dependent on a relatively limited number of products. In addition, their products can become obsolete due to industry innovation, changes in technologies or other market developments. Many new products in the pharmaceutical industry are subject to government approvals, regulation and reimbursement rates. The process of obtaining government approvals may be long and costly. Many companies in the pharmaceutical industry are heavily dependent on patents and intellectual property rights. The loss or impairment of these rights may adversely affect the profitability of these companies. Companies in the pharmaceutical industry may be subject to extensive litigation based on product liability and similar claims.

These factors could affect these industries and could affect the value of the equity securities held by the iShares® Nasdaq Biotechnology ETF and the price of the iShares® Nasdaq Biotechnology ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the iShares® Russell 2000 ETF or the iShares® Russell 3000 ETF, an investment in the notes is subject to risks associated with small-capitalization stocks.**

The stocks that are held by the iShares® Russell 2000 ETF and some of the stocks that are held by the iShares® Russell 3000 ETF are issued by companies with relatively small market capitalization. The stock prices of smaller companies may be more volatile than stock prices of large-capitalization companies. Small-capitalization companies may be less able to withstand adverse economic, market, trade and competitive conditions relative to larger companies. These companies tend to be less well-established than large market capitalization companies. Small-capitalization companies are less likely to pay dividends on their stocks, and the presence of a dividend payment could be a factor that limits downward stock price pressure under adverse market conditions.

**For notes linked in whole or in part to the iShares® U.S. Real Estate ETF, an investment in the notes is subject to risks associated with real estate companies.**

All or substantially all of the equity securities held by the iShares® U.S. Real Estate ETF are issued by companies that invest in real estate, which we refer to as real estate companies, such as REITs or real estate holding companies. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting these companies than a different investment linked to securities of a more broadly diversified group of issuers. The iShares® U.S. Real Estate ETF invests in companies that invest in real estate, which we refer to as real estate companies, such as REITs or real estate holding companies, which expose investors to the risks of owning real estate directly, as well as to risks that relate specifically to the way in which real estate companies are organized and operated. Real estate is highly sensitive to general and local

economic conditions and developments and is characterized by intense competition and periodic overbuilding. Many real estate companies, including REITs, utilize leverage (and some may be highly leveraged), which increases investment risk and the risk normally associated with debt financing, and could potentially magnify the iShares® U.S. Real Estate ETF's losses. The U.S. residential and commercial real estate markets may, in the future, experience and have, in the past, experienced a decline in value, with certain regions experiencing significant losses in property values. Exposure to such real estate may adversely affect the iShares® U.S. Real Estate ETF's performance. Specific risks relevant to investment in real estate companies include:

*Concentration Risk.* Real estate companies may own a limited number of properties and concentrate their investments in a particular geographic region, industry or property type. Economic downturns affecting a particular region, industry or property type may lead to a high volume of defaults within a short period.

*Equity REITs Risk.* Certain REITs may make direct investments in real estate. These REITs are often referred to as "Equity REITs." Equity REITs invest primarily in real properties and may earn rental income from leasing those properties. Equity REITs may also realize gains or losses from the sale of properties. Equity REITs will be affected by conditions in the real estate rental market and by changes in the value of the properties they own. A decline in rental income may occur because of extended vacancies, limitations on rents, the failure to collect rents, increased competition from other properties or poor management. Equity REITs also can be affected by rising interest rates. Rising interest rates may cause investors to demand a high annual yield from future distributions that, in turn, could decrease the market prices for such REITs and for the properties held by such REITs. In addition, rising interest rates also increase the costs of obtaining financing for real estate projects. Because many real estate projects are dependent upon receiving financing, this could cause the value of the Equity REITs in which the iShares® U.S. Real Estate ETF invests to decline.

*Interest Rate Risk.* Rising interest rates could result in higher costs of capital for real estate companies, which could negatively affect a real estate company's ability to meet its payment obligations. Declining interest rates could result in increased prepayment on loans and require redeployment of capital in less desirable investments.

*Leverage Risk.* Real estate companies may use leverage (and some may be highly leveraged), which increases investment risk and the risks normally associated with debt financing and could adversely affect a real estate company's operations and market value in periods of rising interest rates. Financial covenants related to a real estate company's leveraging may affect the ability of the real estate company to operate effectively. In addition, investments may be subject to defaults by borrowers and tenants. Leveraging may also increase repayment risk.

*Liquidity Risk.* Investing in real estate companies may involve risks similar to those associated with investing in small-capitalization companies. Real estate company securities may be volatile. There may be less trading in real estate company shares, which means that purchase and sale transactions in those shares could have a magnified impact on share price, resulting in abrupt or erratic price fluctuations. In addition, real estate is relatively illiquid and, therefore, a real estate company may have a limited ability to vary or liquidate its investments in properties in response to changes in economic or other conditions.

*Loan Foreclosure Risk.* Real estate companies may foreclose on loans that the real estate company originated and acquired. Foreclosure may generate negative publicity for the underlying property that affects its market value. In addition to length and expense, foreclosure proceedings may not fully uphold the validity of all of the terms of the applicable loan.

*Operational Risk.* Real estate companies are dependent upon management skills and may have limited financial resources. Real estate companies are generally not diversified and may be subject to heavy cash flow dependency, default by borrowers and self-liquidation. In addition, transactions between real estate companies and their affiliates may be subject to conflicts of interest, which may adversely affect a real estate company's shareholders. A real estate company may also have joint ventures in

certain of its properties and, consequently, its ability to control decisions relating to such properties may be limited.

*Property Risk.* Real estate companies may be subject to risks relating to functional obsolescence or reduced desirability of properties; extended vacancies due to economic conditions and tenant bankruptcies; catastrophic events such as earthquakes, hurricanes, tornadoes and terrorist acts; eminent domain seizures; and casualty or condemnation losses. Real estate income and values also may be greatly affected by demographic trends, such as population shifts, changing tastes and values, increasing vacancies or declining rents resulting from legal, cultural, technological, global or local economic developments.

*Regulatory Risk.* Real estate income and values may be adversely affected by applicable domestic and foreign laws (including tax laws). Government actions, such as tax increases, zoning law changes or environmental regulations also may have a major impact on real estate.

*Repayment Risk.* The prices of real estate company securities may drop because of the failure of borrowers to repay their loans, poor management, or the inability to obtain financing either on favorable terms or at all. If the properties do not generate sufficient income to meet operating expenses, including, where applicable, debt service, ground lease payments, tenant improvements, third-party leasing commissions and other capital expenditures, the income and ability of the real estate companies to make payments of interest and principal on their loans will be adversely affected.

*U.S. Tax Risk.* Certain U.S. real estate companies are subject to special U.S. federal tax requirements. A REIT that fails to comply with such tax requirements may be subject to U.S. federal income taxation, which may affect the value of the REIT and the characterization of the REIT's distributions. The U.S. federal tax requirement that a REIT distributes substantially all of its net income to its shareholders may result in the REIT having insufficient capital for future expenditures. A REIT that successfully maintains its qualification may still become subject to U.S. federal, state and local taxes, including excise, penalty, franchise, payroll, mortgage recording, and transfer taxes, both directly and indirectly through its subsidiaries.

These factors could affect real estate companies and could affect the value of the equity securities held by the iShares® U.S. Real Estate ETF and the price of the iShares® U.S. Real Estate ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Communication Services Select Sector SPDR® Fund, risks associated with the communications sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Communication Services Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the communications sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Communication services companies are particularly vulnerable to the potential obsolescence of products and services due to technological advancement and the innovation of competitors. Companies in the communication services sector may also be affected by other competitive pressures, such as pricing competition, as well as research and development costs, substantial capital requirements and government regulation. Additionally, fluctuating domestic and international demand, shifting demographics and often unpredictable changes in consumer tastes can drastically affect a communication services company's profitability. While all companies may be susceptible to network security breaches, certain companies in the communication services sector may be particular targets of hacking and potential theft of proprietary or consumer information or disruptions in service, which could have a material adverse effect on their businesses.

These factors could affect the communications sector and could affect the value of the equity securities held by the Communication Services Select Sector SPDR® Fund and the price of the Communication

Services Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Consumer Discretionary Select Sector SPDR® Fund, risks associated with the consumer discretionary sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Consumer Discretionary Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the consumer discretionary sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

The success of consumer product manufacturers and retailers is tied closely to the performance of the overall domestic and global economy, interest rates, competition and consumer confidence. Success depends heavily on disposable household income and consumer spending. Also, companies in the consumer discretionary sector may be subject to severe competition, which may have an adverse impact on their respective profitability. Changes in demographics and consumer tastes can also affect the demand for, and success of, consumer products and services in the marketplace.

These factors could affect the consumer discretionary sector and could affect the value of the equity securities held by the Consumer Discretionary Select Sector SPDR® Fund and the price of the Consumer Discretionary Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Consumer Discretionary Select Sector SPDR® Fund, in September 2018, there were changes to the underlying index for the Consumer Discretionary Select Sector SPDR® Fund and these changes in exposure may adversely affect the value of the notes.**

After the close of business on September 28, 2018, the GICS® consumer discretionary sector was updated to (a) expand the internet & direct marketing retail industry to include companies providing online marketplaces for consumer products and services and e-commerce companies regardless of whether they hold inventory and (b) discontinue the media industry (which was moved to the renamed GICS® communication services sector). The underlying index for the Consumer Discretionary Select Sector SPDR® Fund, the Consumer Discretionary Select Sector Index is designed to measure the performance of the GICS® consumer discretionary sector and has reflected these changes to the GICS® consumer discretionary sector since that date. As a result, the Consumer Discretionary Select Sector SPDR® Fund changed its holdings after that date to reflect the changes to its underlying index. This change could adversely affect the performance of the Consumer Discretionary Select Sector SPDR® Fund and, in turn, the value of the notes.

**For notes linked in whole or in part to the Consumer Staples Select Sector SPDR® Fund, risks associated with the consumer staples sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Consumer Staples Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the consumer staples sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Consumer staples companies are subject to government regulation affecting their products, which may negatively impact these companies' performance. For instance, government regulations may affect the permissibility of using various food additives and production methods of companies that make food products, which could affect company profitability. Tobacco companies may be adversely affected by the adoption of proposed legislation and/or by litigation. Also, the success of food, beverage, household and personal product companies may be strongly affected by consumer interest, marketing campaigns and

other factors affecting supply and demand, including performance of the overall domestic and global economy, interest rates, competition and consumer confidence and spending.

These factors could affect the consumer staples sector and could affect the value of the equity securities held by the Consumer Staples Select Sector SPDR® Fund and the price of the Consumer Staples Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Energy Select Sector SPDR® Fund, risks associated with the energy sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Energy Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the energy sector, including the following industries: oil, gas and consumable fuels; and energy equipment and services. The Energy Select Sector SPDR® Fund is concentrated in the energy sector, which means the Energy Select Sector SPDR® Fund will be more affected by the performance of the energy sector than a fund or index that was more diversified.

Issuers in energy-related industries can be significantly affected by fluctuations in energy prices and supply and demand of energy fuels. Markets for various energy-related commodities can have significant volatility, and are subject to control or manipulation by large producers or purchasers. Companies in the energy sector may need to make substantial expenditures, and to incur significant amounts of debt, in order to maintain or expand their reserves. Oil and gas exploration and production can be significantly affected by natural disasters as well as changes in exchange rates, interest rates, government regulation, world events and economic conditions. These companies may be at risk for environmental damage claims.

These factors could affect the energy sector and could affect the value of the equity securities held by the Energy Select Sector SPDR® Fund and the value of the Energy Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Financial Select Sector SPDR® Fund, risks associated with the financial sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Financial Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the financial sector, including the following industries: diversified financial services; insurance; banks; capital markets; REITs; consumer finance; thrifts and mortgage finance; and real estate management and development. The Financial Select Sector SPDR® Fund is concentrated in the financial sector, which means the Financial Select Sector SPDR® Fund will be more affected by the performance of the financial sector than a fund or index that was more diversified.

Financial services companies are subject to extensive governmental regulation which may limit both the amounts and types of loans and other financial commitments they can make, the interest rates and fees they can charge, the scope of their activities, the prices they can charge and the amount of capital they must maintain. Profitability is largely dependent on the availability and cost of capital funds, and can fluctuate significantly when interest rates change or due to increased competition. In addition, deterioration of the credit markets generally may cause an adverse impact in a broad range of markets, including U.S. and international credit and interbank money markets generally, thereby affecting a wide range of financial institutions and markets. Certain events in the financial sector may cause an unusually high degree of volatility in the financial markets, both domestic and foreign, and cause certain financial services companies to incur large losses. Securities of financial services companies may experience a dramatic decline in value when such companies experience substantial declines in the valuations of their assets, take action to raise capital (such as the issuance of debt or equity securities), or cease operations.



Credit losses resulting from financial difficulties of borrowers and financial losses associated with investment activities can negatively impact the financial sector. Insurance companies may be subject to severe price competition. Adverse economic, business or political developments could adversely affect financial institutions engaged in mortgage finance or other lending or investing activities directly or indirectly connected to the value of real estate. The Financial Select Sector SPDR® Fund's exposure to real estate securities is limited to mortgage REITs.

These factors could affect the financial sector and could affect the value of the equity securities held by the Financial Select Sector SPDR® Fund and the value of the Financial Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Financial Select Sector SPDR® Fund, the Financial Select Sector SPDR® Fund no longer provides exposure to the real estate sector.**

The Financial Select Sector SPDR® Fund seeks to track the Financial Select Sector Index. In September 2016, the Financial Select Sector Index was reconstituted to eliminate the stocks of real estate management and development companies and REITs (other than mortgage REITs) ("real estate stocks") and the Financial Select Sector SPDR® Fund implemented a corresponding change to its portfolio by divesting real estate stocks representing nearly 20% of its net asset value. As a result, the Financial Select Sector SPDR® Fund no longer holds real estate stocks. Consequently, the Financial Select Sector SPDR® Fund is less diversified, and is more concentrated in the financial sector, than it was before this change to its portfolio. These changes represent a significant change in the nature of the Financial Select Sector SPDR® Fund and its holdings and could adversely affect the performance of the Financial Select Sector SPDR® Fund and, in turn, the value of the notes.

**For notes linked in whole or in part to the Health Care Select Sector SPDR® Fund, risks associated with the health care sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Health Care Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the health care sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Companies in the health care sector are subject to extensive government regulation and their profitability can be significantly affected by restrictions on government reimbursement for medical expenses, rising costs of medical products and services, pricing pressure (including price discounting), limited product lines and an increased emphasis on the delivery of healthcare through outpatient services. Companies in the health care sector are heavily dependent on obtaining and defending patents, which may be time consuming and costly, and the expiration of patents may also adversely affect the profitability of these companies. Health care companies are also subject to extensive litigation based on product liability and similar claims. In addition, their products can become obsolete due to industry innovation, changes in technologies or other market developments. Many new products in the health care sector require significant research and development and may be subject to regulatory approvals, all of which may be time consuming and costly with no guarantee that any product will come to market.

These factors could affect the health care sector and could affect the value of the equity securities held by the Health Care Select Sector SPDR® Fund and the price of the Health Care Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Industrial Select Sector SPDR® Fund, risks associated with the industrial sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Industrial Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the industrial sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a

single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Industrial companies are affected by supply and demand both for their specific product or service and for industrial sector products in general. Government regulation, world events, exchange rates and economic conditions, technological developments and liabilities for environmental damage and general civil liabilities will likewise affect the performance of these companies. Aerospace and defense companies, a component of the industrial sector, can be significantly affected by government spending policies because companies involved in this industry rely, to a significant extent, on U.S. and foreign government demand for their products and services. Thus, the financial condition of, and investor interest in, aerospace and defense companies are heavily influenced by governmental defense spending policies, which are typically under pressure from efforts to control the U.S. (and other) government budgets. Transportation securities, a component of the industrial sector, are cyclical and have occasional sharp price movements, which may result from changes in the economy, fuel prices, labor agreements and insurance costs.

These factors could affect the industrial sector and could affect the value of the equity securities held by the Industrial Select Sector SPDR® Fund and the price of the Industrial Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Materials Select Sector SPDR® Fund, risks associated with the materials sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Materials Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the materials sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Many materials companies are significantly affected by the level and volatility of commodity prices, exchange rates, import controls, worldwide competition, environmental policies and consumer demand. At times, worldwide production of industrial materials has exceeded demand as a result of over-building or economic downturns, leading to poor investment returns or losses. Other risks may include liabilities for environmental damage and general civil liabilities, depletion of resources, and mandated expenditures for safety and pollution control. The materials sector may also be affected by economic cycles, technical progress, labor relations, and government regulations.

These factors could affect the materials sector and could affect the value of the equity securities held by the Materials Select Sector SPDR® Fund and the price of the Materials Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Real Estate Select Sector SPDR® Fund, risks associated with the real estate sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Real Estate Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the real estate sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers. There are special risks associated with investment in securities of companies engaged in real property markets, including, without limitation REITs and real estate operating companies.

An investment in a real property company may be subject to risks similar to those associated with direct ownership of real estate, including, by way of example, the possibility of declines in the value of real estate, losses from casualty or condemnation, and changes in local and general economic conditions, supply and demand, interest rates, environmental liability, zoning laws, regulatory limitations on rents, property taxes, and operating expenses. An investment in a real property company is subject to

additional risks, such as poor performance by the manager of the real property company, adverse changes in tax laws, difficulties in valuing and disposing of real estate, and the effect of general declines in stock prices. Some real property companies have limited diversification because they invest in a limited number of properties, a narrow geographic area, or a single type of property. Also, the organizational documents of a real property company may contain provisions that make changes in control of the company difficult and time-consuming. As a shareholder in a real property company, the Real Estate Select Sector SPDR® Fund, and indirectly the Real Estate Select Sector SPDR® Fund's shareholders, would bear their ratable shares of the real property company's expenses and would at the same time continue to pay their own fees and expenses.

REITs are subject to the risks associated with investing in the securities of real property companies. In particular, REITs may be affected by changes in the values of the underlying properties that they own or operate. Further, REITs are dependent upon specialized management skills, and their investments may be concentrated in relatively few properties, or in a small geographic area or a single property type. REITs are also subject to heavy cash flow dependency and, as a result, are particularly reliant on the proper functioning of capital markets, as well as defaults by borrowers and self-liquidation. A variety of economic and other factors may adversely affect a lessee's ability to meet its obligations to a REIT. In the event of a default by a lessee, the REIT may experience delays in enforcing its rights as a lessor and may incur substantial costs associated with protecting its investments. In addition, a REIT could possibly fail to qualify for favorable tax treatment under the Internal Revenue Code, or to maintain its exemptions from registration under the 1940 Act, which could have adverse consequences for the Real Estate Select Sector SPDR® Fund. Investments in REITs are also subject to the risks affecting equity markets generally.

These factors could affect the real estate sector and could affect the value of the equity securities held by the Real Estate Select Sector SPDR® Fund and the price of the Real Estate Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Technology Select Sector SPDR® Fund, risks associated with the technology sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Technology Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the technology sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Market or economic factors impacting technology companies and companies that rely heavily on technological advances could have a major effect on the value of those companies. The value of stocks of technology companies and companies that rely heavily on technology is particularly vulnerable to rapid changes in technology product cycles, rapid product obsolescence, government regulation and competition, both domestically and internationally, including competition from foreign competitors with lower production costs. Stocks of technology companies and companies that rely heavily on technology, especially those of smaller, less-seasoned companies, tend to be more volatile than the overall market. Technology companies are heavily dependent on patent and intellectual property rights, the loss or impairment of which may adversely affect profitability. Additionally, companies in the technology sector may face dramatic and often unpredictable changes in growth rates and competition for the services of qualified personnel.

These factors could affect the technology sector and could affect the value of the equity securities held by the Technology Select Sector SPDR® Fund and the price of the Technology Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Technology Select Sector SPDR® Fund, the Technology Select Sector SPDR® Fund no longer provides exposure to the communication services sector.**

The Technology Select Sector SPDR® Fund seeks to track the Technology Select Sector Index. In September 2018, the Technology Select Sector Index was reconstituted to eliminate the telecommunication services industry group, the internet software & services sub-industry, the home entertainment software sub-industry and companies operating online marketplaces for consumer products and services and the Technology Select Sector SPDR® Fund implemented a corresponding change to its portfolio by divesting communication services stocks representing nearly 25% of its net asset value. As a result, the Technology Select Sector SPDR® Fund no longer holds communication services stocks. Consequently, the Technology Select Sector SPDR® Fund is less diversified, and is more concentrated in the information technology sector, than it was before this change to its portfolio. These changes represent a significant change in the nature of the Technology Select Sector SPDR® Fund and its holdings and could adversely affect the performance of the Technology Select Sector SPDR® Fund and, in turn, the value of the notes.

**For notes linked in whole or in part to the Utilities Select Sector SPDR® Fund, risks associated with the utilities sector will affect the value of the notes.**

All or substantially all of the equity securities held by the Utilities Select Sector SPDR® Fund are issued by companies whose primary line of business is directly associated with the utilities sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

Utility companies are affected by supply and demand, operating costs, government regulation, environmental factors, liabilities for environmental damage and general civil liabilities and rate caps or rate changes. Although rate changes of a regulated utility usually fluctuate in approximate correlation with financing costs, due to political and regulatory factors, rate changes ordinarily occur only following a delay after the changes in financing costs. This factor will tend to favorably affect a regulated utility company's earnings and dividends in times of decreasing costs, but conversely, will tend to adversely affect earnings and dividends when costs are rising. The value of regulated utility equity securities may tend to have an inverse relationship to the movement of interest rates. Certain utility companies have experienced full or partial deregulation in recent years. These utility companies are frequently more similar to industrial companies in that they are subject to greater competition and have been permitted by regulators to diversify outside of their original geographic regions and their traditional lines of business. These opportunities may permit certain utility companies to earn more than their traditional regulated rates of return. Some companies, however, may be forced to defend their core business and may be less profitable. In addition, natural disasters, terrorist attacks, government intervention or other factors may render a utility company's equipment unusable or obsolete and negatively impact profitability.

Among the risks that may affect utility companies are the following: risks of increases in fuel and other operating costs; the high cost of borrowing to finance capital construction during inflationary periods; restrictions on operations and increased costs and delays associated with compliance with environmental and nuclear safety regulations; and the difficulties involved in obtaining natural gas for resale or fuel for generating electricity at reasonable prices. Other risks include those related to the construction and operation of nuclear power plants, the effects of energy conservation and the effects of regulatory changes.

These factors could affect the utilities sector and could affect the value of the equity securities held by the Utilities Select Sector SPDR® Fund and the price of the Utilities Select Sector SPDR® Fund during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the SPDR® Gold Trust, the performance and market value of the SPDR® Gold Trust, particularly during periods of market volatility, may not correlate with the performance of the SPDR® Gold Trust's underlying commodity as well as the net asset value per share.**

The SPDR® Gold Trust does not fully replicate the performance of gold, its "Underlying Commodity," due to the fees and expenses charged by the SPDR® Gold Trust or by restrictions on access to its

Underlying Commodity due to other circumstances. The SPDR® Gold Trust does not generate any income, and as the SPDR® Gold Trust regularly sells its Underlying Commodity to pay for ongoing expenses, the amount of its Underlying Commodity represented by each share gradually declines over time. The SPDR® Gold Trust sells its Underlying Commodity to pay expenses on an ongoing basis irrespective of whether the trading price of the shares rises or falls in response to changes in the price of its Underlying Commodity. The sale by SPDR® Gold Trust of its Underlying Commodity to pay expenses at a time of low prices for its Underlying Commodity could adversely affect the value of the notes. Additionally, there is a risk that part or all of the SPDR® Gold Trust's holdings in its Underlying Commodity could be lost, damaged or stolen due to war, terrorism, theft, natural disaster or otherwise. All of these factors may lead to a lack of correlation between the performance of the SPDR® Gold Trust and its Underlying Commodity. In addition, because the shares of the SPDR® Gold Trust are traded on a securities exchange and are subject to market supply and investor demand, the market value of one share of the SPDR® Gold Trust may differ from the net asset value per share of the SPDR® Gold Trust.

During periods of market volatility, the SPDR® Gold Trust's Underlying Commodity may be unavailable in the secondary market, market participants may be unable to calculate accurately the net asset value per share of the SPDR® Gold Trust and the liquidity of the SPDR® Gold Trust may be adversely affected. This kind of market volatility may also disrupt the ability of market participants to create and redeem shares of the SPDR® Gold Trust. Further, market volatility may adversely affect, sometimes materially, the prices at which market participants are willing to buy and sell shares of the SPDR® Gold Trust. As a result, under these circumstances, the market value of shares of the SPDR® Gold Trust may vary substantially from the net asset value per share of the SPDR® Gold Trust. For all of the foregoing reasons, the performance of the SPDR® Gold Trust may not correlate with the performance of its Underlying Commodity as well as the net asset value per share of the SPDR® Gold Trust, which could materially and adversely affect the value of the notes in the secondary market and/or reduce any payment on the notes.

**For notes linked in whole or in part to the SPDR® Gold Trust, the price of gold is volatile and is affected by numerous factors.**

The value of the SPDR® Gold Trust is closely related to the price of gold. A decrease in the price of gold may have a material adverse effect on the value of the notes and your return on your investment in the notes. Gold is subject to the effect of numerous factors. The following describes some of the factors affecting gold.

The price of gold is primarily affected by the global demand for and supply of gold. The market for gold bullion is global, and gold prices are subject to volatile price movements over short periods of time and are affected by numerous factors, including macroeconomic factors, such as the structure of and confidence in the global monetary system, expectations regarding the future rate of inflation, the relative strength of, and confidence in, the U.S. dollar (the currency in which the price of gold is usually quoted), interest rates, gold borrowing and lending rates and global or regional economic, financial, political, regulatory, judicial or other events, especially those of unexpected nature. Gold prices may be affected by industry factors, such as industrial and jewelry demand as well as lending, sales and purchases of gold by the official sector, including central banks and other governmental agencies and multilateral institutions that hold gold. Additionally, gold prices may be affected by levels of gold production, production costs and short-term changes in supply and demand due to trading activities in the gold market. From time to time, above-ground inventories of gold may also influence the market. It is not possible to predict the aggregate effect of all or any combination of these factors. The price of gold has recently been, and may continue to be, extremely volatile.

**For notes linked in whole or in part to the SPDR® Gold Trust, economic or political events or crises, especially those of unexpected nature, could result in large-scale purchases or sales of gold, which could affect the price of gold and may adversely affect the value of your notes.**

Many investors, institutions, governments and others purchase and sell gold as a hedge against inflation, market turmoil or uncertainty or political events. Under such circumstances, significant large-scale purchases or sales of gold by market participants may affect the price of gold, which could

adversely affect the value of your notes. Crises in the future may impair gold's price performance which would, in turn, adversely affect the shares of the SPDR® Gold Trust and your investment in the notes.

**For notes linked in whole or in part to the SPDR® Gold Trust, gold is traded on the London Bullion Market Association, so an investment in the notes may be subject to risks associated with the London Bullion Market Association.**

The SPDR® Gold Trust is closely related to its underlying commodity (e.g., gold), the price of which is determined by an independent service provider appointed by the London Bullion Market Association (the "LBMA"). Investments in securities indexed to the value of commodities the prices of which are determined by non-U.S. markets involve risks associated with the markets in those countries, including risks of volatility in those markets and governmental intervention in those markets.

The final price of gold will be determined by reference to fixing prices reported by an independent service provider appointed by the LBMA. The LBMA is a self-regulatory association of bullion market participants. Although all market-making members of the LBMA are supervised by the Bank of England and are required to satisfy a capital adequacy test, the LBMA itself is not a regulated entity. If the LBMA should cease operations, or if bullion trading should become subject to a value added tax or other tax or any other form of regulation currently not in place, the role of LBMA price fixings as a global benchmark for the value of gold may be adversely affected. The LBMA is a principals' market which operates in a manner more closely analogous to an over-the-counter physical commodity market than regulated futures markets, and certain features of U.S. futures contracts are not present in the context of LBMA trading. For example, there are no daily price limits on the LBMA which would otherwise restrict fluctuations in the prices of LBMA contracts. In a declining or rising market, it is possible that prices would continue to decline or rise without limitation within a trading day or over a period of trading days. The LBMA, or an independent service provider appointed by the LBMA, may alter, discontinue or suspend calculation or dissemination of the LBMA gold price, which could adversely affect the value of the notes. The LBMA, or an independent service provider appointed by the LBMA, will have no obligation to consider your interests in calculating or revising the LBMA gold price.

**For notes linked in whole or in part to the SPDR® Gold Trust, the relevant exchange for gold has no obligation to consider your interests.**

The price of the SPDR® Gold Trust is closely related to the price of gold. The relevant exchange for gold is responsible for calculating the official settlement price or fixing level, as applicable, for gold. The relevant exchange may alter, discontinue or suspend calculation or dissemination of the official settlement price or fixing level, as applicable, for gold. Any of these actions could adversely affect the value of the notes. The relevant exchange has no obligation to consider your interests in calculating or revising the official settlement price or fixing level, as applicable, for gold.

**For notes linked in whole or in part to the SPDR® Gold Trust, termination of the SPDR® Gold Trust could affect adversely the value of the notes.**

The SPDR® Gold Trust may be required to terminate and liquidate at a time that is disadvantageous to you. If the SPDR® Gold Trust is required to terminate and liquidate, such termination and liquidation could occur at a time that is disadvantageous to you, such as when the price of gold is higher than the price of gold at the time when you purchased your notes.

**For notes linked in whole or in part to the SPDR® Gold Trust, single commodity prices, such as gold prices, tend to be more volatile than, and may not correlate with, the prices of commodities generally.**

The SPDR® Gold Trust is linked to a single commodity and not to a diverse basket of commodities or a broad-based commodity index. The SPDR® Gold Trust's Underlying Commodity may not correlate to the price of commodities generally and may diverge significantly from the prices of commodities generally. As a result, the notes carry greater risk and may be more volatile than notes linked to the prices of more commodities or a broad-based commodity index.

**For notes linked in whole or in part to the SPDR® S&P® Bank ETF or the SPDR® S&P® Regional Banking ETF, risks associated with the banking industry will affect the value of the notes.**

All or substantially all of the equity securities held by the SPDR® S&P® Bank ETF and the SPDR® S&P® Regional Banking ETF are issued by companies whose primary line of business is directly associated with the banking industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

The performance of bank stocks may be affected by extensive governmental regulation, which may limit both the amounts and types of loans and other financial commitments they can make, the interest rates and fees they can charge and the amount of capital they must maintain. Profitability is largely dependent on the availability and cost of capital funds and can fluctuate significantly when interest rates change. Credit losses resulting from financial difficulties of borrowers can negatively impact banking companies. Banks may also be subject to severe price competition. Competition is high among banking companies and failure to maintain or increase market share may result in lost market value.

These factors could affect the banking industry and could affect the value of the equity securities held by the SPDR® S&P® Bank ETF and the SPDR® S&P® Regional Banking ETF and the prices of the SPDR® S&P® Bank ETF and the SPDR® S&P® Regional Banking ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the SPDR® S&P® Biotech ETF, risks associated with the biotechnology industry will affect the value of the notes.**

All or substantially all of the equity securities held by the SPDR® S&P® Biotech ETF are issued by companies whose primary line of business is directly associated with the biotechnology industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Biotechnology companies invest heavily in research and development, which may not necessarily lead to commercially successful products. These companies are also subject to increased governmental regulation, which may delay or inhibit the release of new products. Many biotechnology companies are dependent upon their ability to use and enforce intellectual property rights and patents. Any impairment of these rights may have adverse financial consequences. Biotechnology stocks, especially those of smaller, less-seasoned companies, tend to be more volatile than the overall market. Biotechnology companies can be significantly affected by technological change and obsolescence, product liability lawsuits and consequential high insurance costs.

These factors could affect the biotechnology industry and could affect the value of the equity securities held by the SPDR® S&P® Biotech ETF and the price of the SPDR® S&P® Biotech ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the SPDR® S&P® Homebuilders ETF, risks associated with the homebuilding industry will affect the value of the notes.**

All or substantially all of the equity securities held by the SPDR® S&P® Homebuilders ETF are issued by companies whose primary line of business is directly associated with the homebuilding industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Homebuilding companies can be significantly affected by the national, regional and local real estate markets. Homebuilding companies are also sensitive to interest rate fluctuations, which can cause changes in the availability of mortgage capital and directly affect the purchasing power of potential

homebuyers. Homebuilding companies can be significantly affected by changes in government spending, consumer confidence, demographic patterns and the level of new and existing home sales.

These factors could affect the homebuilding industry and could affect the value of the equity securities held by the SPDR® S&P® Homebuilders ETF and the price of the SPDR® S&P® Homebuilders ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the SPDR® S&P® Metals & Mining ETF, risks associated with the metals and mining industry will affect the value of the notes.**

All or substantially all of the equity securities held by the SPDR® S&P® Metals & Mining ETF are issued by companies whose primary line of business is directly associated with the metals and mining industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Metals and mining companies can be significantly affected by events relating to international political and economic developments, energy conservation, the success of exploration projects, commodity prices, and tax and other government regulations. Investments in metals and mining companies may be speculative and may be subject to greater price volatility than investments in other types of companies. Risks of metals and mining investments include: changes in international monetary policies or economic and political conditions that can affect the supply of precious metals and consequently the value of metals and mining company investments; the United States or foreign governments may pass laws or regulations limiting metals investments for strategic or other policy reasons; and increased environmental or labor costs may depress the value of metals and mining investments.

These factors could affect the metals and mining industry and could affect the value of the equity securities held by the SPDR® S&P® Metals & Mining ETF and the price of the SPDR® S&P® Metals & Mining ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the SPDR® S&P® Oil & Gas Exploration & Production ETF, risks associated with the oil and gas exploration and production industry will affect the value of the notes.**

All or substantially all of the equity securities held by the SPDR® S&P® Oil & Gas Exploration & Production ETF are issued by companies whose primary line of business is directly associated with the oil and gas exploration and production industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Issuers in energy-related industries can be significantly affected by fluctuations in energy prices and supply and demand of energy fuels caused by geopolitical events, energy conservation or use of alternative fuel sources, the success of exploration projects, weather or meteorological events, taxes, increased governmental or environmental regulation, resource depletion, rising interest rates, declines in domestic or foreign production, accidents or catastrophic events, or terrorist threats or attacks, among others. Markets for various energy-related commodities can have significant volatility, and are subject to control or manipulation by large producers or purchasers. Companies in the energy sector may need to make substantial expenditures, and to incur significant amounts of debt, in order to maintain or expand their reserves through exploration of new sources of supply, through the development of existing sources, through acquisitions, or through long-term contracts to acquire reserves. Factors adversely affecting producers, refiners, distributors, or others in the energy sector may affect adversely companies that service or supply those entities, either because demand for those services or products is curtailed, or those services or products come under price pressure.

Oil and gas companies develop and produce crude oil and natural gas and provide drilling and other energy resources production and distribution related services. Stock prices for these types of companies are affected by supply and demand both for their specific product or service and for energy products in



general. The price of oil and gas, exploration and production spending, government regulation, world events and economic conditions will likewise affect the performance of these companies. Correspondingly, securities of companies in the energy field are subject to swift price and supply fluctuations caused by events relating to international politics, energy conservation, the success of exploration projects, and tax and other governmental regulatory policies. Weak demand for the companies' products or services or for energy products and services in general, as well as negative developments in these other areas, would adversely impact the SPDR® S&P® Oil & Gas Exploration & Production ETF's performance. Oil and gas exploration and production can be significantly affected by natural disasters as well as changes in exchange rates, interest rates, government regulation, world events and economic conditions. These companies may be at risk for environmental damage claims.

These factors could affect the oil and gas exploration and production industry and could affect the value of the equity securities held by the SPDR® S&P® Oil & Gas Exploration & Production ETF and the price of the SPDR® S&P® Oil & Gas Exploration & Production ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the SPDR® S&P® Retail ETF, risks associated with the retail industry will affect the value of the notes.**

All or substantially all of the equity securities held by the SPDR® S&P® Retail ETF are issued by companies whose primary line of business is directly associated with the retail industry. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this industry than a different investment linked to securities of a more broadly diversified group of issuers.

Retail companies can be significantly affected by the performance of the domestic and international economy, consumer confidence and spending, intense competition, changes in demographics, and changing consumer tastes and preferences.

The success of consumer product manufacturers and retailers is tied closely to the performance of the overall global economy, interest rates, competition and consumer confidence. Success depends heavily on disposable household income and consumer spending. Also, companies in the consumer discretionary sector may be subject to severe competition, which may have an adverse impact on their respective profitability. Changes in demographics and consumer tastes can also affect the demand for, and success of, consumer products and services in the marketplace.

Consumer staples companies are subject to government regulation affecting their products which may negatively impact these companies' performance. For instance, government regulations may affect the permissibility of using various food additives and production methods of companies that make food products, which could affect company profitability. Tobacco companies may be adversely affected by the adoption of proposed legislation and/or by litigation. Also, the success of food, beverage, household and personal product companies may be strongly affected by consumer interest, marketing campaigns and other factors affecting supply and demand, including performance of the overall domestic and global economy, interest rates, competition and consumer confidence and spending.

These factors could affect the retail industry and could affect the value of the equity securities held by the SPDR® S&P® Retail ETF and the price of the SPDR® S&P® Retail ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the United States Oil Fund, LP, the performance and market value of the United States Oil Fund, LP, particularly during periods of market volatility, may not correlate with the performance of its Underlying Commodity or its benchmark oil futures contract as well as the net asset value per share.**

The United States Oil Fund, LP does not fully replicate the performance of its Underlying Commodity or its benchmark oil futures contract (each as defined under "Fund Descriptions — The United States Oil Fund, LP" below). The United States Oil Fund, LP does not hold its Underlying Commodity directly and

investing primarily in futures contracts for its Underlying Commodity, oil futures contracts and other oil interests. In addition, the performance of the United States Oil Fund, LP will reflect its expenses and transaction costs, including those incurred in connection with its trading activities. All of these factors may lead to a lack of correlation between the performance of the United States Oil Fund, LP and its Underlying Commodity and its benchmark oil futures contract.

The investment objective of the United States Oil Fund, LP is for the daily changes in percentage terms of the net asset value of its shares to reflect the daily changes in percentage terms of its Underlying Commodity, as measured by the daily changes in the price of its benchmark oil futures contract, less its expenses. The United States Oil Fund, LP's investment objective is not for its net asset value or market price of its shares to equal, in dollar terms, the spot price of light, sweet crude oil or any particular futures contract based on light, sweet crude oil, nor is the United States Oil Fund, LP's investment objective for the percentage change in its net asset value to reflect the percentage change of the price of any particular futures contract as measured over a time period greater than one day. There is the risk that the daily changes in the price of the United States Oil Fund, LP's shares on a percentage basis will not closely track the daily changes in the spot price of light, sweet crude oil on a percentage basis. This could happen if the price of United States Oil Fund, LP's shares traded on its primary exchange does not correlate closely with the net asset value per share of the United States Oil Fund, LP; the changes in net asset value per share of the United States Oil Fund, LP do not correlate closely with the changes in the price of the benchmark oil futures contract; or the changes in the price of the benchmark oil futures contract do not closely correlate with the changes in the cash or spot price of crude oil. In addition, disruptions in the market for light, sweet crude oil, the imposition of position or accountability limits by regulators or exchanges or other extraordinary circumstances may impact the variance between the performances of the United States Oil Fund, LP and its benchmark oil futures contract. Further, the correlation between the prices of the benchmark oil futures contract and the spot price of the Underlying Commodity may at time be only approximate. The degree of imperfection of correlation depends upon circumstance such as variations in the speculative oil market, supply of and demand for oil futures contracts (including the benchmark oil futures contract) and other oil-related investments, and technical influences in oil futures trading. Finally, because the shares of the United States Oil Fund, LP are traded on a securities exchange and are subject to market supply and investor demand, the market value of one share of the United States Oil Fund, LP may differ from the net asset value per share of the United States Oil Fund, LP.

During periods of market volatility, the United States Oil Fund, LP's benchmark oil futures contract may be unavailable in the secondary market, market participants may be unable to calculate accurately the net asset value per share of the United States Oil Fund, LP and the liquidity of the United States Oil Fund, LP may be adversely affected. This kind of market volatility may also disrupt the ability of market participants to create and redeem shares of the United States Oil Fund, LP. Further, market volatility may adversely affect, sometimes materially, the prices at which market participants are willing to buy and sell shares of the United State Oil Fund, LP. As a result, under these circumstances, the market value of shares of the United State Oil Fund, LP may vary substantially from the net asset value per share of the United State Oil Fund, LP. For all of the foregoing reasons, the performance of the United State Oil Fund, LP may not correlate with the performance of its Underlying Commodity or its benchmark oil futures contract as well as the net asset value per share of the United State Oil Fund, LP, which could materially and adversely affect the value of the notes in the secondary market and/or reduce any payment on the notes.

**For notes linked in whole or in part to the United States Oil Fund, LP, the market price of crude oil will affect the value of the notes.**

Because the notes are linked in whole or in part to the performance of the United States Oil Fund, LP, which invests primarily in futures contracts on light, sweet crude oil, we expect that generally the market value of the notes will depend in part on the market price of crude oil. The price of crude oil is primarily affected by the global demand for and supply of crude oil, but is also influenced significantly from time to time by speculative actions and by currency exchange rates. Crude oil prices are volatile and subject to dislocation. Demand for refined petroleum products by consumers, as well as the agricultural,

manufacturing and transportation industries, affects the price of crude oil. Crude oil's end-use as a refined product is often as transport fuel, industrial fuel and in-home heating fuel. Potential for substitution in most areas exists, although considerations, including relative cost, often limit substitution levels. Because the precursors of demand for petroleum products are linked to economic activity, demand will tend to reflect economic conditions. Demand is also influenced by government regulations, such as environmental or consumption policies. In addition to general economic activity and demand, prices for crude oil are affected by political events, labor activity and, in particular, direct government intervention (such as embargos) or supply disruptions in major oil producing regions of the world. Such events tend to affect oil prices worldwide, regardless of the location of the event. Supply for crude oil may increase or decrease depending on many factors. These include production decisions by the Organization of the Petroleum Exporting Countries ("OPEC") and other crude oil producers. Crude oil prices are determined with significant influence by OPEC. OPEC has the potential to influence oil prices worldwide because its members possess a significant portion of the world's oil supply. In the event of sudden disruptions in the supplies of oil, such as those caused by war, natural events, accidents or acts of terrorism, prices of oil futures contracts could become extremely volatile and unpredictable. Also, sudden and dramatic changes in the futures market may occur, for example, upon a cessation of hostilities that may exist in countries producing oil, the introduction of new or previously withheld supplies into the market or the introduction of substitute products or commodities. Crude oil prices may also be affected by short-term changes in supply and demand because of trading activities in the oil market and seasonality (e.g., weather conditions such as hurricanes). It is not possible to predict the aggregate effect of all or any combination of these factors.

**For notes linked in whole or in part to the United States Oil Fund, LP, the United States Oil Fund, LP may be more volatile and more susceptible to price fluctuations of commodity futures contracts than an index or fund that provides broad commodity exposure.**

In contrast to an index or fund that includes or holds contracts on crude oil and non-crude oil commodities, the United States Oil Fund, LP primarily invests on contracts only on crude oil. As a result, price volatility in the contracts held by the United States Oil Fund, LP will likely have a greater impact on the United States Oil Fund, LP than it would on an index or fund with broad commodity exposure. In addition, because the United States Oil Fund, LP omits principal market sectors composing the commodity market, it will be less representative of the economy and commodity markets as a whole and will therefore not serve as a reliable benchmark for commodity market performance generally.

**For notes linked in whole or in part to the VanEck Vectors® Gold Miners ETF or the VanEck Vectors® Junior Gold Miners ETF, risks associated with the gold and silver mining industries will affect the value of the notes.**

All or substantially all of the equity securities held by the VanEck Vectors® Gold Miners ETF and the VanEck Vectors® Junior Gold Miners ETF are issued by companies whose primary line of business is directly associated with the gold and/or silver mining industries. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting these industries than a different investment linked to securities of a more broadly diversified group of issuers.

Investments related to gold and silver are considered speculative and are affected by a variety of factors. Competitive pressures may have a significant effect on the financial condition of gold mining and silver mining companies. Also, gold and silver mining companies are highly dependent on the price of gold bullion and silver bullion, respectively, but may also be adversely affected by a variety of worldwide economic, financial and political factors. Therefore, the securities of companies involved in the gold or silver mining industry may under- or over-perform commodities themselves over the short-term or long-term. Gold bullion and silver bullion prices may fluctuate substantially over short periods of time, even during periods of rising prices, so the VanEck Vectors® Gold Miners ETF and the VanEck Vectors® Junior Gold Miners ETF's share prices may be more volatile than other types of investments.

A drop in the price of gold and/or silver bullion would particularly adversely affect the profitability of small- and medium-capitalization mining companies and their ability to secure financing. Furthermore,

companies that are only in the exploration stage are typically unable to adopt specific strategies for controlling the impact of the price of gold or silver. The price of gold has fluctuated in recent years and may continue to fluctuate. These prices may fluctuate substantially over short periods of time so the VanEck Vectors® Gold Miners ETF and the VanEck Vectors® Junior Gold Miners ETF's share prices may be more volatile than other types of investments. Fluctuation in the prices of gold and silver may be due to a number of factors, including the changes in inflation and changes in industrial and commercial demand for metals. Additionally, increased environmental or labor costs may depress the value of metal investments. In times of significant inflation or great economic uncertainty, gold, silver and other precious metals may outperform traditional investments such as bonds and stocks. However, in times of stable economic growth, traditional equity and debt investments could offer greater appreciation potential and the value of gold, silver and other precious metals may be adversely affected, which could in turn affect the VanEck Vectors® Gold Miners ETF and the VanEck Vectors® Junior Gold Miners ETF's returns.

A significant portion of the world's gold reserves are held by governments, central banks and related institutions. The production, purchase and sale of precious metals by governments or central banks or other larger holders can be negatively affected by various economic, financial, social and political factors, which may be unpredictable and may have a significant adverse impact on the supply and prices of precious metals. Additionally, the United States or foreign governments may pass laws or regulations limiting metal investments for strategic or other policy reasons.

The principal supplies of metal industries also may be concentrated in a small number of countries and regions. Economic, social and political conditions in those countries that are the largest producers of gold and silver may have a direct negative effect on the production and marketing of gold and silver and on sales of central bank gold holdings. Some gold, silver and precious metals mining operation companies may hedge their exposure to declines in gold, silver and precious metals prices by selling forward future production, which may result in lower returns during periods when the prices of gold, silver and precious metals increase.

The gold, silver and precious metals industries can be significantly adversely affected by events relating to international political developments, the success of exploration projects, commodity prices, tax and government regulations and intervention (including government restrictions on private ownership of gold and mining land), changes in inflation or expectations regarding inflation in various countries and investment speculation. If a natural disaster or other event with a significant economic impact occurs in a region where the companies in which the VanEck Vectors® Gold Miners ETF or the VanEck Vectors® Junior Gold Miners ETF invests operate, that disaster or event could negatively affect the profitability of such companies and, in turn, the VanEck Vectors® Gold Miners ETF or the VanEck Vectors® Junior Gold Miners ETF's investment in them. Gold and silver mining companies may also be significantly adversely affected by import controls, worldwide competition, environmental hazards, liability for environmental damage, depletion of resources, industrial accidents, underground fires, seismic activity, labor disputes, unexpected geological formations, availability of appropriately skilled persons, unanticipated ground and water conditions and mandated expenditures for safety and pollution control devices.

A significant number of the companies the securities of which are held by the VanEck Vectors® Junior Gold Miners ETF may be early stage mining companies that are in the exploration stage only or that hold properties that might not ultimately produce gold or silver. The exploration and development of mineral deposits involve significant financial risks over a significant period of time, which even a combination of careful evaluation, experience and knowledge may not eliminate. Few properties that are explored are ultimately developed into producing mines. Major expenditures may be required to establish reserves by drilling and to construct mining and processing facilities at a site. In addition, many early stage miners operate at a loss and are dependent on securing equity and/or debt financing, which might be more difficult to secure for an early stage mining company than for a more established counterpart.

These factors could affect the gold and silver mining industries and could affect the value of the equity securities held by the VanEck Vectors® Gold Miners ETF and the VanEck Vectors® Junior Gold Miners ETF and the price of the VanEck Vectors® Gold Miners ETF and the VanEck Vectors® Junior Gold Miners ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the VanEck Vectors® Oil Services ETF, risks associated with the oil services sector will affect the value of the notes.**

All or substantially all of the equity securities held by the VanEck Vectors® Oil Services ETF are issued by companies whose primary line of business is directly associated with the oil services sector. As a result, the value of the notes may be subject to greater volatility and be more adversely affected by a single economic, political or regulatory occurrence affecting this sector than a different investment linked to securities of a more broadly diversified group of issuers.

The profitability of companies in the oil services sector is related to worldwide energy prices, including all sources of energy, and exploration and production costs. The price of energy, the earnings of companies in the oil services sector, and the value of these companies' securities have recently experienced significant volatility. Additionally, the price of oil has also recently experienced significant volatility and has declined significantly, which may materially impact companies operating in the oil services sector. These companies are also subject to risks of changes in exchange rates and the price of oil and gas, changes in prices for competitive energy services, changes in the global supply of and demand for oil and gas, the imposition of import controls, world events, actions of the Organization of Petroleum Exporting Countries, negative perception and publicity, depletion of resources and general economic conditions, development of alternative energy sources, energy conservation efforts, technological developments and labor relations, as well as market, economic, social and political risks of the countries where oil services companies are located or do business. The values of securities of oil services companies are subject to swift price and supply fluctuations caused by events relating to international politics, including political instability, expropriation, social unrest and acts of war, energy conservation, the success of exploration projects and tax and other governmental regulatory policies. Oil services companies operate in a highly competitive and cyclical industry, with intense price competition.

The oil services sector is exposed to significant and numerous operating hazards. Oil services companies' operations are subject to hazards inherent in the oil and gas industry, such as fire, explosion, blowouts, loss of well control, oil spills, pipeline and equipment leaks and ruptures and discharges or releases of toxic or hazardous gases. Oil and gas exploration and production can be significantly affected by natural disasters and adverse weather conditions in the regions in which they operate. The revenues of oil services companies may be negatively affected by contract termination and renegotiation. In the oil services sector, it is customary for contracts to provide for either automatic termination or termination at the option of the customer if the drilling unit is destroyed or lost or if drilling operations are suspended for a specified period of time as a result of events beyond the control of either party or because of equipment breakdowns. In periods of depressed market conditions, the customers of oil services companies may not honor the terms of existing contracts and may terminate contracts or seek to renegotiate contract rates and terms to reduce their obligations.

Oil services companies are subject to, and may be adversely affected by, extensive federal, state, local and foreign laws, rules and regulations. Oil exploration and production companies may also be adversely affected by environmental damage claims and other types of litigation. Laws and regulations protecting the environment may expose oil services companies to liability for the conduct of or conditions caused by others or for acts that were in compliance with all applicable laws at the time they were performed. Changes to environmental protection laws, including the implementation of policies with less stringent environmental protection standards and those geared away from sustainable energy development, could lead to fluctuations in supply, demand and prices of oil and gas. The international operations of oil services companies expose them to risks associated with instability and changes in economic and political conditions, foreign currency fluctuations, changes in interest rates, changes in foreign regulations and other risks inherent to international business. Additionally, changes to U.S. trading policies could cause friction with certain oil producing countries and between the governments of the United States and other major exporters of oil to the United States. Some of the companies in the oil services sector are engaged in other lines of business unrelated to oil services, and they may experience problems with these lines of business, which could adversely affect their operating results. The operating results of these companies may fluctuate as a result of these additional risks and events in the other lines of business. In addition, a company's ability to engage in new activities may expose it to business risks

with which it has less experience than it has with the business risks associated with its traditional businesses. Despite a company's possible success in traditional oil services activities, there can be no assurance that the other lines of business in which these companies are engaged will not have an adverse effect on a company's business or financial condition.

These factors could affect the oil services sector and could affect the value of the equity securities held by the VanEck Vectors® Oil Services ETF and the price of the VanEck Vectors® Oil Services ETF during the term of the notes, which may adversely affect the value of your notes.

**For notes linked in whole or in part to the Vanguard FTSE Emerging Markets ETF, the index tracked by the Vanguard FTSE Emerging Markets ETF has changed over time.**

The Vanguard FTSE Emerging Markets ETF tracked the Select Emerging Markets Index through August 23, 2006; the MSCI Emerging Markets Index through January 9, 2013; the FTSE Emerging Transition Index through June 27, 2013; the FTSE Emerging Index through November 1, 2015; and the FTSE Emerging Markets All Cap China A Transition Index through September 18, 2016. Since September 19, 2016, the Vanguard FTSE Emerging Markets ETF has tracked the FTSE Emerging Markets All Cap China A Inclusion Index. Korean companies were first included as part of the transition to the FTSE Emerging Index, and small-capitalization stocks and China A-shares were first included as part of the transition to the FTSE Emerging Markets All Cap China A Inclusion Index. China A-shares, which are securities of Chinese-incorporated companies that trade on either the Shanghai or Shenzhen stock exchange, are quoted in Renminbi and can be traded only either by residents of the People's Republic of China or under the qualified foreign institutional investor ("QFII") and/or Renminbi QFII ("RQFII") rules and stock connect schemes. These changes could adversely affect the performance of the Vanguard FTSE Emerging Markets ETF and, in turn, your return on the notes. In addition, there is limited historical information that reflects the Vanguard FTSE Emerging Markets ETF's tracking of the FTSE Emerging Markets All Cap China A Inclusion Index.

## EQUITY INDEX DESCRIPTIONS

### THE DOW JONES INDUSTRIAL AVERAGE™

All information contained in this underlying supplement regarding the Dow Jones Industrial Average™, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (“**S&P Dow Jones**”). The Dow Jones Industrial Average™ is calculated, published and disseminated by S&P Dow Jones. S&P Dow Jones has no obligation to continue to publish, and may discontinue publication of, the Dow Jones Industrial Average™. The Dow Jones Industrial Average™ is reported by Bloomberg L.P. under the ticker symbol “INDU.”

The Dow Jones Industrial Average™ is a price-weighted index that seeks to measure of the performance of 30 U.S. blue-chip companies. The Dow Jones Industrial Average™ covers all industries with the exception of transportation and utilities.

The Dow Jones Industrial Average™ is price-weighted rather than market capitalization-weighted, which means that weightings are based only on changes in the stocks’ prices, rather than by both price changes and changes in the number of shares outstanding. The value of the Dow Jones Industrial Average™ is the sum of the primary exchange prices of each of the 30 component stocks included in the Dow Jones Industrial Average™ divided by a divisor. The divisor used to calculate the price-weighted average of the Dow Jones Industrial Average™ is not simply the number of component stocks; rather, the divisor is adjusted to smooth out the effects of stock splits and other corporate actions. While this methodology reflects current practice in calculating the Dow Jones Industrial Average™, no assurance can be given that S&P Dow Jones will not modify or change this methodology in a manner that may affect the amounts payable on the securities at maturity.

#### Index Construction and Maintenance

The Dow Jones Industrial Average™ is maintained by a committee, which is currently composed of three representatives of S&P Dow Jones and two representatives of The Wall Street Journal (the “**Averages Committee**”). The Averages Committee meets at least semi-annually. At each meeting, the Averages Committee reviews pending corporate actions that may affect index constituents, statistics comparing the composition of the Dow Jones Industrial Average™ to the market, companies that are being considered as candidates for addition to an index, and any significant market events. In addition, the Averages Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

The index universe consists of securities in the S&P 500® Index, excluding stocks classified under Global Industry Classification Standard (GICS®) code 2030 (Transportation) and 55 (Utilities). While stock selection is not governed by quantitative rules, a stock typically is added only if the company has an excellent reputation, demonstrates sustained growth and is of interest to a large number of investors. Companies should be incorporated and headquartered in the United States. In addition, a plurality of revenues should be derived from the United States. Maintaining adequate sector representation within the Dow Jones Industrial Average™ is also a consideration in the selection process for the Dow Jones Industrial Average™. Changes to the Dow Jones Industrial Average™ are made on an as-needed basis. There is no annual or semi-annual reconstruction. Rather, changes in response to corporate actions and market developments can be made at any time.

#### *Corporate Actions.*

The table below summarizes the types of index maintenance adjustments and indicates whether or not an index divisor adjustment is required.

Type of Corporate Action	Adjustment Made to Index	Divisor Adjustment
Spin-off	The price of the parent company is adjusted to the price of the parent company minus (the price of the spun-off company/share exchange ratio). Any potential impacts on index constituents are evaluated by the Averages Committee on a case by case basis.	Yes
Rights offering	The price is adjusted according to the terms of the rights offering.	Yes
Stock dividend, stock split, reverse stock split	The price is adjusted according to the terms of the stock split or dividend.	Yes
Share issuance, share repurchase, equity offering or warrant conversion	None.	No
Special dividends	The price of the stock making the special dividend payment is reduced by the per share special dividend amount after the close of trading on the day before the dividend ex-date.	Yes
Constituent change	Deletions due to delistings, acquisition or any other corporate event resulting in the deletion of the stock from the Dow Jones Industrial Average™ will be replaced on the effective date of the drop.	Yes

### License Agreement

The Dow Jones Industrial Average™ is a registered trademark of Dow Jones Trademark Holdings LLC and has been licensed for use. “Dow Jones®,” “Dow Jones Industrial Average™,” “DJIA<sup>SM</sup>” and “Dow Jones Indexes” are service marks of Dow Jones and have been licensed for use for certain purposes by JPMorgan Chase & Co. and certain of its affiliated or subsidiary companies, including JPMorgan Financial. S&P Dow Jones, Dow Jones & Company, Inc. (“Dow Jones”), CME Group Inc. (“CME Group”) and their respective affiliates have no relationship with the Issuer and the Guarantor (if applicable), other than the licensing of the Dow Jones Industrial Average™ (“DJIA”) and their respective service marks for use in connection with the certain financial products, including the notes.

#### **S&P Dow Jones, Dow Jones, CME Group or their respective affiliates do *not*:**

- sponsor, endorse, sell or promote the notes;
- recommend that any person invest in the notes;
- have any responsibility or liability for or make any decisions about the timing, amount or pricing of the notes;
- have any responsibility or liability for the administration, management or marketing of the notes; or
- consider the needs of the notes or the owners of the notes in determining, composing or calculating the DJIA or have any obligation to do so.



Notwithstanding the foregoing, CME Group and its affiliates may independently issue and/or sponsor financial products unrelated to the notes currently being issued by the Issuer, but which may be similar to and competitive with the notes. In addition, CME Group and its affiliates actively trade financial products which are linked to the performance of the DJIA. It is possible that this trading activity will affect the value of the DJIA and the notes.

**S&P Dow Jones, Dow Jones, CME Group and their respective affiliates will not have any liability in connection with the notes. Specifically,**

- **S&P Dow Jones, Dow Jones, CME Group and their respective affiliates do not make any warranty, express or implied, and S&P Dow Jones, Dow Jones, CME Group and their respective affiliates disclaim any warranty about:**
  - **the results to be obtained by the notes, the owner of the notes or any other person in connection with the use of the DJIA and the data included in the DJIA;**
  - **the accuracy or completeness of the DJIA or its data; or**
  - **the merchantability and the fitness for a particular purpose or use of the DJIA or its data;**
- **S&P Dow Jones, Dow Jones, CME Group and/or their respective affiliates will have no liability for any errors, omissions or interruptions in the DJIA or its data; and**
- **under no circumstances will S&P Dow Jones, Dow Jones, CME Group and/or their respective affiliates be liable for any lost profits or indirect, punitive, special or consequential damages or losses, even if they know that they might occur.**

**The licensing relating to the use of the indexes and trademarks referred to above is solely for the benefit of JPMorgan Chase & Co. and certain of its affiliated or subsidiary companies, including JPMorgan Financial, and not for any other third parties.**

## **THE EURO STOXX® SELECT DIVIDEND 30 INDEX**

All information contained in this underlying supplement regarding the EURO STOXX® Select Dividend 30 Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, STOXX Limited. The EURO STOXX® Select Dividend 30 Index was created and is calculated, maintained and published by STOXX Limited, a wholly owned subsidiary of Deutsche Börse AG. STOXX Limited has no obligation to continue to publish, and may discontinue publication of, the EURO STOXX® Select Dividend 30 Index. The EURO STOXX® Select Dividend 30 Index has a base date of December 30, 1998 and a base value of 1,000. The EURO STOXX® Select Dividend 30 Index is reported by Bloomberg L.P. under the ticker symbol “SD3E.”

The EURO STOXX® Select Dividend 30 Index is a “net dividend yield”-weighted index composed of 30 of the highest dividend-paying stocks selected from the components of the EURO STOXX® Index, which provides a broad representation of the developed markets in the Eurozone. See “Equity Index Descriptions — The STOXX Benchmark Indices” in this underlying supplement for additional information about the EURO STOXX® Index. The component stocks of EURO STOXX® Select Dividend 30 Index are traded on the major exchange of 11 Eurozone countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. At any given time, some eligible countries may not be represented in the EURO STOXX® Select Dividend 30 Index. Although the EURO STOXX® Select Dividend 30 Index measures the performance of high dividend-yielding companies, it is a price return index and, therefore, the return on the EURO STOXX® Select Dividend 30 Index will not include any dividends paid on the securities that make up the EURO STOXX® Select Dividend 30 Index.

### **EURO STOXX® Select Dividend 30 Index Composition and Maintenance**

Components of the EURO STOXX® Index and their secondary share lines are eligible for inclusion in the selection list for the EURO STOXX® Select Dividend 30 Index. Companies are screened for the following criteria: indicated annualized dividend (applies for components and non-components), non-negative dividend growth rate over the past five years (applies for non-components only), dividend payments in four out of five calendar years (applies for non-components only), non-negative payout ratio (applies for components and non-components), payout ratio of less than or equal to 60% (applies for non-components only) and a minimum average daily traded value over the preceding 3-months of approximately 11.11 million euros (applies for non-components). For companies that have more than one share line, the line with the higher dividend yield is chosen.

All companies on the selection list are ranked according to the ratio of their net dividend yield to the greater of the net dividend yield of the STOXX total market index for the country for that company and the net dividend yield of the STOXX total market index for the Eurozone. All current companies ranked from 1 to 60 in the selection list will remain in EURO STOXX® Select Dividend 30 Index. If fewer than 30 companies are included, the highest ranked non-components are added until 30 companies are included.

The composition of the EURO STOXX® Select Dividend 30 Index is reviewed annually in March.

To maintain the number of components constant, a deleted stock is replaced with the highest-ranked non-component on the selection list. The selection list is updated on a quarterly basis according to the review component selection process. The restrictions on the maximum count per country are applied. If a company is deleted from the EURO STOXX® Index between the annual review dates, but is still a component of the STOXX® Global TMI, the stock will remain in the EURO STOXX® Select Dividend 30 Index until the next annual review, provided that it still meets the requirements for the EURO STOXX® Select Dividend 30 Index.

If STOXX Limited becomes aware of dividend data changes for the components of the EURO STOXX® Select Dividend 30 Index, the following index adjustments may occur. The timing of the index adjustment depends on the changes in the dividend data. If the company cancels one of its dividends, the company will be deleted from the EURO STOXX® Select Dividend 30 Index, the replacement announced immediately, implemented two trading days later and become effective the next trading day.

If the company lowers its dividend, the company will remain in the EURO STOXX® Select Dividend 30 Index until the next selection list is available. If the company is ranked 60 or above on this selection list, it is retained. If it is ranked 61 or below on the selection list, it is removed and replaced by the highest-ranked non- component on that selection list. The changes will be announced on the fifth trading day of the month together with the selection list and become effective on the first trading day after the third Friday of the month. The weight factors for the new components will be published on the quarterly underlying data announcement based on previous day closing prices.

Spin-off stocks are not considered for immediate addition in the EURO STOXX® Select Dividend 30 Index. If the original company has a significantly lower dividend after the spin-off, then its status will be reviewed for fast exit as described above. In the case of mergers or takeovers, the original stock is replaced by the surviving stock, if it is ranked 60 or above on this selection list. If the stocks of the surviving company is ranked 61 or below on the selection list, the original stocks are replaced with the highest-ranked non-component on the selection list.

### EURO STOXX® Select Dividend 30 Index Calculation

The EURO STOXX® Select Dividend 30 Index is calculated with the “Laspeyres formula,” which measures the aggregate price changes in the component stocks against a fixed base quantity weight. The formula for calculating the EURO STOXX® Select Dividend 30 Index value can be expressed as follows:

$$\text{Index} = \frac{\text{total "units" of the EURO STOXX® Select Dividend 30 Index}}{\text{Divisor}}$$

The “total “units” of the EURO STOXX® Select Dividend 30 Index” is equal to the sum of the products, for each component stock, of the price, weighting factor and weighting cap factor as of the time that the STOXX EURO STOXX® Select Dividend 30 Index is being calculated.

The weighting factor for each component stock is equal to the ratio of (a) the net dividend of the issuer of that component stock divided by the closing price of that component stock (the “net dividend yield”) to (b) the sum of the net dividend yields of all component stocks.

The weighting cap factor limits the weight of each component stock within the EURO STOXX® Select Dividend 30 Index to a maximum of 15% at the time of each review. In addition, the EURO STOXX® Select Dividend 30 Index applies a weighting cap factor for each component stock of  $(1,000,000,000 \times \text{initial weight of that component} / \text{closing price of that component stock})$ , rounded to the nearest integer.

The EURO STOXX® Select Dividend 30 Index is also subject to a divisor, which is adjusted to maintain the continuity of the EURO STOXX® Select Dividend 30 Index values across changes due to corporate actions. The following is a summary of the adjustments to any component stock made for corporate actions and the effect of such adjustment on the divisor, where the shareholders of the component stock will receive “B” number of shares for every “A” share held (where applicable).

**(1) Special cash dividend:**

Cash distributions that are outside the scope of the regular dividend policy or that the company defines as an extraordinary distribution

Adjusted price = closing price – dividend announced by the company × (1 – withholding tax if applicable)

Divisor: decreases

<p>(2) Split and reverse split:</p> <p>Adjusted price = closing price <math>\times</math> A / B</p> <p>New weighting factor = old weighting factor <math>\times</math> B / A</p> <p>Divisor: unchanged</p>	
<p>(3) Rights offering:</p> <p>If the subscription price is not available or if the subscription price is equal to or greater than the closing price on the day before the effective date, then no adjustment is made.</p> <p>For standard rights issues:</p> <p>Adjusted price = (closing price <math>\times</math> A + subscription price <math>\times</math> B) / (A + B)</p> <p>New weighting factor = old weighting factor <math>\times</math> closing price / adjusted price</p> <p>Divisor: unchanged</p>	
<p>(4) Stock dividend:</p> <p>Adjusted price = closing price <math>\times</math> A / (A + B)</p> <p>New weighting factor = old weighting factor <math>\times</math> (A + B) / A</p> <p>Divisor: unchanged</p>	<p>(5) Stock dividend (from treasury stock):</p> <p>Adjusted only if treated as extraordinary dividend.</p> <p>Adjusted close = close – close <math>\times</math> B / (A + B)</p> <p>Divisor: decreases</p>
<p>(6) Stock dividend of another company:</p> <p>Adjusted price = (closing price <math>\times</math> A – price of other company <math>\times</math> B) / A</p> <p>Divisor: decreases</p>	<p>(7) Return of capital and share consolidation:</p> <p>Adjusted price = (closing price – capital return announced by company <math>\times</math> (1 - withholding tax)) <math>\times</math> A / B</p> <p>New weighting factor = old weighting factor <math>\times</math> B / A</p> <p>Divisor: decreases</p>
<p>(8) Repurchase of shares / self-tender:</p> <p>Adjusted price = ((price before tender <math>\times</math> old number of shares) – (tender price <math>\times</math> number of tendered shares)) / (old number of shares – number of tendered shares)</p> <p>New weighting factor = old number of weighting factor <math>\times</math> closing price / adjusted price</p> <p>Divisor: decreases</p>	<p>(9) Spin-off:</p> <p>Adjusted price = (closing price <math>\times</math> A – price of spun-off shares <math>\times</math> B) / A</p> <p>New weighting factor for the spin-off = weighting factor of the parent company <math>\times</math> B / A</p> <p>Divisor: decreases</p>

<p>(10) Combination stock distribution (dividend or split) and rights offering:</p> <p>For this corporate action, the following additional assumptions apply:</p> <p>Shareholders receive B new shares from the distribution and C new shares from the rights offering for every A share held.</p> <p>If A is not equal to one share, all the following “new number of shares” formulae need to be divided by A:</p>	
<p>- If rights are applicable after stock distribution (one action applicable to other):</p> <p>Adjusted price = (closing price × A + subscription price × C × (1 + B / A)) / ((A + B) × (1 + C / A))</p> <p>New weighting factor = old weighting factor × closing price / adjusted price</p> <p>Divisor: increases</p>	<p>- If stock distribution is applicable after rights (one action applicable to other):</p> <p>Adjusted price = (closing price × A + subscription price × C) / ((A + C) × (1 + B / A))</p> <p>New weighting factor = old weighting factor × closing price / adjusted price</p> <p>Divisor: increases</p>
<p>- Stock distribution and rights (neither action is applicable to the other):</p> <p>Adjusted price = (closing price × A + subscription price × C) / (A + B + C)</p> <p>New weighting factor = old weighting factor × closing price / adjusted price</p> <p>Divisor: increases</p>	
<p>(11) Addition / deletion of a company:</p> <p>No price adjustments are made. The net change in units determines the divisor adjustment.</p>	

## License Agreement

JPMorgan Chase & Co. or its affiliate has entered into an agreement with STOXX Limited (“STOXX”) providing it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the EURO STOXX® Select Dividend 30 Index, which is owned and published by STOXX Limited, in connection with the securities, including the notes.

STOXX and its licensors (the “Licensors”) have no relationship to the Issuer or the Guarantor (if applicable), other than the licensing of the EURO STOXX® Select Dividend 30 Index and the related trademarks for use in connection with the notes.

### **STOXX and its Licensors do not:**

- sponsor, endorse, sell or promote the notes;
- recommend that any person invest in the notes or any other securities;
- have any responsibility or liability for or make any decisions about the timing, amount or pricing of the notes;

- have any responsibility or liability for the administration, management or marketing of the notes; or
- consider the needs of the notes or the holders of the notes in determining, composing or calculating the EURO STOXX® Select Dividend 30 Index or have any obligation to do so.

**STOXX and its Licensors will not have any liability in connection with the notes. Specifically,**

- **STOXX and its Licensors do not make any warranty, express or implied and disclaim any and all warranty about:**
  - **The results to be obtained by the notes, the holders of the notes or any other person in connection with the use of the EURO STOXX® Select Dividend 30 Index and the data included in the EURO STOXX® Select Dividend 30 Index;**
  - **The accuracy or completeness of the EURO STOXX® Select Dividend 30 Index and its data; or**
  - **The merchantability and the fitness for a particular purpose or use of the EURO STOXX® Select Dividend 30 Index and its data;**
- **STOXX and its Licensors will have no liability for any errors, omissions or interruptions in the EURO STOXX® Select Dividend 30 Index or its data; and**
- **Under no circumstances will STOXX or its Licensors be liable for any lost profits or indirect, punitive, special or consequential damages or losses, even if STOXX or its Licensors knows that they might occur.**

**The licensing agreement with STOXX is solely for the benefit of the parties to that agreement and not for the benefit of the holders of the notes or any other third parties.**

## THE FTSE® 100 INDEX

All information in this underlying supplement regarding the FTSE® 100 Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, FTSE Russell. FTSE Russell has no obligation to continue to publish, and may discontinue publication of, the FTSE® 100 Index.

The FTSE® 100 Index is reported by Bloomberg L.P. under the ticker symbol “UKX.”

The FTSE® 100 Index is an index calculated, published and disseminated by FTSE Russell. The FTSE® 100 Index measures the composite price performance of the 100 largest companies (determined on the basis of market capitalization) traded on the London Stock Exchange (the “LSE”). Publication of the FTSE® 100 Index began in January 1984.

### Composition of the FTSE® 100 Index

The 100 stocks included in the FTSE® 100 Index (the “FTSE Underlying Stocks”) were selected from a reference group of stocks trading on the LSE that were selected by excluding certain stocks that have low liquidity, public float accuracy, and reliability of prices, or size or have limited voting rights by unrestricted shareholders or foreign ownership restrictions. The FTSE Underlying Stocks were selected from this reference group by selecting 100 stocks with the largest market value. Where there are multiple lines of listed equity capital in a company, all are included and priced separately, *provided* that the secondary line’s full market capitalization (*i.e.* before the application of any investability weightings) is greater than 25% of the full market capitalization of the company’s principal line and the secondary line satisfies the eligibility rules and screens in its own right in all respects.

Companies are required to have greater than 5% of the company’s voting rights (aggregated across all of its equity securities, including, where identifiable, those that are not listed or trading) in the hands of unrestricted shareholders in order to be eligible for index inclusion. Companies already included in the FTSE® 100 Index have a five-year grandfathering period to comply or they will be removed from the FTSE® 100 Index in September 2022.

The FTSE® 100 Index is overseen and reviewed quarterly in March, June, September and December by the FTSE Russell Europe, Middle East & Africa Regional Equity Advisory Committee (the “Index Steering Committee”) in order to maintain continuity in the level. The Index Steering Committee undertakes the reviews of the FTSE® 100 Index and ensures that constituent changes and index calculations are made in accordance with the ground rules of the FTSE® 100 Index. Each review is based on data from the close of business on the Tuesday before the first Friday of the review month. Any constituent changes are implemented after the close of business on the third Friday of the review month (*i.e.* effective Monday), following the expiry of the ICE Futures Europe futures and options contracts.

The FTSE Underlying Stocks may be replaced, if necessary, in accordance with deletion/addition rules that provide generally for the removal and replacement of a stock from the FTSE® 100 Index if such stock is delisted or its issuer is subject to a takeover offer that has been declared unconditional or it has ceased, in the opinion of the Index Steering Committee, to be a viable component of the FTSE® 100 Index. To maintain continuity, a stock will be added at the quarterly review if it has risen to 90th place or above and a stock will be deleted if at the quarterly review it has fallen to 111th place or below, in each case ranked on the basis of market capitalization. A constant number of constituents will be maintained for the FTSE® 100 Index. Where a greater number of companies qualify to be inserted in the index than those qualifying to be deleted, the lowest ranking constituents presently included in the index will be deleted to ensure that an equal number of companies are inserted and deleted at the periodic review. Likewise, where a greater number of companies qualify to be deleted than those qualifying to be inserted, the securities of the highest ranking companies which are presently not included in the index will be inserted to match the number of companies being deleted at the periodic review.

Companies that are large enough to be constituents of the FTSE® 100 Index but do not pass the liquidity test are excluded. They will remain ineligible until the next annual review in June when they will be re-tested against all eligibility screens.

### **Calculation of the FTSE® 100 Index**

The FTSE® 100 Index is an arithmetic weighted index where the weights are the market capitalization of each company. The index is calculated by summing the free float adjusted market values (or capitalizations) of all companies within the index divided by the divisor. On the base date, the divisor is calculated as the sum of the market capitalizations of the index constituents divided by the initial index value of 1,000. The divisor is subsequently adjusted for any capital changes in the index constituents. In order to prevent discontinuities in the index in the event of a corporate action or change in constituents, it is necessary to make an adjustment to the prices used to calculate the index to ensure that the change in index between two consecutive dates reflects only market movements rather than including change due to the impact of corporate actions or constituent changes. This ensures that the index values remain comparable over time and that changes in the index level properly reflect the change in value of a portfolio of index constituents with weights the same as in the index.

### **Corporate Events Affecting the FTSE® 100 Index**

FTSE Russell applies corporate actions to the FTSE® 100 Index on a daily basis. FTSE Russell applies the following methodology guidelines, among others, when adjusting the FTSE® 100 Index in response to corporate actions:

- *Statement of Principles and Adjustments for Specific Corporate Events.* FTSE Russell has stated as general principles that the treatment of corporate events (a) should reflect how such events are likely to be dealt with in investment portfolios to maintain the portfolio structure in line with the target set out in the index objective and index methodology and (b) should normally be designed to minimize the trading activity required by investors to match the index performance. No assurance can be provided that corporate actions and events will be treated by FTSE Russell in a manner consistent with its statement of general principles.

In addition, FTSE Russell has established guidance for the treatment of corporation actions and events, including, but not limited to, dividends, capital repayments, companies converting to a REIT structure, share buybacks, rights issues, mergers, acquisitions, tender offers, split-offs, spin-offs, bankruptcies, insolvencies, liquidations and trading suspensions. However, because of the complexities involved in some cases, those guidelines are not definitive rules that will determine FTSE Russell's actions in all circumstances. FTSE Russell reserves the right to determine the most appropriate method of implementation for any corporate event which is not covered by those guidelines or which is of a complex nature.

- *Changes to Shares Outstanding and Free Float.* The FTSE® 100 Index will be reviewed quarterly for updates to shares outstanding and to free floats used within the calculation of the FTSE® 100 Index. In March, September, and December, shares outstanding and free float will be updated to reflect changes greater than 1% for cumulative shares in issue changes and changes greater than 3% (or 1%, for constituents with a free float of 15% or below) for cumulative free float changes. In June, the shares and free float updates will be implemented regardless of size. Shares and free float updates can be triggered in some cases by certain events, such as some primary or secondary offerings.

### **License Agreement**

The use of and reference to the FTSE® 100 Index in connection with the notes has been consented to by FTSE Russell. All rights to the FTSE® 100 Index are owned by FTSE Russell, the publisher of the FTSE® 100 Index. The Issuer, the Guarantor (if applicable), the agent, the calculation agent and the trustee disclaim all responsibility for the calculation or other maintenance of or any adjustments to the FTSE® 100 Index. In addition, FTSE Russell has no relationship to the Issuer, the Guarantor (if



applicable) or the notes. FTSE Russell does not sponsor, endorse, authorize, sell or promote the notes, and do not have any obligation or liability in connection with the administration, marketing or trading of the notes.

**THE NOTES ARE NOT IN ANY WAY SPONSORED, ENDORSED, SOLD OR PROMOTED BY FTSE RUSSELL AND FTSE RUSSELL MAKES NO WARRANTY OR REPRESENTATION WHATSOEVER, EXPRESSLY OR IMPLIEDLY, EITHER AS TO THE RESULTS TO BE OBTAINED FROM THE USE OF THE FTSE<sup>®</sup> 100 INDEX AND/OR THE FIGURE AT WHICH THE SAID INDEX STANDS AT ANY PARTICULAR TIME ON ANY PARTICULAR DAY OR OTHERWISE. FTSE<sup>®</sup> 100 INDEX IS COMPILED AND CALCULATED BY FTSE RUSSELL. HOWEVER, FTSE RUSSELL SHALL NOT BE LIABLE (WHETHER IN NEGLIGENCE OR OTHERWISE) TO ANY PERSON FOR ANY ERROR IN THE FTSE<sup>®</sup> 100 INDEX AND FTSE RUSSELL SHALL NOT BE UNDER ANY OBLIGATION TO ADVISE ANY PERSON OF ANY ERROR THEREIN.**

**“FTSE<sup>®</sup>,” “FT-SE<sup>®</sup>” AND “FOOTSIE<sup>®</sup>” ARE TRADEMARKS OF LONDON STOCK EXCHANGE GROUP PLC AND ITS AFFILIATES AND ARE USED BY FTSE UNDER LICENSE.**

## THE HANG SENG INDICES

All information contained in this underlying supplement regarding the Hang Seng® Index and the Hang Seng China Enterprises Index (together, the “Hang Seng Indices”), including, without limitation, their make-up, method of calculation and changes in their component securities, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, Hang Seng Indexes Company Limited (“HSIL”), a wholly owned subsidiary of Hang Seng Bank. The Hang Seng Indices are calculated, maintained and published by HSIL. HSIL has no obligation to continue to publish, and may discontinue publication of, either of the Hang Seng Indices.

### The Hang Seng® Index

The Hang Seng® Index was first calculated and published on November 24, 1969 and has a base date of July 31, 1964 and a base level of 100. The Hang Seng® Index is reported by Bloomberg L.P. under the ticker symbol “HSI.”

The Hang Seng® Index is a free float adjusted market capitalization weighted index designed to be an indicator of the performance of the Hong Kong stock market.

### Hang Seng® Index Constituent Selection

Only companies and real estate investment trusts with their primary listing on the main board of the Stock Exchange of Hong Kong Ltd. (the “HKEX”) are eligible as constituents of the Hang Seng® Index. Mainland China enterprises that have an H-share listing in Hong Kong are eligible for inclusion in the Hang Seng® Index only if the company has no unlisted share capital.

To be eligible for selection in the Hang Seng® Index, a company: (1) must be among those that constitute the top 90% of the total market capitalization of all eligible shares listed on the HKEX (market capitalization is expressed as an average of the past 12 months); (2) must be among those that constitute the top 90% of the total turnover of all primary listed shares on the HKEX (turnover is aggregated and individually assessed for eight quarterly sub-periods over the past 24 months); and (3) should normally have a listing history of at least 24 months on the HKEX, though companies with an average market capitalization in the top 25 may qualify with a shorter listing history (as short as three months). Companies that are the subject of a Hong Kong Securities and Futures Commission High Shareholding Concentration notice will not be eligible for inclusion in the Hang Seng® Index. From the candidates, final selections are based on the following: (1) the market capitalization and turnover rankings of the companies, (2) the representation of the sub-sectors within the Hang Seng® Index directly reflecting that of the market and (3) the financial performance of the companies. The number of constituents is fixed at 50.

Should a company that is scheduled to be added as a constituent but the Securities and Futures Commission subsequently issued a high shareholding concentration notice on the company before the scheduled addition date, it generally will not be added to the Hang Seng® Index. The companies that are included in the Securities and Futures Commission “High Shareholding Concentration Announcements” can be reconsidered for regaining their eligibility for constituency in the Hang Seng® Index if the company issues a voluntary announcement entitled “Resolving of High Shareholding Concentration” to state that the high shareholding concentration issue has been resolved, with proper disclosure on the actions taken and the updated shareholding status. The company will be eligible for reconsideration to regain their constituency in the next index review following an observation period of 12 months after the voluntary disclosure.

The Hang Seng® Index is reviewed quarterly. The decision whether to remove a suspended constituent from the Hang Seng® Index and replace it with an appropriate candidate is determined in the regular index review. Should a suspended constituent be removed from the Hang Seng® Index, its last traded price may be adjusted down to the system lowest price, i.e., \$0.0001 in the security’s price currency, or an official residual price (if available) for index calculation on the trading day preceding the effective date of the constituent changes.

## The Hang Seng China Enterprises Index

The Hang Seng China Enterprises Index was first calculated and published on August 8, 1994 and has a base date of January 3, 2000 and a base level of 2,000. The Hang Seng China Enterprises Index is reported by Bloomberg L.P. under the ticker symbol “HSCEI.”

The Hang Seng China Enterprises Index is a free float adjusted market capitalization weighted index designed to be an indicator of the Mainland securities listed in Hong Kong.

### Hang Seng China Enterprises Index Composition

Only Mainland securities with a primary listing on the main board of the HKEX are eligible to be included in the Hang Seng China Enterprises Index. Stocks that are secondary listings, investment companies, preference shares, debt securities, mutual funds and other derivatives are excluded.

To be eligible for selection in the Hang Seng China Enterprises Index, a stock: (1) should be listed for at least one month, starting from the listing date to the review cut-off date (both dates inclusive); and (2) must satisfy the turnover requirements. To be added to the Hang Seng China Enterprises Index, a stock must have a turnover velocity of at least 0.1% for at least 10 out of the past 12 months and for each of the most recent three months. Turnover velocity is calculated by dividing the median of the daily traded shares during a specific calendar month by the free float-adjusted issued shares at the end of that month. Stocks that are already included in the Hang Seng China Enterprises Index must have a turnover velocity of at least 0.1% for at least 10 out of the past 12 months. If a constituent fails to meet the turnover requirement as mentioned above, a supplementary turnover test will be applied for those months in which velocity is less than 0.1%:

- calculate the monthly aggregate turnover of the constituent; and
- if the monthly aggregate turnover is among the top 90<sup>th</sup> percentile of the total market, the constituent passes the monthly turnover test for that month.

The constituent will be regarded as meeting the turnover requirement if the turnover requirement is fulfilled after applying the supplementary turnover test above. Total market includes securities in the universe of eligible securities of the Hang Seng China Enterprises Index.

For a stock with a trading history of less than 12 months or a stock that has transferred from Growth Enterprise Market (“GEM”) to the Main Board in the past 12 months before the data review cut-off date, the following requirements replace those above.

Trading Record	Measurements
< 6 months	1) attain a minimum velocity of 0.1% for all trading months
≥ 6 months	1) cannot have more than one month in which stock has failed to attain a velocity of at least 0.1%; and  2) for the latest three months, stock needs to have attained 0.1% for all trading months if it is not an existing constituent.

Stocks transferred from GEM to the Main Board will be treated as new issues. For existing constituents, the supplementary turnover test as described above also applies.

For a stock which has been suspended for any complete month(s) during the past 12 months before the review cut-off date, the relevant month(s) will be excluded from the velocity calculation. The stock should meet the requirements as described above.

#### **Additional Eligibility Criteria for Red-chips and P-chips (for Non-Existing Constituents Only)**

*Listing History Requirements.* A company with a combined market capitalization ranking (as described under “— Selecting the Index Constituents” below) below 20 should have been listed for at least three years, starting from the listing date to the review cut-off date (both dates inclusive). A company with a combined market capitalization ranking in the top 10 or top 11-20 among mainland companies should have been listed for at least one year or two years, respectively, starting from the listing date to the review cut-off date (both dates inclusive).

*Price Volatility Requirements.* The past one-month, three-month and 12-month historical price volatility (i.e., standard deviation of the daily logarithmic return for the past one, three and 12 months to the data cut-off date) of a stock should not be greater than three times the historical price volatility of the Hang Seng China Enterprises Index for the respective period. The stock will not be eligible if its trading has been suspended for a complete month in the past one month before the review cut-off date.

*Financial Requirements.* The following parameters recorded in the annual reports of a company should be greater than zero for three consecutive fiscal years:

- net profit attributable to equity holders of the company;
- net cash generated from operating activities; and
- cash dividends.

A company with a combined market capitalization ranking in the top 10 or top 11-20 among mainland companies and passed the listing history requirements are eligible for the fast entry mechanism, where the financial requirements will be aligned with the stock's listing history. For example, a stock with a listing history of two years is required to have positive figures for the above three measures in the previous two fiscal years according to its published annual reports instead of the default three years.

The data cut-off date for the financial requirements is one calendar month after the review cut-off date.

#### **Hang Seng China Enterprises Index Constituent Selection**

The Hang Seng China Enterprises Index is reviewed quarterly with data cut-off dates as of the end of March, June, September and December each year.

From all eligible stocks (including H-shares, Red-chips and P-chips), constituent selections are made using the following methodology:

- all eligible are ranked by (i) full market capitalization, in terms of average month-end market capitalization in the past 12 months (or for stocks with a listing of less than 12 months, in terms of the average month-end market capitalization since listing) and (ii) free float-adjusted market capitalization, in terms of 12-month average market capitalization after free float adjustment;
- the combined market capitalization ranking for each eligible stock is determined as the weighted average of the full market capitalization ranking and the free float-adjusted market capitalization ranking, where each rank has a 50% weight; and
- the 50 stocks that have the highest combined market capitalization ranking are selected as the constituents of Hang Seng China Enterprises Index, subject to the buffer zone rule as described below.

**Buffer Zone and Reserve Listing.** Existing constituents (including H-shares, Red-chips and P-chips) ranked 61st or lower will be removed from the Hang Seng China Enterprises Index while non-constituent stocks (including H-shares, Red-chips and P-chips) ranked 40th or above will be included. If the number of incoming stocks is greater than the number of outgoing constituents, constituents with the lowest combined market capitalization ranking will be removed from the Hang Seng China Enterprises Index in order to maintain the number of constituents at 50. If the number of incoming stocks is smaller than the number of outgoing constituents, stocks with the highest combined market capitalization ranking will be added to the Hang Seng China Enterprises Index in order to maintain the number of constituents at 50.

The five non-constituents (including H-shares, Red-chips and P-chips) with the highest combined market capitalization ranking will form a Reserve List. The purpose of the Reserve List is to facilitate the replacement of any outgoing constituent between regular reviews in cases where a constituent may be removed due to trading suspension or delisting.

**Effective Date.** Effective dates of constituent changes will be the next trading day after the first Friday of March, June, September and December. If that Friday falls on a public holiday, it will be postponed to the next Friday, subject to the final decision made by HSICL. Under normal circumstances, at least seven trading days' notice will be given for any constituent changes made before the effective dates.

**Trading Suspension.** Whether or not to remove a suspended constituent from the Hang Seng China Enterprises Index and replace it with an appropriate candidate will be determined in the regular index reviews. Should a suspended constituent be removed from the Hang Seng China Enterprises Index, its last traded price may be adjusted down to the lowest price in a system (i.e., HK\$0.0001 in the security's price currency) or an official residual price (if available) for index calculation on the trading day preceding the effective date of the constituent changes.

**High Shareholding Concentration.** Companies with high shareholding concentration as determined by the Hong Kong Securities and Futures Commission will not be eligible for inclusion in the Hang Seng China Enterprises Index.

## Calculation of the Hang Seng Indices

The Hang Seng Indices are calculated using a free float adjusted market capitalization weighted methodology with a 10% cap on individual stock weightings.

The formula for the index calculation is shown below:

$$\text{current index} = \frac{\text{current aggregate free float adjusted market capitalization of constituents}}{\text{yesterday's aggregate free float adjusted market capitalization of constituents}} \times \text{yesterday's closing index}$$

$$\text{current index} = \frac{\sum (P_t \times IS \times FAF \times CF)}{\sum (P_{t-1} \times IS \times FAF \times CF)} \times \text{yesterday's closing index}$$

where:

$P_t$  : current price at day t;

$P_{t-1}$  : closing price at day t-1;

IS : number of issued shares (in the case of H-share constituents, only the H-share portion is taken into calculation);

FAF: free float adjusted factor, which is between 0 and 1; and

CF : capping factor, which is between 0 and 1.

**Free float Adjustments.** Shares held by any entities (excluding custodians, trustees, mutual funds and investment companies) that control more than or equal to 5% of the shareholdings would be considered as non-free float and are excluded from the index calculation. These include strategic holdings (holdings by governments and affiliated entities or any other entities that hold substantial shares in the company would be considered as non-free float unless otherwise proved), directors' and management holdings (holdings by directors, members of the board committee, principal officers or founding members), corporate cross holdings (holdings by publicly traded companies or private firms or institutions) and lock-up shares (shareholdings with a publicly disclosed lock-up arrangement). Lock-up shares with trading restrictions are classified as non-free float, regardless of the shareholding percentage.

The free float adjusted factor represents the proportion of shares that is free floated as a percentage of the issued shares. The free float adjusted factor is rounded up to the nearest 1% if it is less than 10%; otherwise, it is rounded to the nearest 5%. For companies with more than one class of shares, the free float adjusted factor is calculated separately for each class of shares.

**Cap Factor.** A cap factor ("CF") is calculated quarterly, such that no individual constituent in an index will have a weighting exceeding a cap level of 10% on the index capping date.

**Index Rebalancing.** The update of the issued shares, adjustment of the free float adjusted factor and calculation of the cap factor are undertaken quarterly. In addition, the issued shares will be updated simultaneously with the index adjustment for corporate actions, such as bonus issues, rights issues, stock splits and stock consolidations. Ad hoc rebalancing will be conducted if a constituent's issued shares and/or free float adjusted factor is substantially different from the production data. The Hang Seng China Enterprises Index will also be recapped in the event of constituent changes if the newly added component weighs higher than the index cap level.

### Corporate Action Related Adjustments

The following table describes the adjustments made to the Hang Seng Indices in response to certain corporate actions. An index divisor may decrease (↓) or increase (↑) or keep constant (↔) when corporate actions occur for a component stock.

Event		Description	Adjustment		
			Issued Shares ("IS")	Closing Price ("P")	Divisor ("D")
(a)	Subdivision of Shares/ Split	X existing share(s) to be subdivided into Y subdivided share(s)	$IS_{adjusted} = IS_{before} * Y / X$	$P_{adjusted} = P_{before} * X / Y$	↔
(b)	Consolidation / Reverse Split	X existing shares to be consolidated into Y consolidated share(s)	$IS_{adjusted} = IS_{before} * Y / X$	$P_{adjusted} = P_{before} * X / Y$	↔

(c)	Cash Dividend/ Distribution	Dividend/ distribution in cash	<p>No adjustment will be made to the price index. Instead, the cash dividend or distribution will be reflected in the total return index counterpart as reinvestment on the ex-date.</p> <p><i>Note:</i></p> <p>(i) Besides normal cash dividends, the following types of dividends are also considered as cash dividend equivalents: Cash dividends with scrip option; Scrip dividends with cash option; and Scrip dividends with a preannounced cash value.</p> <p>(ii) If new shares allotted from bonus, rights issues, etc. have a dividend disadvantage (<i>i.e.</i>, the new shares receive a different dividend amount from that paid on the old shares), the dividend amount used in the index calculation will also be adjusted accordingly.</p> <p>(iii) For late dividend (a dividend that is known only after the ex-date): No adjustment will be made to the price index. Instead, the cash dividend or distribution will be reflected in the total return index counterpart as reinvestment on the payment date.</p>		
(d)	Bonus/ Stock Dividend	X bonus share(s) for holding of every Y existing share(s)	$IS_{adjusted} = IS_{before} * (X + Y) / Y$	$P_{adjusted} = P_{before} * Y / (X + Y)$	↔
(e)	Listed Non-cash Distribution	Dividend/ Distribution in specie of X share(s) in Company A for holding of every Y existing share(s) of Company B	↔	$P_{adjusted} = P_{before} - (P_{distribution} * X / Y)$	↓
(f)	To-be-listed Non-cash Distribution	X share(s)/ unit(s) of the distribution for holding of every Y existing shares	<p>The price of the constituent will be suspended on the ex-date.</p> <p>An estimated market value (based on the price drop of the constituent on the ex-date) will be added to the price index on the trading day after ex-date until the trading day before listing of the distributed instrument.</p> <p>The distributed instrument will be added to the price index on its listing date and removed after market close. HSIL will have the discretion to defer the removal of the distributed instrument from either Hang Seng Index if the distribution is material.</p> <p>When performing regular index rebalancing, if the distributed instrument is listed before the effective day, the estimated market value should be deemed to be removed and ignored. Otherwise, the weight of the estimated market value will be kept unchanged before and after index rebalancing.</p> <p><i>Note:</i></p>		

			To-be-listed non-cash distributions include stock dividend of another company, bonus warrant, etc.		
(g)	Preferential Offer	Preferential offer of X share(s) in another unlisted company for holding of every Y share(s) at \$Z per share	To avoid stock price estimation of any unlisted company, no adjustment will be made for preferential offer.		
(h)	Rights Issue/ Open Offer	X rights/ offer share(s) for holding of every Y existing share(s) at subscription price of \$Z per rights/ offer share	$IS_{adjusted} = IS_{before} * (X + Y) / Y$	$P_{adjusted} = [(P_{before} * Y) + (X * Z)] / (X + Y)$	↑
			<i>Note:</i> Adjustment will not be made if Z is greater than the cum-rights closing price, unless the rights issue/ open offer is being fully underwritten.		
(i)	Open Offer of Unlisted Securities	Open offer of X share(s) of unlisted securities for holding of every Y share(s) at \$Z per share	To avoid price estimation of any unlisted securities, no adjustment will be made for the open offer.  <i>Note:</i> If price cannot be evaluated objectively, no adjustment will be made. However, if the unlisted security is priced at an obvious discounted level, HSIL will analyze it on a case by case basis and reserve the right to make a final decision.		
(j)	Spin-off/ Demerger	Creation of a company through the sale or distribution of new shares of an existing business/ division of a parent company. A spin-off is a type of divestiture.	For index adjustment of listed and to-be-listed non-cash distributions, please refer to (e) and (f) above respectively.  The newly spun-off/ detached entity will be considered inclusion into the index family according to regular schedule.		
(k)	Merger and Acquisition	The combination of two or more constituents into one, through a mutual agreement or a tender offer.	The enlarged company will remain in either Hang Seng Index with a potential adjustment in its issued shares and weighting factors, subject to the terms of the transaction.  <i>Example:</i> Merger between China Unicom and China Netcom in Oct 2008.		
(l)	Withdrawal of Listing	Delisting of a company, which might result from privatization, takeover or other corporate actions.	The relevant company will be removed from either Hang Seng Index as soon as practicable.		



(m)	Suspension	Trading in a company's shares has been suspended for any reason.	<p>Last traded price will be used for index calculation during the suspension period.</p> <p>Constituency of suspended constituents in both Hang Seng Indices will be reviewed in its regular index review and removed on the effective date if needed.</p> <p>Should a suspended constituent need to be removed from either Hang Seng Index, it will be removed at the lowest system price, <i>i.e.</i>, \$0.0001 in the security's price currency, or an official residual price (if available). Such price will be used for index calculation on the trading day preceding the effective date of the removal.</p>
(n)	Parallel Trading	Trading in a company's shares under both a temporary stock code and the original stock code. Usually applied to securities which have undergone corporate actions such as consolidation, subdivision, change in board lot size or re-organization involving share exchange other than on a one-to-one basis.	<p>The company in concern will be included in a Hang Seng Index using the temporary stock code during the period where the original stock code is not available.</p> <p><i>Example:</i> Temporary stock code change of Li &amp; Fung (from 0494.HK to 2909.HK) during 19 May to 1 June 2011 after its share subdivision.</p>

## Disclaimers

THE HANG SENG INDICES ARE PUBLISHED AND COMPILED BY HANG SENG® INDEXES COMPANY LIMITED PURSUANT TO A LICENSE FROM HANG SENG DATA SERVICES LIMITED. THE MARK AND NAME 'HANG SENG® INDEX' AND 'HANG SENG CHINA ENTERPRISES INDEX' ARE PROPRIETARY TO HANG SENG DATA SERVICES LIMITED. WE HAVE ASKED HANG SENG® INDEXES COMPANY LIMITED AND HANG SENG DATA SERVICES LIMITED TO AGREE TO THE USE OF, AND REFERENCE TO, THE HANG SENG INDICES BY JPMORGAN CHASE & CO. AND ITS AFFILIATES IN CONNECTION WITH THE SECURITIES (THE "PRODUCT"), BUT NEITHER HANG SENG® INDEXES COMPANY LIMITED NOR HANG SENG DATA SERVICES LIMITED WARRANTS OR REPRESENTS OR GUARANTEES TO ANY BROKER OR HOLDER OF THE PRODUCT OR ANY OTHER PERSON (I) THE ACCURACY OR COMPLETENESS OF THE INDICES AND THEIR COMPUTATION OR ANY INFORMATION RELATED THERETO; OR (II) THE FITNESS OR SUITABILITY FOR ANY PURPOSE OF THE HANG SENG INDICES OR ANY COMPONENT OR DATA COMPRISED IN THE HANG SENG INDICES; OR (III) THE RESULTS WHICH MAY BE OBTAINED BY ANY PERSON FROM THE USE OF THE HANG SENG INDICES OR ANY COMPONENT OR DATA COMPRISED IN THE HANG SENG INDICES FOR ANY PURPOSE, AND NO WARRANTY OR REPRESENTATION OR GUARANTEE OF ANY KIND WHATSOEVER RELATING TO THE HANG SENG INDICES IS GIVEN OR MAY BE IMPLIED. THE PROCESS AND BASIS OF COMPUTATION AND COMPILATION OF THE HANG SENG INDICES AND ANY OF THE RELATED FORMULA OR FORMULAE, CONSTITUENT STOCKS AND FACTORS MAY AT ANY TIME BE CHANGED OR ALTERED BY HANG SENG® INDEXES COMPANY LIMITED WITHOUT NOTICE. TO THE EXTENT PERMITTED BY APPLICABLE LAW, NO RESPONSIBILITY OR LIABILITY IS ACCEPTED BY HANG

SENG® INDEXES COMPANY LIMITED OR HANG SENG DATA SERVICES LIMITED (I) IN RESPECT OF THE USE OF AND/OR REFERENCE TO THE HANG SENG INDICES BY JPMORGAN CHASE & CO. AND ITS AFFILIATES IN CONNECTION WITH THE PRODUCT; OR (II) FOR ANY INACCURACIES, OMISSIONS, MISTAKES OR ERRORS OF HANG SENG® INDEXES COMPANY LIMITED IN THE COMPUTATION OF THE HANG SENG INDICES; OR (III) FOR ANY INACCURACIES, OMISSIONS, MISTAKES, ERRORS OR INCOMPLETENESS OF ANY INFORMATION USED IN CONNECTION WITH THE COMPUTATION OF THE HANG SENG INDICES WHICH IS SUPPLIED BY ANY OTHER PERSON; OR (IV) FOR ANY ECONOMIC OR OTHER LOSS WHICH MAY BE DIRECTLY OR INDIRECTLY SUSTAINED BY ANY BROKER OR HOLDER OF THE PRODUCT OR ANY OTHER PERSON DEALING WITH THE PRODUCT AS A RESULT OF ANY OF THE AFORESAID, AND NO CLAIMS, ACTIONS OR LEGAL PROCEEDINGS MAY BE BROUGHT AGAINST HANG SENG® INDEXES COMPANY LIMITED AND/OR HANG SENG DATA SERVICES LIMITED IN CONNECTION WITH THE PRODUCT IN ANY MANNER WHATSOEVER BY ANY BROKER, HOLDER OR OTHER PERSON DEALING WITH THE PRODUCT. ANY BROKER, HOLDER OR OTHER PERSON DEALING WITH THE PRODUCT DOES SO THEREFORE IN FULL KNOWLEDGE OF THIS DISCLAIMER AND CAN PLACE NO RELIANCE WHATSOEVER ON HANG SENG® INDEXES COMPANY LIMITED AND HANG SENG DATA SERVICES LIMITED. FOR THE AVOIDANCE OF DOUBT, THIS DISCLAIMER DOES NOT CREATE ANY CONTRACTUAL OR QUASI-CONTRACTUAL RELATIONSHIP BETWEEN ANY BROKER, HOLDER OR OTHER PERSON AND HANG SENG® INDEXES COMPANY LIMITED AND/OR HANG SENG DATA SERVICES LIMITED AND MUST NOT BE CONSTRUED TO HAVE CREATED SUCH RELATIONSHIP.

## THE MSCI INDICES

All information contained in this underlying supplement regarding the MSCI ACWI Index, the MSCI ACWI ex USA Index, the MSCI Brazil Index, the MSCI Canada Index, the MSCI EAFE® Index, the MSCI Emerging Markets Index, the MSCI EMU Index, the MSCI Europe Index, the MSCI Italy SMID Cap Index, the MSCI Japan Index, the MSCI Korea Index, the MSCI Malaysia Index, the MSCI Mexico Investable Market Index, the MSCI Pacific Ex-Japan Index, the MSCI Singapore Free Index, the MSCI South Africa Index, the MSCI Spain SMID Cap Index, the MSCI Taiwan Index, the MSCI Turkey Investable Market Index and the MSCI World Index<sup>SM</sup> (each, an “**MSCI Index**” and together, the “**MSCI Indices**”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, MSCI Inc. (“**MSCI**”). The MSCI Indices are calculated, maintained and published by MSCI. MSCI has no obligation to continue to publish, and may discontinue publication of, any of the MSCI Indices.

### The MSCI ACWI Index

The MSCI ACWI Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of certain developed markets and global emerging markets. The MSCI ACWI Index currently consists of the following 23 developed market country indices and 26 emerging market country indices: developed market countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States; emerging market countries include Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey and the United Arab Emirates. The MSCI ACWI Index covers approximately 85% of global investable equities. The U.S. dollar price return version of the MSCI ACWI Index is reported by Bloomberg L.P. under the ticker symbol “MXWD.”

### The MSCI ACWI ex USA Index

The MSCI ACWI ex USA Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of certain developed markets excluding the United States and global emerging markets. The MSCI ACWI ex USA Index currently consists of the following 22 developed market country indices and 26 emerging market country indices: developed market countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom; emerging market countries include Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey and the United Arab Emirates. The MSCI ACWI ex USA Index covers approximately 85% of global investable equities, excluding the United States. The U.S. dollar price return version of the MSCI ACWI ex USA Index is reported by Bloomberg L.P. under the ticker symbol “MXWDU.”

### The MSCI Brazil Index

The MSCI Brazil Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the Brazilian equity market. The MSCI Brazil Index covers approximately 85% of the Brazilian equity universe. The U.S. dollar price return version of the MSCI Brazil Index is reported by Bloomberg L.P. under the ticker symbol “MXBR.”

### The MSCI Canada Index

The MSCI Canada Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the Canadian equity

market. The MSCI Canada Index covers approximately 85% of the free float-adjusted market capitalization in Canada. The Canadian dollar price return version of the MSCI Canada Index is reported by Bloomberg, L.P. under the ticker symbol “MXCA.”

### **The MSCI EAFE® Index**

The MSCI EAFE® Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of certain developed markets excluding the United States and Canada. The MSCI EAFE® Index currently consists of the following 21 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom. The MSCI EAFE® Index covers approximately 85% of the free float-adjusted market capitalization in each country. The U.S. dollar price return version of the MSCI EAFE® Index is reported by Bloomberg L.P. under the ticker symbol “MXEA.”

### **The MSCI Emerging Markets Index**

The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of global emerging markets. The MSCI Emerging Markets Index currently consists of the following 26 emerging market country indices: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Qatar, Russia, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey and the United Arab Emirates. As of June 2018, the MSCI Emerging Markets Index includes shares traded on mainland Chinese exchanges, referred to as A-shares. MSCI has announced that Kuwait will be reclassified to emerging market status and will be added to the MSCI Emerging Markets Index in connection with the May 2020 semi-annual index review. The MSCI Emerging Markets Index covers approximately 85% of the free float-adjusted market capitalization in each country. The U.S. dollar price return version of the MSCI Emerging Markets Index is reported by Bloomberg L.P. under the ticker symbol “MXEF.”

### **The MSCI EMU Index**

The MSCI EMU Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of certain developed markets in the European Economic and Monetary Union (the “**EMU**”). The MSCI EMU Index currently consists of the following 10 developed market country indices: Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal and Spain. The MSCI EMU Index covers approximately 85% of the free float-adjusted market capitalization in the EMU. The euro price return version of the MSCI EMU Index is reported by Bloomberg L.P. under the ticker symbol “MXEM.”

### **The MSCI Europe Index**

The MSCI Europe Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the European equity market. The MSCI Europe Index currently consists of the following 15 developed market European country indices: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The MSCI Europe Index covers approximately 85% of the free float-adjusted market capitalization in European Developed Markets. The euro price return version of the MSCI Europe Index is reported by Bloomberg L.P. under the ticker symbol “MXEU.”

### **The MSCI Italy SMID Cap Index**

The MSCI Italy SMID Cap Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the mid- and small-cap segments in the Italian equity market. The MSCI Italy SMID Cap Index covers approximately 28% of the free float-adjusted market capitalization

in Italy. The euro price return version of the MSCI Italy SMID Cap Index is reported by Bloomberg, L.P. under the ticker symbol "MXITSM."

### **The MSCI Japan Index**

The MSCI Japan Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the Japanese equity market. The MSCI Japan Index covers approximately 85% of the free float-adjusted market capitalization in Japan. The Japanese yen price return version of the MSCI Japan Index is reported by Bloomberg L.P. under the ticker symbol "MXJP."

### **The MSCI Korea Index**

The MSCI Korea Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the South Korean equity market. The MSCI Korea Index covers about 85% of the Korean equity universe. The Korean won price return version of the MSCI Korea Index is reported by Bloomberg L.P. under the ticker symbol "MXKR."

### **The MSCI Malaysia Index**

The MSCI Malaysia Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the Malaysian equity market. The MSCI Malaysia Index covers about 85% of the Malaysian equity universe. The Malaysian ringgit price return version of the MSCI Malaysia Index is reported by Bloomberg L.P. under the ticker symbol "MXMY."

### **The MSCI Mexico Investable Market Index**

The MSCI Mexico Investable Market Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large-, mid- and small-cap segments of the Mexican equity market. The MSCI Mexico Index covers approximately 99% of the free float-adjusted market capitalization in Mexico. The U.S. dollar price return version of the MSCI Mexico Investable Market Index is reported by Bloomberg L.P. under the ticker symbol "MXMX".

### **The MSCI Pacific Ex-Japan Index**

The MSCI Pacific Ex-Japan Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of certain developed markets in the Pacific region, excluding Japan. The MSCI Pacific Ex-Japan Index currently consists of the following 4 developed country indices: Australia, Hong Kong, New Zealand and Singapore. The MSCI Pacific Ex-Japan Index covers approximately 85% of the free float-adjusted market capitalization in each country. The U.S. dollar price return version of the MSCI Pacific Ex-Japan Index is reported by Bloomberg L.P. under the ticker symbol "MXAPJ."

### **The MSCI Singapore Free Index**

The MSCI Singapore Free Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the Singaporean equity market and uses "foreign" prices instead of local prices when available. The MSCI Singapore Free Index covers approximately 85% of the free float-adjusted market capitalization in Singapore. The Singapore dollar price return version of the MSCI Singapore Free Index is reported by Bloomberg L.P. under the ticker symbol "SIMSCI."

### **The MSCI South Africa Index**

The MSCI South Africa Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the South African equity market. The MSCI South Africa Index covers approximately 85% of the free float-adjusted market

capitalization in South Africa. The South African rand price return version of the MSCI South Africa Index is reported by Bloomberg L.P. under the ticker symbol “MXZA.”

### **The MSCI Spain SMID Cap Index**

The MSCI Spain SMID Cap Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the mid- and small-cap segments in the Spanish equity market. The MSCI Spain SMID Cap Index covers approximately 28% of the free float-adjusted market capitalization in Spain. The euro price return version of the MSCI Spain SMID Cap Index is reported by Bloomberg, L.P. under the ticker symbol “MXESSM.”

### **The MSCI Taiwan Index**

The MSCI Taiwan Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of the Taiwanese equity market. The MSCI Taiwan Index covers approximately 85% of the free float-adjusted market capitalization in Taiwan. The Taiwan new dollar price return version of the MSCI Taiwan Index is reported by Bloomberg L.P. under the ticker symbol “TAMSCI.”

### **The MSCI Turkey Investable Market Index**

The MSCI Turkey Investable Market Index is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large-, mid- and small-cap segments of the Turkish equity market. The MSCI Turkey Investable Market Index covers approximately 99% of the free float-adjusted market capitalization in Turkey. The Turkish lira price return version of the MSCI Turkey Investable Market Index is reported by Bloomberg L.P. under the ticker symbol “MXTR.”

### **The MSCI World Index<sup>SM</sup>**

The MSCI World Index<sup>SM</sup> is a free float-adjusted market capitalization index that is designed to measure the equity market performance of the large- and mid-cap segments of certain developed markets. The MSCI World Index<sup>SM</sup> currently consists of the following 23 developed market country indices: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom and the United States. The MSCI World Index<sup>SM</sup> covers approximately 85% of the free float-adjusted market capitalization in each country. The U.S. dollar price return version of the MSCI World Index<sup>SM</sup> is reported by Bloomberg L.P. under the ticker symbol “MXWO.”

### **Constructing the MSCI Global Investable Market Indices**

The MSCI Global Investable Market Indices are constructed and maintained at an individual market level. MSCI undertakes an index construction process that, with respect to the MSCI Indices, involves: (i) defining the Equity Universe for each market; (ii) determining the Market Investable Equity Universe for each market; (iii) determining market capitalization size-segments for each market and (iv) applying Index Continuity Rules for the Standard Index.

#### *Defining the Equity Universe*

- (i) **Identifying Eligible Equity Securities:** All listed equity securities, including real estate investment trusts and certain income trusts listed in Canada, are eligible for inclusion in the Equity Universe. Limited partnerships, limited liability companies and business trusts, which are listed in the United States and are not structured to be taxed as limited partnerships, are likewise eligible for inclusion in the Equity Universe. Conversely, mutual funds, exchange-traded funds, equity derivatives and most investment trusts are not eligible for inclusion in the Equity Universe. Preferred shares that exhibit characteristics of equity securities are eligible. Stapled securities are considered eligible if each of the underlying components exhibit characteristics of equity securities.

- (ii) **Country Classification of Eligible Securities:** The Equity Universe initially looks at securities listed in any of the countries in the MSCI Global Index Series, which will be classified as Developed Markets (“**DM**”), Emerging Markets (“**EM**”) or Frontier Markets (“**FM**”). Each company and its securities (*i.e.*, share classes) are classified in one and only one country, which allows for a distinctive sorting of each company by its respective country.

#### *Determining the Market Investable Equity Universes*

A Market Investable Equity Universe for a market is derived by (i) identifying eligible listings for each security in the Equity Universes; and (ii) applying investability screens to individual companies and securities in the Equity Universe that are classified in that market. A market is equivalent to a single country, except in DM Europe, where all DM countries in Europe are aggregated into a single market for index construction purposes. Subsequently, individual DM Europe country indices within the MSCI Europe Index are derived from the constituents of the MSCI Europe Index under the Global Investable Market Indices methodology.

- (i) **Identifying Eligible Listings:** A security may have a listing that trades in the country where it is classified (*i.e.*, a “**local listing**”) and/or a listing that trades in a different country (*i.e.*, a “**foreign listing**”). A security may be represented by either a local listing or a foreign listing (including a Depositary Receipt) in the Global Investable Equity Universe as determined by MSCI.
- (ii) **Applying Investability Screens:** Some of the investability requirements are applied at the individual security level and some at the overall company level, represented by the aggregation of individual securities of the company. As such, the inclusion or exclusion of one security does not imply the automatic inclusion or exclusion of other securities of the same company.

The investability screens used to determine the Investable Equity Universe in each market are as follows:

- (a) **Equity Universe Minimum Size Requirement:** This investability screen is applied at the company level. In order to be included in a Market Investable Equity Universe, a company must have the required minimum full market capitalization. A company will meet this requirement if its cumulative free float-adjusted market capitalization is within the top 99% of the Equity Universe sorted in descending order by full market capitalization.
- (b) **Equity Universe Minimum Float-Adjusted Market Capitalization Requirement:** This investability screen is applied at the individual security level. To be eligible for inclusion in a Market Investable Equity Universe, a security must have a free float-adjusted market capitalization equal to or higher than 50% of the Equity Universe Minimum Size Requirement.
- (c) **DM and EM Minimum Liquidity Requirement:** This investability screen is applied at the individual security level. To be eligible for inclusion in a Market Investable Equity Universe, a security must have adequate liquidity as measured by the Annualized Traded Value Ratio (“**ATVR**”) and the Frequency of Trading. In addition to the ATVR and Frequency of Trading requirements, securities in the MSCI China Equity Universe will not be eligible for inclusion in the Market Investable Equity Universe if the securities are suspended on the price cutoff date of the index review or have been suspended for 50 consecutive days or more in the past 12 months.

Only one listing per security may be included in the Market Investable Equity Universe. In instances when a security has two or more eligible listings that meet the above liquidity requirements, then the following priority rules are used to determine which listing will be used for potential inclusion of the security in the Market Investable Equity Universe: (i) local listing; (ii) foreign listing in the same geographical region; and (iii) foreign listing in a different geographical region.

- (d) **Global Minimum Foreign Inclusion Factor Requirement:** This investability screen is applied at the individual security level. To be eligible for inclusion in a Market Investable Equity Universe, a security's Foreign Inclusion Factor ("**FIF**") must reach a certain threshold. The FIF of a security is defined as the proportion of shares outstanding that is available for purchase in the public equity markets by international investors. This proportion accounts for the available free float of and/or the foreign ownership limits applicable to a specific security (or company). In general, a security must have an FIF equal to or larger than 0.15 to be eligible for inclusion in a Market Investable Equity Universe. Exceptions to this general rule are made only in the limited cases where the exclusion of securities of a very large company would compromise the Standard Index's ability to fully and fairly represent the characteristics of the underlying market.
- (e) **Minimum Length of Trading Requirement:** This investability screen is applied at the individual security level. For an initial public offering ("**IPO**") to be eligible for inclusion in a Market Investable Equity Universe, the new issue must have started trading at least three months before the implementation of a semi-annual index review. This requirement is applicable to small new issues in all markets. Large IPOs and large primary / secondary offerings of non-index constituents are not subject to the Minimum Length of Trading Requirement and may be included in a Market Investable Equity Universe and the Standard Index outside of a quarterly or semi-annual index review.
- (f) **Minimum Foreign Room Requirement:** This investability screen is applied at the individual security level. For a security that is subject to a Foreign Ownership Limit ("**FOL**") to be eligible for inclusion in a Market Investable Equity Universe, the proportion of shares still available to foreign investors relative to the maximum allowed (referred to as "**foreign room**") must be at least 15%.

#### *Defining Market Capitalization Size-Segments for Each Market*

Once a Market Investable Equity Universe is defined, it is segmented into the following size-based indices, with the following free float-adjusted market capitalization market coverage target ranges:

- (i) Investable Market Index (Large + Mid + Small): 99%+1% or -0.5%
- (ii) Standard Index (Large + Mid): 85%  $\pm$  5%
- (iii) Large Cap Index: 70%  $\pm$  5%
- (iv) Mid Cap Index: The Mid Cap Index market coverage in each market is derived as the difference between the market coverage of the Standard Index and the Large Cap Index in that market.
- (v) Small Cap Index: The Small Cap Index market coverage in each market is derived as the difference between the free float-adjusted market capitalization coverage of the Investable Market Index and the Standard Index in that market.

#### *Index Continuity Rules for the Standard Indices*

In order to achieve index continuity, as well as provide some basic level of diversification within a market index, notwithstanding the effect of other index construction rules, a minimum number of five constituents will be maintained for a DM Standard Index and a minimum number of three constituents will be maintained for an EM Standard Index.

If after the application of the index construction methodology, a Standard Index contains fewer than five securities in a Developed Market or three securities in an Emerging Market, then the largest securities by free float-adjusted market capitalization among the securities included in the Market Investable Equity Universe are added to the Standard Index in order to reach five constituents in that Developed Market or three in that Emerging Market. At subsequent index reviews, if after the application



of the index maintenance methodology a Standard Index contains less than five securities in a Developed Market or three securities in an Emerging Market, then the remaining securities are selected for inclusion by multiplying market capitalization of such securities by a factor of 1.5.

#### *Constructing and Calculating the Individual MSCI Global Investable Market Indices*

After companies are allocated to their respective Size-Segments and securities are reviewed for complying with the final Size-Segment requirements, the final list of constituents for each Market Size-Segment Index is determined. The MSCI Investable Market Indices are composed of the MSCI Standard Indices and the MSCI Small Cap Indices. The MSCI Standard Indices are further subdivided into the MSCI Large Cap and the MSCI Mid Cap Indices. Two or more Market Indices can be combined to form Composite Indices. Market Indices can be grouped either on the basis of Market Classification definition, geographical regions, economic regions or other criteria.

#### **Maintenance of the MSCI Global Investable Market Indices**

The MSCI Global Investable Market Indices are maintained with the objective of reflecting the evolution of the underlying equity markets and segments on a timely basis, while seeking to achieve index continuity, continuous investability of constituents and replicability of the indices, and index stability and low index turnover.

In particular, index maintenance involves semi-annual index reviews in May and November of the Size-Segment and Global Value and Growth Indices and quarterly index reviews in February and August of the Size-Segment Indices. Semi-annual index review includes updating the indices on the basis of a fully refreshed Equity Universe; taking buffer rules into consideration for migration of securities across size and style segments; and updating FIFs and Number of Shares (“**NOS**”). Quarterly index review includes adding significant new eligible securities (such as IPOs that were not eligible for earlier inclusion) in the index; allowing for significant moves of companies within the Size-Segment Indices, using wider buffers than in the semi-annual index reviews; and reflecting the impact of significant market events on FIFs and updating NOS.

In addition, ongoing event-related changes to the indices are made as the result of mergers, acquisitions, spin-offs, bankruptcies, reorganizations and other similar corporate events. They can also result from capital reorganizations in the form of rights issues, bonus issues, public placements and other similar corporate actions that take place on a continuing basis. These changes are reflected in the indices at the time of the event. Significantly large IPOs are included in the indices after the close of the company's tenth day of trading.

#### **Index Calculation**

The MSCI Indices are calculated using the Laspeyres' concept of a weighted arithmetic average together with the concept of chain-linking. As a general principle, today's index level is obtained by applying the change in the market performance to the previous period index level.

#### **License Agreement**

JPMorgan Chase & Co. or its affiliate has entered into an agreement with MSCI providing it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the MSCI Indices, which are owned and published by MSCI, in connection with certain securities, including the notes.

**THIS FINANCIAL PRODUCT IS NOT SPONSORED, ENDORSED, SOLD OR PROMOTED BY MSCI INC. (“MSCI”), ANY AFFILIATE OF MSCI OR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX. THE MSCI INDEXES ARE THE EXCLUSIVE PROPERTY OF MSCI. MSCI AND THE MSCI INDEX NAMES ARE SERVICE MARK(S) OF MSCI OR ITS AFFILIATES AND HAVE BEEN LICENSED FOR USE FOR CERTAIN PURPOSES BY JPMORGAN CHASE & CO. (THE “LICENSEE”). NEITHER MSCI, ANY OF ITS AFFILIATES NOR**

ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX MAKES ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, TO THE OWNERS OF THIS FINANCIAL PRODUCT OR ANY MEMBER OF THE PUBLIC REGARDING THE ADVISABILITY OF INVESTING IN FINANCIAL SECURITIES GENERALLY OR IN THIS FINANCIAL PRODUCT PARTICULARLY OR THE ABILITY OF ANY MSCI INDEX TO TRACK CORRESPONDING STOCK MARKET PERFORMANCE. MSCI OR ITS AFFILIATES ARE THE LICENSORS OF CERTAIN TRADEMARKS, SERVICE MARKS AND TRADE NAMES AND OF THE MSCI INDEXES WHICH ARE DETERMINED, COMPOSED AND CALCULATED BY MSCI WITHOUT REGARD TO THIS FINANCIAL PRODUCT OR THE ISSUER OR OWNER OF THIS FINANCIAL PRODUCT. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX HAS ANY OBLIGATION TO TAKE THE NEEDS OF THE ISSUERS OR OWNERS OF THIS FINANCIAL PRODUCT INTO CONSIDERATION IN DETERMINING, COMPOSING OR CALCULATING THE MSCI INDEXES. NEITHER MSCI, ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX IS RESPONSIBLE FOR OR HAS PARTICIPATED IN THE DETERMINATION OF THE TIMING OF, PRICES AT, OR QUANTITIES OF THIS FINANCIAL PRODUCT TO BE ISSUED OR IN THE DETERMINATION OR CALCULATION OF THE EQUATION BY WHICH THIS FINANCIAL PRODUCT IS REDEEMABLE FOR CASH. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, THE MAKING OR COMPILING ANY MSCI INDEX HAS ANY OBLIGATION OR LIABILITY TO THE OWNERS OF THIS FINANCIAL PRODUCT IN CONNECTION WITH THE ADMINISTRATION, MARKETING OR OFFERING OF THIS FINANCIAL PRODUCT.

ALTHOUGH MSCI SHALL OBTAIN INFORMATION FOR INCLUSION IN OR FOR USE IN THE CALCULATION OF THE MSCI INDEXES FROM SOURCES WHICH MSCI CONSIDERS RELIABLE, NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO MAKING OR COMPILING ANY MSCI INDEX WARRANTS OR GUARANTEES THE ORIGINALITY, ACCURACY AND/OR THE COMPLETENESS OF ANY MSCI INDEX OR ANY DATA INCLUDED THEREIN. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX MAKES ANY WARRANTY, EXPRESS OR IMPLIED, AS TO RESULTS TO BE OBTAINED BY LICENSEE, LICENSEE'S CUSTOMERS OR COUNTERPARTIES, ISSUERS OF THE FINANCIAL SECURITIES, OWNERS OF THE FINANCIAL SECURITIES, OR ANY OTHER PERSON OR ENTITY, FROM THE USE OF ANY MSCI INDEX OR ANY DATA INCLUDED THEREIN IN CONNECTION WITH THE RIGHTS LICENSED HEREUNDER OR FOR ANY OTHER USE. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX SHALL HAVE ANY LIABILITY FOR ANY ERRORS, OMISSIONS OR INTERRUPTIONS OF OR IN CONNECTION WITH ANY MSCI INDEX OR ANY DATA INCLUDED THEREIN. FURTHER, NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX MAKES ANY EXPRESS OR IMPLIED WARRANTIES OF ANY KIND, AND MSCI, ANY OF ITS AFFILIATES AND ANY OTHER PARTY INVOLVED IN, OR RELATED TO MAKING OR COMPILING ANY MSCI INDEX HEREBY EXPRESSLY DISCLAIM ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ANY MSCI INDEX AND ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT SHALL MSCI, ANY OF ITS AFFILIATES OR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI INDEX HAVE ANY LIABILITY FOR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL OR ANY OTHER DAMAGES (INCLUDING LOST PROFITS) EVEN IF NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES.

No purchaser, seller or holder of this security, or any other person or entity, should use or refer to any MSCI trade name, trademark or service mark to sponsor, endorse, market or promote this product without first contacting MSCI to determine whether MSCI's permission is required. Under no circumstances may any person or entity claim any affiliation with MSCI without the prior written permission of MSCI.

## **THE MSCI 25/50 INDICES**

All information contained in this underlying supplement regarding the MSCI Brazil 25/50 Index, the MSCI Korea 25/50 Index, the MSCI Mexico Investable Market (IMI) 25/50 Index and the MSCI Taiwan 25/50 Index (each, an “MSCI 25/50 Index” and together, the “MSCI 25/50 Indices”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, MSCI Inc. (“MSCI”). The MSCI 25/50 Indices are calculated, maintained and published by MSCI. MSCI has no obligation to continue to publish, and may discontinue publication of, any of the MSCI 25/50 Indices.

### **The MSCI Brazil 25/50 Index**

The MSCI Brazil 25/50 Index is designed to measure the performance of the large- and mid-cap segments of the Brazilian equity market. It applies certain investment limits that are imposed on regulated investment companies (“RICs”) under the current U.S. Internal Revenue Code. The MSCI Brazil 25/50 Index covers approximately 85% of the free float-adjusted market capitalization in Brazil. The MSCI Brazil 25/50 Index is an index created by applying the weight constraints described below to the MSCI Brazil Index. For more information about the MSCI Brazil Index, please see “— The MSCI Indices” in this underlying supplement. The U.S. dollar price return version of the MSCI Brazil 25/50 Index is reported by Bloomberg L.P. under the ticker symbol “MXBR2550.”

### **The MSCI Korea 25/50 Index**

The MSCI Korea 25/50 Index is designed to measure the performance of the large- and mid-capitalization segments of the Korean equity market. It applies certain investment limits that are imposed on RICs under the current U.S. Internal Revenue Code. The MSCI Korea 25/50 Index covers approximately 85% of the free float-adjusted market capitalization in Korea. The MSCI Korea 25/50 Index is an index created by applying the weight constraints described below to the MSCI Korea Index. For more information about the MSCI Korea Index, please see “— The MSCI Indices” in this underlying supplement. The U.S. dollar price return version of the MSCI Korea 25/50 Index is reported by Bloomberg L.P. under the ticker symbol “MXKR2550.”

### **The MSCI Mexico IMI 25/50 Index**

The MSCI Mexico IMI 25/50 Index is designed to measure the performance of the large-, mid- and small-cap segments of the Mexican equity market. It applies certain investment limits that are imposed on RICs under the current U.S. Internal Revenue Code. The MSCI Mexico IMI 25/50 Index covers approximately 99% of the free float-adjusted market capitalization in Mexico. The MSCI Mexico IMI 25/50 Index is an index created by applying the weight constraints described below to the MSCI Mexico Investable Market Index. For more information about the MSCI Index, please see “— The MSCI Indices” in this underlying supplement. The U.S. dollar price return version of the MSCI Mexico IMI 25/50 Index is reported by Bloomberg L.P. under the ticker symbol “MXMX5IM.”

### **The MSCI Taiwan 25/50 Index**

The MSCI Taiwan 25/50 Index is designed to measure the performance of the large- and mid-capitalization segments of the Taiwanese equity market. It applies certain investment limits that are imposed on RICs under the current U.S. Internal Revenue Code. The MSCI Taiwan 25/50 Index covers approximately 85% of the free float-adjusted market capitalization in Taiwan. The MSCI Taiwan 25/50 Index covers approximately 85% of the free float-adjusted market capitalization in Taiwan. The MSCI Taiwan 25/50 Index is an index created by applying the weight constraints described below to the MSCI Taiwan Index. For more information about the MSCI Taiwan Index, please see “— The MSCI Indices” in this underlying supplement. The U.S. dollar price return version of the MSCI Taiwan 25/50 Index is reported by Bloomberg L.P. under the ticker “MXCXBICR.”

## Objectives and Guiding Principles Underlying the MSCI 25/50 Indices

Under current regulations, a fund needs to satisfy certain tests, such as those relating to asset diversification and sources of income, for qualification as a RIC. More specifically, one requirement of a RIC is that, at the end of each quarter of a RIC's tax year, no more than 25% of the value of the RIC's assets may be invested in a single issuer and the sum of the weights of all issuers representing more than 5% of the fund should not exceed 50% of the fund's total assets. The MSCI 25/50 Indices take into account these investment limits, aiming to offer a benchmarking alternative for RIC-compliant funds.

The following principles have guided MSCI in designing a methodology for constructing the MSCI 25/50 Indices from underlying non-constrained indices.

*Reflecting the 25% and 50% concentration constraints.* Reflecting the 25% and 50% concentration constraints is the primary consideration in terms of both index construction and index maintenance. Ensuring timely and on-going reflection of the constraints requires an MSCI 25/50 Index to be rebalanced periodically. The MSCI 25/50 Indices are rebalanced in February, May, August and November.

*Minimizing tracking error to the parent index.* Minimizing the tracking error between an MSCI 25/50 Index and the relevant parent index, while keeping the index turnover to a reasonable level, is another important objective. MSCI seeks to achieve this by rebalancing an MSCI 25/50 Index using an optimization process that aims to minimize the constituent weight differences between that MSCI 25/50 Index and the relevant parent index.

## Index Construction and Maintenance Methodology

### *Constructing and Rebalancing the MSCI 25/50 Indices*

The MSCI 25/50 Index methodology follows a portfolio optimization framework. The Barra Optimizer is utilized to perform the optimization function, which is aimed at minimizing index turnover, tracking error and extreme deviation from the relevant parent index. The Barra Optimizer is an algorithm designed to facilitate the portfolio construction process.

*Constraint targets.* Each MSCI 25/50 Index is subject to the following constraints:

- no issuer may exceed 25% of index weight; and
- all issuers with weight above 5% may not exceed 50% of the index weight.

*Minimizing weight distance from the relevant parent index.* The MSCI 25/50 Index methodology aims at minimizing the weight distance from the relevant parent index. The active risk or the tracking error of an MSCI 25/50 Index versus the relevant parent index is measured as the distance between the constituent weights of that MSCI 25/50 Index and the relevant parent index.

*Minimizing transaction cost.* A transaction cost is applied as a proxy for index turnover on rebalancing from each MSCI 25/50 Index.

*Minimum weight of constituents.* The minimum weight of any MSCI 25/50 Index constituent is equal to the weight of the smallest constituent in the relevant parent index.

*Maximum weight of constituents.* In order to avoid excess weight allocation to the smaller securities relative to their market cap weight, the maximum weight of any MSCI 25/50 Index constituent is capped at four times its weight in the relevant parent index. The constraint is relaxed in steps of one in case of infeasibilities. For certain narrow parent indices, the standard maximum weight constraint parameters might lead to an infeasible solution. In such cases, MSCI may apply relaxed constraints relative to the standard set of constraints.

### *Buffer Rules*

A buffer of 10% of the value of each constraint is used in order to reduce the risk of non-compliance due to short term market movements between two quarterly rebalancing. As a result, at the point of constructing or rebalancing the MSCI 25/50 Indices, the weight of any single issuer cannot exceed 22.5% of the index weight and all issuers with weight above 4.5% cannot exceed 45% of the index weight.

### *Maintenance Rules*

*Quarterly index reviews.* The MSCI 25/50 Indices are rebalanced quarterly and the changes resulting from the rebalancing are made as of the close of the last business day of each February, May, August and November, to coincide with the quarterly index reviews of their parent indices.

The MSCI 25/50 Indices are in general rebalanced nine business days before the effective date. The changes resulting from the rebalancing are announced on the same day.

In case a pro forma MSCI 25/50 Index violates the 25/50 constraints between the announcement date and the effective date, the previously announced results will be discarded and a newly rebalanced MSCI 25/50 Index will be announced.

There is no index rebalancing due to non-compliance between quarterly index reviews.

At each rebalancing, a constraint factor is calculated for each constituent of each MSCI 25/50 Index. The constraint factor is defined as the weight in the applicable MSCI 25/50 Index at the time of the rebalancing *divided by* the weight in the relevant parent index. The constraint factor as well as the constituents of each MSCI 25/50 Index remains constant between index reviews except in case of corporate events.

*Ongoing Event Related Changes.* A security added to a parent index following a corporate event is added to the relevant MSCI 25/50 Index with an estimated capped weight, without rebalancing of the MSCI 25/50 index.

In the event of a merger or an acquisition where an index constituent acquires another index constituent or merges with another index constituent, the remaining company is maintained in the relevant MSCI 25/50 Index with a constraint factor calculated as the weighted average of the constraint factors before the corporate event.

If a spun-off security of an index constituent is added to a parent index, it will be added to the relevant MSCI 25/50 Index with the same constraint factor as the parent security.

The deletion of a constituent from a parent index following a corporate event triggers its deletion from the relevant MSCI 25/50 Index without rebalancing of that MSCI 25/50 Index.

The addition of a newly eligible security in a parent index — for example, an early inclusion of a large initial public offering, or a security migrating to that parent index from another size segment — will result in the inclusion of that security in the relevant MSCI 25/50 Index and consequently trigger the full rebalancing of that MSCI 25/50 Index.

### *Issuer Concentration Issues*

A minimum of 15 issuers in the relevant parent index is required at any point in time for an MSCI 25/50 Index to be rebalanced as described above. In the event the number of issuers drops below 15 but remains above 11 following a corporate event or a regular index review, MSCI will apply the following adjustments:

- Number of issuers drops to 14: the buffer mentioned above will be reduced from 10% to 9%. Thus, the weight of any single issuer cannot exceed 22.75% of the index weight and all issuers with weight above 4.55% cannot exceed 45.5% of the index weight.

- Number of issuers drops to 13: the buffer mentioned above will be reduced from 10% to 4%. Thus, the weight of any single issuer cannot exceed 24% of the index weight and all issuers with weight above 4.8% cannot exceed 48% of the index weight.
- Number of issuers drops to 12: the buffer mentioned above will be reduced from 10% to 0%. Thus, the weight of any single issuer cannot exceed 25% of the index weight and all issuers with weight above 5% cannot exceed 50% of the index weight.

An MSCI 25/50 Index will need to be discontinued if the number of issuers drops below 12 as mathematically no solution can satisfy the 25% and 50% constraints. MSCI will however temporarily maintain the MSCI 25/50 Index for a minimum of two months before discontinuation by adding the necessary number of securities to that MSCI 25/50 Index. The index discontinuation will coincide with one of the subsequent regular index reviews. The securities to be added will be chosen in the following order of priority:

- Securities deleted from the relevant MSCI 25/50 Index, *provided* they exhibit required liquidity and were not deleted due to financial difficulties, etc.
- Eligible securities of relevant size not included in the relevant parent index, e.g., largest small cap size-segment securities.

In the event that no securities are eligible for temporary addition to the relevant MSCI 25/50 Index, MSCI will provide an index, as close as possible to the 25/50 constraints, for a minimum of two months before discontinuation. The index discontinuation will coincide with one of the subsequent regular index reviews.

### **Index Calculation and Corporate Events**

Please refer to “—The MSCI Indices” in this underlying supplement for information relating to the calculation of the MSCI 25/50 Indices, subject to the weight limits, buffer rules and issuer concentration issues described above, and the treatment of corporate events, subject to the maintenance rules described above. For these purposes, the MSCI 25/50 Indices are deemed to be included in the MSCI Indices described in “— The MSCI Indices” in this underlying supplement.

### **License Agreement**

JPMorgan Chase & Co. or its affiliate expects to enter into an agreement with MSCI providing it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the MSCI 25/50 Indices, which are owned and published by MSCI, in connection with certain securities, including the notes.

**THIS FINANCIAL PRODUCT IS NOT SPONSORED, ENDORSED, SOLD OR PROMOTED BY MSCI INC. (“MSCI”), ANY AFFILIATE OF MSCI OR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX. THE MSCI 25/50 INDEXES ARE THE EXCLUSIVE PROPERTY OF MSCI. MSCI AND THE MSCI 25/50 INDEX NAMES ARE SERVICE MARK(S) OF MSCI OR ITS AFFILIATES AND HAVE BEEN LICENSED FOR USE FOR CERTAIN PURPOSES BY JPMORGAN CHASE & CO. (THE “LICENSEE”). NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX MAKES ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, TO THE OWNERS OF THIS FINANCIAL PRODUCT OR ANY MEMBER OF THE PUBLIC REGARDING THE ADVISABILITY OF INVESTING IN FINANCIAL SECURITIES GENERALLY OR IN THIS FINANCIAL PRODUCT PARTICULARLY OR THE ABILITY OF ANY MSCI 25/50 INDEX TO TRACK CORRESPONDING STOCK MARKET PERFORMANCE. MSCI OR ITS AFFILIATES ARE THE LICENSORS OF CERTAIN TRADEMARKS, SERVICE MARKS AND TRADE NAMES AND OF THE MSCI 25/50 INDEXES WHICH ARE DETERMINED, COMPOSED AND CALCULATED BY MSCI WITHOUT REGARD TO THIS FINANCIAL PRODUCT OR THE ISSUER OR OWNER OF THIS**

FINANCIAL PRODUCT. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX HAS ANY OBLIGATION TO TAKE THE NEEDS OF THE ISSUERS OR OWNERS OF THIS FINANCIAL PRODUCT INTO CONSIDERATION IN DETERMINING, COMPOSING OR CALCULATING THE MSCI 25/50 INDEXES. NEITHER MSCI, ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX IS RESPONSIBLE FOR OR HAS PARTICIPATED IN THE DETERMINATION OF THE TIMING OF, PRICES AT, OR QUANTITIES OF THIS FINANCIAL PRODUCT TO BE ISSUED OR IN THE DETERMINATION OR CALCULATION OF THE EQUATION BY WHICH THIS FINANCIAL PRODUCT IS REDEEMABLE FOR CASH. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, THE MAKING OR COMPILING ANY MSCI 25/50 INDEX HAS ANY OBLIGATION OR LIABILITY TO THE OWNERS OF THIS FINANCIAL PRODUCT IN CONNECTION WITH THE ADMINISTRATION, MARKETING OR OFFERING OF THIS FINANCIAL PRODUCT.

ALTHOUGH MSCI SHALL OBTAIN INFORMATION FOR INCLUSION IN OR FOR USE IN THE CALCULATION OF THE MSCI 25/50 INDEXES FROM SOURCES WHICH MSCI CONSIDERS RELIABLE, NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO MAKING OR COMPILING ANY MSCI 25/50 INDEX WARRANTS OR GUARANTEES THE ORIGINALITY, ACCURACY AND/OR THE COMPLETENESS OF ANY MSCI 25/50 INDEX OR ANY DATA INCLUDED THEREIN. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX MAKES ANY WARRANTY, EXPRESS OR IMPLIED, AS TO RESULTS TO BE OBTAINED BY LICENSEE, LICENSEE'S CUSTOMERS OR COUNTERPARTIES, ISSUERS OF THE FINANCIAL SECURITIES, OWNERS OF THE FINANCIAL SECURITIES, OR ANY OTHER PERSON OR ENTITY, FROM THE USE OF ANY MSCI 25/50 INDEX OR ANY DATA INCLUDED THEREIN IN CONNECTION WITH THE RIGHTS LICENSED HEREUNDER OR FOR ANY OTHER USE. NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX SHALL HAVE ANY LIABILITY FOR ANY ERRORS, OMISSIONS OR INTERRUPTIONS OF OR IN CONNECTION WITH ANY MSCI 25/50 INDEX OR ANY DATA INCLUDED THEREIN. FURTHER, NEITHER MSCI, ANY OF ITS AFFILIATES NOR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX MAKES ANY EXPRESS OR IMPLIED WARRANTIES OF ANY KIND, AND MSCI, ANY OF ITS AFFILIATES AND ANY OTHER PARTY INVOLVED IN, OR RELATED TO MAKING OR COMPILING ANY MSCI 25/50 INDEX HEREBY EXPRESSLY DISCLAIM ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ANY MSCI 25/50 INDEX AND ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT SHALL MSCI, ANY OF ITS AFFILIATES OR ANY OTHER PARTY INVOLVED IN, OR RELATED TO, MAKING OR COMPILING ANY MSCI 25/50 INDEX HAVE ANY LIABILITY FOR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE, CONSEQUENTIAL OR ANY OTHER DAMAGES (INCLUDING LOST PROFITS) EVEN IF NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES.

No purchaser, seller or holder of this security, or any other person or entity, should use or refer to any MSCI trade name, trademark or service mark to sponsor, endorse, market or promote this product without first contacting MSCI to determine whether MSCI's permission is required. Under no circumstances may any person or entity claim any affiliation with MSCI without the prior written permission of MSCI.

## THE NASDAQ-100 INDEX®

All information contained in this underlying supplement regarding the NASDAQ-100 Index®, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, Nasdaq, Inc. (“**Nasdaq**”). The NASDAQ-100 Index® was developed by, and is calculated, maintained and published by Nasdaq. Nasdaq does not have any obligation to continue to publish, and may discontinue publication of, the NASDAQ-100 Index®. The NASDAQ-100 Index® is reported by Bloomberg L.P. under the ticker symbol “NDX.”

The NASDAQ-100 Index® is a modified market capitalization-weighted index of stocks of 100 of the largest non-financial companies listed on The NASDAQ Stock Market. The NASDAQ-100 Index®, which includes companies across a variety of major industry groups, was launched on January 31, 1985, with a base index value of 125.00, as adjusted. Current information regarding the market value of the NASDAQ-100 Index® is available from Nasdaq as well as numerous market information services.

The NASDAQ-100 Index® share weights of the component securities of the NASDAQ-100 Index® at any time are based upon the total shares outstanding in each of those securities and are additionally subject, in certain cases, to rebalancing. Accordingly, each underlying stock’s influence on the level of the NASDAQ-100 Index® is directly proportional to the value of its NASDAQ-100 Index® share weight.

### Calculation of the NASDAQ-100 Index®

At any moment in time, the value of the NASDAQ-100 Index® equals the aggregate value of the then-current NASDAQ-100 Index® share weights of each of the NASDAQ-100 Index® component securities, which are based on the total shares outstanding of each such NASDAQ-100 Index® component security, multiplied by each such security’s respective last sale price on The NASDAQ Stock Market (which may be the official closing price published by The NASDAQ Stock Market), and divided by a scaling factor (the “**Divisor**”), which becomes the basis for the reported NASDAQ-100 Index® value. The Divisor serves the purpose of scaling such aggregate value to a lower order of magnitude which is more desirable for NASDAQ-100 Index® reporting purposes.

### Underlying Stock Eligibility Criteria

#### *Initial Eligibility Criteria*

To be eligible for initial inclusion in the NASDAQ-100 Index®, a security must meet the following criteria:

- the issuer of the security’s U.S. listing must be exclusively on the NASDAQ Global Select Market or the NASDAQ Global Market (unless the security was dually listed on another U.S. market prior to January 1, 2004 and has continuously maintained such listing);
- a security must be issued by a non-financial company;
- a security may not be issued by an issuer currently in bankruptcy proceedings;
- a security must have an average daily trading volume of at least 200,000 shares in the previous three months (measured annually during the ranking review process described below);
- if the issuer of the security is organized under the laws of a jurisdiction outside the United States, then that security must have listed options on a recognized options market in the United States or be eligible for listed-options trading on a recognized options market in the United States (measured during the ranking review process);
- the issuer of the security may not have entered into a definitive agreement or other arrangement where the transaction is determined to be highly probable and would likely result in the security no longer being NASDAQ-100 Index® eligible;



- the issuer of the security may not have annual financial statements with an audit opinion that is currently withdrawn; and
- the security must have “seasoned” on the NASDAQ, NYSE or CBOE. Generally, a company is considered to be seasoned if it has been listed on a market for at least three full months (excluding the first month of initial listing).

#### *Continued Eligibility Criteria*

In addition, to be eligible for continued inclusion in the NASDAQ-100 Index®, the security must meet the following criteria:

- the issuer of the security’s primary U.S. listing must be exclusively listed on the NASDAQ Global Select Market or the NASDAQ Global Market;
- the security must be issued by a non-financial company;
- the security may not be issued by an issuer currently in bankruptcy proceedings;
- the security must have an average daily trading volume of at least 200,000 shares in the previous three month trading period (measured during the ranking review process);
- if the issuer of the security is organized under the laws of a jurisdiction outside the United States, then that security must have listed options on a recognized options market in the United States or be eligible for listed-options trading on a recognized options market in the United States;
- the issuer must have an adjusted market capitalization equal to or exceeding 0.10% of the aggregate adjusted market capitalization of the NASDAQ-100 Index® at each month-end. In the event a company does not meet this criterion for two consecutive month-ends, it will be removed from the NASDAQ-100 Index® effective after the close of trading on the third Friday of the following month; and
- the issuer of the security may not have annual financial statements with an audit opinion that is currently withdrawn.

For the purposes of NASDAQ-100 Index® eligibility criteria, if the security is a depositary receipt representing a security of a non-U.S. issuer, then references to the “issuer” are references to the issuer of the underlying security.

These NASDAQ-100 Index® eligibility criteria may be revised from time to time by Nasdaq without regard to the notes.

#### **Annual Ranking Review**

The composition of the NASDAQ-100 Index® is evaluated on an annual basis, except under extraordinary circumstances that may result in an interim evaluation, as follows (this evaluation is referred to herein as the “ranking review”). Securities listed on The NASDAQ Stock Market that meet the applicable eligibility criteria are ranked by market value. NASDAQ-100 Index®-eligible securities that are already in the NASDAQ-100 Index® and whose issuer is ranked in the top 100 eligible companies (based on market capitalization) are retained in the NASDAQ-100 Index®. A NASDAQ-100 Index® issuer that is ranked 101 to 125 is generally retained, *provided* that such issuer was ranked in the top 100 eligible issuers as of the previous ranking review or was added to the NASDAQ-100 Index® subsequent to the previous ranking review. NASDAQ-100 Index® issuers not meeting such criteria are replaced. Additionally, if at the time of the ranking review an eligible issuer not currently in the NASDAQ-100 Index® is ranked within the top 75 eligible securities by market capitalization and is not one of the replacement securities, it will be automatically added to the NASDAQ-100 Index® and the smallest issuer by market capitalization will be removed from the NASDAQ-100 Index®. The replacement securities chosen are

those eligible securities not currently in the NASDAQ-100 Index® whose issuers have the largest market capitalization. The data used in the ranking includes market data as of the last trading of October and is updated for total shares outstanding submitted in a publicly filed SEC document via EDGAR through the end of November.

Generally, the list of annual additions and deletions as a result of the annual evaluation is publicly announced via a press release in the early part of December. Replacements are made effective after the close of trading on the third Friday in December. Moreover, if at any time during the year other than the ranking review, a NASDAQ-100 Index® issuer no longer meets the continued eligibility criteria or is otherwise determined by Nasdaq to become ineligible for continued inclusion in the NASDAQ-100 Index®, the issuer will be replaced with the largest market capitalization issuer not currently in the NASDAQ-100 Index® and meeting the initial eligibility criteria listed above. Ordinarily, a security will be removed from the NASDAQ-100 Index® at its last sale price. If, however, at the time of its removal the security is halted from trading on its primary listing market and an official closing price cannot readily be determined, the security may, in Nasdaq's discretion, be removed at a zero price. The zero price will be applied to the security after the close of the market but prior to the time the official closing value of the NASDAQ-100 Index® is disseminated, which is ordinarily 17:16:00 EST.

### **Index Maintenance**

Changes in the price and/or the number of total shares outstanding of each of the NASDAQ-100 Index® component securities driven by corporate events such as stock dividends, stock splits and certain spin-offs and rights issuances are adjusted on the ex-date. If the change in total shares outstanding arising from other corporate actions is greater than or equal to 10.0%, the change will be made to the NASDAQ-100 Index® as soon as practicable. Otherwise, if the change in total shares outstanding is less than 10.0%, then all such changes are accumulated and made effective at one time on a quarterly basis after the close of trading on the third Friday in each of March, June, September and December. The index shares for those underlying stocks are derived from each security's total shares outstanding. The index shares for those underlying stocks are adjusted by the same percentage amount by which the total shares outstanding have changed in those NASDAQ-100 Index® component securities.

The price of the component security is adjusted for the amount of the special cash dividend. A dividend is considered special if the information provided by the listing exchange in their announcement of the ex-date indicates that the dividend is special. A special dividend may also be referred to as extra, extraordinary, non-recurring, one-time, unusual, etc.

### **Index Rebalancing**

On a quarterly basis coinciding with the quarterly scheduled index share adjustment procedures in March, June and September, the NASDAQ-100 Index® will be rebalanced if it is determined that: (1) the current weight of the single largest market capitalization component security is greater than 24.0% and (2) the "collective weight" of those component securities whose individual current weights are in excess of 4.5%, when added together, exceed 48.0% of the NASDAQ-100 Index®.

If either one or both weight distribution requirements are met upon quarterly review or it is determined that a special rebalancing is required, a weight rebalancing will be performed.

First, relating to weight distribution requirement (1) above, if the current weight of the single largest component security exceeds 24.0%, then the weights of all stocks with weights greater than 4.5% will be scaled down proportionately towards 1.0% for the adjusted weight of the single largest component security to be set to 20.0%.

Second, relating to weight distribution requirement (2) above, for those component securities whose individual current weights or adjusted weights in accordance with the preceding step are in excess of 4.5%, if their "collective weight" exceeds 48.0%, then the weights of all stocks with weights greater than 4.5% will be scaled down proportionately towards 1.0% for the "collective weight," so adjusted, to be set to 40.0%.

On an annual basis coinciding with the annual evaluation in December, the NASDAQ-100 Index® will be rebalanced if it is determined that the “collective weight” of the five largest component securities by weight, when added together, exceeds 40.0% of the NASDAQ-100 Index®. In addition, a special rebalancing of the NASDAQ-100 Index® may be conducted at any time if it is determined necessary to maintain the integrity of the NASDAQ-100 Index®.

If the weight distribution requirement is met upon the annual evaluation or it is determined that a special rebalancing is required, a weight rebalancing will be performed.

If the “collective weight” of the five largest NASDAQ-100 Index® securities by weight, when added together, exceeds 40.0% of the NASDAQ-100 Index® at the time of the annual evaluation, those top five securities will be scaled down proportionately towards 1.0% for the “collective weight,” so adjusted, to be set to 38.5%. The excess weight due to capping from the five largest, capped securities is redistributed to the remaining securities. Thereafter, all other securities are capped at 4.5% and the weight is proportionally redistributed to all securities that have not yet been capped.

In the event of a special rebalance, either coinciding with the quarterly review or annual evaluation (or at any other point in time where necessary), prior month-end shares outstanding and prices for each security in the NASDAQ-100 Index® are utilized to calculate the weights that require capping and the associated index shares. If a special rebalance were to occur in accordance with the quarterly scheduled index adjustment or annual evaluation, the index weights will be determined anew based upon the last sale prices and aggregate capitalization of the NASDAQ-100 Index® at the close of trading on the last day in February, May, August and November. Changes to the index weights will be made effective after the close of trading on the third Friday in March, June, September and December and an adjustment to the divisor is made to ensure continuity of the NASDAQ-100 Index®.

Ordinarily, new rebalanced weights will be determined by applying the above procedures to the current index weights. However, Nasdaq may from time to time determine rebalanced weights, if necessary, by applying the above procedure to the actual current market capitalization of the component securities. In such instances, Nasdaq would announce the different basis for rebalancing prior to its implementation.

At the quarterly rebalancing, data is cutoff as of the previous month end and no changes are made to the NASDAQ-100 Index® from that cutoff until the quarterly share change effective date with the single exception for corporate actions with an ex-date.

## **License Agreement**

JPMorgan Chase & Co. or its affiliate has entered into a non-exclusive license agreement with Nasdaq providing for the license to it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the NASDAQ-100 Index® in connection with certain securities, including the notes.

The license agreement with Nasdaq provides that the following language must be stated in this underlying supplement:

The notes are not sponsored, endorsed, sold or promoted by, Nasdaq Inc. or its affiliates (Nasdaq, with its affiliates, are referred to as the “Corporations”). The Corporations have not passed on the legality or suitability of, or the accuracy or adequacy of descriptions and disclosures relating to, the notes. The Corporations make no representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly, or the ability of the NASDAQ-100 Index® to track general stock market performance. The Corporations’ only relationship to the Issuer, the Guarantor (if applicable) and their affiliates is in the licensing of Nasdaq®, NASDAQ-100® and NASDAQ-100 Index® registered trademarks, service marks and certain trade names of the Corporations and the use of the NASDAQ-100 Index® which is determined, composed and calculated by Nasdaq without regard to the Issuer or the Guarantor (if applicable) or the notes. Nasdaq has no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the

owners of the notes into consideration in determining, composing or calculating the NASDAQ-100 Index®. The Corporations are not responsible for and have not participated in the determination of the timing of, prices at, or quantities of the notes to be issued or in the determination or calculation of the equation by which the notes are to be converted into cash. The Corporations have no liability in connection with the administration, marketing or trading of the notes.

**THE CORPORATIONS DO NOT GUARANTEE THE ACCURACY AND/OR UNINTERRUPTED CALCULATION OF THE NASDAQ-100 INDEX® OR ANY DATA INCLUDED THEREIN. THE CORPORATIONS MAKE NO WARRANTY, EXPRESS OR IMPLIED, AS TO RESULTS TO BE OBTAINED BY THE ISSUER, THE GUARANTOR (IF APPLICABLE), OWNERS OF THE NOTES, OR ANY OTHER PERSON OR ENTITY FROM THE USE OF THE NASDAQ-100 INDEX® OR ANY DATA INCLUDED THEREIN. THE CORPORATIONS MAKE NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIM ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE NASDAQ-100 INDEX® OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT SHALL THE CORPORATIONS HAVE ANY LIABILITY FOR ANY LOST PROFITS OR SPECIAL, INCIDENTAL, PUNITIVE, INDIRECT, OR CONSEQUENTIAL DAMAGES, EVEN IF NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES.**

## THE NASDAQ-100® TECHNOLOGY SECTOR INDEX<sup>SM</sup>

All information contained in this underlying supplement regarding the NASDAQ-100® Technology Sector Index<sup>SM</sup>, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, The Nasdaq Stock Market, Inc. (“Nasdaq”). The NASDAQ-100® Technology Index was developed by Nasdaq and is calculated, maintained and published by The NASDAQ OMX Group, Inc. (“NASDAQ OMX”). Neither Nasdaq nor NASDAQ OMX has any obligation to continue to publish, and may discontinue publication of, the NASDAQ-100® Technology Sector Index<sup>SM</sup>.

The NASDAQ-100® Technology Sector Index<sup>SM</sup> began on February 22, 2006 at a base value of 1,000.00. The NASDAQ-100® Technology Sector Index<sup>SM</sup> is reported by Bloomberg, L.P. under the ticker symbol “NDXT.”

The NASDAQ-100® Technology Sector Index<sup>SM</sup> is an equal weighted, price-return index based on technology companies included in the NASDAQ-100 Index®.

### Index Calculation

The NASDAQ-100® Technology Sector Index<sup>SM</sup> is an equal weighted, price return index. The value of the NASDAQ-100® Technology Sector Index<sup>SM</sup> equals the aggregate value of the NASDAQ-100® Technology Sector Index<sup>SM</sup> share weights, also known as the “Index Shares,” of each of the NASDAQ-100® Technology Sector Index<sup>SM</sup> securities (each, an “Index Security” and collectively, “Index Securities”) multiplied by each such security’s Last Sale Price (defined below), and divided by the divisor of the NASDAQ-100® Technology Sector Index<sup>SM</sup>. The divisor serves the purpose of scaling such aggregate value to a lower order of magnitude which is more desirable for reporting purposes. If trading in an Index Security is halted on its primary listing market, the most recent Last Sale Price for that security is used for all index computations until trading on such market resumes. Likewise, the most recent Last Sale Price is used if trading in a security is halted on its primary listing market before the market is open.

The “Last Sale Price” refers to the last sale price on Nasdaq, which may be the NASDAQ Official Closing Price. The “NASDAQ Official Closing Price” is a primary market close that is validated and subject to Nasdaq and National Association of Securities Dealers surveillance.

The formula for index value is as follows: Aggregate Adjusted Market Value / Divisor.

The formula for the divisor is as follows: (Market Value after Adjustments / Market Value before Adjustments) × Divisor before Adjustments.

The NASDAQ-100® Technology Sector Index<sup>SM</sup> is ordinarily calculated without regard to cash dividends on Index Securities.

### Eligibility Criteria

The NASDAQ-100® Technology Sector Index<sup>SM</sup> contains securities of the NASDAQ-100 Index® which are classified as Technology according to the Industry Classification Benchmark (“ICB”). The eligibility for the NASDAQ-100® Technology Sector Index<sup>SM</sup> is determined in a 2-step process and the security has to meet both criteria in order to become eligible for the NASDAQ-100® Technology Sector Index<sup>SM</sup>. For additional information about the NASDAQ-100 Index®, including the methodology for inclusion in the NASDAQ-100 Index®, see — “The NASDAQ-100 Index®” in this underlying supplement.

1. The security must be part of the NASDAQ-100 Index®, which includes 100 of the largest domestic and international non-financial companies listed on the Nasdaq.
2. The company must be classified as Technology according to ICB. Currently, companies in the following sectors are classified as Technology according to ICB: software and computer services; and technology hardware and equipment.

## Index Maintenance

Index Share changes are not made during the quarter; however changes arising from stock dividends and stock splits are made to the NASDAQ-100® Technology Sector Index<sup>SM</sup> on the evening prior to the effective date of that corporate action. In the case of certain spin-offs or rights issuances, the price of the Index Security is adjusted and a corresponding adjustment is made to the Index Shares such that the weight of the Index Security will not change as a result of the action. In the case of a special cash dividend, a determination is made on an individual basis whether to make a change to the price of an Index Security in accordance with its Index dividend policy. If it is determined that a change will be made, a corresponding adjustment will be made to the Index Shares of the security such that the weight of the Index Security will not change as a result of the action. Any such change will become effective on the ex-date. All changes are announced in advance and are reflected in the NASDAQ-100® Technology Sector Index<sup>SM</sup> prior to market open on the NASDAQ-100® Technology Sector Index<sup>SM</sup> effective date.

## Index Component Changes

1. If a component of the NASDAQ-100® Index that is classified as Technology according to ICB is removed from the NASDAQ-100® Index, it is also removed from the NASDAQ-100® Technology Sector Index<sup>SM</sup> and as such, if the replacement company being added to the NASDAQ-100® Index is classified as Technology according to ICB, it is added to the NASDAQ-100® Technology Sector Index<sup>SM</sup> and will assume the weight of the removed company on the NASDAQ-100® Technology Sector Index<sup>SM</sup> effective date;
2. If a component of the NASDAQ-100® Index that is not classified as Technology according to ICB is removed and the replacement company being added to the NASDAQ-100® Index is classified as Technology according to ICB, the replacement company is added to the NASDAQ-100® Technology Sector Index<sup>SM</sup> at the next quarterly rebalancing; and
3. If a component of the NASDAQ-100® Index that is classified as Technology according to ICB is removed from the NASDAQ-100® Index and the replacement company being added to the NASDAQ-100® Index is not classified as Technology according to ICB, the company is removed from the NASDAQ-100® Technology Sector Index<sup>SM</sup> and the divisor of the NASDAQ-100® Technology Sector Index<sup>SM</sup> is adjusted to ensure index continuity.

Ordinarily, a security will be removed from the NASDAQ-100® Technology Sector Index<sup>SM</sup> at its Last Sale Price. If, however, at the time of its removal the Index Security is halted from trading on its primary listing market and an official closing price cannot readily be determined, the Index Security may, in Nasdaq's discretion, be removed at a zero price. The zero price will be applied to the Index Security after the close of the market but prior to the time the official closing value of the NASDAQ-100® Technology Sector Index<sup>SM</sup> is disseminated, which is ordinarily 17:16:00 ET. All changes are announced in advance and are reflected in the NASDAQ-100® Technology Sector Index<sup>SM</sup> prior to market open on the NASDAQ-100® Technology Sector Index<sup>SM</sup> effective date.

## Index Rebalancing

The NASDAQ-100® Technology Sector Index<sup>SM</sup> employs an equal-dollar weighting methodology such that each company's Index market value is rebalanced quarterly to an equal-dollar value corresponding to an equal percent weight of the NASDAQ-100® Technology Sector Index<sup>SM</sup>'s aggregate market value. Index Shares are calculated by dividing this equal-dollar value for each Index Security by the corresponding Last Sale Price of the security at the close of trading on the third Friday in March, June, September, and December. In the case of multiple share classes of a company being included in the NASDAQ-100® Technology Sector Index<sup>SM</sup>, the equal-weighted market value will be divided equally among the securities of that company.

In administering the NASDAQ-100® Technology Sector Index<sup>SM</sup>, NASDAQ OMX will exercise reasonable discretion as it deems appropriate to ensure index continuity.

## License Agreement

JPMorgan Chase & Co. or its affiliate has entered into a non-exclusive license agreement with NASDAQ OMX providing for the license to it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the NASDAQ-100® Technology Sector Index<sup>SM</sup> in connection with certain securities, including the notes.

The license agreement with NASDAQ OMX provides that the following language must be stated in this underlying supplement:

The notes are not sponsored, endorsed, sold or promoted by, The NASDAQ OMX Group, Inc. or its affiliates (NASDAQ OMX, with its affiliates, are referred to as the "Corporations"). The Corporations have not passed on the legality or suitability of, or the accuracy or adequacy of descriptions and disclosures relating to, the notes. The Corporations make no representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly, or the ability of the NASDAQ-100® Technology Sector Index<sup>SM</sup> to track general stock market performance. The Corporations' only relationship to JPMorgan Chase & Co., JPMorgan Financial and their affiliates is in the licensing of the Nasdaq®, NASDAQ OMX®, OMX® and NASDAQ-100® Technology Sector Index<sup>SM</sup> registered trademarks, service marks and certain trade names of the Corporations and the use of the NASDAQ-100® Technology Sector Index<sup>SM</sup> which is determined, composed and calculated by NASDAQ OMX without regard to JPMorgan Chase & Co., JPMorgan Financial or the notes. NASDAQ OMX has no obligation to take the needs of JPMorgan Chase & Co. or JPMorgan Financial or the owners of the notes into consideration in determining, composing or calculating the NASDAQ-100® Technology Sector Index<sup>SM</sup>. The Corporations are not responsible for and have not participated in the determination of the timing of, prices at, or quantities of the notes to be issued or in the determination or calculation of the equation by which the notes are to be converted into cash. The Corporations have no liability in connection with the administration, marketing or trading of the notes.

**THE CORPORATIONS DO NOT GUARANTEE THE ACCURACY AND/OR UNINTERRUPTED CALCULATION OF THE NASDAQ-100® TECHNOLOGY SECTOR INDEX<sup>SM</sup> OR ANY DATA INCLUDED THEREIN. THE CORPORATIONS MAKE NO WARRANTY, EXPRESS OR IMPLIED, AS TO RESULTS TO BE OBTAINED BY JPMORGAN CHASE & CO., JPMORGAN FINANCIAL, OWNERS OF THE NOTES, OR ANY OTHER PERSON OR ENTITY FROM THE USE OF THE NASDAQ-100® TECHNOLOGY SECTOR INDEX<sup>SM</sup> OR ANY DATA INCLUDED THEREIN. THE CORPORATIONS MAKE NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIM ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE NASDAQ-100® TECHNOLOGY SECTOR INDEX<sup>SM</sup> OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT SHALL THE CORPORATIONS HAVE ANY LIABILITY FOR ANY LOST PROFITS OR SPECIAL, INCIDENTAL, PUNITIVE, INDIRECT, OR CONSEQUENTIAL DAMAGES, EVEN IF NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES.**

## THE NIKKEI 225 INDEX

All information contained in this underlying supplement regarding the Nikkei 225 Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, Nikkei Inc. The Nikkei 225 Index is calculated, maintained and published by Nikkei Inc. Nikkei Inc. has no obligation to continue to publish, and may discontinue the publication of, the Nikkei 225 Index. The Nikkei 225 Index is reported by Bloomberg L.P. under the ticker symbol “NKY.”

The Nikkei 225 Index is a stock index that measures the composite price performance of selected Japanese stocks. The Nikkei 225 Index is currently based on 225 underlying stocks (the “**Nikkei Underlying Stocks**”) trading on the Tokyo Stock Exchange (“**TSE**”) representing a broad cross-section of Japanese industries. Non-ordinary shares, such as shares of ETFs, REITs, preferred stock or other preferred securities or tracking stocks, are excluded from the Nikkei 225 Index.

All 225 Nikkei Underlying Stocks are stocks listed in the First Section of the TSE. Stocks listed in the First Section of the TSE are among the most actively traded stocks on the TSE. Nikkei Inc. rules require that the 75 most liquid issues (one-third of the component count of the Nikkei 225 Index) be included in the Nikkei 225 Index. Nikkei Inc. first calculated and published the Nikkei 225 Index in 1970.

### Rules of the Periodic Review

Nikkei Underlying Stocks are reviewed annually (the “**periodic review**”) in accordance with the following rules, and results of the review are applied on the first trading day in October. Results of the review become effective on the first trading day of October, and there is no limit to the number of Nikkei Underlying Stocks that can be affected. Stocks selected by the procedures outlined below are presented as candidates to a committee composed of academics and market professionals for comment; based on comments from the committee, Nikkei Inc. determines and announces any changes to the Nikkei Underlying Stocks.

#### *High Liquidity Group*

The top 450 most liquid stocks are chosen from the TSE First Section. For purposes of this selection, liquidity is measured by (i) trading volume in the preceding 5-year period and (ii) the magnitude of price fluctuation by volume in the preceding 5-year period. These 450 stocks constitute the “High Liquidity Group” for the review. Those Nikkei Underlying Stocks that are not in the High Liquidity Group are removed. Those stocks that are not currently Nikkei Underlying Stocks but that are in the top 75 of the High Liquidity Group are added.

#### *Sector Balance*

The High Liquidity Group is then categorized into the following six sectors: Technology, Financials, Consumer Goods, Materials, Capital Goods/Others, and Transportation and Utilities. These six sector categories are further divided into 36 industrial classifications as follows:

- Technology — Pharmaceuticals, Electrical Machinery, Automobiles & Auto Parts, Precision Instruments and Communications;
- Financials — Banking, Other Financial Services, Securities and Insurance;
- Consumer Goods — Fishery, Foods, Retail and Services;
- Materials — Mining, Textiles & Apparel, Pulp & Paper, Chemicals, Petroleum, Rubber, Glass & Ceramics, Steel, Nonferrous Metals and Trading Companies;
- Capital Goods/Others — Construction, Machinery, Shipbuilding, Transportation Equipment, Other Manufacturing and Real Estate; and



- Transportation/Utilities — Railway & Bus, Land Transport, Marine Transport, Air Transport, Warehousing, Electric Power and Gas.

The “appropriate number” of constituents for each sector is defined to be half the number of stocks in that sector. After the liquidity-based adjustments, discussed above, a rebalancing is conducted if any of the sectors are over- or under-represented. The degree of representation is evaluated by comparing the actual number of constituents in the sector against the appropriate number for that sector.

For over-represented sectors, current constituents in the sector are deleted in the order of liquidity (lowest liquidity first) to correct the overage. For under-represented sectors, non-constituent stocks are added from the High Liquidity Group in the order of liquidity (highest liquidity first) to correct the shortage.

### **Extraordinary Replacement Rules**

Nikkei Underlying Stocks removed from the TSE First Section are deleted from the Nikkei 225 Index. Reasons for removal from the TSE First Section include: designation to “securities to be delisted” (*i.e.*, “Seiri Meigara”) or delisting due to bankruptcy (including filing under the Corporate Reorganization Act, Civil Rehabilitation Act or liquidation), delisting due to corporate restructuring such as merger, share exchange or share transfer, designation to “securities to be delisted” or actual delisting due to excess debt or transfer to the TSE Second Section. In addition, constituents designated to “securities under supervision” (*i.e.*, “Kanri Meigara”) become deletion candidates. However, the decision to delete such candidates will be made by examining the sustainability and the probability of delisting for each individual case.

When a Nikkei Underlying Stock is deleted from the Nikkei 225 Index as outlined in the preceding paragraph, a new Nikkei Underlying Stock will be selected and added, in principle, from the same sector of the High Liquidity Group in order of liquidity and non-constituents. Notwithstanding the foregoing, the following rules may apply depending on the timing and circumstances of the deletion: (i) when such deletion is scheduled close to the periodic review, additional stocks may be selected as part of the periodic review process and (ii) when multiple deletions are scheduled in a short period, additions may be selected using the liquidity and sector balancing rules outlined above.

### **Procedures to Implement Constituent Changes**

As a general rule, for both the periodic review and the extraordinary replacement rules, additions and deletions are made effective on the same day in order to keep the number of Nikkei Underlying Stocks 225. However, under the circumstances outlined below, when an addition cannot be made on the same day as a deletion, the Nikkei 225 Index may be calculated with fewer than 225 Nikkei Underlying Stocks. In this case, the divisor is adjusted to ensure continuity.

The first instance when the Nikkei 225 Index may be calculated with fewer than 225 Nikkei Underlying Stocks is when a Nikkei Underlying Stock is delisted by reason of share exchange or transfer and the succeeding company becomes listed a short period of time later. The second instance is when a Nikkei Underlying Stock is deleted due to a sudden announcement of bankruptcy or designation to “security to be delisted.” The addition will be made after a short period (approximately 2 days). The exact schedule is announced on a case-by-case basis.

### **Calculation of the Nikkei 225 Index**

The Nikkei 225 Index is a modified, price-weighted index (*i.e.*, a Nikkei Underlying Stock’s weight in the index is based on its price per share rather than the total market capitalization of the issuer) that is calculated by (i) multiplying the per share price of each Nikkei Underlying Stock by the corresponding weighting factor for such Nikkei Underlying Stock (a “**Weight Factor**”), (ii) calculating the sum of all these products and (iii) dividing such sum by a divisor (the “**Divisor**”). The Divisor is subject to periodic adjustments as set forth below. Each Weight Factor is computed by dividing ¥50 by the par value of the relevant Nikkei Underlying Stock, so that the share price of each Nikkei Underlying Stock when multiplied by its Weight Factor corresponds to a share price based on a uniform par value of ¥50. The stock prices

used in the calculation of the Nikkei 225 Index are those reported by a primary market for the Nikkei Underlying Stocks (currently the TSE). The level of the Nikkei 225 Index is calculated every 5 seconds.

In order to maintain continuity in the Nikkei 225 Index in the event of certain changes due to non-market factors affecting the Nikkei Underlying Stocks, such as the addition or deletion of stocks, substitution of stocks, stock splits or distributions of assets to stockholders, the Divisor used in calculating the Nikkei 225 Index is adjusted in a manner designed to prevent any instantaneous change or discontinuity in the level of the Nikkei 225 Index. Thereafter, the Divisor remains at the new value until a further adjustment is necessary as the result of another change. As a result of such change affecting any Nikkei Underlying Stock, the Divisor is adjusted in such a way that the sum of all share prices immediately after such change multiplied by the applicable Weight Factor and divided by the new Divisor (*i.e.*, the level of the Nikkei 225 Index immediately after such change) will equal the level of the Nikkei 225 Index immediately prior to the change.

### **License Agreement**

JPMorgan Chase & Co. or its affiliate expects to enter into an agreement with Nikkei Inc. that would provide it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the Nikkei 225 Index, which is owned and published by Nikkei Inc., in connection with certain securities, including the notes.

The license agreement with Nikkei Inc. will provide that Nikkei Inc. will assume no obligation or responsibility for use of the Nikkei 225 Index by the Issuer, the Guarantor (if applicable) or its affiliates.

The Nikkei 225 Index is an intellectual property of Nikkei Inc. “Nikkei,” “Nikkei Stock Average,” and “Nikkei 225” are the service marks of Nikkei Inc. Nikkei Inc. reserves all the rights, including copyright, to the Nikkei 225 Index. Nikkei Digital Media, Inc., a wholly owned subsidiary of Nikkei Inc., calculates and disseminates the Nikkei 225 Index under exclusive agreement with Nikkei Inc. Nikkei Inc. and Nikkei Digital Media Inc. are collectively referred to as the “Nikkei 225 Index Sponsor.”

**THE NOTES ARE NOT IN ANY WAY SPONSORED, ENDORSED OR PROMOTED BY THE NIKKEI 225 INDEX SPONSOR. THE NIKKEI 225 INDEX SPONSOR DOES NOT MAKE ANY WARRANTY OR REPRESENTATION WHATSOEVER, EXPRESS OR IMPLIED, EITHER AS TO THE RESULTS TO BE OBTAINED AS TO THE USE OF THE NIKKEI 225 INDEX OR THE FIGURE AT WHICH THE NIKKEI 225 INDEX STANDS AT ANY PARTICULAR DAY OR OTHERWISE. THE NIKKEI 225 INDEX IS COMPILED AND CALCULATED SOLELY BY THE NIKKEI 225 INDEX SPONSOR. HOWEVER, THE NIKKEI 225 INDEX SPONSOR SHALL NOT BE LIABLE TO ANY PERSON FOR ANY ERROR IN THE NIKKEI 225 INDEX, AND THE NIKKEI 225 INDEX SPONSOR SHALL NOT BE UNDER ANY OBLIGATION TO ADVISE ANY PERSON, INCLUDING A PURCHASER OR VENDOR OF THE NOTES, OF ANY ERROR THEREIN.**

In addition, the Nikkei 225 Index Sponsor gives no assurance regarding any modification or change in any methodology used in calculating the Nikkei 225 Index and is under no obligation to continue the calculation, publication and dissemination of the Nikkei 225 Index.

## THE RUSSELL INDICES

All information contained in this underlying supplement regarding the Russell 1000® Index, the Russell 2000® Index and the Russell 3000® Index (each, a “**Russell Index**” and collectively, the “**Russell Indices**”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, FTSE Russell. The Russell Indices are calculated, maintained and published by FTSE Russell. FTSE Russell has no obligation to publish, and may discontinue the publication of, the Russell Indices.

### The Russell 1000® Index

The Russell 1000® Index measures the capitalization-weighted price performance of 1,000 U.S. large-capitalization stocks listed on eligible U.S. exchanges (with respect to the Russell 1000® Index, the “**Component Stocks**”). The companies included in the Russell 1000® Index are the 1,000 largest companies that form the Russell 3000E™ Index, which is composed of the 4,000 largest U.S. companies as determined by total market capitalization and represents approximately 99% of the U.S. equity market. The Russell 1000® Index represents approximately 92% of the United States equity market. The Russell 1000® Index is reported by Bloomberg L.P. under the ticker symbol “RIY.”

### The Russell 2000® Index

The Russell 2000® Index measures the capitalization-weighted price performance of 2,000 U.S. small-capitalization stocks listed on eligible U.S. exchanges (with respect to the Russell 2000® Index, the “**Component Stocks**”) and is designed to track the performance of the small-capitalization segment of the U.S. equity market. The companies included in the Russell 2000® Index are the middle 2,000 of the companies that form the Russell 3000E™ Index, which is composed of the 4,000 largest U.S. companies as determined by total market capitalization and represents approximately 99% of the U.S. equity market. The Russell 2000® Index is reported by Bloomberg L.P. under the ticker symbol “RTY.”

### The Russell 3000® Index

The Russell 3000® Index measures the capitalization-weighted price performance of 3,000 U.S. large- and small-capitalization stocks listed on eligible U.S. exchanges (with respect to the Russell 3000® Index, the “**Component Stocks**”) and is designed to represent the broad U.S. equity market. The companies included in the Russell 3000® Index are the 3,000 largest U.S. companies that form the Russell 3000E™ Index, which is composed of the 4,000 largest U.S. companies as determined by total market capitalization and represents approximately 99% of the U.S. equity market. The Russell 3000® Index consists of the 3,000 companies included in the Russell 1000® Index and the Russell 2000® Index, which are subsets of the Russell 3000E™ Index, and represents approximately 98% of the U.S. equity market. The Russell 3000E™ Index is not the same as the Russell 3000® Index, which is a subset of the Russell 3000E™ Index. The Russell 3000® Index is reported by Bloomberg L.P. under the ticker symbol “RAY.”

### Selection of Stocks Underlying the Russell Indices

The Russell Indices are sub-indices of the Russell 3000E™ Index. To be eligible for inclusion in the Russell 3000E™ Index and, consequently, a Russell Index, a company must meet the following criteria as of the rank day in May (except that initial public offerings (“**IPOs**”) are considered for inclusion on a quarterly basis):

- *U.S. Equity Market.* The company must be determined to be part of the U.S. equity market, meaning that its home country is the United States. If a company incorporates in, has a stated headquarters location in, and also trades in the same country (ADRs and ADSs are not eligible), the company is assigned to its country of incorporation.

If any of the three criteria do not match, FTSE Russell then defines three Home Country Indicators (“**HCIs**”): country of incorporation, country of headquarters and country of the most liquid exchange as defined by two-year average daily dollar trading volume from all exchanges within a country. After the HCIs are defined, the next step in the country assignment involves an analysis of assets by location. FTSE Russell cross-compares the primary location of the company’s assets with the three HCIs. If the primary location of assets matches any of the HCIs, then the company is assigned to its primary asset location.

If there is not enough information to determine a company’s primary location of assets, FTSE Russell uses the primary location of the company’s revenue for the same cross-comparison and assigns the company to the appropriate country in a similar fashion. FTSE Russell uses an average of two years of assets or revenue data for analysis to reduce potential turnover.

If conclusive country details cannot be derived from assets or revenue, FTSE Russell assigns the company to the country in which its headquarters are located unless the country is a Benefit Driven Incorporation (“**BDI**”) country. If the country in which its headquarters are located is a BDI country, the company is assigned to the country of its most liquid stock exchange. The BDI countries are Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bonaire, British Virgin Islands, Cayman Islands, Channel Islands, Cook Islands, Curacao, Faroe Islands, Gibraltar, Guernsey, Isle of Man, Jersey, Liberia, Marshall Islands, Panama, Saba, Sint Eustatius, Sint Maarten and Turks and Caicos Islands.

- *U.S. Eligible Exchange.* The following exchanges and markets are deemed to be eligible U.S. exchanges: the Chicago Board Options Exchange, the New York Stock Exchange, NYSE American, The Nasdaq Stock Market and NYSE Arca. Stocks that are not traded on an eligible U.S. exchange (Bulletin Board, Pink Sheet and over-the-counter securities, including securities for which prices are displayed on the FINRA Alternative Display Facility) are not eligible for inclusion.
- *Minimum Closing Price.* A stock must have a close price at or above \$1.00 (on its primary exchange), subject to exceptions to reduce turnover.
- *Minimum Total Market Capitalization.* Companies with a total market capitalization less than \$30 million are not eligible for inclusion.
- *Minimum Free Float.* Companies with 5.5% or less of their shares available in the marketplace are not eligible for inclusion.
- *Company Structure.* Companies structured in the following ways are not eligible for inclusion: royalty trusts, U.S. limited liability companies, closed-end investment companies, business development companies (and other companies that are required to report Acquired Fund Fees and Expenses, as defined by the SEC), blank-check companies, special-purpose acquisition companies (SPACs), limited partnerships, exchange-traded funds and mutual funds.
- *UBTI.* Real estate investment trusts and publicly traded partnerships that generate or have historically generated unrelated business taxable income (“**UBTI**”) and have not taken steps to block UBTI to equity holders are not eligible for inclusion. Information used to confirm UBTI impact includes the following publicly available sources: 10-K, SEC Form S-3, K-1, company annual report, dividend notices or company website.
- *Security Types.* The following types of securities are not eligible for inclusion: preferred and convertible preferred stock, redeemable shares, participating preferred stock, warrants, rights, installment receipts and trust receipts.
- *Minimum Voting Rights.* As of August 2017, more than 5% of a company’s voting rights (aggregated across all of its equity securities, including, where identifiable, those that are not listed or trading) must be in the hands of unrestricted shareholders. Existing constituents have a

5 year grandfathering period to comply or they will be removed from each applicable Russell Index in September 2022.

- *Multiple Share Classes.* If an eligible company trades under multiple share classes, each share class is reviewed independently for eligibility for inclusion. Share classes in addition to the primary share class must meet the following minimum size, liquidity and float requirements to be eligible: (i) total market capitalization must be larger than \$30 million; (ii) average daily dollar trading value must exceed that of the global median; and (iii) more than 5% of shares must be available in the marketplace.

Securities of eligible companies are included in Russell Indices based on total market capitalization. Total market capitalization is determined by multiplying total outstanding shares by the market price (generally, the last price traded on the primary exchange of the share class with the highest two-year trading volume, subject to exceptions) as of the rank day in May (except that IPOs are considered for inclusion on a quarterly basis). Common stock, non-restricted exchangeable shares and partnership units/membership interests (but not operating partnership units of umbrella partnership real estate investment trusts) are used to calculate a company's total market capitalization. If multiple share classes of common stock exist, they are combined to determine total shares outstanding; however, in cases where the common stock share classes act independently of each other (e.g., tracking stocks), each class is considered for inclusion separately. For merger and spin-off transactions that are effective between rank day in May and the Friday prior to annual reconstitution in June, the market capitalizations of the impacted securities are recalculated and membership is reevaluated as of the effective date of the corporate action.

The 4,000 securities with the greater total market capitalization become members of the Russell 3000E™ Index. All remaining Russell Indices are a subset of the Russell 3000E™ Index. Market capitalization breakpoints for the Russell Indices are determined by the breaks between the rankings of companies (based on descending total market capitalization). Market capitalization breakpoints for the Russell 3000® Index are determined by the break between the companies ranked #1 through #3,000. Market capitalization breakpoints for the Russell 1000® Index are determined by the break between the companies ranked #1 through #1,000. Market capitalization breakpoints for the Russell 2000® Index are determined by the break between the companies ranked #1,001 through #3,000. New members are assigned on the basis of the breakpoints, and existing members are reviewed to determine if they fall within a cumulative 5% market cap range around these new market capitalization breakpoints. If an existing member's market cap falls within this cumulative 5% of the market capitalization breakpoint, it will remain in its current index rather than be moved to a different Russell Index.

After membership is determined, a security's shares are adjusted to include only those shares available to the public ("**free float**"). The purpose of this adjustment is to exclude from market calculations the capitalization that is not available for purchase and is not part of the investable opportunity set. Stocks in the Russell Indices are weighted by their available (also called float-adjusted) market capitalization. The following types of shares are removed from total market capitalization to arrive at free float or available market capitalization, based on information recorded in SEC corporate filings: officers' and directors' holdings, private holdings exceeding 10% of shares outstanding, institutional holdings exceeding 30% of shares outstanding, shares held by publicly listed companies, shares held by an Employee Stock Ownership Plan or a Leveraged Employee Stock Ownership Plan; shares locked up during an IPO; direct government holdings; and indirect government holdings exceeding 10% of shares outstanding.

Reconstitution occurs on the last Friday in June. However, at times this date is too proximal to exchange closures and abbreviated exchange trading schedules when market liquidity is exceptionally low. In order to ensure proper liquidity in the markets, when the last Friday in June falls on the 29th or 30th, reconstitution will occur on the preceding Friday. A full calendar for reconstitution is made available each spring.

## Corporate Actions and Events Affecting the Russell Indices

FTSE Russell applies corporate actions to the Russell Indices on a daily basis. FTSE Russell applies the following methodology guidelines, among others, when adjusting the applicable Russell Index in response to corporate actions:

- *“No Replacement” Rule.* Securities that leave the relevant Russell Index for any reason (e.g., mergers, acquisitions or other similar corporate activity) are not replaced. Thus, the number of securities in the relevant Russell Index over a year will fluctuate according to corporate activity.
- *Statement of Principles and Adjustments for Specific Corporate Events.* FTSE Russell has stated as general principles that the treatment of corporate events (a) should reflect how such events are likely to be dealt with in investment portfolios to maintain the portfolio structure in line with the target set out in the index objective and index methodology and (b) should normally be designed to minimize the trading activity required by investors to match the index performance. No assurance can be provided that corporate actions and events will be treated by FTSE Russell in a manner consistent with its statement of general principles.

In addition, FTSE Russell has established guidance for the treatment of corporate actions and events, including, but not limited to, dividends, capital repayments, companies converting to a REIT structure, share buybacks, rights issues, mergers, acquisitions, tender offers, split-offs, spin-offs, bankruptcies, insolvencies, liquidations and trading suspensions. However, because of the complexities involved in some cases, those guidelines are not definitive rules that will determine FTSE Russell's actions in all circumstances. FTSE Russell reserves the right to determine the most appropriate method of implementation for any corporate event which is not covered by those guidelines or which is of a complex nature.

- *Changes to Shares Outstanding and Free Float.* Each Russell Index will be reviewed quarterly for updates to shares outstanding and to free floats used within the calculation of each Russell Index. In March, September and December, shares outstanding and free float will be updated to reflect changes greater than 1% for cumulative shares in issue changes and changes greater than 3% (or 1%, for constituents with a free float of 15% or below) for cumulative free float changes. In June the shares and free float updates will be implemented regardless of size. Shares and free float updates can be triggered in some cases by certain events, such as some primary or secondary offerings.

## Disclaimers

The notes are not sponsored, endorsed, sold, or promoted by London Stock Exchange Group plc or its affiliates (collectively, “LSE”) or any successor thereto or index owner and neither LSE nor any party hereto makes any representation or warranty whatsoever, whether express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly or the ability of the Russell Indices to track general stock market performance or a segment of the same. LSE's publication of the Russell Indices in no way suggests or implies an opinion by LSE as to the advisability of investment in any or all of the securities upon which the Russell Indices are based. LSE's only relationship to the Issuer, the Guarantor (if applicable) and their affiliates is the licensing of certain trademarks and trade names of LSE and of the Russell Indices, which are determined, composed and calculated by LSE without regard to the Issuer, the Guarantor (if applicable) and their affiliates or the notes. LSE is not responsible for and has not reviewed the notes or any associated literature or publications and LSE makes no representation or warranty express or implied as to their accuracy or completeness, or otherwise. LSE reserves the right, at any time and without notice, to alter, amend, terminate or in any way change the Russell Indices. LSE has no obligation or liability in connection with the administration, marketing or trading of the notes.

“Russell 1000® Index,” “Russell 2000® Index,” “Russell 3000® Index” and “Russell 3000E™ Index” are trademarks of LSE and have been licensed for use by JPMorgan Chase Bank, National Association and

its affiliates. This transaction is not sponsored, endorsed, sold, or promoted by LSE and LSE makes no representation regarding the advisability of entering into this transaction.

**LSE DOES NOT GUARANTEE THE ACCURACY AND/OR THE COMPLETENESS OF THE RUSSELL INDICES OR ANY DATA INCLUDED THEREIN AND LSE SHALL HAVE NO LIABILITY FOR ANY ERRORS, OMISSIONS, OR INTERRUPTIONS THEREIN. LSE MAKES NO WARRANTY, EXPRESS OR IMPLIED, AS TO RESULTS TO BE OBTAINED BY THE ISSUER, THE GUARANTOR (IF APPLICABLE) AND/OR THEIR AFFILIATES, INVESTORS, OWNERS OF THE PRODUCT(S), OR ANY OTHER PERSON OR ENTITY FROM THE USE OF THE RUSSELL INDICES OR ANY DATA INCLUDED THEREIN. LSE MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE RUSSELL INDICES OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT SHALL LSE HAVE ANY LIABILITY FOR ANY SPECIAL, PUNITIVE, INDIRECT, OR CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS), EVEN IF NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES.**

## THE S&P/ASX 200 INDEX

All information contained in this underlying supplement regarding the S&P/ASX 200 Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (“**S&P Dow Jones**”). The S&P/ASX 200 Index is calculated, maintained and published by S&P Dow Jones. S&P Dow Jones has no obligation to continue to publish, and may discontinue publication of, the S&P/ASX 200 Index. The S&P/ASX 200 Index is reported by Bloomberg L.P. under the ticker symbol “AS51.”

### Composition of the S&P/ASX 200 Index

The S&P/ASX 200 Index is designed to be the primary gauge for the Australian equity market, and it is recognized as an investable benchmark in Australia. The S&P/ASX 200 Index measures the performance of the 200 largest and most liquid index-eligible stocks listed on the Australian Securities Exchange (the “**ASX**”) by float-adjusted market capitalization.

The S&P/ASX 200 Index weights companies according to the Global Industry Classification Standard (“**GICS**®”), which creates uniform ground rules for replicable, custom-tailored, industry-focused portfolios. It also enables meaningful comparisons of sectors and industries across regions.

### Eligibility Criteria

The index companies are drawn from the universe of ordinary and preferred equity stocks listed on ASX. The criteria for index additions include, but are not limited to:

- *Listing.* Only securities listed on the ASX are considered for inclusion in the S&P/ASX 200 Index;
- *Eligible Securities.* Common and equity preferred stocks (which are not of a fixed income nature) are eligible for inclusion in the S&P/ASX 200 Index. Hybrid stocks, such as convertible stock, bonds, warrants and preferred stock that provide a guaranteed fixed return, are not eligible. Listed investment companies (LICs) that invest in a portfolio of securities are not eligible. Companies that are currently under consideration for merger or acquisition are not eligible.
- *Market Capitalization.* The market capitalization criterion for stock inclusion is based upon the daily average market capitalization of a security over the last six months. The stock price history (last six months), latest available shares on issue and the investable weight factor (“**IWF**”) are the relevant variables for the calculation. The IWF is a variable that is primarily used to determine the available float of a security for ASX listed securities; and
- *Liquidity.* Only securities that are regularly traded are eligible for inclusion in the S&P/ASX 200 Index. A stock's liquidity is measured relative to its peers. Relative Liquidity is calculated as follows:

$$\text{Relative Liquidity} = \frac{\text{Stock Median Liquidity}}{\text{Market Liquidity}}$$

Where:

- Stock Median Liquidity is the median daily value traded for each stock divided by the average float/index weight-adjusted market capitalization for the previous six months; and
- Market Liquidity is determined using the market capitalization weighted average of the stock median liquidities of the 500 companies in the All Ordinaries Index, an index that includes nearly all ordinary shares listed on the ASX.



Stocks must have a minimum Relative Liquidity of 50% to be included in the S&P/ASX 200 Index. Should a stock's Relative Liquidity drop below half of this level at a quarterly review, it may be considered for removal.

**Rebalancing.** Rebalancing of the S&P/ASX 200 Index occurs on a regular basis. Both market capitalization and liquidity are assessed using the previous six months' worth of ASX trading data to determine index eligibility. Shares and IWFs updates are also applied regularly. The reference date used for the six months' worth of trading data is the last Friday of the month prior to the rebalancing, except for the September rebalancing where the reference date for data used is the second to last Friday of August.

**Frequency.** The S&P/ASX 200 Index constituents are rebalanced quarterly to ensure adequate market capitalization and liquidity. Quarterly rebalancing changes take effect after the market close on the third Friday of March, June, September and December.

**Buffers.** In order to limit the level of index turnover, eligible non-constituent securities will generally only be considered for index inclusion once a current constituent stock is excluded due to a sufficiently low rank and/or liquidity, based on the float-adjusted market capitalization. Potential index inclusions and exclusions need to satisfy a buffer requirement in terms of the rank of the stock relative to the S&P/ASX 200 Index. The following buffer aims to limit the level of index turnover that may take place at each quarterly rebalancing, maximizing the efficiency and limiting the cost associated with holding the index portfolio.

<b>Addition</b>	<b>Rank Buffer for Deletion</b>
179 <sup>th</sup> or higher	221 <sup>st</sup> or lower

This float-adjusted market capitalization rank buffer serves as the guideline used by the S&P/ASX Index Committee to arrive at any potential constituent changes to the S&P/ASX 200 Index. However, the S&P/ASX Index Committee has complete discretion to by-pass these rules when circumstances warrant.

**Intra-Quarter Additions/Deletions.** Between rebalancing dates, an addition to the S&P/ASX 200 Index is generally made only if a vacancy is created by an index deletion. Index additions are made according to market size and liquidity. An initial public offering is added to the S&P/ASX 200 Index only when an appropriate vacancy occurs and is subject to proven liquidity for at least eight weeks. An exception may be made for extraordinary large offerings where sizeable trading volumes justify inclusion. An addition is made as soon as a place has been vacated due to an index deletion. Deletions can occur between index rebalancing dates due to acquisitions, mergers and spin-offs or due to suspension or bankruptcies. The decision to remove a stock from the S&P/ASX 200 Index will be made once there is sufficient evidence that the transaction will be completed. Stocks that are removed due to mergers & acquisitions activity are removed from the S&P/ASX 200 Index at the cash offer price for cash-only offers. Otherwise the best available price in the market is used.

**Share Updates.** The share count for all index constituents are reviewed quarterly and are rounded to the nearest thousand ('000) for all Australian stocks. Updates will be made to the number of shares outstanding if the difference between the current number of shares used and the latest figure quoted by the ASX differs by 5% or more, as at the quarterly rebalance reference date. Intra-quarter share changes are implemented at the effective date or as soon as reliable information is available; however, they will only take place in the following circumstances:

- Changes in a company's shares outstanding of 5% or more due to market-wide shares issuance or major off-market buy-backs;
- Rights issues, bonus issues and other major corporate actions; and
- Share issues resulting from index companies merging.

Share changes due to mergers or acquisitions are implemented when the transaction occurs, even if both of the companies are not in the S&P/ASX 200 Index and regardless of the size of the change.

Notification of intra-quarter changes to the number of issued shares generally takes place three business days prior to the implementation date.

### **Calculation of the S&P/ASX 200 Index**

The S&P/ASX 200 Index is calculated using a base-weighted aggregate methodology so that the level of the S&P/ASX 200 Index reflects the total market value of all the component stocks relative to a particular base period. The total market value of a company is determined by multiplying the price of its stock by the number of shares available after float (IWF) adjustment. An indexed number is used to represent the result of this calculation in order to make the value easier to work with and track over time.

**Investable Weight Factor (IWF).** A stock's weight in the S&P/ASX 200 Index is determined by the float-adjusted market capitalization of the stock. The number of shares outstanding is reduced to exclude closely held shares from the index calculation because such shares are not available to investors. The S&P/ASX 200 Index calculates an IWF, which is the percentage of total shares outstanding that are included in the index calculation. All constituents in the S&P/ASX 200 Index are assigned an IWF. A company must have a minimum IWF of 0.3 to be eligible for index inclusion, however an IWF at or above that level is not necessary for ongoing index membership. IWFs are reviewed annually as part of the September quarterly review. However, any event that alters the float of a security in excess of 5% will be implemented as soon as practicable by an adjustment to the IWF.

On any given day, the S&P/ASX 200 Index value is the quotient of the total available market capitalization of its constituents and its divisor. The key to index maintenance is the adjustment of the divisor. The purpose of the index divisor is to maintain the continuity of an index level following the implementation of corporate actions, index rebalancing events, or other non-market driven actions. Index maintenance — reflecting changes in shares outstanding, corporate actions, addition or deletion of stocks to the S&P/ASX 200 Index — should not change the level of the S&P/ASX 200 Index. Any change to the stocks in the S&P/ASX 200 Index that alters the total market value of the S&P/ASX 200 Index while holding stock prices constant will require a divisor adjustment.

### **Index Governance**

The S&P/ASX 200 Index is maintained by the S&P/ASX Index Committee. S&P Dow Jones chairs the S&P/ASX Index Committee, which is comprised of five voting members representing both S&P Dow Jones and the ASX.

The S&P/ASX Index Committee meets regularly to review market developments and convenes as needed to address major corporate actions. At each meeting, the S&P/ASX Index Committee may review pending corporate actions that may affect index constituents, statistics comparing the composition of the S&P/ASX 200 Index to the market, companies that are being considered as candidates for addition to the S&P/ASX 200 Index, and any significant market events. In addition, the S&P/ASX Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

The S&P/ASX 200 Index Committee reserves the right to make exceptions when applying the methodology if the need arises. At least once within any twelve-month period, the S&P/ASX Index Committee reviews the methodology to ensure that the S&P/ASX 200 Index continues to achieve the stated objectives, and that the data and methodology remain effective.

### **License Agreement**

JPMorgan Chase & Co. or its affiliate has entered into an agreement with S&P Dow Jones that provides it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive

license and, for a fee, with the right to use the S&P/ASX 200 Index, which is owned and published by S&P Dow Jones, in connection with certain securities, including the notes.

The notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones or its third party licensors. Neither S&P Dow Jones nor its third party licensors makes any representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly or the ability of the S&P/ASX 200 Index to track general stock market performance. S&P Dow Jones' and its third party licensors' only relationship to the Issuer or the Guarantor (if applicable) is the licensing of certain trademarks and trade names of S&P Dow Jones and the third party licensors and of the S&P/ASX 200 Index, which is determined, composed and calculated by S&P Dow Jones or its third party licensors without regard to the Issuer or the Guarantor (if applicable) or the notes. S&P Dow Jones and its third party licensors have no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the owners of the notes into consideration in determining, composing or calculating the S&P/ASX 200 Index. Neither S&P Dow Jones nor its third party licensors is responsible for and has not participated in the determination of the prices and amount of the notes or the timing of the issuance or sale of the notes or in the determination or calculation of the equation by which the notes are to be converted into cash. S&P Dow Jones has no obligation or liability in connection with the administration, marketing or trading of the notes. There is no assurance that investment products based on the S&P/ASX 200 Index will accurately track the S&P/ASX 200 Index's performance or provide positive investment returns. S&P Dow Jones, its subsidiaries and their third party licensors are not investment advisors. Inclusion of a security within the S&P/ASX 200 Index is not a recommendation by S&P Dow Jones to buy, sell or hold such security, nor is it considered to be investment advice.

**NEITHER S&P DOW JONES, ITS AFFILIATES NOR THEIR THIRD PARTY LICENSORS GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS OR COMPLETENESS OF THE S&P/ASX 200 INDEX OR ANY DATA RELATED THERETO OR ANY COMMUNICATIONS, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATIONS (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES, ITS AFFILIATES AND THEIR THIRD PARTY LICENSORS SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS OR DELAYS THEREIN. S&P DOW JONES MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE OR AS TO ANY RESULTS TO BE OBTAINED BY US, OWNERS OF THE NOTES, OR ANY OTHER PERSON OR ENTITY FROM THE USE OF THE S&P/ASX 200 INDEX OR ANY DATA RELATED THERETO. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES, ITS AFFILIATES OR THEIR THIRD PARTY LICENSORS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE.**

"Standard & Poor's," "S&P" and "S&P/ASX 200" are trademarks of Standard & Poor's Financial Services LLC and have been licensed for use by JPMorgan Chase & Co. and its affiliates, including JPMorgan Financial.

## THE S&P 500® LOW VOLATILITY HIGH DIVIDEND INDEX

All information contained in this underlying supplement regarding the S&P 500® Low Volatility High Dividend Index (the “**Low Volatility High Dividend Index**”), including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (“**S&P Dow Jones**”). The Low Volatility High Dividend Index is calculated, maintained and published by S&P Dow Jones. S&P Dow Jones has no obligation to continue to publish, and may discontinue the publication of, the Low Volatility High Dividend Index.

The Low Volatility High Dividend Index began publishing on September 17, 2012 and has a base date of January 31, 1990 and a base value of 1,000. The price return of the Low Volatility High Dividend Index is reported by Bloomberg, L.P. under the ticker symbol “SP5LVHD.”

The Low Volatility High Dividend Index is a modified dividend yield-weighted index that is designed to measure the performance of the 50 least-volatile among the 75 highest dividend-yielding companies in the S&P 500® Index, subject to sector and individual constituent concentration limits. Although the Low Volatility High Dividend Index measures the performance of high dividend-yielding companies, it is a price return index and, therefore, the return on the Low Volatility High Dividend Index will not include any dividends paid on the securities that make up the Low Volatility High Dividend Index.

### Index Constituent Selection

To be eligible for inclusion in the Low Volatility High Dividend Index, a stock must be a constituent of the S&P 500® Index. For additional information about the S&P 500® Index, including the methodology for inclusion in the S&P 500® Index, see “Equity Index Descriptions – The S&P U.S. Indices – The S&P 500® Index” in this underlying supplement.

S&P Dow Jones first selects the stocks to be included in the Low Volatility High Dividend Index and then weights those constituents. Generally, a stock must have been issued and trading on all trading days in the 12 months leading up to the rebalancing reference date to be included in the Low Volatility High Dividend Index. Some companies may have more than one share class or more than one listing in the S&P 500® Index. In the Low Volatility High Dividend Index, each company is represented once by the primary listing, which is generally the most liquid share class. S&P Dow Jones selects the stocks to be included in the Low Volatility High Dividend Index by ranking the stocks in the S&P 500® Index in descending order by their 12-month trailing dividend yield. Dividend yield is calculated by dividing each stock's dividends per share for the prior 12 months by the stock price as of the rebalancing reference date. Special dividends are not considered in the calculation of dividend yields. The 75 stocks with the highest dividend yield are selected, with the number of stocks from each Global Industry Classification Standard (“**GICS**®”) sector capped at 10. If the number of stocks from a GICS® sector reaches 10, the remaining highest yielding stocks from other sectors are selected until the number of selected stocks reaches 75. Using available price return data for the trailing 252 trading day leading up to the rebalancing reference date, the realized volatilities of these stocks are calculated. Realized volatility is defined as the standard deviation of the stock's daily price returns over the prior 252 trading days. Those stocks are then ranked in ascending order based on their realized volatility. The 50 stocks with the lowest realized volatility form the Low Volatility High Dividend Index.

At times, a company may appear to temporarily violate one or more of the addition criteria. However, the addition criteria are for addition to the Low Volatility High Dividend Index, not for continued membership. As a result, an index constituent that appears to violate criteria for addition to the Low Volatility High Dividend Index is not deleted unless ongoing conditions warrant an index change.

At the discretion of S&P Dow Jones, a stock may be excluded from the Low Volatility High Dividend Index, or not considered for membership, at a semi-annual rebalancing if S&P Dow Jones determines the stock's dividend yield to be unsustainable.

Except for major corporate actions, such as mergers and spin-offs, additions and deletions of stocks generally only take place at the time of the reconstitution. In addition, constituents removed from the S&P 500® Index are also removed from the Low Volatility High Dividend Index simultaneously.

## Index Rebalancing

The Low Volatility High Dividend Index is rebalanced after the close of the last business day of January and July based on market data from the rebalancing reference dates, which are the last business day of December and June, respectively. The constituents' shares are calculated using closing prices five business days prior to the rebalancing date as the reference price. The constituents' shares are calculated and assigned to each stock to arrive at the weights determined on the rebalancing reference date.

The S&P Dow Jones' U.S. Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any change will be announced with proper advance notice where possible.

## Index Calculation and Governance

The Low Volatility High Dividend Index is calculated using the same methodology as the S&P 500<sup>®</sup> Index, except that the constituents of the S&P 500<sup>®</sup> Low Volatility High Dividend Index are weighted by dividend yield. In addition, at each rebalancing, modifications are made to stock weights to increase diversification across individual stocks and sectors. The weight for each constituent of the S&P 500<sup>®</sup> Low Volatility High Dividend Index is constrained between 0.05% and 3.0%, and the weight of each GICS<sup>®</sup> sector is capped at 25%. The Low Volatility High Dividend Index is governed using the same methodology as the S&P 500<sup>®</sup> Index. For additional information about the calculation and governance of the S&P 500<sup>®</sup> Index, see "Equity Index Descriptions – The S&P U.S. Indices – The S&P 500<sup>®</sup> Index" in this underlying supplement.

## Corporate Actions

The table below summarizes types of index maintenance adjustments and indicates whether or not a divisor adjustment is required.

Type of Corporate Action	Adjustment Made to Index	Divisor Adjustment
Spin-off	The spun-off company is added to the Low Volatility High Dividend Index of which the parent is a constituent, at a zero price at the market close of the day before the ex-date (with no divisor adjustment). The spun-off company is then removed after at least one day of regular way trading (with a divisor adjustment).	See "Adjustment Made to Index"
Rights offering	The price is adjusted to the price of the parent company minus (the price of the rights offering/rights ratio). Index shares change so that the company's weight remains the same as its weight before the rights offering.	No
Stock dividend, stock split, reverse stock split	Index shares are multiplied by and price is divided by the split factor.	No
Share issuance, share repurchase, equity offering or warrant conversion	None.	No
Special dividends	Price of the stock making the special dividend payment is reduced by the per share special dividend amount after the close of trading on the day before the dividend ex-date.	No
Constituent change	There are no intra-rebalancing additions.	—

Type of Corporate Action	Adjustment Made to Index	Divisor Adjustment
	Deletions due to delistings, acquisition or any other corporate event resulting in the deletion of the stock from the index causes the weights of the rest of the stocks in the index to change. Relative weights stay the same.	Yes

### Other Adjustments

In cases where there is no achievable market price for a stock being deleted, it may be removed at a zero or minimal price at the S&P Dow Jones' U.S. Index Committee's discretion, in recognition of the constraints faced by investors in trading bankrupt or suspended stocks.

### License Agreement

S&P Dow Jones and J.P. Morgan Securities LLC have entered into a non-exclusive license agreement providing for the sub-license to us, and certain of our affiliated or subsidiary companies, in exchange for a fee, of the right to use the S&P 500® Low Volatility High Dividend Index, which is owned and published by S&P Dow Jones, in connection with certain financial products, including the notes.

The notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones or its third party licensors. Neither S&P Dow Jones nor its third party licensors makes any representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in financial products generally or in the notes particularly or the ability of the S&P 500® Low Volatility High Dividend Index to track general stock market performance. S&P Dow Jones' and its third party licensor's only relationship to JPMorgan Chase Bank, N.A. is the licensing of certain trademarks and trade names of S&P Dow Jones and the third party licensors and of the S&P 500® Low Volatility High Dividend Index which is determined, composed and calculated by S&P Dow Jones or its third party licensors without regard to JPMorgan Chase Bank, N.A. or the notes. S&P Dow Jones and its third party licensors have no obligation to take the needs of JPMorgan Chase Bank, N.A. or the owners of the notes into consideration in determining, composing or calculating the S&P 500® Low Volatility High Dividend Index. Neither S&P Dow Jones nor its third party licensors is responsible for and has not participated in the determination of the prices and amount of the notes or the timing of the issuance or sale of the notes or in the determination or calculation of the equation by which the notes are to be converted into cash. S&P Dow Jones has no obligation or liability in connection with the administration, marketing or trading of the notes.

**NEITHER S&P DOW JONES, ITS AFFILIATES NOR THEIR THIRD PARTY LICENSORS GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS OR COMPLETENESS OF THE S&P 500® LOW VOLATILITY HIGH DIVIDEND INDEX OR ANY DATA INCLUDED THEREIN OR ANY COMMUNICATIONS, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATIONS (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES, ITS AFFILIATES AND THEIR THIRD PARTY LICENSORS SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS OR DELAYS THEREIN. S&P DOW JONES MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE MARKS, THE S&P 500® LOW VOLATILITY HIGH DIVIDEND INDEX OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES, ITS AFFILIATES OR THEIR THIRD PARTY LICENSORS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE.**

"Standard & Poor's," "S&P" and "S&P 500" are trademarks of Standard & Poor's and have been licensed for use by J.P. Morgan Securities LLC and sub-licensed for use by JPMorgan Chase Bank, N.A.

## THE S&P SELECT INDUSTRY INDICES

All information contained in this underlying supplement regarding the S&P® Homebuilders Select Industry™ Index, the S&P Banks Select Industry™ Index, the S&P® Biotechnology Select Industry™ Index, the S&P® Metals & Mining Select Industry™ Index, the S&P® Oil & Gas Exploration & Production Select Industry™ Index, the S&P® Regional Banks Select Industry™ Index and the S&P® Retail Select Industry™ Index (each, a “**Select Industry Index**” and collectively, the “**Select Industry Indices**”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (“**S&P Dow Jones**”). S&P Dow Jones has no obligation to continue to calculate and publish, and may discontinue calculation and publication of, the Select Industry Indices.

The Select Industry Indices are modified equal-weighted indices that are designed to measure the performance of stocks composing specific GICS® sub-industries or groups of sub-industries in the S&P Total Market Index (the “**S&P TM Index**”). Membership is based on a company’s GICS® classification, as well as liquidity and market capitalization requirements.

### The S&P Total Market Index

The S&P TM Index offers broad market exposure to companies of all market capitalization, including all U.S. common equities with a primary listing on the New York Stock Exchange, NYSE Arca, NYSE American, Nasdaq Global Select Market, Nasdaq Select Market, Nasdaq Capital Market, Cboe BZX, Cboe BYX, Cboe EDGA, Cboe EDGX or IEX exchanges. Only U.S. companies are eligible for inclusion in the S&P TM Index.

### The S&P® Banks Select Industry™ Index

The S&P® Banks Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the following GICS® sub-industries of the S&P TM Index: asset management & custody banks (must also meet the North American Industry Classification of depository credit intermediation); diversified banks; regional banks; other diversified financial services; and thrifts & mortgage finance. The S&P® Banks Select Industry™ Index is reported by Bloomberg L.P. under the ticker symbol “SPSIBK.”

### The S&P® Biotechnology Select Industry™ Index

The S&P® Biotechnology Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the GICS® biotechnology sub-industry of the S&P TM Index. The S&P® Biotechnology Select Industry™ Index may also include companies in the following supplementary sub-industry: life sciences tools & services. The S&P® Biotechnology Select Industry™ Index is reported by Bloomberg L.P. under the ticker symbol “SPSIBI.”

### The S&P® Homebuilders Select Industry™ Index

The S&P® Homebuilders Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the GICS® homebuilding sub-industry of the S&P TM Index. The S&P® Homebuilders Select Industry™ Index may also include companies in the following supplementary GICS® sub-industries: building products; home furnishings; home improvement retail; homefurnishing retail and household appliances. The S&P® Homebuilders Select Industry™ Index is reported by Bloomberg L.P. under the ticker symbol “SPSIHO.”

### The S&P® Metals & Mining Select Industry™ Index

The S&P® Metals & Mining Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the following GICS® sub-industries of the S&P TM Index: aluminum; coal & consumable fuels; copper; diversified metals & mining; gold; precious metals &

minerals; silver and steel. The S&P® Metals & Mining Select Industry™ Index is reported by Bloomberg L.P. under the ticker symbol “SPSIMM.”

### **The S&P® Oil & Gas Exploration & Production Select Industry™ Index**

The S&P® Oil & Gas Exploration & Production Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the following GICS® sub-industries of the S&P TM Index: integrated oil & gas; oil & gas exploration & production; and oil & gas refining & marketing. The S&P® Oil & Gas Exploration & Production Select Industry™ Index is reported by Bloomberg under the ticker symbol “SPSIOP.”

### **The S&P® Regional Banks Select Industry™ Index**

The S&P® Regional Banks Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the GICS® regional banks sub-industry of the S&P TM Index. The S&P® Regional Banks Select Industry™ Index is reported by Bloomberg L.P. under the ticker symbol “SPSIRBK.”

### **The S&P® Retail Select Industry™ Index**

The S&P® Retail Select Industry™ Index is a modified equal-weighted index that is designed to measure the performance of the following GICS® sub-industries of the S&P TM Index: apparel retail; automotive retail; computer & electronic retail; department stores; drug retail; food retailers; general merchandise stores; hypermarkets & super centers; internet & direct marketing retail; and specialty stores. The S&P® Retail Select Industry™ Index is reported by Bloomberg L.P. under the ticker symbol “SPSIRE.”

### **Index Eligibility**

To qualify for membership in a Select Industry Index, at each quarterly rebalancing, a company must satisfy the following criteria:

1. be a member of the S&P TMI;
2. be included in the relevant GICS® sub-industries for the applicable Select Industry Index (stocks included in such sub-industry, “**primary stocks**”);
3. meet one of the following float-adjusted market capitalization and float-adjusted liquidity ratio requirements:
  - a. be a current constituent, have a float-adjusted market capitalization greater than or equal to US\$ 300 million, and have a float-adjusted liquidity ratio greater than or equal to 50%;
  - b. have a float-adjusted market capitalization greater than or equal to US\$ 500 million and a float-adjusted liquidity ratio greater than or equal to 90%; or
  - c. have a float-adjusted market capitalization greater than or equal to US\$ 400 million and a float-adjusted liquidity ratio greater than or equal to 150%.

Notwithstanding the foregoing, to be eligible for inclusion in the S&P® Banks Select Industry Index, a company's float-adjusted market capitalization must be above \$2 billion and its float-adjusted liquidity ratio must be above 100%, and existing index constituents of the S&P® Banks Select Industry Index are removed at the quarterly rebalancing date if either their float-adjusted market capitalization falls below \$1 billion or their float-adjusted liquidity ratio falls below 50%.

In the event that fewer than 35 stocks are selected for each Select Industry Index using the eligible primary stocks, certain indices, will select stocks for inclusion from a supplementary list of highly correlated sub-industries (supplementary stocks) based on process established by S&P Dow Jones.



Additionally, minimum float-adjusted market capitalization requirements may be relaxed for all Select Industry Indices to ensure that there are at least 22 stocks in each Select Industry Index as of each rebalancing effective date.

*Liquidity.* The liquidity measurement used is a float-adjusted liquidity ratio (FALR), defined as dollar value traded over the previous 12-months divided by the float-adjusted market capitalization as of the applicable rebalancing reference date.

The length of time to evaluate liquidity is reduced to the available trading period for IPOs or spin-offs that do not have 12 months of trading history. In these cases, the dollar value traded available as of the rebalancing reference date is annualized.

*Takeover Restrictions.* At the discretion of S&P Dow Jones, constituents with shareholder ownership restrictions defined in company bylaws may be deemed ineligible for inclusion in a Select Industry Index. Ownership restrictions preventing entities from replicating the index weight of a stock may be excluded from the eligible universe or removed from the applicable Select Industry Index. S&P Dow Jones will provide up to five days advance notification of a deletion between rebalancings due to ownership restrictions.

*Multiple Share Classes.* Each company in the Select Industry Indices is represented once by the primary listing, which is generally the most liquid share line.

## Index Construction and Calculations

The Select Industry Indices are equal-weighted, with adjustments to individual constituent weights to ensure concentration and liquidity requirements, and calculated by the divisor methodology.

The index value of each Select Industry Index is simply the market value of that Select Industry Index divided by the index divisor:

$$\text{Index Value} = (\text{Index Market Value}) / \text{Divisor}$$

$$\text{Index Market Value} = \sum_{i=1}^N P_i \times \text{Shares}_i \times \text{IWF}_i \times \text{AWF}_i$$

where N is the number of stocks in the index,  $P_i$  the price of stock i,  $\text{Shares}_i$  is total shares outstanding of stock i,  $\text{IWF}_i$  is the float factor of stock i (as defined below), and  $\text{AWF}_i$  is the adjustment factor of stock i assigned at each index rebalancing date, t, which makes all index constituents modified market capitalization equal (and, therefore, equal weight), while maintaining the total market value of the overall index. The AWF for each index constituent, i, at rebalancing date, t, is calculated by:

$$\text{AWF}_{i,t} = Z / N \times \text{FloatAdjustedMarketValue}_{i,t}$$

where Z is an index specific constant set for the purpose of deriving the AWF and, therefore, each stock's share count used in the index calculation (often referred to as modified index shares).

*Float Adjustment.* Float adjustment means that the number of shares outstanding is reduced to exclude closely held shares from the calculation of the index value because such shares are not available to investors. The goal of float adjustment is to distinguish between long-term, strategic shareholders, whose holdings depend on concerns such as maintaining control rather than the shorter term economic fortunes of the company, and shareholders who are considered more short-term in nature. Generally, these long-term strategic shareholders include, but are not limited to, officers and directors, private equity, venture capital & special equity firms, asset managers and insurance companies with board of director representation, other publicly traded companies that hold shares, holders of restricted shares, company-sponsored employee share plans/trusts, defined contribution plans/savings, and investment plans, foundations or family trusts associated with the company, government entities at all levels (other than government retirement/pension funds), sovereign wealth funds and any individual person who controls a 5% or greater stake in a company as reported in regulatory filings. Restricted shares are generally not

included in total shares outstanding except for shares held as part of a lock-up agreement. Shares that are not considered outstanding are also not included in the available float. These generally include treasury stock, stock options, equity participation units, warrants, preferred stock, convertible stock and rights.

For each component, S&P Dow Jones calculates an Investable Weight Factor (“**IWF**”), which represents the portion of the total shares outstanding that are considered part of the public float for purposes of the relevant Select Industry Index.

*Divisor.* Continuity in index values of each Select Industry Index is maintained by adjusting its divisor for all changes in its constituents’ share capital after its base date. This includes additions and deletions to the relevant Select Industry Index, rights issues, share buybacks and issuances and non-zero price spin-offs. The value of each Select Industry Index’s divisor over time is, in effect, a chronological summary of all changes affecting the base capital of that Select Industry Index. The divisor of each Select Industry Index is adjusted such that the index value of that Select Industry Index at an instant just prior to a change in base capital equals the index value of that Select Industry Index at an instant immediately following that change.

### **Constituent Weightings**

At each quarterly rebalancing, companies are initially equally weighted using closing prices as of the second Friday of the last month of the quarter as the reference price. Adjustments are then made to ensure that there are no individual constituents whose weight in the applicable Select Industry Index exceeds the value that can be traded in a single day for a given theoretical portfolio value ranging from U.S. \$500 million to U.S. \$2,000 million (the “**Theoretical Portfolio Value**”). Theoretical Portfolio Values are determined and reviewed annually by The Americas Thematic and Strategy Index Committee (the “**Index Committee**”) at S&P Dow Jones. Any updates to Theoretical Portfolio Values are made at the discretion of the Index Committee and announced to the clients with ample lead time.

S&P Dow Jones calculates a maximum basket liquidity weight for each constituent in the applicable Select Industry Index using the ratio of its three-month median daily value traded to the Theoretical Portfolio Value. Each constituent’s weight in the applicable Select Industry Index is then, compared to its maximum basket liquidity weight and is set to the lesser of its maximum basket liquidity weight or its initial equal weight. All excess weight is redistributed across the applicable Select Industry Index to the uncapped stocks. If necessary, a final adjustment is made to ensure that no stock in the applicable Select Industry Index has a weight greater than 4.5%. This step of the iterative weighting process may force the weight of those stocks limited to their maximum basket liquidity weight to exceed that weight. In such cases, S&P Dow Jones will make no further adjustments. If any of the Select Industry Indices contain exactly 22 stocks as of the rebalancing effective date, the applicable Select Industry Index is equally weighted without basket liquidity constraints.

### **Index Maintenance**

The membership to the Select Industry Indices is reviewed quarterly. Rebalancings occur after the closing on the third Friday of the quarter ending month. The reference date for additions and deletions is after the closing of the last trading date of the previous month. Closing prices as of the second Friday of the last month of the quarter are used for setting index weights. The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced by S&P Dow Jones with proper advance notice where possible.

### **Timing of Changes**

- *Additions.* Stocks are added between rebalancings only if a deletion in the applicable Select Industry Index causes the stock count to fall below 22. In those cases, each stock deletion is accompanied with a stock addition. The new stock will be added to the applicable Select Industry Index at the weight of the deleted company. In the case of mergers involving two index

constituents, the merged entity will remain in the applicable Select Industry Index provided that it meets all general eligibility requirements. The merged entity will be added to the applicable Select Industry Index at the weight of the stock deemed to be the surviving stock in the transaction (*i.e.*, the surviving stock will not experience a weight change and its subsequent weight will not be equal to that of the pre-merger weight of the merged entities). In the case of spin-offs, the applicable Select Industry Index will follow the S&P TM Index's treatment of the action.

- **Deletions.** A stock is deleted from the applicable Select Industry Index if the S&P TM Index drops the company. If a stock deletion causes the number of stocks in the relevant index to fall below 22, each stock deletion is accompanied with a corresponding stock addition. In case of GICS® changes, where a company does not belong to a qualifying sub-industry after the classification change, it is removed from the applicable Select Industry Index at the next rebalancing.

## Adjustments

The tables below summarize the types of index maintenance adjustments and indicate whether or not an index adjustment is required.

### *S&P TM Index Actions*

<b>S&amp;P TM Index Action</b>	<b>Adjustment Made to a Select Industry Index</b>	<b>Divisor Adjustment</b>
Constituent deletion	If the constituent is a member of a Select Industry Index, it is dropped.	Yes
Constituent addition	Only in cases where the deletion causes the stock count to fall below 22 stocks, then the deletion is accompanied by an addition assuming the weight of the dropped stock.  If a stock is removed from a Select Industry Index at a price of \$0.00, the stock's replacement will be added to the applicable Select Industry Index at the weight using the previous day's closing value, or the most immediate prior business day that the deleted stock was not valued at \$0.00.  In the case of additions due to spin-offs, the Select Industry Indices follow the S&P TM Index's treatment of the action.	No, except in the case of stocks removed at \$0.00
GICS® change	None. If, after the GICS® change, a stock no longer qualifies to belong to a Select Industry Index, it is removed at the next rebalancing.	No

## Corporate Actions

Type of Corporate Action	Adjustment Made to a Select Industry Index	Divisor Adjustment
Spin-off	In general, both the parent stock and spun-off stocks will remain in the applicable Select Industry Index until the next index rebalancing, regardless of whether they conform to the theme of the applicable Select Industry Index.	No
Rights offering	The price is adjusted to the price of the parent company minus (the price of the rights subscription/rights ratio). The index shares change so that the company's weight remains the same as its weight before the rights offering.	No
Stock dividend, stock split or reverse stock split	The index shares are multiplied by and price is divided by the split factor.	No
Share issuance or share repurchase	None	No
Special dividends	Price of the stock making the special dividend payment is reduced by the per share special dividend amount after the close of trading on the day before the dividend ex-date.	Yes

## Index Committee

The Index Committee maintains the S&P Select Industry Indices. All committee members are full-time professional members of S&P Dow Jones' staff. The committee meets regularly. At each meeting, the Index Committee reviews pending corporate actions that may affect the Select Industry Indices constituents, statistics comparing the composition of the Select Industry Indices to the market, companies that are being considered as candidates for addition to a Select Industry Index, and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

## License Agreement

JPMorgan Chase & Co. or its affiliate has entered into an agreement with S&P Dow Jones that provides it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the Select Industry Indices, which are owned and published by S&P Dow Jones, in connection with certain securities, including the notes.

The notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones or its third party licensors. Neither S&P Dow Jones nor its third party licensors makes any representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly or the ability of the Select Industry Indices to track general stock market performance. S&P Dow Jones' and its third party licensor's only relationship to the Issuer or the Guarantor (if applicable) is the licensing of certain trademarks and trade names of S&P Dow Jones and the third party licensors and of the Select Industry Indices which is determined, composed and calculated by S&P Dow Jones or its third party licensors without regard to the Issuer or the Guarantor (if applicable) or the notes. S&P Dow Jones and its third party licensors have no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the owners of the notes into consideration in determining, composing or calculating the Select Industry Indices. Neither S&P Dow Jones nor its third party licensors is responsible for and has not participated in the determination of the prices and amount of the notes or the timing of the issuance or sale of the notes or in the determination or

calculation of the equation by which the notes are to be converted into cash. S&P Dow Jones has no obligation or liability in connection with the administration, marketing or trading of the notes.

**NEITHER S&P DOW JONES, ITS AFFILIATES NOR THEIR THIRD PARTY LICENSORS GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS OR COMPLETENESS OF THE SELECT INDUSTRY INDICES OR ANY DATA INCLUDED THEREIN OR ANY COMMUNICATIONS, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATIONS (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES, ITS AFFILIATES AND THEIR THIRD PARTY LICENSORS SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS OR DELAYS THEREIN. S&P DOW JONES MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE MARKS, THE SELECT INDUSTRY INDICES OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES, ITS AFFILIATES OR THEIR THIRD PARTY LICENSORS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE.**

“Standard & Poor’s,” “S&P” and “S&P Select Industry Index” are trademarks of S&P Dow Jones and have been licensed for use by JPMorgan Chase & Co. and its affiliates, including JPMorgan Financial.

## THE S&P SELECT SECTOR INDICES

All information contained in this underlying supplement regarding the Communication Services Select Sector Index, the Consumer Discretionary Select Sector Index, the Consumer Staples Select Sector Index, the Energy Select Sector Index, the Financial Select Sector Index, the Health Care Select Sector Index, the Industrial Select Sector Index, the Materials Select Sector Index, the Real Estate Select Sector Index, the Technology Select Sector Index and the Utilities Select Sector Index (each, a **“Select Sector Index”** and collectively, the **“Select Sector Indices”**), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (**“S&P Dow Jones”**). The Select Sector Indices are calculated, maintained and published by S&P Dow Jones. S&P Dow Jones has no obligation to continue to publish, and may discontinue the publication of, any of the Select Sector Indices.

The constituents included in each Select Sector Index at each moment in time are members of the S&P 500® Index. For additional information about the S&P 500® Index, please see “Equity Index Descriptions — S&P U.S. Indices” in this underlying supplement. S&P Dow Jones assigns constituents to a Select Sector Index based on the constituent’s classification under the Global Industry Classification Standard (**“GICS®”**).

### The Communication Services Select Sector Index

The Communication Services Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® communication services sector, which currently includes companies in the following industries: diversified telecommunication services; wireless telecommunication services; media; entertainment; and interactive media & services. The Communication Services Select Sector Index was launched in April 2018. The Communication Services Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXCPR.”

### The Consumer Discretionary Select Sector Index

The Consumer Discretionary Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® consumer discretionary sector, which currently includes companies in the following industries: auto components; automobiles; household durables; leisure products; textiles, apparel & luxury goods; hotels, restaurants & leisure; diversified consumer services; distributors; internet & direct marketing retail (expanded to include companies providing online marketplaces for consumer products and services and e-commerce companies, regardless of whether they hold inventory, in September 2018); multiline retail; and specialty retail. Prior to September 2018, the Consumer Discretionary Select Sector Index also included companies in the GICS® media industry. The Consumer Discretionary Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXY.”

### The Consumer Staples Select Sector Index

The Consumer Staples Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® consumer staples sector, which currently includes companies in the following industries: food & staples retailing; beverages; food products; tobacco; household products; and personal products. The Consumer Staples Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXR.”

### The Energy Select Sector Index

The Energy Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® energy sector, which currently includes companies in the following industries: energy equipment & services; and oil, gas & consumable fuels. The Energy Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXE.”

## **The Financial Select Sector Index**

The Financial Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® financials sector, which currently includes companies in the following industries: banks; thrifts & mortgage finance; diversified financial services; consumer finance; capital markets; mortgage real estate investment trusts (“REITs”); and insurance. Prior to September 2016, the Financial Select Sector Index also included companies in the GICS® real estate industry group, which includes the following industries: equity REITs; and real estate management & development. The Financial Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXM.”

## **The Health Care Select Sector Index**

The Health Care Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® health care sector, which currently includes companies in the following industries: health care equipment & supplies; health care providers & services; health care technology; biotechnology; pharmaceuticals; and life sciences tools & services. The Health Care Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXV.”

## **The Industrials Select Sector Index**

The Industrials Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® industrials sector, which currently includes companies in the following industries: aerospace & defense; building products; construction & engineering; electrical equipment; industrial conglomerates; machinery; trading companies & distributors; commercial services & supplies; professional services; air freight & logistics; airlines; marine; road & rail; and transportation infrastructure. The Industrials Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXI.”

## **The Materials Select Sector Index**

The Materials Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® materials sector, which currently includes companies in the following industries: chemicals; construction materials; containers & packaging; metals & mining; and paper & forest products. The Materials Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXB.”

## **The Real Estate Select Sector Index**

The Real Estate Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® real estate sector, which currently includes companies in the following industries: equity REITs; and real estate management & development. The Real Estate Select Sector Index was launched in August 2015. The Real Estate Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXRE.”

## **The Technology Select Sector Index**

The Technology Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® information technology sector, which currently includes companies in the following industries: IT services; software; communications equipment; technology hardware, storage & peripherals; electronic equipment, instruments & components; and semiconductors & semiconductor equipment. Prior to September 2018, the Technology Select Sector Index also included certain companies in the following GICS® industries: internet software & services. The Technology Select Sector Index is reported by Bloomberg L.P. under the ticker symbol “IXT.”

## **The Utilities Select Sector Index**

The Utilities Select Sector Index is a capped modified market capitalization-based index that measures the performance of the GICS® utilities sector, which currently includes companies in the

following industries: electric utilities; gas utilities; multi-utilities; water utilities; and independent power & renewable electricity producers. The Utilities Select Sector Index is reported by Bloomberg L.P. under the ticker symbol "IXU."

### Select Sector Index Capping Methodology

For capping purposes, the Select Sector Indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December using the following procedures:

1. The rebalancing reference date is the second Friday of March, June, September and December.
2. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and investable weight factors ("IWFs") as of the rebalancing effective date, each company is weighted by float-adjusted market capitalization. Modifications are made as defined below.
3. If any company has a weight greater than 24%, the company's float-adjusted market capitalization weight is capped at 23%, which allows for a 2% buffer. This buffer is meant to ensure that no company exceeds 25% as of the quarter-end diversification requirement date.
4. All excess weight is proportionally redistributed to all uncapped companies within the relevant Select Sector Index.
5. After this redistribution, if the float-adjusted market capitalization weight of any other company then breaches 23%, the process is repeated iteratively until no company breaches the 23% weight cap.
6. The sum of the companies with weights greater than 4.8% cannot exceed 50% of the total index weight. These caps are set to allow for a buffer below the 5% limit.
7. If the rule in paragraph 6 is breached, all companies are ranked in descending order of their float-adjusted market capitalization weights. The first company that causes the 50% limit to be breached has its weight reduced to 4.5%.
8. This excess weight is proportionally redistributed to all companies with weights below 4.5%. This is repeated iteratively until paragraph 6 is satisfied.
9. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.
10. If, on the third to last business day of March, June, September or December, a company has a weight greater than 24% or the sum of the companies with weights greater than 4.8% exceeds 50%, a secondary rebalancing will be triggered with the rebalancing effective date being the opening of the last business day of the month. This secondary rebalancing will use the closing prices as of the third to last business day of March, June, September or December, and membership, shares outstanding, and IWFs as of the rebalancing effective date.

When companies represented in the Select Sector Indices are represented by multiple share classes, maximum weight capping is based on company float-adjusted market capitalization, with the weight of multiple-class companies allocated proportionally to each share class based on its float-adjusted market capitalization as of the rebalancing reference date. If no capping is required, both share classes remain in the relevant Select Sector Index at their natural float-adjusted market capitalization.



## **Calculation, Maintenance and Governance of the Select Sector Indices**

The Select Sector Indices are calculated, maintained and governed using the same methodology as the S&P 500® Index, subject to the capping methodology described above. For additional information about the calculation, maintenance and governance of the S&P 500® Index, please see “Equity Index Descriptions — S&P U.S. Indices” in this underlying supplement.

## **License Agreement**

JPMorgan Chase or its affiliate has entered into an agreement with S&P Dow Jones that provides it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the Select Sector Indices, which are owned and published by S&P Dow Jones, in connection with certain securities, including the notes.

The notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones or its third party licensors. Neither S&P Dow Jones nor its third party licensors makes any representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly or the ability of the Select Sector Indices to track general stock market performance. S&P Dow Jones’ and its third party licensor’s only relationship to the Issuer or the Guarantor (if applicable) is the licensing of certain trademarks and trade names of S&P Dow Jones and the third party licensors and of the Select Sector Indices which is determined, composed and calculated by S&P Dow Jones or its third party licensors without regard to the Issuer or the Guarantor (if applicable) or the notes. S&P Dow Jones and its third party licensors have no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the owners of the notes into consideration in determining, composing or calculating the Select Sector Indices. Neither S&P Dow Jones nor its third party licensors is responsible for and has not participated in the determination of the prices and amount of the notes or the timing of the issuance or sale of the notes or in the determination or calculation of the equation by which the notes are to be converted into cash. S&P Dow Jones has no obligation or liability in connection with the administration, marketing or trading of the notes.

**NEITHER S&P DOW JONES, ITS AFFILIATES NOR THEIR THIRD PARTY LICENSORS GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS OR COMPLETENESS OF THE SELECT SECTOR INDICES OR ANY DATA INCLUDED THEREIN OR ANY COMMUNICATIONS, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATIONS (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES, ITS AFFILIATES AND THEIR THIRD PARTY LICENSORS SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS OR DELAYS THEREIN. S&P DOW JONES MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE MARKS, THE SELECT SECTOR INDICES OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES, ITS AFFILIATES OR THEIR THIRD PARTY LICENSORS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE.**

“Standard & Poor’s,” “S&P” and “S&P Select Sector Index” are trademarks of Standard & Poor’s Financial Services LLC and have been licensed for use by JPMorgan Chase & Co. and its affiliates, including JPMorgan Financial.

## THE S&P U.S. INDICES

All information contained in this underlying supplement regarding the S&P 500® Index, the S&P MidCap 400® Index and the S&P SmallCap 600® Index (each, an “**S&P U.S. Index**” and collectively, the “**S&P U.S. Indices**”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (“**S&P Dow Jones**”). The S&P U.S. Indices are calculated, maintained and published by S&P Dow Jones. S&P Dow Jones has no obligation to continue to publish, and may discontinue the publication of, any of the S&P U.S. Indices.

### The S&P 500® Index

The S&P 500® Index consists of stocks of 500 companies selected to provide a performance benchmark for the U.S. equity markets. The S&P 500® Index is reported by Bloomberg L.P. under the ticker symbol “SPX.”

### The S&P MidCap 400® Index

The S&P MidCap 400® Index consists of stocks of 400 companies selected to provide a performance benchmark for the medium market capitalization segment of the U.S. equity markets. The S&P MidCap 400® Index is reported by Bloomberg L.P. under the ticker symbol “MID.”

### The S&P SmallCap 600® Index

The S&P SmallCap 600® Index consists of stocks of 600 companies selected to provide a performance benchmark for the small market capitalization segment in the U.S. equity markets. The S&P SmallCap 600® Index is reported by Bloomberg L.P. under the ticker symbol “SML.”

### Composition of the S&P U.S. Indices

Index constituents are selected from the S&P Total Market Index. Additions to the S&P U.S. Indices are evaluated based on the following eligibility criteria:

- *Market Capitalization.* The unadjusted company market capitalization should be within a specified range for the relevant S&P U.S. Index. These ranges are reviewed from time to time to assure consistency with market conditions. A company meeting the unadjusted company market capitalization criteria is also required to have a security level float-adjusted market capitalization that is at least 50% of the relevant S&P U.S. Index’s unadjusted company level minimum market capitalization threshold. For spin-offs, S&P U.S. Index membership eligibility is determined using when-issued prices, if available.
- *Liquidity.* Using composite pricing and volume, the ratio of annual dollar value traded (defined as average closing price over the period multiplied by historical volume) to float-adjusted market capitalization should be at least 1.00, and the stock should trade a minimum of 250,000 shares in each of the six months leading up to the evaluation date.
- *Domicile.* Only common stocks of U.S. companies are eligible. For index purposes, a U.S. company has the following characteristics:
  - the company files 10-K annual reports;
  - the U.S. portion of fixed assets and revenues constitutes a plurality of the total, but need not exceed 50%. When these factors are in conflict, fixed assets determine plurality. Revenue determines plurality when there is incomplete asset information. Geographic information for revenue and fixed asset allocations are determined by the company as reported in its annual filings. If this criteria is not met or is ambiguous, S&P Dow Jones may still deem the

company to be a U.S. company for index purposes if its primary listing, headquarters and incorporation are all in the United States and/or “a domicile of convenience” (Bermuda, Channel Islands, Gibraltar, islands in the Caribbean, Isle of Man, Luxembourg, Liberia or Panama); and

- the primary listing is on an eligible U.S. exchange as described below.

In situations where the only factor suggesting that a company is not a U.S. company is its tax registration in a “domicile of convenience” or another location chosen for tax-related reasons, S&P Dow Jones normally determines that the company is still a U.S. company. The final determination of domicile eligibility is made by the S&P Dow Jones’ U.S. Index Committee.

- *Public Float.* There should be a public float of at least 50% of the company’s stock.
- *Sector Classification.* The company is evaluated for its contribution to sector balance maintenance, as measured by a comparison of each GICS® sector’s weight in the relevant S&P U.S. Index with its weight in the S&P Total Market Index, in the relevant market capitalization range. The S&P Total Market Index is a float-adjusted, market-capitalization weighted index designed to track the broad equity market, including large-, mid-, small- and micro-cap stocks.
- *Financial Viability.* The sum of the most recent four consecutive quarters’ Generally Accepted Accounting Principles (“GAAP”) earnings (net income excluding discontinued operations) should be positive as should the most recent quarter. For equity real estate investment trusts (“REITs”), financial viability is based on GAAP earnings and/or Funds From Operations (“FFO”), if reported.
- *Treatment of IPOs.* Initial public offerings should be traded on an eligible exchange for at least 12 months before being considered for addition to an S&P U.S. Index. Spin-offs or in-specie distributions from existing constituents do not need to be seasoned for 12 months prior to their inclusion in an S&P U.S. Index.
- *Exchange Listing.* A primary listing on one of the following U.S. exchanges is required: New York Stock Exchange, NYSE Arca, NYSE American, Nasdaq Global Select Market, Nasdaq Select Market, Nasdaq Capital Market, Cboe BZX, Cboe BYX, Cboe EDGA or Cboe EDGX exchanges. Ineligible exchanges include the OTC Bulletin Board and Pink Sheets.
- *Organizational Structure and Share Type.* Eligible organizational structures and share types are corporations (including equity and mortgage REITS) and common stock (*i.e.*, shares). Ineligible organizational structures and share types include business development companies, limited partnerships, master limited partnerships, limited liability companies, closed-end funds, exchange-traded funds, exchange-traded notes, royalty trusts, special purposes acquisition companies, preferred and convertible preferred stock, unit trusts, equity warrants, convertible bonds, investment trusts, rights, American Depositary Receipts and tracking stocks.

As of July 31, 2017, the securities of companies with multiple share class structures (including companies with listed and unlisted share classes) are no longer eligible to be added to the S&P U.S. Indices, but securities already included in an S&P U.S. Index have been grandfathered and are not affected by this change.

Removals from the S&P U.S. Indices are evaluated based as follows:

- *Companies that are involved in mergers, acquisitions or significant restructuring such that they no longer meet inclusion criteria.* Companies delisted as a result of merger, acquisition or other corporate action are removed at a time announced by S&P Dow Jones, normally at the close of the last day of trading or expiration of a tender offer. Constituents that are halted from trading may be kept in an S&P U.S. Index until trading resumes, at the discretion of S&P Dow Jones. If a stock is moved to the pink sheets or the bulletin board, the stock is removed.

Any company that is removed from an S&P U.S. Index (including discretionary and bankruptcy/exchange delistings) must wait a minimum of one year from its index removal date before being reconsidered as a replacement candidate.

- *Companies that substantially violate one or more of the addition criteria.* S&P Dow Jones believes turnover in membership in the S&P U.S. Indices should be avoided when possible. At times a stock may appear to temporarily violate one or more of the addition criteria. However, the addition criteria are for addition to the S&P U.S. Indices, not for continued membership. As a result, an index constituent of the S&P U.S. Indices that appears to violate criteria for addition to that index is not deleted unless ongoing conditions warrant an index change. When a stock is removed from an index, S&P Dow Jones explains the basis for the removal.

Current constituents of an S&P U.S. Index can be migrated from one S&P U.S. Index to another without meeting the financial viability, public float and/or liquidity eligibility criteria if the S&P Dow Jones' U.S. Index Committee decides that such a move will enhance the representativeness of the relevant index as a market benchmark. Companies that are spun-off from current S&P U.S. Index constituents do not need to meet the outside addition criteria, but they should have a total market cap representative of the relevant S&P U.S. Index.

### **Calculation of the S&P U.S. Indices**

The S&P U.S. Indices are float-adjusted market capitalization-weighted indices. On any given day, the index value of each S&P U.S. Index is the total float-adjusted market capitalization of that S&P U.S. Index's constituents *divided* by its divisor. The float-adjusted market capitalization reflects the price of each stock in the relevant S&P U.S. Index *multiplied* by the number of shares used in the index value calculation.

*Float Adjustment.* Float adjustment means that the number of shares outstanding is reduced to exclude closely held shares from the calculation of the index value because such shares are not available to investors. The goal of float adjustment is to distinguish between long-term, strategic shareholders, whose holdings depend on concerns such as maintaining control rather than the shorter term economic fortunes of the company, and shareholders who are considered more short-term in nature. Generally, these long-term strategic shareholders include, but are not limited to, officers and directors, private equity, venture capital & special equity firms, asset managers and insurance companies with board of director representation, other publicly traded companies that hold shares, holders of restricted shares, company-sponsored employee share plans/trusts, defined contribution plans/savings, and investment plans, foundations or family trusts associated with the company, government entities at all levels (other than government retirement/pension funds), sovereign wealth funds and any individual person who controls a 5% or greater stake in a company as reported in regulatory filings. Restricted shares are generally not included in total shares outstanding except for shares held as part of a lock-up agreement. Shares that are not considered outstanding are also not included in the available float. These generally include treasury stock, stock options, equity participation units, warrants, preferred stock, convertible stock and rights.

For each component, S&P Dow Jones calculates an Investable Weight Factor ("**IWF**"), which represents the portion of the total shares outstanding that are considered part of the public float for purposes of the relevant S&P U.S. Index.

*Divisor.* Continuity in index values of each S&P U.S. Indices is maintained by adjusting its divisor for all changes in its constituents' share capital after its base date. This includes additions and deletions to the relevant S&P U.S. Index, rights issues, share buybacks and issuances and non-zero price spin-offs. The value of each S&P U.S. Index's divisor over time is, in effect, a chronological summary of all changes affecting the base capital of that S&P U.S. Index. The divisor of each S&P U.S. Index is adjusted such that the index value of that S&P U.S. Index at an instant just prior to a change in base capital equals the index value of that S&P U.S. Index at an instant immediately following that change.

## Maintenance of the S&P U.S. Indices

Changes to index composition are made on an as-needed basis. There is no scheduled reconstitution. Rather, changes in response to corporate actions and market developments can be made at any time. Index additions and deletions are announced with at least three business days advance notice. Less than three business days' notice may be given at the discretion of the S&P Dow Jones' U.S. Index Committee.

*Share Updates.* Changes in a company's shares outstanding and IWF due to its acquisition of another public company are made as soon as reasonably possible. At S&P Dow Jones' discretion, de minimis merger and acquisition share changes are accumulated and implemented with the quarterly share rebalancing. All other changes of less than 5% are accumulated and made quarterly on the third Friday of March, June, September and December.

*5% Rule.* Constituent share changes related to public offerings of at least 5% are implemented weekly. Public offerings are eligible for weekly implementation if all information is available in a timely fashion. Any concurrent share repurchase or share issuance by the affected company, even if less than 5% will also be included in the treatment as long as the selling shareholder's stake equals at least 5% of the total shares of the company.

If a 5% or more share change causes a company's IWF to change by five percentage points or more (for example from 0.80 to 0.85), the IWF is updated at the same time as the share change. IWF changes resulting from partial tender offers are considered on a case by case basis.

For weekly share reviews involving companies with multiple share classes, the 5% share change threshold is based on each individual share class rather than total company shares.

*Share/IWF Freezes.* A share/IWF freeze period is implemented during each quarterly rebalancing. The freeze period begins after the market close on the Tuesday preceding the second Friday of each rebalancing month (*i.e.*, March, June, September, and December) and ends after the market close on the third Friday of a rebalancing month. Pro-forma files are normally released after the market close on the second Friday, one week prior to the rebalancing effective date. In September, preliminary share and float data are released on the first Friday of the month, but the share freeze period for September will follow the same schedule as the other three quarterly share freeze periods. For illustration purposes, if rebalancing pro-forma files are scheduled to be released on Friday, March 13, the share/IWF freeze period will begin after the close of trading on Tuesday, March 10 and will end after the close of trading the following Friday, March 20 (*i.e.*, the third Friday of the rebalancing month).

During the share/IWF freeze period, shares and IWFs are not changed except for certain corporate action events (such as merger activity, stock splits, rights offerings). Share/IWF changes for Index constituents resulting from secondary public offerings that would otherwise be eligible for next day implementation are instead collected during the freeze period and added to the weekly share change announcement on the third Friday of the rebalancing month for implementation the following Friday night. There is no weekly share change announcement on the first and second Friday of a rebalancing month.

*Outside Additions to the S&P U.S. Indices.* If a company is added to one of the S&P U.S. Indices, its IWF and shares outstanding are subject to review at the discretion of the S&P Dow Jones' U.S. Index Committee.

*Corporate Actions.* Corporate actions (such as stock splits, stock dividends, non-zero price spin-offs and rights offerings) are applied after the close of trading on the day prior to the ex-date.

*Other Adjustments.* In cases where there is no achievable market price for a stock being deleted, it can be removed at a zero or minimal price at the S&P Dow Jones' U.S. Index Committee's discretion.

The table below summarizes the types of index maintenance adjustments and indicates whether or not a divisor adjustment is required.

Type of Corporate Action	Adjustment Made to an S&P U.S. Index	Divisor Adjustment
Company added/deleted	Net change in market value determines divisor adjustment.	Yes
Change in shares outstanding	Any combination of secondary issuance, share repurchase or buy back – share counts revised to reflect change.	Yes
Stock split	Share count revised to reflect new count. Divisor adjustment is not required since the share count and price changes are offsetting.	No
Spin-off	The spin-off is added to the relevant S&P U.S. Index on the ex-date at a price of zero.	No
Change in IWF	Increasing (decreasing) the IWF increases (decreases) the total market value of the relevant S&P U.S. Index. The divisor change reflects the change in market value caused by the change to an IWF.	Yes
Special dividend	The stock price is adjusted by the amount of the dividend; the divisor adjustment reflects the net change to the index market capitalization.	Yes
Rights offering	The calculation assumes that the offering is fully subscribed. Divisor adjustment reflects increase in market capitalization measured as the shares issued multiplied by the price paid.	Yes

Stock splits and stock dividends do not affect the divisor, because following a split or dividend, both the stock price and number of shares outstanding are adjusted by S&P Dow Jones so that there is no change in the market value of the relevant component. All stock split and dividend adjustments are made after the close of trading on the day before the ex-date.

### **Governance of the S&P U.S. Indices**

The S&P U.S. Indices are maintained by the S&P Dow Jones' U.S. Index Committee. All S&P Dow Jones' U.S. Index Committee members are full-time professional members of S&P Dow Jones' staff. The S&P Dow Jones' U.S. Index Committee meets monthly. At each meeting, the S&P Dow Jones' U.S. Index Committee reviews pending corporate actions that may affect Index constituents, statistics comparing the composition of the S&P U.S. Indices to the market, companies that are being considered as candidates for addition to an S&P U.S. Index, and any significant market events. In addition, the S&P Dow Jones' U.S. Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

### **License Agreement**

JPMorgan Chase & Co. or its affiliate has entered into an agreement with S&P Dow Jones that provides it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the S&P U.S. Indices, which are owned and published by S&P Dow Jones, in connection with certain securities, including the notes.

The notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones or its third party licensors. Neither S&P Dow Jones nor its third party licensors makes any representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of

investing in securities generally or in the notes particularly or the ability of the S&P U.S. Indices to track general stock market performance. S&P Dow Jones' and its third party licensors' only relationship to the Issuer or the Guarantor (if applicable) is the licensing of certain trademarks and trade names of S&P Dow Jones and the third party licensors and of the S&P U.S. Indices which is determined, composed and calculated by S&P Dow Jones or its third party licensors without regard to the Issuer or the Guarantor (if applicable) or the notes. S&P Dow Jones and its third party licensors have no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the owners of the notes into consideration in determining, composing or calculating the S&P U.S. Indices. Neither S&P Dow Jones nor its third party licensors is responsible for and has not participated in the determination of the prices and amount of the notes or the timing of the issuance or sale of the notes or in the determination or calculation of the equation by which the notes are to be converted into cash. S&P Dow Jones has no obligation or liability in connection with the administration, marketing or trading of the notes.

**NEITHER S&P DOW JONES, ITS AFFILIATES NOR THEIR THIRD PARTY LICENSORS GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS OR COMPLETENESS OF THE S&P U.S. INDICES OR ANY DATA INCLUDED THEREIN OR ANY COMMUNICATIONS, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATIONS (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES, ITS AFFILIATES AND THEIR THIRD PARTY LICENSORS SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS OR DELAYS THEREIN. S&P DOW JONES MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE MARKS, THE S&P U.S. INDICES OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES, ITS AFFILIATES OR THEIR THIRD PARTY LICENSORS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE.**

"Standard & Poor's," "S&P," "S&P 500," "S&P MidCap 400," "MidCap 400," "S&P SmallCap 600" and "SmallCap 600" are trademarks of Standard & Poor's Financial Services LLC and have been licensed for use by JPMorgan Chase & Co. and its affiliates, including JPMorgan Financial.

## THE STOXX BENCHMARK INDICES

All information contained in this underlying supplement regarding the STOXX® Europe Total Market Index, the STOXX® Europe 600 Index, the EURO STOXX® Index, the STOXX® Europe 600 Supersector indices, the EURO STOXX® Supersector indices, the STOXX® Europe 50 Index and the EURO STOXX 50® Index (each, a “**STOXX Benchmark Index**” and collectively, the “**STOXX Benchmark Indices**”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, STOXX Limited, a wholly owned subsidiary of Deutsche Börse AG. The STOXX Benchmark Indices were created and are calculated, maintained and published by STOXX Limited. STOXX Limited has no obligation to continue to publish, and may discontinue publication of, any of the STOXX Benchmark Indices.

### The STOXX® Europe Total Market Index

The STOXX® Europe Total Market Index is a free-float market-capitalization weighted index composed of at least 95% of the free-float market capitalization traded on the major exchanges of 17 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom. The euro price return version of the STOXX® Europe Total Market Index is reported by Bloomberg L.P. under the ticker symbol “BKXP.”

Only common stocks and equities with similar characteristics from financial markets that provide reliable real-time, historical component and currency pricing, and reference and corporate actions data are eligible for inclusion in the STOXX® Europe Total Market Index. In addition, only listed companies on a regulated market on a major exchange as determined by STOXX are eligible to be included in the STOXX® Europe Total Market Index. Investment instruments (Industry Classification Benchmark: 8985 or 8995) and companies that were recently removed from the STOXX® Europe Total Market Index due to mergers and acquisition are not eligible for inclusion in the STOXX® Europe Total Market Index.

Each stock is uniquely assigned to a specific country and listing within the STOXX investable universe. The country classification and listing is based on the country of incorporation, the primary listing and the country with the largest trading volume. American and other depositary receipts (*e.g.* ADRs/GDRs) are assigned to the same country as the stock on which the receipt is issued. Each country is assigned to one or more regions. The STOXX® Europe Total Market Index is composed of stocks assigned to countries within the Europe region.

All stocks in the investable stock universe of each country included in STOXX® Europe Total Market Index are ranked in terms of their free-float market capitalization at the cut-off date to produce the review list. The largest companies in the investible universe of each country with a cumulative free-float market capitalization up to and including 93% of the investible universe of that country, qualify for inclusion in the STOXX® Europe Total Market Index. The stocks covering the next 2% of cumulative free-float market capitalization are selected among the largest remaining current components of the STOXX® Europe Total Market Index representing the portion of capitalization above 93% and up to and including 99%. If the country coverage is still below the defined threshold, then the largest remaining stocks are selected until the country coverage is reached.

No weighting cap factor (see “— STOXX Benchmark Index Calculation” below) is applied in calculating the STOXX® Europe Total Market Index.

### The STOXX® Europe 600 Index

The STOXX® Europe 600 Index is a free-float market-capitalization weighted index composed of 600 of the largest stocks in terms of free-float market capitalization traded on the major exchanges of 17 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom. At any given time, some eligible countries may not be represented in the STOXX® Europe 600 Index. The euro



price return version of the STOXX® Europe 600 Index is reported by Bloomberg L.P. under the ticker symbol “SXXP.”

The selection list for the STOXX® Europe 600 Index is composed of the most liquid stock of each component of the STOXX® Europe Total Market Index that has a minimum liquidity of greater than one million EUR measured over 3-month average daily trading value. From the selection list, the largest 550 stocks qualify for inclusion in the STOXX® Europe 600 Index. The remaining 50 stocks are selected from the largest remaining current components ranked between 551 and 750. If the number of stocks selected is still below 600, the largest remaining stocks are selected until there are enough stocks.

The weighting cap factor (see “— STOXX Benchmark Index Calculation” below) limits the weight of each component stock within the STOXX® Europe 600 Index to a maximum of 20% at the time of each review.

### **The EURO STOXX® Index**

The EURO STOXX® Index is a free-float market-capitalization weighted index composed of the largest stocks in terms of free-float market capitalization traded on the major exchanges of 11 Eurozone countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. At any given time, some eligible countries may not be represented in the EURO STOXX® Index. The euro price return version of the EURO STOXX® Index is reported by Bloomberg L.P. under the ticker symbol “SXXE.”

The EURO STOXX® Index is composed of all of the components of the STOXX® Europe 600 Index that are traded in euros and assigned to countries in the Eurozone.

The weighting cap factor (see “— STOXX Benchmark Index Calculation” below) limits the weight of each component stock within the EURO STOXX® Index to a maximum of 20% at the time of each review.

### **The STOXX® Europe 600 Supersector Indices and the EURO STOXX® Supersector Indices**

The STOXX® Europe 600 Index and the EURO STOXX® Index are each divided into 19 supersector indices according to the Industry Classification Benchmark (“**ICB**”), an international system for categorizing companies that is maintained by FTSE Russell. Each supersector index includes the components of its parent index that have been issued by companies within the relevant ICB supersector. The ICB supersectors are: oil & gas; chemicals; basic resources; construction & materials; industrial goods & services; automobiles & parts; food & beverage; personal & household goods; health care; retail; media; travel & leisure; telecommunications; utilities; banks; insurance; real estate; financial services; and technology.

The STOXX® Europe 600 Banks Index is one of 19 STOXX® Europe 600 Supersector indices and includes stocks composing the STOXX® Europe 600 Index that have been issued by companies in the ICB banks supersector. The banks supersector tracks companies providing a broad range of financial services, including retail banking, loans and money transmissions. The euro price return version of the STOXX® Europe 600 Banks Index is reported by Bloomberg L.P. under the ticker symbol “SX7P.”

The EURO STOXX® Banks Index is one of 19 EURO STOXX® Supersector indices and includes stocks composing the EURO STOXX® Index that have been issued by companies in the ICB banks supersector. The banks supersector tracks companies providing a broad range of financial services, including retail banking, loans and money transmissions. The euro price return version of the EURO STOXX® Banks Index is reported by Bloomberg L.P. under the ticker symbol “SX7E.”

With respect to each STOXX® Europe 600 Supersector index, the weighting cap factor (see “— STOXX Benchmark Index Calculation” below) limits the weight of the largest company to a maximum of 30% at the time of each review and limits the weight of the second largest company to a maximum of 15% at the time of each review. An intra-quarter capping will be triggered if the largest company exceeds

35% or if the second largest company exceeds 20%. No weighting cap factor is applied in calculating the EURO STOXX® Supersector indices.

### **The STOXX® Europe 50 Index**

The STOXX® Europe 50 Index is a free-float market-capitalization weighted index composed of 50 of the largest stocks in terms of free-float market capitalization traded on the major exchanges of 17 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom. At any given time, some eligible countries may not be represented in the STOXX® Europe 50 Index. The euro price return version of the STOXX® Europe 50 Index is reported by Bloomberg L.P. under the ticker symbol “SX5P.”

The selection list for the STOXX® Europe 50 Index is composed of the components of the STOXX® Europe 600 Index. In addition, the selection list for the STOXX® Europe 50 Index includes only the top 60% of the free-float market capitalization of each of the 19 STOXX® Europe 600 Supersector indices and all current STOXX® Europe 50 Index component stocks. All the stocks on the selection list are ranked in terms of free-float market capitalization. The largest 40 stocks on the selection list are selected for inclusion in the STOXX® Europe 50 Index; the remaining 10 stocks are selected from the largest remaining current stocks ranked between 41 and 60. If the number of stocks selected is still below 50, then the largest remaining stocks are selected until there are 50 stocks.

The weighting cap factor (see “— STOXX Benchmark Index Calculation” below) limits the weight of each component stock within the STOXX® Europe 50 Index to a maximum of 10% at the time of each review.

### **The EURO STOXX 50® Index**

The EURO STOXX 50® Index is a free-float market-capitalization weighted index composed of 50 of the largest stocks in terms of free-float market capitalization traded on the major exchanges of 11 Eurozone countries: Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. At any given time, some eligible countries may not be represented in the EURO STOXX 50® Index. The euro price return version of the EURO STOXX 50® Index is reported by Bloomberg L.P. under the ticker symbol “SX5E.”

The selection list for the EURO STOXX® 50 Index includes the top 60% of the free-float market capitalization of each of the 19 EURO STOXX® Supersector indices and all current EURO STOXX® 50 Index component stocks. All the stocks on the selection list are ranked in terms of free-float market capitalization. The largest 40 stocks on the selection list are selected for inclusion in the EURO STOXX® 50 Index; the remaining 10 stocks are selected from the largest remaining current stocks ranked between 41 and 60. If the number of stocks selected is still below 50, then the largest remaining stocks are selected until there are 50 stocks.

The weighting cap factor (see “— STOXX Benchmark Index Calculation” below) limits the weight of each component stock within the EURO STOXX® 50 Index to a maximum of 10% at the time of each review.

### **STOXX Benchmark Index Maintenance**

The composition of each of the STOXX® Europe Total Market Index, the STOXX® Europe 600 Index, the EURO STOXX® Index, the STOXX® Europe 600 Supersector indices and the EURO STOXX® Supersector indices is reviewed quarterly in March, June, September and December. The review cut-off date is the last trading day of the month preceding the review month.

The composition of each of the STOXX® Europe 50 Index and the EURO STOXX 50® Index is reviewed annually in September. The review cut-off date is the last trading day of August. The

composition of these STOXX Benchmark Indices is also reviewed monthly and components that rank 75 or below are replaced and non-component stocks that rank 25 or above are added.

The STOXX Benchmark Indices are also reviewed on an ongoing basis. Corporate actions (including initial public offerings, mergers and takeovers, spin-offs, delistings, bankruptcy, and price and share adjustments) that affect a STOXX Benchmark Index composition are immediately reviewed. Any changes are announced, implemented and effective in line with the type of corporate action and the magnitude of the effect.

With respect to the STOXX® Europe Total Market Index, removed companies are not replaced. With respect to the STOXX® Europe 600 Index, the EURO STOXX® Index, the STOXX® Europe 600 Supersector indices, the EURO STOXX® Supersector indices, the STOXX® Europe 50 Index and the EURO STOXX 50® Index, to maintain the number of components constant, a removed company is replaced by the highest-ranked non-component on the relevant selection list. The selection list is updated on a monthly basis according to the review component selection process.

The free-float factors for each component stock used to calculate each STOXX Benchmark Index are reviewed, calculated and implemented on a quarterly basis and are fixed until the next quarterly review.

### **STOXX Benchmark Index Calculation**

Each STOXX Benchmark Index is calculated with the “Laspeyres formula,” which measures the aggregate price changes in the component stocks against a fixed base quantity weight. The formula for calculating the value of a STOXX Benchmark Index can be expressed as follows:

$$\text{Index} = \frac{\text{free-float market capitalization of the relevant STOXX Benchmark Index}}{\text{Divisor}}$$

The “free-float market capitalization of the relevant STOXX Benchmark Index” is equal to the sum of the products, for each component stock, of the price, number of shares, free-float factor, weighting cap factor and, if applicable, the exchange rate from the local currency into the index currency of the relevant STOXX Benchmark Index as of the time that STOXX Benchmark Index is being calculated.

The free-float factor of each component stock is intended to reduce the number of shares to the actual amount available on the market. All fractions of the total number of shares that are larger than 5% and whose holding is of a long-term nature are excluded from the calculation of the STOXX Benchmark Indices, including: cross-ownership (stock owned either by the company itself, in the form of treasury shares, or owned by other companies); government ownership (stock owned by either governments or their agencies); private ownership (stock owned by either individuals or families); and restricted shares that cannot be traded during a certain period or have a foreign ownership restriction. Block ownership is not applied for holdings of custodian nominees, trustee companies, mutual funds, investment companies with short-term investment strategies, pension funds and similar entities.

Each STOXX Benchmark Index is also subject to a divisor, which is adjusted to maintain the continuity of the values of that STOXX Benchmark Index despite changes due to corporate actions. The following is a summary of the adjustments to any component stock of a STOXX Benchmark Index made for corporate actions and the effect of such adjustment on the divisor of that STOXX Benchmark Index, where shareholders of the component stock will receive “B” number of shares for every “A” share held (where applicable).

<p>(1) <i>Special cash dividend:</i></p> <p>Cash distributions that are outside the scope of the regular dividend policy or that the company defines as an extraordinary distribution</p> <p>Adjusted price = closing price – dividend announced by the company × (1 – withholding tax if applicable)</p> <p>Divisor: decreases</p>	
<p>(2) <i>Split and reverse split:</i></p> <p>Adjusted price = closing price × A / B</p> <p>New number of shares = old number of shares × B / A</p> <p>Divisor: unchanged</p>	
<p>(3) <i>Rights offering:</i></p> <p>If the subscription price is not available or if the subscription price is equal to or greater than the closing price on the day before the effective date, then no adjustment is made.</p> <p>In case the share increase is greater than or equal to 100% (<math>B / A \geq 1</math>), the adjustment of the shares and weight factors are delayed until the new shares are listed.</p> <p>Adjusted price = (closing price × A + subscription price × B) / (A + B)</p> <p>New number of shares = old number of shares × (A + B) / A</p> <p>Divisor: increases</p>	
<p>(4) <i>Stock dividend:</i></p> <p>Adjusted price = closing price × A / (A + B)</p> <p>New number of shares = old number of shares × (A + B) / A</p> <p>Divisor: unchanged</p>	<p>(5) <i>Stock dividend (from treasury stock):</i></p> <p>Adjusted only if treated as extraordinary dividend.</p> <p>Adjusted close = close – close × B / (A + B)</p> <p>Divisor: decreases</p>
<p>(6) <i>Stock dividend of another company:</i></p> <p>Adjusted price = (closing price × A – price of other company × B) / A</p> <p>Divisor: decreases</p>	<p>(7) <i>Return of capital and share consolidation:</i></p> <p>Adjusted price = (closing price – capital return announced by company × (1-withholding tax)) × A / B</p> <p>New number of shares = old number of shares × B / A</p> <p>Divisor: decreases</p>
<p>(8) <i>Repurchase of shares / self-tender:</i></p> <p>Adjusted price = ((price before tender × old number of shares) – (tender price × number of tendered shares)) / (old number of shares – number of tendered shares)</p> <p>New number of shares = old number of shares – number of tendered shares</p> <p>Divisor: decreases</p>	<p>(9) <i>Spin-off:</i></p> <p>Adjusted price = (closing price × A – price of spun-off shares × B) / A</p> <p>Divisor: decreases</p>
<p>(10) <i>Combination stock distribution (dividend or split) and rights offering:</i></p> <p>For this corporate action, the following additional assumptions apply:</p> <p>Shareholders receive B new shares from the distribution and C new shares from the rights offering for</p>	

every A share held. If A is not equal to one share, all the following “new number of shares” formulae need to be divided by A:	
<p><i>- If rights are applicable after stock distribution (one action applicable to other):</i></p> <p>Adjusted price = (closing price × A + subscription price × C × (1 + B / A)) / ((A + B) × (1 + C / A))</p> <p>New number of shares = old number of shares × ((A + B) × (1 + C / A)) / A</p> <p>Divisor: increases</p>	<p><i>- If stock distribution is applicable after rights (one action applicable to other):</i></p> <p>Adjusted price = (closing price × A + subscription price × C) / ((A + C) × (1 + B / A))</p> <p>New number of shares = old number of shares × ((A + C) × (1 + B / A))</p> <p>Divisor: increases</p>
<p><i>- Stock distribution and rights (neither action is applicable to the other):</i></p> <p>Adjusted price = (closing price × A + subscription price × C) / (A + B + C)</p> <p>New number of shares = old number of shares × (A + B + C) / A</p> <p>Divisor: increases</p>	
<p><i>(11) Addition / deletion of a company:</i></p> <p>No price adjustments are made. The net change in market capitalization determines the divisor adjustment.</p>	<p><i>(12) Free-float and shares changes:</i></p> <p>No price adjustments are made. The net change in market capitalization determines the divisor adjustment.</p>

## License Agreement

JPMorgan Chase & Co. or its affiliate has entered into an agreement with STOXX Limited (“STOXX”) providing it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use each STOXX Benchmark Index, which is owned and published by STOXX Limited, in connection with certain securities, including the notes.

STOXX and its licensors (the “Licensors”) have no relationship to the Issuer or the Guarantor (if applicable), other than the licensing of any STOXX Benchmark Index and the related trademarks for use in connection with the notes.

### **STOXX and its Licensors do not:**

- sponsor, endorse, sell or promote the notes;
- recommend that any person invest in the notes or any other securities;
- have any responsibility or liability for or make any decisions about the timing, amount or pricing of the notes;
- have any responsibility or liability for the administration, management or marketing of the notes; or
- consider the needs of the notes or the holders of the notes in determining, composing or calculating any STOXX Benchmark Index or have any obligation to do so.

### **STOXX and its Licensors will not have any liability in connection with the notes. Specifically,**

- **STOXX and its Licensors do not make any warranty, express or implied and disclaim any and all warranty about:**

- The results to be obtained by the notes, the holders of the notes or any other person in connection with the use of any STOXX Benchmark Index and the data included in any STOXX Benchmark Index;
- The accuracy or completeness of any STOXX Benchmark Index and its data; or
- The merchantability and the fitness for a particular purpose or use of any STOXX Benchmark Index and its data;
- STOXX and its Licensors will have no liability for any errors, omissions or interruptions in any STOXX Benchmark Index or its data; and
- Under no circumstances will STOXX or its Licensors be liable for any lost profits or indirect, punitive, special or consequential damages or losses, even if STOXX or its Licensors knows that they might occur.

The licensing agreement with STOXX is solely for the benefit of the parties to that agreement and not for the benefit of the holders of the notes or any other third parties.

## THE SWISS MARKET INDEX

All information contained in this underlying supplement regarding the Swiss Market Index (the “SMI<sup>®</sup>”), including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, SIX Swiss Exchange Ltd (“SSE”). The SMI<sup>®</sup> is calculated, maintained and published by SSE. SSE has no obligation to continue to publish, and may discontinue publication of, the SMI<sup>®</sup>. The SMI<sup>®</sup> is reported by Bloomberg L.P. under the ticker symbol “SMI.”

The SMI<sup>®</sup> is a free-float adjusted market capitalization-weighted price return index of the Swiss equity market. The SMI<sup>®</sup> was standardized on June 30, 1988 with an initial baseline value of 1,500 points.

### Composition of the SMI<sup>®</sup>

The SMI<sup>®</sup> is composed of the most highly capitalized and liquid stocks of the Swiss Performance Index<sup>®</sup> (“SPI<sup>®</sup>”). The SPI<sup>®</sup> comprises all equity securities whose primary listing is on the SIX Swiss Exchange with a free float of at least 20%, other than investment companies. The SMI<sup>®</sup> represents more than 75% of the free-float market capitalization of the Swiss equity market.

The SMI<sup>®</sup> is composed of the 20 highest ranked securities of the SPI<sup>®</sup>, where the ranking of each security is determined by a combination of the following criteria:

- average free-float market capitalization over the last 12 months (compared to the capitalization of the entire SPI<sup>®</sup>); and
- cumulated on order book turnover over the last 12 months (compared to the total turnover of the SPI<sup>®</sup>).

The average market capitalization in percent and the turnover in percent are each given a weighting of 50% and the result is ranked in descending order. A security is admitted to the SMI<sup>®</sup> if it ranks 18 or below in the selection list. A security is excluded from the SMI<sup>®</sup> if it ranked 23 or lower in the selection list. To reduce fluctuations in the SMI<sup>®</sup>, a buffer is applied for securities ranked 19 to 22. Out of the candidates from ranks 19 to 22, current components are selected with priority over the other candidates. New components out of the buffer are selected until 20 components have been reached. Instruments that are primary listed on more than one stock exchange and generate less than 50% of their total turnover at SIX Swiss Exchange, need to fulfill additional liquidity criteria in order to be selectable for the SMI<sup>®</sup>. For this purpose, all components of the SPI<sup>®</sup> are ranked based on their cumulated order book turnover over the past 12 months relative to the total turnover of the index universe. For this list, only turnovers of stock exchanges are considered where the instrument is primary listed. Such an instrument with several primary listings must rank among the first 18 components on the order book turnover list in order to be selectable for the SMI<sup>®</sup>. Such an instrument is excluded from the SMI<sup>®</sup> once it reaches 23 or lower.

### Standards for Admission and Exclusion

To ensure that the composition of the SMI<sup>®</sup> maintains a high level of continuity, the stocks contained within it are subject to a special admission and exclusion procedure. This is based on the criteria of free-float market capitalization and liquidity. The index-basket adjustments which arise from this procedure are, as a rule, made once per year.

The securities included in the SMI<sup>®</sup> are weighted according to their free-float. The free-float is calculated only for shares with voting rights. This means that large positions in a security that reach or exceed the threshold of 5% and are held in firm hands are subtracted from the total market capitalization. The following positions in a security are deemed to be held in firm hands:

- Shareholding that has been acquired by one person or a group of persons who are subject to a shareholder or lockup agreement.

- Shareholding that has been acquired by one person or a group of persons who according to publicly known facts, have a long-term interest in a company.

The free-float is calculated on the basis of outstanding shares. Issued and outstanding equity capital is, as a rule, the total amount of equity capital that has been fully subscribed, wholly or partially paid in and to be documented in the Commercial Registry. Neither conditional nor approved capital is counted as issued and outstanding equity capital. The free-float is calculated on the basis of listed shares only. Where a company has different categories of shares listed, these are considered separately for the free-float calculation.

#### *Exceptions*

The positions in a security held by institutions of the following kind are deemed free-floating:

- custodian nominees
- trustee companies
- investment funds
- pension funds
- investment companies

The SIX Swiss Exchange classifies at its own discretion persons and groups of persons who, because of their area of activity or the absence of important information, cannot be clearly assigned.

#### *Ordinary Index Review*

Each year on the third Friday of September, the composition of the SMI® is updated in the ordinary index review based on the selection list of June. With the cut-off dates on March 31, September 30 and December 31, a provisional selection list is created, which serves as the basis for the adjustment of extraordinary corporate actions. The number of securities and free-float shares are adjusted on four ordinary adjustment dates a year: the third Friday in March, June, September and December.

#### *Extraordinary Corporate Actions*

An extraordinary corporate action is an initial public offering (“IPO”), merger and acquisition activity, spin-off, insolvency or any other event that leads to a listing or delisting. An extraordinary corporate action has an ex-date, but its effect can usually not be calculated by a generic predefined formula. In most cases, an extraordinary corporate action leads to a new listing or delisting and subsequently there is a change in the composition of the SMI® and in the component weights of the composition of the SMI®.

Newly listed instruments that fulfill the selection rules of the SMI® are extraordinarily included in the SMI® on their second trading day and the SMI® is adjusted with the free-float market capitalization at the close of the first trading day. The extraordinary inclusion of a newly listed instrument in the SMI® can lead to an extraordinary replacement of an existing index component. Extraordinary inclusions are implemented after a notification period of five trading days. The adjusted cap factors are implemented after a notification period of generally five trading days, but no less than one trading day.

If an IPO of a real estate instrument leads to an extraordinary inclusion, it is included in the SMI® in three equal stages. This is achieved by the gradual increase of the number of shares or the free-float factor over three trading days starting on the second trading day.

In case of a delisting, the exclusion of an index component is made, if possible, on the next ordinary index review date on the third Friday of March, June, September or December. However, if the delisting would be effective before the ordinary index review, the component is excluded from the SMI® on the effective date of the delisting. If a component is excluded from the SMI® outside of the ordinary index review, it is replaced by the best-ranked candidate on the selection list that is not yet part composition of the SMI® in order to maintain a stable number of components within the SMI®. Extraordinary exclusions



are implemented after a notification period of 5 trading days. Adjusted cap factors are implemented after a notification period of generally 5 trading days, but no less than one trading day.

Extraordinary inclusions in the SMI® take place if the selection rules for the SMI® are fulfilled after a three-month period. This occurs on a quarterly basis after the close of trading on the third Friday of March, June, September and December as follows:

<u>Latest Listing Date</u>	<u>Earliest Extraordinary Acceptance Date</u>
5 trading days prior to the end of November	March
5 trading days prior to the end of February	June
5 trading days prior to the end of May	September
5 trading days prior to the end of August	December

In the case of major market changes as a result of a corporate action, an instrument may be admitted to the SMI® outside of the accepted admission period as long as it clearly fulfills the index selection rules. For the same reasons, a component can be excluded if the requirements for admission to the SMI® are no longer fulfilled.

### Calculation of the SMI®

The SMI® is calculated using the Laspeyres method with the weighted arithmetic mean of a defined number of securities issues. The index level is calculated by dividing the market capitalizations of all securities included in the SMI® by a divisor:

$$I_t = \frac{\sum_{i=1}^M s_{i,t} \times f_{i,t} \times c_{i,t} \times p_{i,t} \times x_{i,t}}{D_t}$$

where t is current day;  $I_t$  is the current index level on day t;  $D_t$  is the divisor on day t; M is the number of issues in the SMI®;  $p_{i,t}$  is the last-paid price of security i;  $s_{i,t}$  is the number of shares of security i on day t;  $f_{i,t}$  is the free-float for security i on day t;  $c_{i,t}$  is the capping factor for security i on day t and  $x_{i,t}$  is the current CHF exchange rate at time on day t.

The divisor is a technical number used to calculate the SMI®. If the market capitalization changes due to a corporate event, the divisor changes while the index value remains the same. The new divisor is calculated on the evening of the day before the corporate event takes effect.

In calculating the SMI®, the last-paid price is taken into account. If no price has been paid on the day of calculation, the previous day's price is used. Only the prices achieved via the electronic order book of the SIX Swiss Exchange are used.

The trading hours for Swiss equities, participation certificates and bonus certificates are determined by the SIX Swiss Exchange. Since the opening phase usually causes strong price fluctuations, the SMI® is first calculated two minutes after the start of on order book trading. This index level is called the "open." At the close of trading, the final closing prices from the closing auction are used in calculating the closing level of the SMI®. If a closing price is unavailable, the price from the previous closing level's calculation is used.

### *Component Weighting*

The SMI® is weighted by the free-float market capitalization of its components. The number of shares and the free-float factor are reviewed on a quarterly basis. In the same context, each component of the

SMI® with a free-float market capitalization larger than 18% of the total market capitalization of the SMI® is capped to that weight of 18%.

Additionally, the components of the index are capped to 18% between two ordinary index reviews as soon as two components exceed a weight of 20% each. If such an intra quarter breach is observed after the close of markets, the new cap factors are calculated so that any component has a maximum weight of 18%. This cap factor is set to be effective after the close of the following trading day.

If an issuer has issued more than one equity instrument (e.g., registered shares, bearer shares, participation certificates, bonus certificates), it is possible that one issuer is represented in the SMI® with more than one instrument. In this case, the free-float market capitalization of those instruments is cumulated for the calculation of the cap factors. If the cumulated index weight exceeds the 18% threshold, the weight is capped accordingly. The cumulated, capped index weight is distributed proportionally based on the free-float market capitalization of those instruments.

### **License Agreement**

JPMorgan Chase & Co. or its affiliate has entered into an agreement with SSE providing it and certain of its affiliates or subsidiaries, including JPMorgan Financial, with a non-exclusive license and, for a fee, with the right to use the SMI®, which is owned and published by SSE, in connection with certain securities, including the notes.

SSE and its licensors (the “Licensors”) have no relationship with the Issuer or the Guarantor (if applicable), other than the licensing of the SMI® and the related trademarks for use in connection with the notes.

The notes are not in any way sponsored, endorsed, sold or promoted by SSE, and SSE makes no warranty or representation whatsoever, express or implied, either as to the results to be obtained from the use of the SMI® and/or the figure at which the SMI® stands at any particular time on any particular day or otherwise. However, SSE shall not be liable (whether in negligence or otherwise) to any person for any error in the SMI® and SSE shall not be under any obligation to advise any person of any error therein. The Swiss Market Index® and SMI® are registered trademarks of SSE which are used under license.

SSE is not responsible for, and has not participated in the determination of, the terms, prices or amount of the notes and will not be responsible for, or participate in, any determination or calculation regarding any amount payable on the notes payable. SSE has no obligation or liability in connection with the administration, marketing or trading of the notes.

The SMI® is compiled and calculated by SSE. However, SSE shall not be liable (whether in negligence or otherwise) to any person for any error in the SMI®, and SSE shall not be under any obligation to advise any person of any error therein.

SSE is under no obligation to continue the calculation and dissemination of the SMI®. SSE determines, composes and calculates the SMI® without regard to the notes. SSE has no obligation to take into account your interest, or that of anyone else having an interest, in the notes in determining, composing or calculating the SMI®.

## THE TOPIX® INDEX

All information contained in this underlying supplement regarding the Tokyo Stock Price Index, or the TOPIX® Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, the Tokyo Stock Exchange (the “TSE”). The TOPIX® Index is calculated, maintained and published by the TSE. The TSE has no obligation to continue to publish, and may discontinue publication of, the TOPIX® Index. The TOPIX® Index is reported by Bloomberg L.P. under the ticker symbol “TPX.”

### Composition and Maintenance of the TOPIX® Index

The TOPIX® Index was developed by the TSE. Publication of the TOPIX® Index began on July 1, 1969, based on an initial Index value of 100 at January 4, 1968.

The component stocks of the TOPIX® Index consist of all Japanese common stocks listed on the First Section of the TSE. The TOPIX® Index measures changes in the aggregate market value of these stocks. Japanese stocks admitted to the TSE are assigned to one of the First Section, the Second Section and the Mothers (market of the high-growth and emerging stocks). Stocks listed on the First Section are typically limited to larger, longer established and more actively traded issues, stocks listed on the Second Section are typically limited to mid-sized companies and stocks listed on the Mothers are typically limited to high-growth start-up companies.

The TOPIX® Index is a free-float adjusted market capitalization-weighted index, with the market price of each component stock multiplied by the number of shares listed (as adjusted by multiplying the free-float weight (“**FFW**”) to take into account only the listed shares deemed to be available for trading in the market). The TSE is responsible for calculating and maintaining the TOPIX® Index, and can add, delete or substitute the stocks underlying the TOPIX® Index or make other methodological changes that could change the value of the TOPIX® Index. The underlying stocks may be removed, if necessary, in accordance with deletion/addition rules, which provide generally for the deletion of a stock from the TOPIX® Index if that stock ceases to meet the criteria for inclusion. Stocks listed on the Second Section or Mothers of the TSE may be transferred to the First Section if they satisfy applicable criteria. These criteria include numerical minimum values for number of shares listed, number of shareholders and average monthly trading volume, among others. Similarly, when a First Section stock falls within the coverage of TSE rules prescribing reassignment thereof to the Second Section, that stock will be removed from the First Section.

Additions to the component stocks can occur (1) through the initial listing of a company (directly or via another stock exchange), with those changes taking effect on the last business day of the month after that initial listing; (2) as a result of changes in listing from the TSE Second Section or from the Mothers market of the TSE to the TSE First Section, with those changes taking effect on the last business day of the month after that change, as applicable; or (3) through the initial listing of a new company resulting from a corporate consolidation, with those changes taking effect on the new listing date.

Deletions of constituents are conducted due to (1) de-listing, resulting from a corporate consolidation, when the surviving company re-lists with the TSE, with those changes taking effect on the initial listing date of the new company (normally three business days after the delisting date); (2) de-listing of a company for reasons other than those stated above, with those changes taking effect on the de-listing date; (3) designation of stocks to be de-listed, with those changes taking effect four business days after that designation; or (4) changes in listing from the TSE First Section to the TSE Second Section, with those changes taking effect on the date of that change.

### Calculation of the TOPIX® Index

The TOPIX® Index is not expressed in Japanese yen, but is presented in terms of points (as a decimal figure), rounded to the nearest one-hundredth. The TOPIX® Index is calculated by multiplying 100 by the figure obtained by dividing the current free-float adjusted market value (the current market

price per share at the time of the index calculation multiplied by the number of free-float adjusted common shares listed on the First Section of the TSE at the same instance) (as adjusted by multiplying the FFW) (the “**Current Market Value**”) by the base market value (*i.e.*, the Current Market Value on the base date) (the “**Base Market Value**”).

The calculation of the TOPIX® Index can be represented by the following formula:

$$\text{Index} = \frac{\text{Current Market Value}}{\text{Base Market Value}} \times 100$$

The number of free float-adjusted shares at the time of the index calculation is the number of common shares listed on the TSE First Section multiplied by the free float weight. The free float weight reflects the weight of listed shares deemed to be available for trading in the market and is calculated by the TSE for each listed company for purposes of index calculation. The free float weight is determined on the basis of securities reports and statutory documents required by the Financial Instruments and Exchange Act of Japan and publicly available documents issued by the listed companies themselves to estimate the amount of non-free float shares. In determining the free float weight, the TSE deems the following shares as non-free float shares: shares held by the top 10 major shareholders (subject to certain exceptions), treasury stocks (including certain cross-shareholdings), shares held by board members of the relevant company and other shares TSE deems not available for trading in the market. The free float weight is equal to 1 minus the number of non-free float shares divided by the number of listed shares. In the case of some companies with low liquidity, the TSE may adjust their free float downwards by applying a “liquidity factor.”

The free float weight assigned to each listed company is reviewed annually, with timings that vary according to the settlement terms of that listed company. Free float weights may also be subject to extraordinary review in the case of certain corporate actions (*e.g.*, allocation of new shares, conversion of preferred shares or exercise of subscription warrants, spin-offs, mergers, stock swaps, take-overs) and for other reasons the TSE believes appropriate.

In order to maintain continuity, the Base Market Value is adjusted from time to time to ensure that it reflects only price movements resulting from auction market activity, and to eliminate the effects of other factors and prevent any instantaneous change or discontinuity in the level of the TOPIX® Index. These factors include, without limitation: new listings, delistings, new share issues either through public offerings or through rights offerings to shareholders (limited to cases where the allotted subscription warrant securities are listed), issuance of shares as a consequence of exercise of convertible bonds or warrants, and transfer of listed securities from the First Section to the Second Section of the TSE.

The formula for the adjustment is as follows:

$$\frac{\text{Free-float adjusted Market Value on business day before adjustment date}}{\text{Base Market Value before adjustment}} = \frac{(\text{Free-float adjusted Market Value on business day before adjustment date} \pm \text{Adjustment Amount})}{\text{Base Market Value after adjustment}}$$

where Adjustment Amount is equal to the changes in the number of shares included in the calculation of the TOPIX® Index *multiplied* by the price of those shares used for the purposes of the adjustment.

Therefore,

$$\begin{array}{rcl} \text{New} & & \text{Old Base Market Value} \times \\ \text{Base} & & (\text{Free-float adjusted Market Value on} \\ \text{Market} & = & \text{business day before adjustment date} \pm \\ \text{Value} & & \text{Adjustment Amount}) \\ & & \hline & & \text{Free-float adjusted Market Value on} \\ & & \text{business day before adjustment date} \end{array}$$

The Base Market Value remains at the new value until a further adjustment is necessary as a result of another change. As a result of a change affecting the Current Market Value or any stock underlying the TOPIX® Index, the Base Market Value is adjusted in a way that the new value of the TOPIX® Index will equal the level of the TOPIX® Index immediately prior to that change.

No adjustment is made to the Base Market Value, however, in the case of events such as stock splits or decreases in capital without compensation, which theoretically do not affect market capitalization.

### License Agreement

JPMorgan Chase & Co. or its affiliate has entered into a non-exclusive license agreement with the TSE providing for the license to certain of its affiliated or subsidiary companies, including JPMorgan Financial, in exchange for a fee, of the right to use the TOPIX® Index, which is owned and published by the TSE, in connection with the notes.

The TOPIX® Index value and the TOPIX® trademarks are subject to the intellectual property rights owned by the Tokyo Stock Exchange, Inc. and the Tokyo Stock Exchange, Inc. owns all rights relating to the TOPIX® Index, such as calculation, publication and use of the TOPIX® Index value and relating to the TOPIX® trademarks.

The Tokyo Stock Exchange, Inc. reserves the rights to change the methods of calculation or publication, to cease the calculation or publication of the TOPIX® Index value or to change the TOPIX® trademarks or cease the use thereof.

The Tokyo Stock Exchange, Inc. makes no warranty or representation whatsoever, either as to the results stemming from the use of the TOPIX® Index value and the TOPIX® trademarks or as to the figure at which the TOPIX® Index value stands on any particular day.

The Tokyo Stock Exchange, Inc. gives no assurance regarding accuracy or completeness of the TOPIX® Index value and data contained therein. Further, the Tokyo Stock Exchange, Inc. shall not be liable for the miscalculation, incorrect publication, delayed or interrupted publication of the TOPIX® Index value.

The notes are in no way sponsored, endorsed or promoted by the Tokyo Stock Exchange, Inc.

The Tokyo Stock Exchange, Inc. shall not bear any obligation to give an explanation of the notes or any advice on investments to any purchaser of the notes or to the public.

The Tokyo Stock Exchange, Inc. neither selects specific stocks or groups thereof nor takes into account any needs of the Issuer or the Guarantor or any purchaser of the notes, for calculation of the TOPIX® Index value.

Including but not limited to the foregoing, the Tokyo Stock Exchange, Inc. shall not be responsible for any damage resulting from the issue and sale of the notes.

“TOPIX®” and “TOPIX® Index” are trademarks of the Tokyo Stock Exchange, Inc. and prior to the settlement date are expected to be licensed for use by the Issuer and the Guarantor. The notes have not been and will not be passed on by the TSE as to their legality or suitability. The notes will not be issued,

endorsed, sold or promoted by the TSE. THE TSE MAKES NO WARRANTIES AND BEARS NO LIABILITY WITH RESPECT TO THE NOTES.

## **COMMODITY INDEX DESCRIPTIONS**

### **THE BLOOMBERG COMMODITY INDICES**

#### **General**

All information contained in this underlying supplement regarding the Bloomberg Commodity Index<sup>SM</sup>, its single-commodity sub-indices and the forward-month version of the Bloomberg Commodity Index<sup>SM</sup> and its single-commodity sub-indices (each, a “Bloomberg Commodity Index” and collectively, the “Bloomberg Commodity Indices”), including, without limitation, their make-up, methods of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, UBS Securities LLC (collectively with its affiliates, “UBS”) and Bloomberg Index Services Limited (“BISL” and, collectively with its affiliates, “Bloomberg”). UBS and Bloomberg are not involved in the offer of the notes in any way and have no obligation to consider your interests as a holder of the notes. UBS and Bloomberg have no obligation to continue to publish, and may discontinue publication of, the Bloomberg Commodity Indices at any time in their sole discretion.

In 2014, Bloomberg became responsible for the governance, calculation, distribution and licensing of the Bloomberg Commodity Indices. The Dow Jones-UBS Commodity Index<sup>SM</sup> was renamed to the Bloomberg Commodity Index<sup>SM</sup> and the ticker changed from “DJUBS” to “BCOM.” UBS and its licensors have maintained their ownership, but BISL calculates, administers and publishes the Bloomberg Commodity Indices on behalf of UBS. Material changes or amendments to the index methodology are subject to approval by the Product, Risk & Operations Committee (the “PROC”) in consultation, if practical, with UBS, except during periods of extraordinary circumstances, such as during a market emergency.

#### **Overview**

The Bloomberg Commodity Index<sup>SM</sup> was introduced in July of 1998 to provide an economically rational, diversified, stable and liquid benchmark for commodities as an asset class. The Bloomberg Commodity Index<sup>SM</sup> currently is composed of the prices of twenty-three exchange-traded futures contracts on physical commodities. A futures contract is a bilateral agreement providing for the purchase and sale of a specified type and quantity of a commodity or financial instrument during a stated delivery month for a fixed price. For a general description of the commodity futures markets, please see “The Commodity Futures Markets” below. The commodities included in the Bloomberg Commodity Index<sup>SM</sup> for 2020 are as follows: aluminum, coffee, copper, corn, cotton, crude oil, gold, lean hogs, live cattle, low sulphur gas oil, natural gas, nickel, reformulated gasoline blendstock for oxygen blending gasoline (“RBOB gasoline”), silver, soybean meal, soybean oil, soybeans, sugar, hard red winter wheat (“HRW wheat”), ultra-low-sulfur diesel (“ULS diesel”) and zinc. The Bloomberg Commodity Index<sup>SM</sup> tracks futures contracts that trade on the Chicago Board of Trade (“CBOT”), the Chicago Mercantile Exchange (“CME”), the Commodities Exchange division of the CME Group (“COMEX”), the London Metals Exchange (“LME”), the New York Mercantile Exchange (“NYMEX”), ICE Futures Europe and ICE Futures U.S. The component weightings are determined primarily based on liquidity data, which is the relative amount of trading activity of a particular commodity, and U.S.-dollar weighted production data, which is used to measure the importance of a commodity to the world economy. The Bloomberg Commodity Index<sup>SM</sup> is published by Bloomberg L.P. under the ticker symbols “BCOM” for the excess return version and “BCOMTR” for the total return version.

The single-commodity sub-indices of the Bloomberg Commodity Index<sup>SM</sup> follow the methodology of the Bloomberg Commodity Index<sup>SM</sup>, except that the calculation of each single-commodity sub-index utilizes the prices of the relevant futures contracts (listed under “— Designated Contracts for Each Commodity”) and the relevant Commodity Index Multiplier (determined as described under “— Commodity Index Multipliers”). The single-commodity sub-indices of the Bloomberg Commodity Index<sup>SM</sup> are published by Bloomberg L.P. If the notes are linked in whole or in part to a single-commodity sub-index of the Bloomberg Commodity Index<sup>SM</sup>, the ticker symbol will be provided in the relevant terms supplement.

BISL also publishes forward-month versions of the Bloomberg Commodity Index<sup>SM</sup> and its single-commodity sub-indices that trades longer-dated commodity futures contracts. The Bloomberg Commodity Index 3 Month Forward<sup>SM</sup> follows the methodology of the Bloomberg Commodity Index<sup>SM</sup>, except that the futures contracts used for calculating the Bloomberg Commodity Index 3 Month Forward<sup>SM</sup> are advanced, as compared to the Bloomberg Commodity Index<sup>SM</sup>, such that the delivery months for the reference contracts are later than those of the corresponding reference contracts used for the Bloomberg Commodity Index<sup>SM</sup>. The Bloomberg Commodity Index 3 Month Forward<sup>SM</sup> is published by Bloomberg L.P. under the ticker symbols “BCOMF3” for the excess return version and “BCOMF3T” for the total return version.

The forward-month single-commodity sub-indices of the Bloomberg Commodity Index<sup>SM</sup> follow the methodology of the Bloomberg Commodity Index<sup>SM</sup>, except that the calculation of each forward-month single-commodity sub-index utilizes the prices of the relevant futures contracts (as listed under “— Designated Contracts for Each Commodity”) and the relevant Commodity Index Multiplier (determined as described under “— Commodity Index Multipliers”). In addition, the futures contracts used for calculating the forward-month single-commodity sub-indices are advanced, as compared to the futures contracts included in the Bloomberg Commodity Index<sup>SM</sup>, such that the delivery months for the reference contracts are later than those of the corresponding reference contracts used for the single-commodity sub-indices. The forward-month single-commodity sub-indices of the Bloomberg Commodity Index<sup>SM</sup> are published by Bloomberg L.P. If the notes are linked in whole or in part to a forward-month single-commodity sub-index of the Bloomberg Commodity Index<sup>SM</sup>, the ticker symbol will be provided in the relevant terms supplement.

BISL publishes both a total return version and excess return version of each of the Bloomberg Commodity Indices. The total return version of each Bloomberg Commodity Index reflects the returns on a fully collateralized investment in the excess return version of such Bloomberg Commodity Index. Accordingly, the total return version of each Bloomberg Commodity Index combines the returns of the relevant excess return version with returns on cash collateral invested in Treasury Bills. The cash collateral returns are calculated using the most recent weekly auction high rate for 13-week (3 Month) U.S. Treasury Bills, as published by the Bureau of the Public Debt of the U.S. Treasury (or any successor source). Weekly auction high rates are generally published once each week on Monday. The notes may be linked to the excess return or the total return version of the Bloomberg Commodity Indices, as specified in the relevant terms supplement.

UBS and its affiliates actively trade futures contracts and options on futures contracts on the commodities that underlie the Bloomberg Commodity Index<sup>SM</sup>, as well as commodities, including commodities included in the Bloomberg Commodity Index<sup>SM</sup>. For information about how this trading may affect the value of the Bloomberg Commodity Indices, see “Risk Factors — For notes linked to a Bloomberg Commodity Index, trading and other transactions by UBS and its affiliates in the futures contracts constituting the Bloomberg Commodity Indices and the underlying commodities may affect the level of the Bloomberg Commodity Indices” in this underlying supplement.

## **Benchmark Governance**

BISL uses two primary committees to provide overall governance and effective oversight of its administration activities: the PROC and the Benchmark Oversight Committee (the “BOC”).

The PROC provides direct governance and is responsible for controls over the creation, design, production and dissemination of benchmark indices, strategy indices and fixings administered by Bloomberg, including the Bloomberg Commodity Indices. The PROC is composed of Bloomberg personnel with experience or relevant expertise in relation to financial benchmarks. Meetings are attended by internal Bloomberg legal and compliance personnel. Nominations and removals are subject to review by the BOC, discussed below.

The oversight function is provided by the BOC. The BOC is independent of the PROC and is responsible for reviewing and challenging the activities carried out by the PROC. In carrying out its



oversight duties, the BOC receives reports of management information both from the PROC as well as internal Bloomberg legal and compliance personnel engaged in second level controls.

On a quarterly basis, the PROC reports to the BOC on governance matters, including but not limited to client complaints, the launch of new benchmarks, operational incidents (including errors & restatements), major announcements and material changes concerning the benchmarks, the results of any reviews of the benchmarks (internal or external) and material stakeholder engagements.

#### *Internal and External Reviews*

BISL's index administration is also subject to Bloomberg's compliance function, which periodically reviews various aspects of its businesses in order to determine whether it is adhering to applicable policies and procedures, and assess whether applicable controls are functioning properly.

In addition, Bloomberg may from time to time appoint an independent external auditor with appropriate experience and capability to review adherence to benchmark regulation. The frequency of such external reviews will depend on the size and complexity of the operations and the breadth and depth of the index use by stakeholders.

#### *Conflicts of Interest*

BISL may exercise discretion in making certain determinations, calculations and corrections with respect to the Bloomberg Commodity Indices from time to time. In making those determinations, calculations and corrections, BISL has no obligation to take the needs of UBS into consideration. Also, neither BISL nor UBS has any obligation to take the needs of any holders of financial products based on or tracking the Bloomberg Commodity Indices (with respect to the Bloomberg Commodity Indices, "Index Products" and the holder of these products, "Index Product Investors") into consideration at any time.

BISL is committed to avoiding and, where necessary, managing actual or potential conflicts of interest in its decision-making process and has established a Conflicts of Interest Policy to minimize or resolve actual or potential conflicts of interest.

BISL does not create, trade or market Index Products.

UBS and its subsidiaries may each face conflicts between the roles it performs in respect of the Bloomberg Commodity Index<sup>SM</sup> and its own interests. In particular, in its other businesses, UBS may have, or enter into transactions to create, a physical, economic or other interest (including an adverse and/or short interest, as the case may be) in the Bloomberg Commodity Index<sup>SM</sup>, any Index Product, any component of the Bloomberg Commodity Index<sup>SM</sup>, any investments referenced by or linked to any component of the Bloomberg Commodity Index<sup>SM</sup> or any other related investments and may exercise remedies or take other action with respect to its interests as it deems appropriate.

### **Four Main Principles Guiding the Creation of the Bloomberg Commodity Index<sup>SM</sup>**

The Bloomberg Commodity Index<sup>SM</sup> was created using the following four main principles:

- **ECONOMIC SIGNIFICANCE.** A commodity index should fairly represent the importance of a diversified group of commodities to the world economy. To achieve a fair representation, the Bloomberg Commodity Index<sup>SM</sup> uses both liquidity data and U.S.-dollar-weighted production data in determining the relative quantities of included commodities. The Bloomberg Commodity Index<sup>SM</sup> primarily relies on liquidity data, or the relative amount of trading activity of a particular commodity, as an important indicator of the value placed on that commodity by financial and physical market participants. The Bloomberg Commodity Index<sup>SM</sup> also relies on production data as a useful measure of the importance of a commodity to the world economy. Production data alone, however, may underestimate the economic significance of storable commodities (e.g., gold) relative to non-storable commodities (e.g., live cattle). Production data alone also may underestimate the investment value that financial market participants place on certain

commodities and/or the amount of commercial activity that is centered on various commodities. Accordingly, production statistics alone do not necessarily provide as accurate a reflection of economic importance as the pronouncements of the markets themselves. The Bloomberg Commodity Index<sup>SM</sup> thus relies on data that is both endogenous to the futures market (liquidity) and exogenous to the futures market (production) in determining relative weightings.

- **DIVERSIFICATION.** A second major goal of the Bloomberg Commodity Index<sup>SM</sup> is to provide diversified exposure to commodities as an asset class. Disproportionate weighting of any particular commodity or sector increases volatility and negates the concept of a broad-based commodity index. Instead of diversified commodities exposure, the investor is unduly subjected to micro-economic shocks in one commodity or sector. As described further below, diversification rules have been established and are applied annually. Additionally, the Bloomberg Commodity Index<sup>SM</sup> is rebalanced annually on a price-percentage basis in order to maintain diversified commodities exposure over time.
- **CONTINUITY.** A third goal of the Bloomberg Commodity Index<sup>SM</sup> is to be responsive to the changing nature of commodity markets in a manner that does not completely reshape the character of the Bloomberg Commodity Index<sup>SM</sup> from year to year. The Bloomberg Commodity Index<sup>SM</sup> is intended to provide a stable benchmark so that end-users may be reasonably confident that historical performance data (including such diverse measures as correlation, spot yield, roll yield and volatility) is based on a structure that bears some resemblance to both the current and future composition of the Bloomberg Commodity Index<sup>SM</sup>.
- **LIQUIDITY.** Another goal of the Bloomberg Commodity Index<sup>SM</sup> is to provide a highly liquid index. The explicit inclusion of liquidity as a weighting factor helps to ensure that the Bloomberg Commodity Index<sup>SM</sup> can accommodate substantial investment flows. The liquidity of an index not only affects transaction costs associated with current investments, but may also affect the reliability of historical price performance data.

These four principles represent goals of the Bloomberg Commodity Index<sup>SM</sup> and its creators, and there can be no assurance that these goals will be achieved.

### **Composition of the Bloomberg Commodity Index<sup>SM</sup> — Commodities Available for Inclusion**

Commodities have been selected that are believed to be both sufficiently significant to the world economy to merit consideration for inclusion in the Bloomberg Commodity Index<sup>SM</sup> and that are tradable through a qualifying related futures contract. With the exception of several metals contracts (aluminum, lead, tin, nickel and zinc) that trade on the LME and contracts for Brent crude oil and low sulphur gas oil, which both trade on ICE Futures Europe, each of the potential commodities is currently the subject of at least one futures contract that trades on a U.S. exchange.

The 25 commodities currently available for inclusion in the Bloomberg Commodity Index<sup>SM</sup> are aluminum, cocoa, coffee, copper, corn, cotton, crude oil, gold, lead, lean hogs, live cattle, low sulphur gas oil, natural gas, nickel, platinum, RBOB gasoline, silver, soybean meal, soybean oil, soybeans, sugar, tin, ULS diesel, wheat and zinc.

The 21 commodities included in the Bloomberg Commodity Index<sup>SM</sup> (each, an “Index Commodity” and collectively, the “Index Commodities”) for 2020 are as follows: aluminum, coffee, copper, corn, cotton, crude oil, gold, lean hogs, live cattle, low sulphur gas oil, natural gas, nickel, RBOB gasoline, silver, soybean meal, soybean oil, soybeans, sugar, wheat, ULS diesel and zinc.

### **Designated Contracts for Each Commodity**

One or more futures contracts known as a “Designated Contract” is selected by BISL for each of the 25 commodities eligible for inclusion in the Bloomberg Commodity Index<sup>SM</sup>.

Historically, through and including the composition of the Bloomberg Commodity Index<sup>SM</sup> for 2020, BISL has chosen for each Index Commodity one Designated Contract that is traded in North America and denominated in U.S. dollars (with the exception of several LME contracts, which are traded in London, and with the exception of crude oil, for which two Designated Contracts have been selected starting in 2012, and wheat, for which two Designated Contracts that are traded in North America have been selected starting in 2013).

BISL may in the future select more than one Designated Contract for additional commodities or may select Designated Contracts that are traded outside of the United States or in currencies other than the U.S. dollar. For example, in the event that changes in regulations concerning position limits materially affect the ability of market participants to replicate the Bloomberg Commodity Index<sup>SM</sup> in the underlying futures markets, it may become appropriate to include multiple Designated Contracts for one or more commodities (in addition to crude oil and wheat) in order to enhance liquidity.

The termination or replacement of a futures contract on an established exchange occurs infrequently; if a Designated Contract were to be terminated or replaced, a comparable futures contract would be selected, if available, to replace that Designated Contract. Please see “Risk Factors — S&P or Bloomberg may be required to replace a contract underlying an S&P GSCI<sup>®</sup> Index or a Bloomberg Commodity Index, if the existing futures contract is terminated or replaced” in this underlying supplement.

The 2020 Designated Contracts for the commodities underlying the Bloomberg Commodity Index<sup>SM</sup> are set forth in the table below:

Commodity	Designated Contract	Exchange	Units	Price Quote
Aluminum	High Grade Primary Aluminum	LME	25 metric tons	USD/metric ton
Cocoa	Cocoa	ICE Futures U.S.	10 metric tons	USD/metric ton
Coffee	Coffee "C"	ICE Futures U.S.	37,500 lbs	U.S. cents/pound
Copper*	Copper	COMEX	25,000 lbs	U.S. cents/pound
Corn	Corn	CBOT	5,000 bushels	U.S. cents/bushel
Cotton	Cotton No. 2	ICE Futures U.S.	50,000 lbs	U.S. cents/pound
Crude Oil (Brent)	Brent Crude Oil	ICE Futures Europe	1,000 barrels	USD/barrel
Crude Oil (WTI)	Light, Sweet Crude Oil	NYMEX	1,000 barrels	USD/barrel
Gold	Gold	COMEX	100 troy oz.	USD/troy oz.
Lead	Refined Standard Lead	LME	25 metric tons	USD/metric ton
Lean Hogs	Lean Hogs	CME	40,000 lbs	U.S. cents/pound
Live Cattle	Live Cattle	CME	40,000 lbs	U.S. cents/pound
Low Sulphur Gas Oil	Gas Oil	ICE Futures Europe	100 tonnes	USD/MT
Natural Gas	Henry Hub Natural Gas	NYMEX	10,000 mmbtu	USD/mmbtu
Nickel	Primary Nickel	LME	6 metric tons	USD/metric ton
Platinum	Platinum	NYMEX	50 troy oz.	USD/troy oz.
Silver	Silver	COMEX	5,000 troy oz.	U.S. cents/troy oz.
Soybean Meal	Soybean Meal	CBOT	100 short tons	USD/short ton
Soybean Oil	Soybean Oil	CBOT	60,000 lbs	U.S. cents/pound
Soybeans	Soybeans	CBOT	5,000 bushels	U.S. cents/bushel
Sugar	Sugar No. 11	ICE Futures U.S.	112,000 lbs	U.S. cents/pound
Tin	Refined Tin	LME	5 metric tons	USD/metric ton
ULS Diesel	ULS Diesel	NYMEX	42,000 gallons	U.S. cents/gallon
Unleaded Gasoline	RBOB	NYMEX	42,000 gallons	U.S. cents/gallon
Wheat (Chicago)	Soft Wheat	CBOT	5,000 bushels	U.S. cents/bushel
Wheat (KC HRW)	Hard Red Winter Wheat	CBOT	5,000 bushels	U.S. cents/bushel
Zinc	Special High Grade Zinc	LME	25 metric tons	USD/metric ton

\*The Bloomberg Commodity Index<sup>SM</sup> uses the copper contract traded on the COMEX division of the New York Mercantile Exchange for copper contract prices and LME volume data in determining the weighting for the Bloomberg Commodity Index<sup>SM</sup>.

## Commodity Groups

For purposes of applying the diversification rules discussed above and below, each of the commodities eligible for inclusion in the Bloomberg Commodity Index<sup>SM</sup> are assigned to “Commodity Groups.” The Commodity Groups, and the commodities currently included in each Commodity Group, are as follows:

Commodity Group	Commodities
Energy	Crude Oil (Brent and WTI) Natural Gas RBOB Gasoline Low Sulphur Gas Oil ULS Diesel
Precious Metals	Gold Platinum Silver
Industrial Metals	Aluminum Copper Lead Nickel Tin Zinc
Livestock	Live Cattle Lean Hogs
Grains	Corn Soybeans Soybean Oil Soybean Meal
Softs	Wheat (Chicago and KC HRW) Cocoa Coffee Cotton Sugar

## Bloomberg Commodity Index<sup>SM</sup> Breakdown by Commodity Group

The Commodity Group Breakdown set forth below is based on the weightings and composition of the Bloomberg Commodity Index<sup>SM</sup> set forth under “The Bloomberg Commodity Index<sup>SM</sup> 2020 Commodity Index Target Weights” below.

Energy	29.93%
Precious Metals	17.40%
Industrial Metals	17.46%
Livestock	5.80%
Grains	22.19%
Softs	7.21%

## Annual Reweightings and Rebalancings of the Bloomberg Commodity Index<sup>SM</sup>

BISL calculates the weightings for the Bloomberg Commodity Index<sup>SM</sup> for each year in the third or fourth quarter of the year immediately prior to the year the relevant weightings are effective and publishes

the results as promptly as practicable following the calculation. These new weightings are implemented in January of the effective year.

For example, the target composition of the Bloomberg Commodity Index<sup>SM</sup> for 2020 was published on October 30, 2019. The January 2020 reweighting and rebalancing was based on the following percentages:

#### The Bloomberg Commodity Index<sup>SM</sup> 2020 Commodity Index Target Weights

Group	Commodity	Ticker	2020 Target Weights
Energy	WTI Crude Oil	CL	7.9906450%
	Natural Gas	NG	7.9601350%
	Brent Crude Oil	CO	7.0093550%
	Low Sulphur Gas Oil	QS	2.5990850%
	RBOB Gasoline	XB	2.2583580%
	ULS Diesel*	HO	2.1137150%
Grains	Corn	C	5.8331390%
	Soybeans	S	5.6367600%
	Soybean Meal	SM	3.2950770%
	Wheat	W	3.0422510%
	Soybean Oil	BO	2.8985800%
	HRW Wheat	KW	1.4859640%
Industrial Metals	Copper	HG	6.9605820%
	Aluminum	LA	4.3266510%
	Zinc	LX	3.4262380%
	Nickel	LN	2.7507970%
Precious Metals	Gold	GC	13.6224130%
	Silver	SI	3.7785780%
Softs	Sugar	SB	3.0098940%
	Coffee	KC	2.7121520%
	Cotton	CT	1.4915570%
Livestock	Live Cattle	LC	4.0201190%
	Lean Hogs	LH	1.7779520%

\*CME's heating oil contract on NYMEX was renamed ULS diesel futures in 2013.

#### Determination of Relative Weightings

The relative weightings of the Index Commodities are determined annually according to both liquidity and dollar-adjusted production data in 2/3 and 1/3 shares, respectively. Each year, for each Designated Contract selected as a reference contract for a commodity designated for potential inclusion in the Bloomberg Commodity Index<sup>SM</sup>, liquidity is measured by the Commodity Liquidity Percentage ("CLP") and production by the Commodity Production Percentage ("CPP"). The CLP for each Designated Contract is determined by taking a five-year average of the product of trading volume and the historical U.S. dollar value of that Designated Contract, and dividing the result by the sum of such products for all Designated Contracts. The CPP is determined for each commodity by taking a five-year average of annual world production figures, adjusted by the historical U.S. dollar value of the applicable Designated Contract, and dividing the result by the sum of such production figures for all the commodities that were designated for potential inclusion in the Bloomberg Commodity Index<sup>SM</sup>. The CLP and the CPP are then combined (using a ratio of 2:1) to establish the Commodity Index Percentage ("CIP") for each commodity. This CIP is then adjusted in accordance with certain diversification rules to determine the Index Commodities that will be included in the Bloomberg Commodity Index<sup>SM</sup> and their respective percentage weights.

## Diversification Rules

The Bloomberg Commodity Index<sup>SM</sup> is designed to provide diversified exposure to commodities as an asset class. To ensure that no single commodity or commodity sector dominates the Bloomberg Commodity Index<sup>SM</sup>, the following diversification rules are applied to the annual reweighting and rebalancing of the Bloomberg Commodity Index<sup>SM</sup>:

- No single commodity (e.g., natural gas or silver) may constitute more than 15% of the Bloomberg Commodity Index<sup>SM</sup>.
- No single commodity sector, together with its derivatives (e.g., WTI crude oil and Brent crude oil, together with ULS diesel and unleaded gasoline), may constitute more than 25% of the Bloomberg Commodity Index<sup>SM</sup>.
- No related group of commodities designated as a “Commodity Group” (e.g., energy, precious metals, livestock or grains) may constitute more than 33% of the Bloomberg Commodity Index<sup>SM</sup>.
- No single commodity (e.g., natural gas, silver) may constitute less than 2% of the Bloomberg Commodity Index<sup>SM</sup>, as liquidity allows.

The last rule helps to increase the diversification of the Bloomberg Commodity Index<sup>SM</sup> by giving even the smallest commodity within the basket a reasonably significant weight. Commodities with small weights initially may have their weights increased to higher than 2% by prior steps.

Following the annual reweighting and rebalancing of the Bloomberg Commodity Index<sup>SM</sup>, the percentage of any Index Commodity or Commodity Group at any time prior to the next reweighting or rebalancing will fluctuate and may exceed or be less than the percentages initially established.

## Commodity Index Multipliers

Following application of the diversification rules discussed above, CIPs are incorporated into the Bloomberg Commodity Index<sup>SM</sup> by calculating the new unit weights for each Designated Contract. Near the beginning of each new calendar year, the CIPs, along with the settlement prices determined on that date for Designated Contracts included in the Bloomberg Commodity Index<sup>SM</sup>, are used to determine a Commodity Index Multiplier (“CIM”) for each Designated Contract. This CIM is used to achieve the percentage weightings of the Designated Contracts, in dollar terms, indicated by their respective CIPs. After the CIMs are calculated, they remain fixed throughout the year. As a result, the observed price percentage of each Designated Contract will float throughout the year, until the CIMs are reset the following year based on new CIPs.

## Calculations

The excess return version of the Bloomberg Commodity Index<sup>SM</sup> is calculated by BISL by applying the impact of the changes to the futures prices of commodities included in the Bloomberg Commodity Index<sup>SM</sup> (based on their relative weightings). Once the CIMs are determined as discussed above, the calculation of the excess return version of the Bloomberg Commodity Index<sup>SM</sup> is a mathematical process whereby the CIMs for the Index Commodities are multiplied by the prices in U.S. dollars for the applicable Designated Contracts. These products are then summed. The percentage change in this sum is then applied to the prior Bloomberg Commodity Index<sup>SM</sup> excess return level to calculate the new Bloomberg Commodity Index<sup>SM</sup> excess return level.

The total return version of the Bloomberg Commodity Index<sup>SM</sup> is calculated by BISL by applying the impact of the changes in the level of the excess return version of the Bloomberg Commodity Index<sup>SM</sup> and adding interest that could be earned on funds committed to the trading of the underlying futures contracts. Once the level of the excess return version of the Bloomberg Commodity Index<sup>SM</sup> is determined as

discussed above, the daily return on a 13-week (3-month) T-bill is added to the percentage change in the excess return version of the Bloomberg Commodity Index<sup>SM</sup> (as compared with the prior Bloomberg Commodity Index<sup>SM</sup> excess return level) to obtain the total return. The total return is then applied to the prior Bloomberg Commodity Index<sup>SM</sup> total return level to calculate the new Bloomberg Commodity Index<sup>SM</sup> total return level.

### **The Bloomberg Commodity Index<sup>SM</sup> Is a Rolling Index**

The Bloomberg Commodity Index<sup>SM</sup> is composed of futures contracts on physical commodities. Unlike equities, which typically entitle the holder to a continuing stake in a corporation, commodity futures contracts normally specify a certain date for the delivery of the underlying commodity. In order to avoid delivering the underlying physical commodities and to maintain exposure to the underlying physical commodities, futures contracts on physical commodities specifying delivery on a nearby date must be sold and futures contracts on physical commodities that have not yet reached the delivery period must be purchased. The rollover for each contract occurs over a period of five Index Business Days (as defined below) each month according to a pre-determined schedule. This process is known as “rolling” a futures position. The Bloomberg Commodity Index<sup>SM</sup> is a “rolling index.”

With respect to the Bloomberg Commodity Index<sup>SM</sup>, an “Index Business Day” is any day on which the sum of the CIPs (as defined above in “— Determination of Relative Weightings”) for the Index Commodities that are open for trading is greater than 50%. For example, based on the weighting of the Index Commodities for 2020, if the CBOT, the NYMEX and the LME are each closed for trading on the same day, an Index Business Day will not exist.

### **Bloomberg Commodity Index<sup>SM</sup> Calculation Disruption Events**

From time to time, disruptions can occur in trading futures contracts on various commodity exchanges. The daily calculation of the Bloomberg Commodity Index<sup>SM</sup> will be adjusted in the event that BISL determines that any of the following index calculation disruption events exists:

- (a) the termination or suspension of, or material limitation or disruption in, the trading of any futures contract used in the calculation of the Bloomberg Commodity Index<sup>SM</sup> on that day;
- (b) the settlement price of any futures contract used in the calculation of the Bloomberg Commodity Index<sup>SM</sup> reflects the maximum permitted price change from the previous day's settlement price;
- (c) the failure of an exchange to publish official settlement prices for any futures contract used in the calculation of the Bloomberg Commodity Index<sup>SM</sup>; or
- (d) with respect to any futures contract used in the calculation of the Bloomberg Commodity Index<sup>SM</sup> that trades on the LME, an Index Business Day on which the LME is not open for trading.

### **License Agreement**

The Bloomberg Commodity Indices are joint products of UBS and Bloomberg, and have been licensed for use by JPMorgan Chase & Co. and its affiliates, including JPMorgan Financial, in connection with certain financial products, including the notes. “Bloomberg,” “Bloomberg Commodity Index<sup>SM</sup>” and “BCOM” are service and/or trademarks of Bloomberg.

The notes are not sponsored, endorsed, sold or promoted by UBS, Bloomberg or any of their subsidiaries or affiliates. None of UBS, Bloomberg or any of their subsidiaries or affiliates makes any representation or warranty, express or implied, to the owners of or counterparts to the notes or any member of the public regarding the advisability of investing in securities or commodities generally or in the notes particularly. The only relationship of UBS, Bloomberg or any of their subsidiaries or affiliates to the Issuer or the Guarantor (if applicable) in connection with the notes is the licensing of certain trademarks, trade names and service marks and of the Bloomberg Commodity Indices, which are determined, composed and calculated by BISL in conjunction with UBS without regard to the Issuer or the



Guarantor (if applicable) or the notes. UBS and BISL have no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the owners of the notes into consideration in determining, composing or calculating the Bloomberg Commodity Indices. None of UBS, Bloomberg or any of their respective subsidiaries or affiliates is responsible for or has participated in the determination of the timing of, prices at, or quantities of the notes to be issued or in the determination or calculation of the equation by which the notes are to be converted into cash. None of UBS, Bloomberg or any of their subsidiaries or affiliates shall have any obligation or liability, including, without limitation, to notes customers, in connection with the administration, marketing or trading of the notes. Notwithstanding the foregoing, UBS, Bloomberg and their respective subsidiaries and affiliates may independently issue and/or sponsor financial products unrelated to the notes currently being issued by the Issuer or the Guarantor (if applicable), but which may be similar to and competitive with the notes. In addition, UBS, Bloomberg and their subsidiaries and affiliates actively trade commodities, commodity indices and commodity futures (including the Bloomberg Commodity Indices), as well as swaps, options and derivatives which are linked to the performance of such commodities, commodity indices and commodity futures. It is possible that this trading activity will affect the value of the Bloomberg Commodity Indices and the notes.

This underlying supplement and the relevant terms supplement relate only to the notes and does not relate to the exchange-traded physical commodities underlying any of the Bloomberg Commodity Index<sup>SM</sup> components. Purchasers of the notes should not conclude that the inclusion of a futures contract in the Bloomberg Commodity Index<sup>SM</sup> is any form of investment recommendation of the futures contract or the underlying exchange-traded physical commodity by UBS, Bloomberg or any of their subsidiaries or affiliates. The information in this underlying supplement regarding the Bloomberg Commodity Index<sup>SM</sup> components has been derived solely from publicly available documents. None of UBS, Bloomberg or any of their subsidiaries or affiliates has made any due diligence inquiries with respect to the Bloomberg Commodity Index<sup>SM</sup> components in connection with the notes. None of UBS, Bloomberg or any of their subsidiaries or affiliates makes any representation that these publicly available documents or any other publicly available information regarding the Bloomberg Commodity Index<sup>SM</sup> components, including without limitation a description of factors that affect the prices of such components, are accurate or complete.

**NONE OF UBS, BLOOMBERG OR ANY OF THEIR SUBSIDIARIES OR AFFILIATES GUARANTEES THE ACCURACY AND/OR THE COMPLETENESS OF THE BLOOMBERG COMMODITY INDICES OR ANY DATA RELATED THERETO AND NONE OF UBS, BLOOMBERG OR ANY OF THEIR SUBSIDIARIES OR AFFILIATES SHALL HAVE ANY LIABILITY FOR ANY ERRORS, OMISSIONS OR INTERRUPTIONS THEREIN. NONE OF UBS, BLOOMBERG OR ANY OF THEIR SUBSIDIARIES OR AFFILIATES MAKES ANY WARRANTY, EXPRESS OR IMPLIED, AS TO RESULTS TO BE OBTAINED BY THE ISSUER OR THE GUARANTOR (IF APPLICABLE), OWNERS OF THE NOTES, OR ANY OTHER PERSON OR ENTITY FROM THE USE OF THE BLOOMBERG COMMODITY INDICES OR ANY DATA RELATED THERETO. NONE OF UBS, BLOOMBERG OR ANY OF THEIR SUBSIDIARIES OR AFFILIATES MAKES ANY EXPRESS OR IMPLIED WARRANTIES AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE BLOOMBERG COMMODITY INDICES OR ANY DATA RELATED THERETO. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT SHALL UBS, BLOOMBERG OR ANY OF THEIR SUBSIDIARIES OR AFFILIATES HAVE ANY LIABILITY FOR ANY LOST PROFITS OR INDIRECT, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSSES, EVEN IF NOTIFIED OF THE POSSIBILITY THEREOF. THERE ARE NO THIRD PARTY BENEFICIARIES OF ANY AGREEMENTS OR ARRANGEMENTS AMONG UBS, BLOOMBERG AND THE ISSUER OR THE GUARANTOR (IF APPLICABLE), OTHER THAN UBS AND THE LICENSORS OF BLOOMBERG.**

### **The Commodity Futures Markets**

Futures contracts on physical commodities are traded on regulated futures exchanges, in the over-the-counter market and on various types of physical and electronic trading facilities and markets. As of the date of this underlying supplement, all of the contracts included in the Bloomberg Commodity Index<sup>SM</sup> described in this underlying supplement are exchange-traded futures contracts. An exchange-traded futures contract provides for the purchase and sale of a specified type and quantity of a commodity or

financial instrument during a stated delivery month for a fixed price. A futures contract provides for a specified settlement month in which cash settlement is made or in which the commodity or financial instrument is to be delivered by the seller (whose position is therefore described as “short”) and acquired by the purchaser (whose position is therefore described as “long”).

No purchase price is paid or received on the purchase or sale of a futures contract. Instead, an amount of cash or cash equivalents must be deposited with the broker as “initial margin.” This amount varies based on the requirements imposed by the exchange clearing houses, but it may be lower than 5% of the notional value of the contract. This margin deposit provides collateral for the obligations of the parties to the futures contract.

By depositing margin, which may vary in form depending on the exchange, with the clearing house or broker involved, a market participant may be able to earn interest on its margin funds, thereby increasing the total return that it may realize from an investment in futures contracts.

Futures contracts are traded on organized exchanges, known as “contract markets” in the United States. At any time prior to the expiration of a futures contract, a trader may elect to close out its position by taking an opposite position on the exchange on which the trader obtained the position, subject to the availability of a liquid secondary market. This operates to terminate the position and fix the trader’s profit or loss. Futures contracts are cleared through the facilities of a centralized clearing house and a brokerage firm, referred to as a “futures commission merchant,” which is a member of the clearing house.

Unlike equity securities, futures contracts, by their terms, have stated expirations at a specified point in time prior to expiration. At a specific point in time prior to expiration, trading in a futures contract for the current delivery month will cease. As a result, a market participant wishing to maintain its exposure to a futures contract on a particular commodity or financial instrument with the nearest expiration must close out its position in the expiring contract and establish a new position in the contract for the next delivery month, a process referred to as “rolling.” For example, a market participant with a long position in a futures contract expiring in November who wishes to maintain a position in the nearest delivery month will, as the November contract nears expiration, sell the November contract, which serves to close out the existing long position, and buy a futures contract expiring in December. This will “roll” the November position into a December position, and, when the November contract expires, the market participant will still have a long position in the nearest delivery month.

Futures exchanges and clearing houses in the United States are subject to regulation by the Commodity Futures Trading Commission. Exchanges may adopt rules and take other actions that affect trading, including imposing speculative position limits, maximum price fluctuations and trading halts and suspensions and requiring liquidation of contracts in certain circumstances.

Futures markets outside the United States are generally subject to regulation by comparable regulatory authorities. The structure and nature of trading on non-U.S. exchanges may differ from this description.

## THE S&P GSCI® INDICES

All information contained in this underlying supplement regarding the S&P GSCI® Indices (as defined below), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC (“S&P Dow Jones”), the publisher of the S&P GSCI® Indices. The S&P GSCI® Indices are determined, composed and calculated by S&P Dow Jones, without regard to the notes. S&P Dow Jones acquired the rights to the S&P GSCI® Indices from Goldman, Sachs & Co. in 2007. Goldman, Sachs & Co. established and began calculating the S&P GSCI® in April 1991. The former name of the S&P GSCI® was the Goldman Sachs Commodity Index, or GSCI®. S&P Dow Jones has no obligation to continue to publish, and may discontinue publication of, any S&P GSCI® Index.

The notes may be linked in whole or in part to the performance of the S&P GSCI® Index (“S&P GSCI®”), the S&P GSCI® Light Energy Index or certain of the S&P GSCI®’s commodity sector sub-indices: the S&P GSCI® Agriculture Index, the S&P GSCI® Energy Index, the S&P GSCI® Industrial Metals Index, the S&P GSCI® Livestock Index and the S&P GSCI® Precious Metals Index (each a “S&P GSCI® Sector Index,” and together, the “S&P GSCI® Sector Indices”), or the S&P GSCI®’s single commodity sub-indices (each a “S&P GSCI® Single Component Index,” and collectively, the “S&P GSCI® Single Component Indices”). The S&P GSCI® Single Component Indices and S&P GSCI® Sector Indices are referred to in this underlying supplement collectively as the “S&P GSCI® Component Indices,” and together with the S&P GSCI® and the S&P GSCI® Light Energy Index, as the “S&P GSCI® Indices,” and each, an “S&P GSCI® Index.” If the notes are linked to any S&P GSCI® Single Component Index, any relevant disclosure for such S&P GSCI® Single Component Index will be provided in the relevant terms supplement.

S&P Dow Jones publishes excess return and total return versions of each of the S&P GSCI® Indices. The relevant terms supplement will specify whether the notes are linked to the excess return or total return version of the S&P GSCI® Indices. The excess return versions of the S&P GSCI® Indices are based on price levels of the futures contracts included in that S&P GSCI® Index as well as the discount or premium obtained by “rolling” hypothetical positions in those contracts forward as they approach delivery. The total return versions of the S&P GSCI® Indices incorporate the returns of the excess return versions, except that the total return versions also reflect interest earned on hypothetical, fully collateralized contract positions on the included commodities.

The S&P GSCI® is an index on a world production-weighted basket of principal non-financial commodities (*i.e.*, physical commodities) that satisfy specified criteria. The only commodities represented in the S&P GSCI® are those physical commodities on which active and liquid contracts are traded on trading facilities in major industrialized countries. The commodities included in the S&P GSCI® are weighted, on a production basis, to reflect the relative significance (in the view of S&P Dow Jones, as described below) of such commodities to the world economy. The fluctuations in the value of the S&P GSCI® are intended generally to correlate with changes in the prices of such physical commodities in global markets. The S&P GSCI® has been normalized such that its hypothetical level on January 2, 1970 was 100. Futures contracts on the S&P GSCI®, and options on such futures contracts, are currently listed for trading on the Chicago Mercantile Exchange.

The S&P GSCI® Light Energy Index is composed of the same commodity futures contracts as the S&P GSCI® but with those weights for contracts in the energy sector having been divided by 4. Because the weights of energy-related S&P GSCI® commodities are reduced in the S&P Light Energy Index relative to the S&P GSCI®, the relative weights of the remaining S&P GSCI® commodities are necessarily increased. As a result, although the S&P GSCI® Light Energy Index contains all of the S&P GSCI® commodities that are included in the S&P GSCI®, they are not world-production weighted in the same manner as the S&P GSCI® and may not serve as a benchmark for changes in inflation or other economic factors. In particular, because of the significance of energy-related commodities to the world economy, a significant reduction in the weights of these commodities in the S&P GSCI® Light Energy Index will substantially limit the effect of changes in energy prices on the S&P GSCI® Light Energy Index. Increases

in the prices of energy commodities, therefore, will not increase the level of the S&P GSCI® Light Energy Index to the same extent as the S&P GSCI®.

The S&P GSCI® Agriculture Index is a world production-weighted index of certain agricultural commodities in the world economy, including wheat (Chicago and Kansas), corn, soybeans, cotton, sugar, coffee and cocoa.

The S&P GSCI® Energy Index is a world production-weighted index of certain energy commodities in the world economy, including crude oil, Brent crude oil, RBOB gasoline, heating oil, gasoil and natural gas.

The S&P GSCI® Industrial Metals Index is a world production-weighted index of certain industrial metals commodities in the world economy, including aluminum, copper, lead, nickel and zinc.

The S&P GSCI® Livestock Index is a world production-weighted index of certain livestock commodities in the world economy, including lean hogs, live cattle and feeder cattle.

The S&P GSCI® Precious Metals Index is a world production-weighted index consisting of two precious metals commodities in the world economy: gold and silver.

Set forth below is a summary of the methodology used to calculate the S&P GSCI® Indices. Because the S&P GSCI® is the base index of the S&P GSCI® Component Indices, the methodology for compiling the S&P GSCI® relates as well to the methodology of compiling the S&P GSCI® Component Indices. Each of the S&P GSCI® Component Indices is calculated in the same manner as the S&P GSCI®, except that (i) the daily contract reference price, CPWs and roll weights (each as discussed below) used in performing those calculations are limited to those of the commodities included in the relevant S&P GSCI® Component Index and (ii) each S&P GSCI® Component Index has a separate normalizing constant (discussed below). The methodology for determining the composition and weighting of the S&P GSCI® and for calculating its value is subject to modification in a manner consistent with the purposes of the S&P GSCI®, as described below. S&P Dow Jones makes the official calculations of the S&P GSCI® Indices.

### **Composition of the S&P GSCI®**

In order to be included in the S&P GSCI®, a contract must satisfy the following eligibility criteria:

- the contract must be in respect of a physical commodity and not a financial commodity;
- the contract must have a specified expiration or term or provide in some other manner for delivery or settlement at a specified time, or within a specified period, in the future;
- the contract must, at any given point in time, be available for trading at least five months prior to its expiration or such other date or time period specified for delivery or settlement;
- the contract must be traded on an exchange, facility or other platform (referred to as a “trading facility”) that allows market participants to execute spread transactions, through a single order entry, between the pairs of contract expirations included in the S&P GSCI® that, at any given point in time, will be involved in the rolls to be effected in the next three roll periods (defined below);
- the contract must be denominated in U.S. dollars; and
- the contract must be traded on or through a trading facility that has its principal place of business or operations in a country that is a member of the Organization for Economic Cooperation and Development.

The price of the relevant contract that is used as a reference or benchmark by market participants (referred to as the “daily contract reference price”) generally must have been available on a continuous basis for at least two years prior to the proposed date of inclusion in the S&P GSCI®. In appropriate circumstances, S&P Dow Jones may determine that a shorter time period is sufficient or that historical daily contract reference prices for such contract may be derived from daily contract reference prices for a similar or related contract. The daily contract reference price may be (but is not required to be) the price (a) used by the relevant trading facility or clearing facility to determine the margin obligations (if any) of its members or participants or margining transactions or for other purposes or (b) referred to generally as the reference, closing or settlement price of the relevant contract.

For a contract to be eligible for inclusion in the S&P GSCI®, volume data with respect to such contract must be available for at least the three months immediately preceding the date on which the determination is made. The following eligibility criteria apply:

- In order to be added to the S&P GSCI®, a contract that is not included in the S&P GSCI® at the time of determination and that is based on a commodity that is not represented in the S&P GSCI® at such time must have an annualized total dollar value traded over the relevant period of at least U.S. \$15 billion. The total dollar value traded is the dollar value of the total quantity of the commodity underlying transactions in the relevant contract over the period for which the calculation is made, based on the average of the daily contract reference prices on the last day of each month during the period.
- In order to continue to be included in the S&P GSCI®, a contract that is already included in the S&P GSCI® at the time of determination and that is the only contract on the relevant commodity included in the S&P GSCI® must have an annualized total dollar value traded of at least U.S. \$5 billion over the relevant period and of at least U.S. \$10 billion during at least one of the three most recent annual periods used in making the determination.
- In order to be added to the S&P GSCI®, a contract that is not included in the S&P GSCI® at the time of determination and that is based on a commodity on which there are one or more contracts already included in the S&P GSCI® at such time must have an annualized total dollar value traded over the relevant period of at least U.S. \$30 billion.
- In order to continue to be included in the S&P GSCI®, a contract that is already included in the S&P GSCI® at the time of determination and that is based on a commodity on which there are one or more contracts already included in the S&P GSCI® at such time must have an annualized total dollar value traded, over the relevant period of at least U.S. \$10 billion over the relevant period and of at least U.S. \$20 billion during at least one of the three most recent annual periods used in making the determination.

In addition to the volume requirements described above, a contract must have a minimum reference percentage dollar weight:

- In order to continue to be included in the S&P GSCI®, a contract that is already included in the S&P GSCI® at the time of determination must have a reference percentage dollar weight of at least 0.10%. The reference percentage dollar weight of a contract is determined by multiplying the CPW (defined below) of a contract by the average of its daily contract reference prices on the last day of each month during the relevant period. These amounts are summed for all contracts included in the S&P GSCI® and each contract's percentage of the total is then determined.
- In order to be added to the S&P GSCI®, a contract that is not included in the S&P GSCI® at the time of determination must have a reference percentage dollar weight of at least 1.00% at the time of determination.

In the event that two or more contracts on the same commodity satisfy the eligibility criteria, such contracts are included in the S&P GSCI® in the order of their respective total quantity traded during the relevant period (determined as the total quantity of the commodity underlying transactions in the relevant contract), with the contract having the highest total quantity traded being included first. No further contracts are included if such inclusion results in the portion of the S&P GSCI® attributable to such commodity exceeding a particular level.

If under the procedure set forth in the preceding paragraph, additional contracts could be included with respect to several commodities at the same time, the procedure is first applied to the commodity that has the smallest portion of the S&P GSCI® attributable to it at the time of determination. Subject to the other eligibility criteria, the contract with the highest total quantity traded on such commodity is included. Before any additional contracts on any commodity are included, the portion of the S&P GSCI® attributable to all commodities is recalculated. The selection procedure described above is then repeated with respect to the contracts on the commodity that then has the smallest portion of the S&P GSCI® attributable to it.

The contracts currently included in the S&P GSCI® are all futures contracts traded on the New York Mercantile Exchange, Inc. ("NYMEX"), ICE Futures Europe ("ICE-Europe"), ICE Futures U.S. ("ICE-US"), the Chicago Mercantile Exchange ("CME"), the Chicago Board of Trade ("CBOT"), the Kansas City Board of Trade ("KBT"), the Commodities Exchange Inc. ("CMX") and the London Metal Exchange ("LME").

The quantity of each of the contracts included in the S&P GSCI® is determined on the basis of a five-year average (referred to as the "world production average") of the production quantity of the underlying commodity from sources determined by S&P Dow Jones to be reasonably accurate and reliable, such as the United Nations Industrial Commodity Statistics Yearbook. However, if a commodity is primarily a regional commodity, based on its production, use, pricing, transportation or other factors, S&P Dow Jones may calculate the weight of such commodity based on regional, rather than world, production data. At present, natural gas is the only commodity included in the S&P GSCI® where the production quantity is determined based on regional (North American) production.

The five-year moving average is updated annually for each commodity included in the S&P GSCI®, based on the five-year period (ending approximately two years prior to the date of calculation and moving backwards) for which complete data for all commodities is available. The contract production weights (the "CPWs") used in calculating the S&P GSCI® are derived from world or regional production averages, as applicable, of the relevant commodities, and are calculated based on the total quantity traded for the relevant contract and the world or regional production average, as applicable, of the underlying commodity. However, if the volume of trading in the relevant contract, as a multiple of the production levels of the commodity, is below specified thresholds, the CPW of the contract is reduced until the threshold is satisfied. This is designed to ensure that trading in each such contract is sufficiently liquid relative to the production of the commodity.

In addition, S&P Dow Jones performs this calculation on a quarterly basis and, if the multiple of any contract is below the prescribed threshold, the composition of the S&P GSCI® is reevaluated, based on the criteria and weighting procedure described above. This procedure is undertaken to allow the S&P GSCI® to shift from contracts that have lost substantial liquidity into more liquid contracts, during the course of a given year. As a result, it is possible that the composition or weighting of the S&P GSCI® will change on one or more of these quarterly evaluation dates. In addition, regardless of whether any changes have occurred during the year, S&P Dow Jones reevaluates the composition of the S&P GSCI® at the conclusion of each year, based on the above criteria. Other commodities that satisfy such criteria, if any, will be added to the S&P GSCI®. Commodities included in the S&P GSCI® that no longer satisfy such criteria, if any, will be deleted.

S&P Dow Jones also determines whether modifications in the selection criteria or the methodology for determining the composition and weights of and for calculating the S&P GSCI® are necessary or appropriate in order to assure that the S&P GSCI® represents a measure of commodity market performance. S&P Dow Jones has the discretion to make any such modifications.

## Contract Expirations

Because the S&P GSCI® comprises actively traded contracts with scheduled expirations, it can only be calculated by reference to the prices of contracts for specified expiration, delivery or settlement periods, referred to as “contract expirations.” The contract expirations included in the S&P GSCI® for each commodity during a given year are designated by S&P Dow Jones, *provided* that each such contract must be an “active contract.” An “active contract” for this purpose is a liquid, actively traded contract expiration, as defined or identified by the relevant trading facility or, if no such definition or identification is provided by the relevant trading facility, as defined by standard custom and practice in the industry.

If a trading facility deletes one or more contract expirations, the S&P GSCI® will be calculated during the remainder of the year in which such deletion occurs based on the remaining contract expirations designated by S&P Dow Jones. If a trading facility ceases trading in all contract expirations relating to a particular contract, S&P Dow Jones may designate an eligible replacement contract on the commodity. To the extent practicable, the replacement will be in effect during the next monthly review of the composition of the S&P GSCI®. If that timing is not practicable, S&P Dow Jones will determine the date of the replacement and will consider a number of factors, including the differences between the existing contract and the replacement contract specifications and contract expirations.

## Value of the S&P GSCI®

The value of the S&P GSCI® on any given day is equal to the total dollar weight of the S&P GSCI® divided by a normalizing constant that assures the continuity of the S&P GSCI® over time. The total dollar weight of the S&P GSCI® is the sum of the dollar weight of each of the underlying commodities.

The dollar weight of each such commodity on any given day is equal to:

- the “daily contract reference price” (discussed below),
- multiplied by the appropriate CPWs, and
- during a roll period, the appropriate “roll weights” (discussed below).

The daily contract reference price used in calculating the dollar weight of each commodity on any given day is the most recent daily contract reference price made available by the relevant trading facility, except that the daily contract reference price for the most recent prior day will be used if the exchange is closed or otherwise fails to publish a daily contract reference price on that day. In addition, if the trading facility fails to make a daily contract reference price available or publishes a daily contract reference price that, in the reasonable judgment of S&P Dow Jones, reflects manifest error, the relevant calculation will be delayed until the price is made available or corrected; *provided* that, if the price is not made available or corrected by 4:00 p.m., New York City time, S&P Dow Jones may, if it deems such action to be appropriate under the circumstances, determine the appropriate daily contract reference price for the applicable futures contract in its reasonable judgment for purposes of the relevant S&P GSCI® calculation.

The “roll weight” of each commodity reflects the fact that the positions in contracts must be liquidated or rolled forward into more distant contract expirations as they approach expiration. If actual positions in the relevant markets were rolled forward, the roll would likely need to take place over a period of days. Since the S&P GSCI® is designed to replicate the performance of actual investments in the underlying contracts, the rolling process incorporated in the S&P GSCI® also takes place over a period of days at the beginning of each month (referred to as the “roll period”). On each day of the roll period, the “roll weights” of the first nearby contract expiration on a particular commodity and the more distant contract expiration into which it is rolled are adjusted, so that the hypothetical position in the contract on the commodity that

is included in the S&P GSCI® is gradually shifted from the first nearby contract expiration to the more distant contract expiration.

If on any day during a roll period any of the following conditions exists, the portion of the roll that would have taken place on that day is deferred until the next day on which such conditions do not exist:

- no daily contract reference price is available for a given contract expiration;
- any such price represents the maximum or minimum price for such contract month, based on exchange price limits (referred to as a "Limit Price");
- the daily contract reference price published by the relevant trading facility reflects manifest error, or such price is not published by 4:00 p.m., New York City time. In that event, S&P Dow Jones may, but is not required to, determine a daily contract reference price and complete the relevant portion of the roll based on such price; *provided*, that, if the trading facility publishes a price before the opening of trading on the next day, S&P Dow Jones will revise the portion of the roll accordingly; or
- trading in the relevant contract terminates prior to its scheduled closing time.

If any of these conditions exist throughout the roll period, the roll with respect to the affected contract will be effected in its entirety on the next day on which such conditions no longer exist.

### **Contract Daily Return**

The contract daily return on any given day is equal to the sum, for each of the commodities included in the S&P GSCI®, of the applicable daily contract reference price on the relevant contract multiplied by the appropriate CPW and the appropriate "roll weight," divided by the total dollar weight of the S&P GSCI® on the preceding day, minus one.

### **Calculation of the S&P GSCI® Indices**

#### *Excess return S&P GSCI® Indices*

The value of any excess return version of a S&P GSCI® Index on any day on which the S&P GSCI® is calculated (an "S&P GSCI® Business Day") is equal to the product of:

- the value of the applicable S&P GSCI® Index on the immediately preceding S&P GSCI® Business Day; and
- one *plus* the contract daily return of the applicable S&P GSCI® Index on the S&P GSCI® Business Day on which the calculation is made.

#### *Total Return S&P GSCI® Indices*

The value of any total return version of an S&P GSCI® Index on any S&P GSCI® Business Day reflects the value of an investment in the excess return version of that S&P GSCI® Index together with a Treasury bill return and is equal to the product of:

- the value of the applicable S&P GSCI® Index on the immediately preceding S&P GSCI® Business Day;
- one *plus* the sum of the contract daily return and the Treasury Bill return on the S&P GSCI® Business Day on which the calculation is made; and



- one *plus* the Treasury Bill return for each non-S&P GSCI® Business Day since the immediately preceding S&P GSCI® Business Day.

The Treasury Bill return is the return on a hypothetical investment in the applicable S&P GSCI® Index at a rate equal to the interest rate on a specified U.S. Treasury Bill.

## **Index Governance**

### *Index Committee*

S&P Dow Jones has established an index committee with respect to the S&P GSCI® Indices (the “Index Committee”) to oversee the daily management and operations of the S&P GSCI®, and is responsible for all analytical methods and calculation of the S&P GSCI® Indices. The Index Committee consists of full-time professional members of S&P Dow Jones’s staff. At each meeting, the Index Committee reviews any issues that may affect index constituents, statistics comparing the composition of the indices to the market, commodities that are being considered as candidates for addition to an index and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting commodities or other matters.

S&P Dow Jones considers information about changes to the S&P GSCI® Indices and related matters to be potentially market-moving and material. Therefore, all Index Committee discussions are confidential.

The Index Committee reserves the right to make exceptions when applying the methodology of the S&P GSCI® if the need arises.

In addition to the daily governance of the S&P GSCI® Indices and maintenance of their methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the S&P GSCI® Indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones may publish a consultation inviting comments from external parties.

### *Commodity Index Advisory Panel*

S&P Dow Jones has established a commodity index advisory panel (with respect to the S&P GSCI® Indices, the “Advisory Panel”) to assist it in connection with the operation of the S&P GSCI®. The Advisory Panel meets on an annual basis and at other times at the request of the Index Committee. The principal purpose of the Advisory Panel is to advise the Index Committee with respect to, among other things, the calculation of the S&P GSCI®, the effectiveness of the S&P GSCI® as a measure of commodity futures market performance and the need for changes in the composition or in the methodology of the S&P GSCI®. The Advisory Panel acts solely in an advisory and consultative capacity; the Index Committee makes all decisions with respect to the composition, calculation and operation of the S&P GSCI®.

## **License Agreement**

The S&P GSCI® Indices are licensed by S&P Dow Jones for use in connection with an issuance of the notes.

The notes are not sponsored, endorsed, sold or promoted by S&P Dow Jones or its third party licensors. Neither S&P Dow Jones nor its third party licensors makes any representation or warranty, express or implied, to the owners of the notes or any member of the public regarding the advisability of investing in securities generally or in the notes particularly or the ability of the S&P GSCI® Indices to track general stock market performance. S&P and its third party licensors’ only relationship to the Issuer or the Guarantor (if applicable) is the licensing of certain trademarks and trade names of S&P and the third party

licensors and of the S&P GSCI® Indices which are determined, composed and calculated by S&P or its third party licensors without regard to the Issuer or the Guarantor (if applicable) or the notes. S&P Dow Jones and its third party licensors have no obligation to take the needs of the Issuer or the Guarantor (if applicable) or the owners of the notes into consideration in determining, composing or calculating the S&P GSCI® Indices. Neither S&P Dow Jones nor its third party licensors is responsible for and has not participated in the determination of the prices and amount of the notes or the timing of the issuance or sale of the notes or in the determination or calculation of the equation by which the notes are to be converted into cash. S&P Dow Jones has no obligation or liability in connection with the administration, marketing or trading of the notes.

**NEITHER S&P DOW JONES, ITS AFFILIATES NOR THEIR THIRD PARTY LICENSORS GUARANTEE THE ADEQUACY, ACCURACY, TIMELINESS OR COMPLETENESS OF THE S&P GSCI® INDICES OR ANY DATA INCLUDED THEREIN OR ANY COMMUNICATIONS, INCLUDING BUT NOT LIMITED TO, ORAL OR WRITTEN COMMUNICATIONS (INCLUDING ELECTRONIC COMMUNICATIONS) WITH RESPECT THERETO. S&P DOW JONES, ITS AFFILIATES AND THEIR THIRD PARTY LICENSORS SHALL NOT BE SUBJECT TO ANY DAMAGES OR LIABILITY FOR ANY ERRORS, OMISSIONS OR DELAYS THEREIN. S&P MAKES NO EXPRESS OR IMPLIED WARRANTIES, AND EXPRESSLY DISCLAIMS ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE WITH RESPECT TO THE MARKS, THE S&P GSCI® INDICES OR ANY DATA INCLUDED THEREIN. WITHOUT LIMITING ANY OF THE FOREGOING, IN NO EVENT WHATSOEVER SHALL S&P DOW JONES, ITS AFFILIATES OR THEIR THIRD PARTY LICENSORS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF PROFITS, TRADING LOSSES, LOST TIME OR GOODWILL, EVEN IF THEY HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, WHETHER IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE.**

“Standard & Poor’s,” “S&P” and “S&P GSCI®” are trademarks of Standard & Poor’s Financial Services LLC and have been licensed for use by JPMorgan Chase & Co. and its affiliates, including JPMorgan Financial.

## **The Commodity Futures Markets**

Futures contracts on physical commodities are traded on regulated futures exchanges, in the over-the-counter market and on various types of physical and electronic trading facilities and markets. As of the date of this underlying supplement, all of the contracts included in the S&P GSCI® Indices are exchange-traded futures contracts. An exchange-traded futures contract provides for the purchase and sale of a specified type and quantity of a commodity or financial instrument during a stated delivery month for a fixed price. A futures contract provides for a specified settlement month in which cash settlement is made or in which the commodity or financial instrument is to be delivered by the seller (whose position is therefore described as “short”) and acquired by the purchaser (whose position is therefore described as “long”).

No purchase price is paid or received on the purchase or sale of a futures contract. Instead, an amount of cash or cash equivalents must be deposited with the broker as “initial margin.” This amount varies based on the requirements imposed by the exchange clearing houses, but it may be lower than 5% of the notional value of the contract. This margin deposit provides collateral for the obligations of the parties to the futures contract.

By depositing margin, which may vary in form depending on the exchange, with the clearing house or broker involved, a market participant may be able to earn interest on its margin funds, thereby increasing the total return that it may realize from an investment in futures contracts.

Futures contracts are traded on organized exchanges, known as “contract markets” in the United States. At any time prior to the expiration of a futures contract, a trader may elect to close out its position by taking an opposite position on the exchange on which the trader obtained the position, subject to the availability of a liquid secondary market. This operates to terminate the position and fix the trader’s profit

or loss. Futures contracts are cleared through the facilities of a centralized clearing house and a brokerage firm, referred to as a “futures commission merchant,” which is a member of the clearing house.

Unlike equity securities, futures contracts, by their terms, have stated expirations at a specified point in time prior to expiration. At a specific point in time prior to expiration, trading in a futures contract for the current delivery month will cease. As a result, a market participant wishing to maintain its exposure to a futures contract on a particular commodity or financial instrument with the nearest expiration must close out its position in the expiring contract and establish a new position in the contract for the next delivery month, a process referred to as “rolling.” For example, a market participant with a long position in a futures contract expiring in November who wishes to maintain a position in the nearest delivery month will, as the November contract nears expiration, sell the November contract, which serves to close out the existing long position, and buy a futures contract expiring in December. This will “roll” the November position into a December position, and, when the November contract expires, the market participant will still have a long position in the nearest delivery month.

Futures exchanges and clearing houses in the United States are subject to regulation by the Commodity Futures Trading Commission. Exchanges may adopt rules and take other actions that affect trading, including imposing speculative position limits, maximum price fluctuations and trading halts and suspensions and requiring liquidation of contracts in certain circumstances.

Futures markets outside the United States are generally subject to regulation by comparable regulatory authorities. The structure and nature of trading on non-U.S. exchanges may differ from this description. From their inception to the present, the S&P GSCI® Indices have been composed exclusively of futures contracts traded on regulated exchanges.

## FUND DESCRIPTIONS

### THE INVESCO QQQ TRUST<sup>SM</sup>, SERIES 1

All information contained in this underlying supplement regarding the Invesco QQQ Trust<sup>SM</sup>, Series 1 (the “**QQQ Fund**”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, The Bank of New York Mellon, as trustee of the QQQ Fund (the “**QQQ Fund Trustee**”), and Invesco Capital Management LLC, as sponsor of the QQQ Fund (the “**QQQ Fund Sponsor**”). The QQQ Fund is a unit investment trust that issues securities called “Invesco QQQ Shares.” The QQQ Fund is an exchange-traded fund that trades on The NASDAQ Stock Market under the ticker symbol “QQQ.”

#### *Investment Objective and Strategy*

The QQQ Fund is a unit investment trust. The investment objective of the QQQ Fund is to seek to track the investment results, before fees and expenses, of the NASDAQ-100 Index<sup>®</sup>. For additional information about the NASDAQ-100 Index<sup>®</sup>, see “Equity Index Descriptions — The NASDAQ-100 Index<sup>®</sup>.”

The QQQ Fund holds securities and cash and is not actively managed by traditional methods, which typically involve effecting changes in the holdings of securities on the basis of judgments made relating to economic, financial and market considerations. To maintain the correspondence between the composition and weights of the securities held by the QQQ Fund and the stocks included in the NASDAQ-100 Index<sup>®</sup> (“**QQQ Index Securities**”), the QQQ Fund Trustee adjusts the holdings of the QQQ Fund from time to time to conform to periodic changes in the identity and/or relative weights of the QQQ Index Securities.

The QQQ Fund will not be able to replicate exactly the performance of the NASDAQ-100 Index<sup>®</sup> because the total return generated by the securities held by the QQQ Fund will be reduced by transaction costs incurred in adjusting the actual balance of the securities held by the QQQ Fund and other expenses of the QQQ Fund, whereas such transaction costs and expenses are not included in the calculation of the NASDAQ-100 Index<sup>®</sup>. It is also possible that for short periods of time, the QQQ Fund may not fully replicate the performance of the NASDAQ-100 Index<sup>®</sup> due to the temporary unavailability of certain QQQ Index Securities in the secondary market or due to other extraordinary circumstances. Such events are unlikely to continue for an extended period of time because the QQQ Fund Trustee is required to correct such imbalances by means of adjusting the composition of the securities held by the QQQ Fund. It is also possible that the composition of the QQQ Fund may not exactly replicate the composition of the NASDAQ-100 Index<sup>®</sup> if the QQQ Fund has to adjust its holdings of securities in order to continue to qualify as a “regulated investment company” under the Internal Revenue Code of 1986.

The QQQ Fund is a registered investment company. Information provided to or filed with the SEC by the QQQ Fund pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-61001 and 811-08947, respectively, through the SEC’s website at <http://www.sec.gov>.

## **THE iSHARES® 20+ YEAR TREASURY BOND ETF**

All information contained in this underlying supplement regarding the iShares® 20+ Year Treasury Bond ETF (the “20+ Treasury Fund”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, iShares® Trust and BlackRock Fund Advisors (“BFA”). The 20+ Treasury Fund is an investment portfolio of iShares® Trust and is maintained and managed by BFA. BFA is currently the investment adviser to the 20+ Treasury Fund. The 20+ Treasury Fund is an exchange-traded fund (“ETF”) that trades on The NASDAQ Stock Market under the ticker symbol “TLT.”

The 20+ Treasury Fund seeks to track the investment results, before fees and expenses, of an index composed of U.S. Treasury bonds with remaining maturities greater than twenty years. On March 31, 2016, the 20+ Treasury Fund ceased tracking the Barclays U.S. 20+ Year Treasury Bond Index and began tracking the ICE U.S. Treasury 20+ Year Bond Index (the “ICE 20+ Year Index”). The ICE 20+ Year Index measures the performance of the U.S. dollar-denominated, fixed-rate U.S. Treasury market that has a remaining maturity of greater than or equal to twenty years. For more information on the ICE 20+ Year Index, please see “The ICE U.S. Treasury 20+ Year Bond Index” below.

BFA uses a representative sampling indexing strategy to manage the 20+ Treasury Fund. “Representative sampling” is an indexing strategy that involves investing in a representative sample of securities that collectively has an investment profile similar to that of an applicable underlying index. The securities selected are expected to have, in the aggregate, investment characteristics (based on factors such as market capitalization and industry weightings), fundamental characteristics (such as return variability, duration, maturity or credit ratings and yield) and liquidity measures similar to those of an applicable underlying index. The 20+ Treasury Fund may or may not hold all of the securities in the ICE 20+ Year Index.

The ICE 20+ Year Index is a financial calculation, based on a grouping of financial instruments, and is not an investment product, while the 20+ Treasury Fund is an actual investment portfolio. The performance of the 20+ Treasury Fund and the ICE 20+ Year Index may vary for a number of reasons, including transaction costs, non-U.S. currency valuations, asset valuations, corporate actions (such as mergers and spin-offs), timing variances and differences between the 20+ Treasury Fund’s portfolio and the ICE 20+ Year Index resulting from the 20+ Treasury Fund’s use of representative sampling or from legal restrictions (such as diversification requirements) that apply to the 20+ Treasury Fund but not to the ICE 20+ Year Index.

“Tracking error” is the divergence of the performance (return) of the 20+ Treasury Fund’s portfolio from that of the ICE 20+ Year Index. BFA expects that, over time, the 20+ Treasury Fund’s tracking error will not exceed 5%. Because the 20+ Treasury Fund uses a representative sampling indexing strategy, it can be expected to have a larger tracking error than if it used a replication indexing strategy. “Replication” is an indexing strategy in which a fund invests in substantially all of the securities in its underlying index in approximately the same proportions as in the underlying index.

iShares® Trust is a registered investment company that consists of numerous separate investment portfolios, including the 20+ Treasury Fund. Information provided to or filed with the SEC by iShares® Trust pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-92935 and 811-09729, respectively, through the SEC’s website at <http://www.sec.gov>.

### **The ICE U.S. Treasury 20+ Year Bond Index**

All information contained in this underlying supplement regarding the ICE 20+ Year Index is derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, ICE Data Indices, LLC or its affiliates (collectively “IDI”), a subsidiary of Intercontinental Exchange, Inc. IDI has no obligation to continue to publish, and may discontinue publication of, the ICE 20+ Year Index.

The ICE 20+ Year Index is a market-value weighted index that is designed to measure the performance of the U.S. dollar-denominated, fixed-rate U.S. Treasury market that has a remaining maturity of greater than or equal to twenty years. The ICE 20+ Year Index was launched on December 31, 2015. The ICE 20+ Year Index is reported by Bloomberg L.P. under the ticker symbol “IDCOT20.”

### ***Index Eligibility Criteria and Inclusion Rules***

The ICE 20+ Year Index consists of securities that meet the criteria listed below (the “Eligible Bond universe”). The basis of the Eligible Bond universe are those securities for which content is available daily, including evaluations and reference data, through ICE Data Pricing & Reference Data, LLC (“PRD”).

***Maturity.*** Each security must have a minimum remaining term to final maturity of greater than or equal to twenty years as of the last business day of the month (the “Rebalance Date”). Treasury securities that have an announced call are removed from the ICE 20+ Year Index at the end of the month prior to the month in which the call will take place.

***Size.*** Each security is required to have a minimum amount outstanding of U.S. \$300 million. Amount outstanding is defined as the par amount outstanding of each U.S. Treasury security, inclusive of any announced auctions or re-openings, less the par amount of that U.S. Treasury security held in the Federal Reserve System Open Market Account or bought at issuance by the Federal Reserve. A new issuance bought at auction by the Federal Reserve is not included in the Eligible Bond universe. Secondary market purchases or sales by the Federal Reserve that occur in the current month are reflected in the Eligible Bond universe at the next rebalancing.

***Coupon.*** The Eligible Bond universe includes only fixed-rate securities, excluding zero coupon securities.

***Currency.*** The Eligible Bond universe includes only securities with principal and interest denominated in U.S. dollars.

***Bond Type.*** Inflation-linked securities, Treasury bills, floating-rate notes, cash-management bills and any government agency debt issued with or without a government guarantee are excluded from the Eligible Bond universe.

### ***Index Maintenance***

The ICE 20+ Year Index is rebalanced monthly. Securities are required to meet the ICE 20+ Year Index inclusion rules highlighted in the previous section to be considered for inclusion at the beginning of any given month. This includes the availability of evaluated pricing and reference data through PRD.

***Rebalancing.*** The ICE 20+ Year Index is rebalanced at each month end. The new ICE 20+ Year Index for the next month is available three days prior to month end and is intended to reflect the constituent changes from the prior rebalancing date based on index eligibility.

***Reinvestment of Cash Flows.*** Cash that has accrued intra-month from interest and principal payments by the securities included in the ICE 20+ Year Index earns no reinvestment return during the month. Accumulated cash (from coupon and principal payments) is removed from the ICE 20+ Year Index at month-end, such that the cash is reinvested pro rata across the entire ICE 20+ Year Index.

***New Issues.*** Qualifying securities issued on or before the rebalancing date may qualify for inclusion. Issued securities are included in the pro forma ICE 20+ Year Index with a price of U.S. \$100 until replaced with an evaluated price as soon as available after auction day.

### ***Calculation***

Returns and risk measures, such as yield duration, are first calculated at the constituent level and then aggregated to the ICE 20+ Year Index level using its constituents’ market weights.

### *Constituent Level Calculations*

$P_0$ ,  $A_0$ ,  $PAR_0$ ,  $C_0$  and  $MV_0$  and  $P_1$ ,  $A_1$ ,  $PAR_1$ ,  $C_1$  and  $MV_1$  denote the price, accrued interest, par amount, cumulative coupon payments and market values at date  $T_0$  and date  $T_1$ , respectively.  $C$  denotes the coupon payments during the period (excluding any coupon payment on date  $T_0$  but including any coupon payment on date  $T_1$ ).

Coupon payments during the period are calculated as follows:  $C = C_1 - C_0$ .

The market values at time  $T_0$  and  $T_1$  are:  $MV_0 = PAR_0 \times (P_0 + A_0)$  and  $MV_1 = PAR_1 \times (P_1 + A_1)$ , respectively.

The price return  $R_1^{\text{price}}$  and coupon return  $R_1^{\text{coupon}}$  (whenever applicable) are defined as follows:

- Price return: return due to price appreciation over the return period:

$$R_1^{\text{price}} = \frac{P_1 - P_0}{(P_0 + A_0)}$$

- Coupon return: return due to coupon accrual during the period:

$$R_1^{\text{coupon}} = \frac{(A_1 - A_0) + C}{(P_0 + A_0)}$$

The total return is the sum of the price return and the coupon return:

$$\text{Total Return}_1 = \text{Price Return}_1 + \text{Coupon Return}_1$$

### *Index Level Calculations*

The ICE 20+ Year Index had an initial level of 100 at the inception date. As time passes, the ICE 20+ Year Index level is calculated in an iterative way as follows:

$$\text{Index Level}_1 = \text{Index Level}_0 + (\text{Index Level}_0 \times \text{Index Total Returns}_1)$$

The ICE 20+ Year Index total return is calculated by aggregating the constituent level total returns using market weights. To calculate the ICE 20+ Year Index total return for the period from dates  $T_0$  and  $T_1$ , market value weights at date  $T_0$  are used. The total market value of the ICE 20+ Year Index at time  $T_0$  is  $\sum_n MV_0^n$  plus any intra-month cash from coupon payment or principal repayment and the weight for constituent security, which is calculated as follows:

$$w_o^i = \frac{MV_o^i}{(\text{Cash} + \sum_n MV_o^n)}$$

The ICE 20+ Year Index's level will be provided to four decimal places.

### **Index Policies**

#### *Timing and Pricing Source.*

The ICE 20+ Year Index's level is calculated using 3:00 p.m. Eastern Standard Time evaluations from PRD. These evaluations are based upon methodologies designed to reflect the market upon which the ICE 20+ Year Index is based.

PRD's bid-side evaluations are market-based measurements that are processed through a rules-based pricing application and represent its good faith determinations as to what the holder would receive in an orderly transaction (for an institutional round lot position, typically \$1,000,000 or greater current value in U.S. dollars or local currency equivalent) under current market conditions. The rules based logic utilizes valuation techniques that may vary by asset class and per methodology, maximize the use of relevant observable data including quoted prices for similar assets, benchmark yield curves and market corroborated inputs. For example, its pricing applications are coded to review trades and bids to determine that the lot size is representative of an institutional round lot, though smaller or retail sized lots may be considered, especially if this is the only or primary trading information available.

PRD's evaluators meet regularly to discuss market movements and other macro-economic information. PRD evaluates U.S. Treasury securities by obtaining feeds continuously from a number of live data sources including active market makers and inter-dealer brokers. Sources are reviewed on the basis of their historical accuracy for individual issues and maturity ranges. As new information is received, it is compared against the previous evaluation as part of the daily process. To provide additional transparency into its procedures, controls and governing processes, PRD adopted a code of conduct which enables benchmark administrators, like IDI, to exercise oversight of the benchmark setting process in conformance with the IOSCO Principles. IDI also maintains a verification process designed to identify price tolerance breaks for further investigation.

*Calendar.* The ICE 20+ Year Index follows the SIFMA U.S. bond market holiday schedule. The ICE 20+ Year Index's level is calculated daily at the end of each day on which SIFMA declares the U.S. fixed income markets open. When the bond market closes early per the SIFMA schedule, the ICE 20+ Year Index's level may be calculated at a time in accordance with the recommended close. However, evaluated pricing from PRD must be available to calculate the ICE 20+ Year Index's level.

*Exceptional Market Conditions and Corrections.* IDI retains the right to delay the publication of the level of the ICE 20+ Year Index. Furthermore, IDI retains the right to suspend the publication of the level of the ICE 20+ Year Index if it believes that circumstances prevent the proper calculation of the ICE 20+ Year Index. If evaluated prices are not available, the ICE 20+ Year Index will not be recalculated unless IDI decides otherwise. Reasonable efforts are made to ensure the correctness and validity of data used in index calculations. Where errors have occurred in the determination or calculation of the ICE 20+ Year Index, the decision to make a restatement will be assessed on a case by case basis. Such decision will take account of the significance, impact; age; and scale of the error.

In the event that there is a market-wide event resulting in evaluated prices not being available, IDI will determine its approach on a case by case basis, taking into account information and notifications provided by PRD. Market-wide events include, but are not limited to, technological problems or failures, natural disaster or other business continuity planning-related event. IDI will communicate any issues with publication of the ICE 20+ Year Index during the day through the regular client communication channels; in addition, IDI may also contact clients directly; post a notice on the IDI website; send a message via the market data portal; or use other such forms of communication.

*Expert Judgment.* In cases which are not expressly covered in the index rules, operational adjustments may take place along the lines of the aim of the ICE 20+ Year Index. Operational adjustments may also take place if, in the opinion of IDI, it is desirable to do so to maintain the integrity of the ICE 20+ Year Index. Any such modifications described under this section or exercise of expert judgment will be based upon the IDI's Index Design Principles, which detail the core design principles adhered to IDI in establishing an ICE 20+ Year Index determination specific to the ICE 20+ Year Index. "Expert Judgment" refers to the exercise of discretion by the IDI with respect to the use of data in determining a benchmark. Expert Judgment includes extrapolating values from prior or related transactions, adjusting values for factors that might influence the quality of data such as market events or impairment of a buyer's or seller's credit quality or weighting firm bids or offers greater than a particular concluded transaction. Any exercise of expert judgment will be overseen by the ICE Data Indices, LLC Governance Committee (for purposes of this section, the "Index Committee"). The IDI Index Design Principles are available on request to PRD.



*Index Reviews.* IDI undertakes regular reviews of the ICE 20+ Year Index, the methodology and the market which it represents to ensure it continues to meet the index objective, in accordance with IDI's policies and procedures. Should material changes to the ICE 20+ Year Index be required or proposed, this will be communicated to stakeholders and subscribers in accordance with IDI's consultation policy, where possible.

*Consultations.* IDI may from time to time consult with stakeholders and subscribers on proposed material changes that affect the ICE 20+ Year Index in accordance with IDI's consultation process. These proposals will be published to stakeholders and subscribers and all feedback received will be considered by IDI. Any resulting changes to the ICE 20+ Year Index will be announced prior to it being implemented.

*Restatements.* IDI reserves the right to restate the ICE 20+ Year Index's level based on its discretion. The ICE 20+ Year Index subscribers are notified prior to a restatement of data. Restatements are typically communicated on the same day but may take longer depending on the volume of restatements required and other conditions.

### ***Index Governance***

The Index Committee is responsible for governance and oversight of the ICE 20+ Year Index. The Index Committee provides oversight to IDI that has daily responsibilities for the development, issuance and operation of the ICE 20+ Year Index.

The Index Committee will approve any necessary changes in the ICE 20+ Year Index's methodology. The IDI is then responsible for implementing the changes and notifying subscribers. Where a change is material, IDI will consult with stakeholders and subscribers in accordance with the IDI consultation process. For other changes, advance notice will be provided, where possible, to allow stakeholders and subscribers appropriate preparation to implement the change.

## THE iSHARES® ETFS

All information contained in this underlying supplement regarding the iShares® MSCI Brazil ETF, the iShares® MSCI Emerging Markets ETF, the iShares® MSCI EAFE ETF, the iShares® MSCI Japan ETF, the iShares® MSCI Mexico ETF, the iShares® Nasdaq Biotechnology ETF, the iShares® Russell 2000 ETF, the iShares® Russell 3000 ETF and the iShares® U.S. Real Estate ETF (each, an “iShares® ETF” and collectively, the “iShares® ETFs”), including, without limitation, their make-up, method of calculation and changes in their components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, the fund manager of each iShares® ETF and BlackRock Fund Advisors (“BFA”). The iShares® ETFs are investment portfolios of either iShares Trust® or iShares®, Inc. and are maintained and managed by their respective fund managers. BFA is currently the investment adviser to the iShares® ETFs. The iShares® ETFs (except for the iShares® Nasdaq Biotechnology ETF) are exchange-traded funds that trade on the NYSE Arca, Inc. under their respective ticker symbols. The iShares® Nasdaq Biotechnology ETF is an exchange-traded fund that trades on The NASDAQ Stock Market (“NASDAQ”) under its ticker symbol.

BFA uses a representative sampling indexing strategy to manage each iShares® ETF. “Representative sampling” is an indexing strategy that involves investing in a representative sample of securities that collectively has an investment profile similar to that of an applicable underlying index. The securities selected are expected to have, in the aggregate, investment characteristics (based on factors such as market capitalization and industry weightings), fundamental characteristics (such as return variability and yield) and liquidity measures similar to those of an applicable underlying index. Each iShares® ETF may or may not hold all of the securities in its respective underlying index.

Each iShares® ETF’s underlying index is a financial calculation, based on a grouping of financial instruments, and is not an investment product, while each iShares® ETF is an actual investment portfolio. The performance of each iShares® ETF and its underlying index may vary for a number of reasons, including transaction costs, non-U.S. currency valuations, asset valuations, corporate actions (such as mergers and spin-offs), timing variances and differences between that iShares® ETF’s portfolio and its underlying index resulting from that iShares® ETF’s use of representative sampling or from legal restrictions (such as diversification requirements) that apply to that iShares® ETF but not to its underlying index. “Tracking error” is the divergence of the performance (return) of an iShares® ETF’s portfolio from that of its underlying index. Because each iShares® ETF uses a representative sampling indexing strategy, it can be expected to have a larger tracking error than if it used a replication indexing strategy. “Replication” is an indexing strategy in which a fund invests in substantially all of the securities in its underlying index in approximately the same proportions as in the underlying index.

iShares® Trust and iShares®, Inc. are registered investment companies that consist of numerous separate investment portfolios, including the iShares® ETFs. Information provided to or filed with the SEC by iShares® Trust and iShares®, Inc. pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-92935 and 811-09729, respectively, for iShares® Trust, and SEC file numbers 033-97598 and 811-09102, respectively, for iShares®, Inc., through the SEC’s website at <http://www.sec.gov>.

### **The iShares® MSCI Brazil ETF**

The iShares® MSCI Brazil ETF (the “EWZ Fund”) seeks to track the investment results, before fees and expenses, of an index composed of Brazilian equities, which is currently the MSCI Brazil 25/50 Index. For more information about the MSCI 25/50 Brazil Index, please see “Equity Index Descriptions — The MSCI 25/50 Indices” in this underlying supplement. The EWZ Fund is an investment portfolio of iShares®, Inc. The EWZ Fund trades under the ticker symbol “EWZ.”

### **The iShares® MSCI Emerging Markets ETF**

The iShares® MSCI Emerging Markets ETF (the “EEM Fund”) seeks to track the investment results, before fees and expenses, of an index composed of large- and mid-cap emerging market equities, which is currently the MSCI Emerging Markets Index. For more information about the MSCI Emerging Markets

Index, please see “Equity Index Descriptions — The MSCI Indices” in this underlying supplement. The EEM Fund is an investment portfolio of iShares®, Inc. The EEM Fund trades under the ticker symbol “EEM.”

### **The iShares® MSCI EAFE ETF**

The iShares® MSCI EAFE ETF (the “EFA Fund”) seeks to track the investment results, before fees and expenses, of an index composed of large- and mid-capitalization developed market equities, excluding the U.S. and Canada, which is currently the MSCI EAFE® Index. For more information about the MSCI EAFE® Index, please see “Equity Index Descriptions — The MSCI Indices” in this underlying supplement. The EFA Fund is an investment portfolio of iShares® Trust. The EFA Fund trades under the ticker symbol “EFA.”

### **The iShares® MSCI Japan ETF**

The iShares® MSCI Japan ETF (the “EWJ Fund”) seeks to track the investment results, before fees and expenses, of an index composed of Japanese equities, which is currently the MSCI Japan Index. For more information about the MSCI Japan Index, please see “Equity Index Descriptions — The MSCI Indices” in this underlying supplement. The EWJ Fund is an investment portfolio of iShares®, Inc. The EWJ Fund trades under the ticker symbol “EWJ.”

### **The iShares® MSCI Mexico ETF**

The iShares® MSCI Mexico ETF (the “EWW Fund”) seeks to track the investment results, before fees and expenses, of a broad-based index composed of Mexican equities, which is currently the MSCI Mexico IMI 25/50 Index. For more information about the MSCI Mexico IMI 25/50 Index, please see “Equity Index Descriptions — The MSCI 25/50 Indices” in this underlying supplement. The EWW Fund is an investment portfolio of iShares®, Inc. The EWW Fund trades under the ticker symbol “EWW.”

### **The iShares® Nasdaq Biotechnology ETF**

The iShares® Nasdaq Biotechnology ETF (the “IBB Fund”) seeks to track the investment results, before fees and expenses, of an index composed of biotechnology and pharmaceutical equities listed on NASDAQ, which is currently the NASDAQ Biotechnology Index® (the “Biotechnology Index”). For more information about the Biotechnology Index, please see “— Additional Information About the Underlying Indices for Certain iShares® ETFs — The NASDAQ Biotechnology Index®” below. The IBB Fund is an investment portfolio of iShares® Trust. The IBB Fund trades under the ticker symbol “IBB.”

### **The iShares® Russell 2000 ETF**

The iShares® Russell 2000 ETF (the “IWM Fund”) seeks to track the investment results, before fees and expenses, of an index composed of small-capitalization U.S. equities, which is currently the Russell 2000® Index. For more information about the Russell 2000® Index, please see “Equity Index Descriptions — The Russell Indices” in this underlying supplement. The IWM Fund is an investment portfolio of iShares® Trust. The IWM Fund trades under the ticker symbol “IWM.”

### **The iShares® Russell 3000 ETF**

The iShares® Russell 3000 ETF (the “IWK Fund”) seeks to track the investment results, before fees and expenses, of a broad-based index composed of U.S. equities, which is currently the Russell 3000® Index. For more information about the Russell 3000® Index, please see “Equity Index Descriptions — The Russell Indices” in this underlying supplement. The IWK Fund is an investment portfolio of iShares® Trust. The IWK Fund trades under the ticker symbol “IWK.”

### **The iShares® U.S. Real Estate ETF**

The iShares® U.S. Real Estate ETF (the “IYR Fund”) seeks to track the investment results, before fees and expenses, of an index composed of U.S. equities in the real estate sector, which is currently the

Dow Jones U.S. Real Estate Index. For more information about the Dow Jones U.S. Real Estate Index, please see “— Additional Information About the Underlying Indices for Certain iShares® ETFs — Dow Jones U.S. Real Estate Index” below. The IYR Fund is an investment portfolio of iShares® Trust. The IYR Fund trades under the ticker symbol “IYR.”

## **Additional Information About the Underlying Indices for Certain iShares® ETFs**

### ***The NASDAQ Biotechnology Index®***

All information contained in this underlying supplement regarding the Biotechnology Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by The NASDAQ OMX Group, Inc. (“NASDAQ OMX”). The Biotechnology Index was developed and is calculated, maintained and published by NASDAQ OMX. NASDAQ OMX does not have any obligation to continue to publish, and may discontinue publication of, the Biotechnology Index.

#### *General*

The Biotechnology Index is designed to track the performance of a set of securities listed on NASDAQ that are classified as either biotechnology or pharmaceutical according to the Industry Classification Benchmark (“ICB”). The inception date of the Biotechnology Index is November 1, 1993. The Biotechnology Index is reported by Bloomberg L.P. under the ticker symbol “NBI.”

#### *Component Security Eligibility Criteria*

To be eligible for initial inclusion in the Biotechnology Index, the issuer of a component security (which can be a common stock, ordinary share, American depositary receipt (“ADR”), share of beneficial interest or limited partnership interest) must meet the following criteria:

- the component security's U.S. listing must be exclusively on the NASDAQ Global Select Market or on the NASDAQ Global Market (unless the security was dually listed on another U.S. market prior to January 1, 2004 and has continuously maintained such listing);
- the issuer of the security must be classified according to the Industry Classification Benchmark as either biotechnology or pharmaceutical;
- the component security may not be issued by an issuer currently in bankruptcy proceedings;
- the component security must have a market capitalization of at least \$200 million;
- the component security must have an average daily trading volume of at least 100,000 shares;
- the issuer of the component security may not have entered into a definitive agreement or other arrangement that would likely result in the security no longer being eligible for inclusion in the Biotechnology Index;
- the issuer of the component security may not have annual financial statements with an audit opinion that is currently withdrawn; and
- the component security must have “seasoned” on NASDAQ, the New York Stock Exchange or NYSE American LLC (generally, a company is considered to be seasoned if it has been listed on a market for at least three full months, excluding the first month of initial listing).

#### *Calculation of the Biotechnology Index*

The NASDAQ Biotechnology Index is a modified market capitalization weighted index. The closing level of the Biotechnology Index is calculated as the aggregate values of (x) the number of shares each component security of the Biotechnology Index included in the Biotechnology Index (the “Biotechnology Index Shares”) *multiplied by* (y) its last sale price on NASDAQ, which may be the NASDAQ Official Closing Price, and then *divided by* (z) the divisor of the Biotechnology Index, which is a scaling

factor. The divisor serves the purpose of scaling the aggregate value to a lower order of magnitude for index reporting purposes. If trading in a component security is halted on its primary listing market, the most recent last sale price for that security is used for all index computations until trading on such market resumes. Likewise, the most recent last sale price is used if trading in a component security is halted on its primary listing market before the market is open. The closing level of the Biotechnology Index reflects the price return of the component securities without regard to cash dividends paid on the component securities. The Biotechnology Index also reflects extraordinary cash dividends.

#### *Biotechnology Index Rebalancing*

The Biotechnology Index is rebalanced quarterly. At each quarter, the Biotechnology Index is rebalanced such that the maximum weight of any component security does not exceed 8% and no more than five component securities are at that cap. The excess weight of any capped component security is distributed proportionally across the remaining component securities. If, after redistribution, any of the five highest ranked component securities are weighted below 8%, these securities are not capped. Next, any remaining component securities in excess of 4% are capped at 4% and the excess weight is redistributed proportionally across the remaining component securities. The process is repeated, if necessary, to derive the final modified market capitalization weights of each component security.

The modified market capitalization weighting methodology is applied to the capitalization of each component security, using its last sale price as of the close of trading on the last trading day in February, May, August and November and after applying quarterly changes to the total shares outstanding. The Biotechnology Index Shares of each component security are then calculated by multiplying its weight derived above by the new market value of the Biotechnology Index and dividing the modified market capitalization of each component security by its last sale price. The changes will be effective after the close of trading on the third Friday in March, June, September and December.

NASDAQ OMX may, from time to time, exercise reasonable discretion as it deems appropriate in order to ensure the integrity of the Biotechnology Index.

#### *Biotechnology Index Evaluation*

The component securities of the Biotechnology Index are evaluated annually in December of each year. The eligibility criteria described above are applied using market data through the end of October and is updated for total shares outstanding submitted in a document filed publicly with the SEC through the end of November. Securities meeting the eligibility criteria listed above are included in the Biotechnology Index. Additions and deletions of component securities become effective after the close of trading on the third Friday in December.

Additionally, if at any time during the year other than the time for an evaluation, a component security no longer meets the eligibility criteria, or is otherwise determined to have become ineligible for continued inclusion in the Biotechnology Index, the component security will be removed from the Biotechnology Index at its last sale price. If, however, at the time of its removal, a component security is halted from trading on its primary listing market and an official closing price cannot be readily determined, the component security may, in NASDAQ OMX's discretion, be removed at a price of zero.

#### *Biotechnology Index Maintenance*

Changes in the price and/or Biotechnology Index Shares of component securities driven by corporate events such as stock dividends, stock splits and certain spin-offs and rights issuances are adjusted on the ex-date. If the change in total shares outstanding arising from other corporate actions is greater than or equal to 10%, the changes is made as soon as practicable. However, if the change in total shares outstanding is less than 10%, all such changes are accumulated and made effective at one time on a quarterly basis after the close of trading on the third Friday in March, June, September and December. The Biotechnology Index Shares of each component security are adjusted by the same percentage amount by which the total shares outstanding for that component security has changed.

A special cash dividend announced by the listing exchange will result in an adjustment to the last sale price of the relevant component security prior to market open on the ex-date for the special amount distributed.

Ordinarily, whenever there is a change in the Biotechnology Index Shares of component securities, in the component securities or to the price of a component security due to spin-offs, rights issuances or special cash dividends, the divisor of the Biotechnology Index will be adjusted to ensure that there is no discontinuity in the value of the Biotechnology Index caused by any such change. All changes are announced in advance and are reflected in the Biotechnology Index prior to market open on the relevant date of effectiveness.

### ***The Dow Jones U.S. Real Estate Index***

All information contained in this underlying supplement regarding the Dow Jones U.S. Real Estate Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, S&P Dow Jones Indices LLC ("S&P Dow Jones"). The Dow Jones U.S. Real Estate Index is calculated, maintained and published by S&P Dow Jones. S&P Dow Jones is under no obligation to continue to publish, and may discontinue publication of, the Dow Jones U.S. Real Estate Index. The Dow Jones U.S. Real Estate Index is reported by Bloomberg L.P. under the ticker symbol "DJUSRE."

### ***Dow Jones U.S. Real Estate Index Composition and Maintenance***

The Dow Jones U.S. Real Estate Index is designed to track the performance of real estate investment trusts (REITs) and other companies that invest directly or indirectly in real estate through development, management, or ownership, including property agencies. REITs are passive investment vehicles that invest primarily in income producing real estate or real estate-related loans and interests.

The Dow Jones U.S. Real Estate Index is one of the 19 supersector indices that make up the Dow Jones U.S. Index. The Dow Jones U.S. Real Estate Index is a subset of the Dow Jones U.S. Index, which is designed to be a measure of the U.S. stock market, covering 95% of U.S. stocks by float-adjusted market capitalization, excluding the most thinly traded securities. The Dow Jones U.S. Real Estate Index is weighted by float-adjusted market capitalization, rather than full market capitalization, to reflect the actual number of shares available to investors.

The index universe is defined as all stocks traded on the major U.S. stock exchanges, minus any non-common issues and illiquid stocks. Index component candidates are filtered through screens for share class and eligibility. For share class, index component candidates must be common shares or other securities that have the characteristics of common equities. All classes of common shares, both fully and partially paid, are eligible. Fixed-dividend shares and securities such as convertible notes, warrants, rights, mutual funds, unit investment trusts, closed-end fund shares, shares in limited partnerships and business development companies are not eligible. Temporary issues arising from corporate actions, such as "when-issued shares," are considered on a case-by-case basis when necessary to maintain continuity in a company's index membership. REITs, listed property trusts and similar real-property-owning pass-through structures taxed as REITs by their domiciles are also eligible. In some cases, companies issue multiple share classes. All publicly listed multiple share class lines are eligible for index inclusion. A separate investable weight factor (IWF), which is an adjustment factor that accounts for publicly available shares of a company, is calculated for each class and the class is included, providing it meets eligibility criteria and foreign investors may hold shares in the class. For liquidity, each stock must meet two separate liquidity criteria to be considered eligible for inclusion:

- 12-Month Median Value Traded Ratio (MVTR). Stocks must have an MVTR of at least 20%. Current constituents remain eligible if they have an MVTR of at least 14%. This ratio is calculated by taking the median daily value traded amount for each of the 12 months preceding the rebalancing reference date, multiplying the amount by the number of days that the stock traded during that month, and then dividing by its end-of-month float-adjusted

market capitalization. The sum of the 12 monthly values is the MVTR for that stock. If a stock has traded for less than 12 months, the average of the available monthly values is taken and multiplied by 12; and

- 6-Month Median Daily Value Traded (MDVT). Stocks must have an MDVT over the six months prior to the rebalancing reference date of at least US\$ 250,000. Current constituents remain eligible if they have an MDVT of at least US\$ 175,000. If a stock has traded for less than six months, the MDVT amount for as long as the stock has been trading is used.

Stocks in the index universe are sorted by float-adjusted market capitalization. Stocks in the top 95% of the index universe by float-adjusted market capitalization are selected as constituents of the Dow Jones U.S. Index. Selection is subject to a 2% buffer for current and non-current stocks. Current constituents remain eligible up to the 97th percentile as ranked by float-adjusted market capitalization. Non-constituents are eligible up to the 93rd percentile as ranked by float-adjusted market capitalization.

Stocks selected as components of the Dow Jones U.S. Index are then categorized into Subsectors based on their primary source of revenue. The Subsectors are rolled up into Sectors, which in turn are rolled up into Supersectors and finally into Industries. Subsectors, Sectors, Supersectors and Industries are defined by a proprietary classification system used by S&P Dow Jones. The Dow Jones U.S. Real Estate Index is a Supersector that is a subset of the Dow Jones U.S. Index.

The Dow Jones Real Estate Index is calculated by means of the divisor methodology. On any given day, the index value is the quotient of the total float-adjusted market capitalization of the Dow Jones Real Estate Index's constituents and its divisor. The key to index maintenance is the adjustment of the divisor. Index maintenance — reflecting changes in shares outstanding, corporate actions, addition or deletion of stocks to the index — should not change the level of the index. This is accomplished with an adjustment to the divisor. Any change to the stocks in the index that alters the total market value of the index while holding stock prices constant will require a divisor adjustment.

The Dow Jones U.S. Real Estate Index is reconstituted annually in September. The process includes the review of all stocks in their respective markets to determine eligibility according to the existing criteria. The reference date for data used in the annual reconstitution is the last business day in July. In addition, the IWF for each stock is reviewed and updated as needed. Changes are implemented at the opening of trading on the Monday following the third Friday of September. Changes to shares and IWFs are implemented at the open of trading on the Monday following the third Friday of March, June and December.

*Initial Public Offerings (IPOs).* IPOs and new listings on eligible exchanges are added to the Dow Jones U.S. Real Estate Index at the next quarterly update if the new listing meets all eligibility requirements. IPOs must have a trading history of at least three months as of the reference date. The reference date for IPO inclusions will be five weeks prior to the effective rebalancing date and additions are effective at the open of Monday following the third Friday of March, June, September and December.

*Spinoffs.* The spun-off company is added to the Dow Jones U.S. Real Estate Index, at a zero price at the market close of the day before the ex-date (with no divisor adjustment). If a spun-off company is determined not to be eligible to remain in the Dow Jones U.S. Real Estate Index, it will be removed after at least one day of regular way trading (with a divisor adjustment). Spinoffs are assigned the same size and style as the parent company at the time of the event. All spinoff sizes are evaluated at the next quarterly update.

#### *Additions*

Generally no companies are added to the Dow Jones U.S. Real Estate Index between annual reconstitutions except for IPOs and spinoffs as described above. Any exceptions to this rule will be announced in advance. Any stocks considered for addition at the quarterly rebalance must have a float market capitalization larger than the smallest stock included in the Dow Jones U.S. Real Estate Index at the time of the previous reconstitution.

### *Deletions*

Between rebalancings, a company can be deleted from the Dow Jones U.S. Real Estate Index due to corporate events such as mergers, acquisitions, takeovers, delistings or bankruptcies. Whenever possible, changes in the Dow Jones U.S. Real Estate Index's constituents are announced at least two business days prior to their implementation date. If an index constituent is suspended by its primary market, it may be removed from the Dow Jones U.S. Real Estate Index at the discretion of the Global Equity Indices Index Committee. Whenever practicable, S&P Dow Jones will use the best-available alternate pricing source to determine the value at which the company should be removed from the Dow Jones U.S. Real Estate Index.

### *Governance of the Dow Jones U.S. Real Estate Index*

The Dow Jones Global Indices® are maintained by the Global Equity Indices Index Committee. All committee members are full-time professional members of S&P Dow Jones' staff. The Global Equity Indices Index Committee meets regularly. At each meeting, the Global Equity Indices Index Committee may review pending corporate actions that may affect index constituents, statistics comparing the composition of the Dow Jones U.S. Real Estate Index to the market, companies that are being considered as candidates for addition to the Dow Jones U.S. Real Estate Index, and any significant market events. In addition, the Global Equity Indices Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.



## THE SELECT SECTOR SPDR® FUNDS

All information contained in this underlying supplement regarding the Select Sector SPDR® Funds set forth in the table below (each, a “**Select Sector SPDR® Fund**” and collectively, the “**Select Sector SPDR® Funds**”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by The Select Sector SPDR® Trust (the “**Select Sector Trust**”) and SSGA Funds Management, Inc. (“**SSGA FM**”). Each Select Sector SPDR® Fund is an investment portfolio managed by SSGA FM, the investment adviser to the Select Sector SPDR® Funds. Each Select Sector SPDR® Fund is an exchange-traded fund (“**ETF**”) that trades on the NYSE Arca, Inc. (“**NYSE Arca**”) under the ticker symbol set forth in the table below.

Each Select Sector SPDR® Fund seeks to provide investment results that, before expenses, correspond generally to the price and yield performance of publicly traded equity securities of companies included in a Select Sector Index, as specified in the table below. The companies included in each Select Sector Index are selected on the basis of general industry classifications from a universe of companies defined by the S&P 500® Index. For more information about the Select Sector Indices, please see “Equity Index Descriptions — The S&P Select Sector Indices” in this underlying supplement.

<b>Select Sector SPDR® Fund</b>	<b>Ticker</b>	<b>Select Sector Index</b>
Communication Services Select Sector SPDR® Fund	XLC	Communication Services Select Sector Index
Consumer Discretionary Select Sector SPDR® Fund	XLY	Consumer Discretionary Select Sector Index
Consumer Staples Select Sector SPDR® Fund	XLP	Consumer Staples Select Sector Index
Energy Select Sector SPDR® Fund	XLE	Energy Select Sector Index
Financial Select Sector SPDR® Fund	XLF	Financial Select Sector Index
Health Care Select Sector SPDR® Fund	XLV	Health Care Select Sector Index
Industrial Select Sector SPDR® Fund	XLI	Industrials Select Sector Index
Materials Select Sector SPDR® Fund	XLB	Materials Select Sector Index
Real Estate Select Sector SPDR® Fund	XLRE	Real Estate Select Sector Index
Technology Select Sector SPDR® Fund	XLK	Technology Select Sector Index
Utilities Select Sector SPDR® Fund	XLU	Utilities Select Sector Index

The Communication Services Select Sector SPDR® Fund was launched in June 2018 and therefore has limited historical performance. In September 2018, the Consumer Discretionary Select Sector Index and the Technology Select Sector Index were reconstituted to remove communication services stocks, as described under “Equity Index Descriptions — The S&P Select Sector Indices” in this underlying supplement, and the Consumer Discretionary Select Sector SPDR® Fund and the Technology Select Sector SPDR® Fund implemented corresponding changes to their respective portfolios. In addition, in September 2016, the Financial Select Sector Index was reconstituted to remove real estate stocks, as described under “Equity Index Descriptions — The S&P Select Sector Indices” in this underlying supplement, and the Financial Select Sector SPDR® Fund implemented corresponding changes to its portfolio.

In seeking to track the performance of the relevant Select Sector Index, each Select Sector SPDR® Fund employs a replication strategy, which means that each Select Sector SPDR® Fund typically invests in substantially all of the securities represented in the relevant Select Sector Index in approximately the

same proportions as that Select Sector Index. However, under various circumstances, it may not be possible or practical to purchase all of the securities in the relevant Select Sector Index, or amounts of those securities in proportion to their weighting in that Select Sector Index. Under these circumstances, SSGA FM intends to employ a sampling strategy in managing the relevant Select Sector SPDR® Fund. Sampling means that SSGA FM will use quantitative analysis to select securities, including securities in the relevant Select Sector Index, outside of the relevant Select Sector Index and derivatives that have a similar investment profile as the relevant Select Sector Index in terms of key risk factors, performance attributes and other economic characteristics. These include industry weightings, market capitalization and other financial characteristics of securities.

While SSGA FM seeks to track the performance of the relevant Select Sector Index (i.e., achieve a high degree of correlation with the relevant Select Sector Index), each Select Sector SPDR® Fund's return may not match the return of the relevant Select Sector Index. Each Select Sector SPDR® Fund incurs a number of operating expenses not applicable to the relevant Select Sector Index and incurs costs in buying and selling securities. In addition, a Select Sector SPDR® Fund may not be fully invested at times, generally as a result of cash flows into or out of that Select Sector SPDR® Fund or reserves of cash held by that Select Sector SPDR® Fund to meet redemptions.

The Select Sector Trust is a registered investment company that consists of a separate investment portfolio for each of the Select Sector SPDR® Funds. Information provided to or filed with the SEC by the Select Sector Trust pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-57791 and 811-08837, respectively, through the SEC's website at <http://www.sec.gov>.

## THE SPDR® EURO STOXX 50® ETF

All information contained in this underlying supplement regarding the SPDR® EURO STOXX 50® ETF (the “**FEZ Fund**”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, SSGA Funds Management, Inc. (“**SSGA FM**”), the investment advisor for the FEZ Fund. The FEZ Fund is an investment portfolio maintained and managed by SSGA FM. The FEZ Fund is an exchange-traded fund that trades on the NYSE Arca, Inc. under the ticker symbol “FEZ.”

The FEZ Fund seeks to provide investment results that, before fees and expenses, correspond generally to the total return performance of the EURO STOXX 50® Index. For more information about the EURO STOXX 50® Index, please see “Equity Index Descriptions — The EURO STOXX 50® Index” in this underlying supplement.

In seeking to track the performance of the EURO STOXX 50® Index, the FEZ Fund employs a sampling strategy, which means that the FEZ Fund is not required to purchase all of the securities represented in the EURO STOXX 50® Index. Instead, the FEZ Fund may purchase a subset of the securities in the EURO STOXX 50® Index in an effort to hold a portfolio of securities with generally the same risk and return characteristics of the EURO STOXX 50® Index. The quantity of holdings in the FEZ Fund will be based on a number of factors, including asset size of the FEZ Fund. Based on its analysis of these factors, SSGA FM, either may invest the FEZ Fund’s assets in a subset of securities in underlying index or may invest the FEZ Fund’s assets in substantially all of the securities represented in the EURO STOXX 50® Index in approximately the same proportions as the EURO STOXX 50® Index.

While SSGA FM seeks to track the performance of the EURO STOXX 50® Index (*i.e.*, achieve a high degree of correlation with the EURO STOXX 50® Index), the FEZ Fund’s return may not match the return of the EURO STOXX 50® Index. The FEZ Fund incurs a number of operating expenses not applicable to the EURO STOXX 50® Index, and incurs costs in buying and selling securities. In addition, the FEZ Fund may not be fully invested at times, generally as a result of cash flows into or out of the FEZ Fund or reserves of cash held by the FEZ Fund to meet redemptions. SSGA FM may attempt to replicate the EURO STOXX 50® Index return by investing in fewer than all of the securities in the EURO STOXX 50® Index, or in some securities not included in the EURO STOXX 50® Index, potentially increasing the risk of divergence between the FEZ Fund’s return and that of the EURO STOXX 50® Index.

SPDR® Index Shares Funds is a registered investment company that consists of numerous separate investment portfolios, including the FEZ Fund. Information provided to or filed with the SEC by the FEZ Fund pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-92106 and 811-21145, respectively, through the SEC’s website at <http://www.sec.gov>.

## THE SPDR® GOLD TRUST

All information contained in this underlying supplement regarding the SPDR® Gold Trust (the “Gold Trust”), has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, the Gold Trust and World Gold Trust Services, LLC (“World Gold”), the sponsor of the Gold Trust. BNY Mellon Asset Servicing, a division of The Bank of New York Mellon, is the trustee of the Gold Trust, and HSBC Bank plc is the custodian of the Gold Trust. The Gold Trust is an investment trust. The Gold Trust trades under the ticker symbol “GLD” on the NYSE Arca, Inc.

The investment objective of the Gold Trust is for its shares to reflect the performance of the price of gold bullion, less the Gold Trust’s expenses. The Gold Trust holds gold bars and from time to time, issues shares in exchange for deposits of gold and distributes gold in connection with the redemption of shares. The shares of the Gold Trust are designed for investors who want a cost-effective and convenient way to invest in gold.

The shares of the Gold Trust represent units of fractional undivided beneficial interest in and ownership of the Gold Trust. The Gold Trust is a passive investment vehicle and the trustee of the Gold Trust does not actively manage the gold held by the Gold Trust. The trustee of the Gold Trust sells gold held by the Gold Trust to pay the Gold Trust’s expenses on an as-needed basis irrespective of then-current gold prices. Currently, the Gold Trust’s only recurring fixed expense is World Gold’s fee which accrues daily at an annual rate equal to 0.40% of the daily net asset value of the Gold Trust, in exchange for World Gold assuming the responsibility to pay all ordinary fees and expenses of the Gold Trust.

Information provided to or filed with the Securities and Exchange Commission (the “SEC”) by the Gold Trust pursuant to the Securities Act of 1933, as amended, and the Securities Exchange Act of 1934, as amended, can be located by reference to SEC file numbers 333-233191 and 001-32356, respectively, through the SEC’s website at <http://www.sec.gov>. The Gold Trust is not a mutual fund or any other type of investment company within the meaning of the Investment Company Act of 1940, as amended, and is not subject to regulation thereunder. The Gold Trust is not a commodity pool for purposes of the Commodity Exchange Act of 1936, as amended, and World Gold is not subject to regulation by the Commodity Futures Trading Commission as a commodity pool operator, or a commodity trading advisor.

### Gold

The price of gold is primarily affected by the global demand for and supply of gold. The market for gold bullion is global, and gold prices are subject to volatile price movements over short periods of time and are affected by numerous factors, including macroeconomic factors such as the structure of and confidence in the global monetary system, expectations regarding the future rate of inflation, the relative strength of, and confidence in, the U.S. dollar (the currency in which the price of gold is usually quoted), interest rates, gold borrowing and lending rates and global or regional economic, financial, political, regulatory, judicial or other events, especially those of unexpected nature. Gold prices may be affected by industry factors, such as industrial and jewelry demand as well as lending, sales and purchases of gold by the official sector, including central banks and other governmental agencies and multilateral institutions that hold gold. Additionally, gold prices may be affected by levels of gold production, production costs and short-term changes in supply and demand due to trading activities in the gold market. From time to time, above-ground inventories of gold may also influence the market. It is not possible to predict the aggregate effect of all or any combination of these factors. The price of gold has recently been, and may continue to be, extremely volatile.

## THE SPDR® S&P 500® ETF TRUST

All information contained in this underlying supplement regarding the SPDR® S&P 500® ETF Trust (the “**SPY Fund**”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, State Street Global Advisors Trust Company (“**SSGA TC**”), as trustee of the SPY Fund, and PDR Services LLC (“**PDRS**”), as sponsor of the SPY Fund. The SPY Fund is a unit investment trust that issues securities called “Units.” The SPY Fund trades on the NYSE Arca, Inc. under the ticker symbol “SPY.”

The SPY Fund seeks to provide investment results that, before expenses, correspond generally to the price and yield performance of the S&P 500® Index. For more information about the S&P 500® Index, please see “Equity Index Descriptions — S&P U.S. Indices” in this underlying supplement. The SPY Fund seeks to achieve its investment objective by holding a portfolio of the common stocks that are included in the S&P 500® Index, with the weight of each stock in the portfolio substantially corresponding to the weight of that stock in the S&P 500® Index. At any time, the portfolio of the SPY Fund will consist of as many of the component stocks of the S&P 500® Index as is practicable. To maintain the correspondence between the composition and weightings of the stocks held by the SPY Fund and the component stocks of the S&P 500® Index, SSGA TC or its parent company, State Street Bank and Trust Company (“**SSBT**”) adjusts the portfolio of the SPY Fund from time to time to conform to periodic changes to the identity and/or relative weightings of the component stocks of the S&P 500® Index. SSGA TC or SSBT aggregates certain of these adjustments and makes changes to the portfolio of the SPY Fund at least monthly, or more frequently in the case of significant changes to the S&P 500® Index.

While the SPY Fund is intended to track the performance of the S&P 500® Index as closely as possible (*i.e.*, to achieve a high degree of correlation with the S&P 500® Index), the return of the SPY Fund may not match or achieve a high degree of correlation with the return of the S&P 500® Index due to expenses and transaction costs incurred in adjusting the SPY Fund’s portfolio. In addition, it is possible that the SPY Fund may not always fully replicate the performance of the S&P 500® Index due to the unavailability of certain component stocks of the S&P 500® Index in the secondary market or due to other extraordinary circumstances (*e.g.*, if trading in a security has been halted).

The SPY Fund is an investment company registered under the Investment Company Act of 1940, as amended. Information provided to or filed with the SEC by the SPY Fund pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 033-46080 and 811-06125, respectively, through the SEC’s website at <http://www.sec.gov>.

## THE SPDR® S&P® INDUSTRY ETFS

All information contained in this underlying supplement regarding the SPDR® S&P® Industry ETFs set forth in the table below (each, a “**SPDR® S&P® Industry ETF**” and collectively, the “**SPDR® S&P® Industry ETFs**”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, SPDR® Series Trust and SSGA Funds Management, Inc. (“**SSGA FM**”). Each SPDR® S&P® Industry ETF is an investment portfolio maintained and managed by SSGA FM, the investment adviser to the SPDR® S&P® Industry ETFs. Each SPDR® S&P® Industry ETF is an exchange-traded fund that trades on the NYSE Arca, Inc. under the ticker symbol set forth in the table below.

Each SPDR® S&P® Industry ETF seeks to provide investment results that, before fees and expenses, correspond generally to the total return performance of an index that tracks the performance of publicly traded companies in a particular industry or group of industries, as represented by a specified Select Industry Index in the table below. The companies included in each Select Industry Index are selected on the basis of general industry classifications and liquidity and market capitalization requirements from a universe of companies defined by the S&P® Total Market Index, a U.S. total market composite index. For more information about the Select Industry Indices, please see “Equity Index Descriptions — The S&P Select Industry Indices” in this underlying supplement.

<b>SPDR® S&amp;P® Industry ETF</b>	<b>Ticker</b>	<b>Select Industry Index</b>
SPDR® S&P® Bank ETF	KBE	S&P® Banks Select Industry™ Index
SPDR® S&P® Biotech ETF	XBI	S&P® Biotechnology Select Industry™ Index
SPDR® S&P® Homebuilders ETF	XHB	S&P® Homebuilders Select Industry™ Index
SPDR® S&P® Metals & Mining ETF	XME	S&P® Metals & Mining Select Industry™ Index
SPDR® S&P® Oil & Gas Exploration & Production ETF	XOP	S&P® Oil & Gas Exploration & Production Select Industry™ Index
SPDR® S&P® Regional Banking ETF	KRE	S&P® Regional Banks Select Industry™ Index
SPDR® S&P® Retail ETF	XRT	S&P® Retail Select Industry™ Index

In seeking to track the performance of the relevant Select Industry Index, each SPDR® S&P® Industry ETF employs a “sampling” strategy, which means that the SPDR® S&P® Industry ETF is not required to purchase all of the securities represented in the relevant Select Industry Index. Instead, each SPDR® S&P® Industry ETF may purchase a subset of the securities in the relevant Select Industry Index in an effort to hold a portfolio of securities with generally the same risk and return characteristics of the relevant Select Industry Index. The quantity of holdings in each SPDR® S&P® Industry ETF will be based on a number of factors, including asset size of that SPDR® S&P® Industry ETF. Based on its analysis of these factors, SSGA FM either may invest each SPDR® S&P® Industry ETF’s assets in a subset of securities in the relevant Select Industry Index or may invest that SPDR® S&P® Industry ETF’s assets in substantially all of the securities represented in the relevant Select Industry Index in approximately the same proportions as the relevant Select Industry Index, as determined by SSGA FM to be in the best interest of that SPDR® S&P® Industry ETF in pursuing its objective.

While SSGA FM seeks to track the performance of the relevant Select Industry Index (*i.e.*, achieve a high degree of correlation with the relevant Select Industry Index), a SPDR® S&P® Industry ETF’s return may not match the return of the relevant Select Industry Index. Each SPDR® S&P® Industry ETF incurs a number of operating expenses not applicable to the relevant Select Industry Index, and incurs costs in buying and selling securities. In addition, an SPDR® S&P® Industry ETF may not be fully invested at times, generally as a result of cash flows into or out of that SPDR® S&P® Industry ETF or reserves of cash held by that SPDR® S&P® Industry ETF to meet redemptions. SSGA FM may attempt to replicate

the relevant Select Industry Index's return by investing in fewer than all of the securities in that Select Industry Index, or in some securities not included in that Select Industry Index, potentially increasing the risk of divergence between an SPDR® S&P® Industry ETF's return and that of the relevant Select Industry Index.

The SPDR® Series Trust is a registered investment company that consists of a separate investment portfolio for each SPDR® S&P® Industry ETF. Information provided to or filed with the SEC by the SPDR® Series Trust pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-57793 and 811-08839, respectively, through the SEC's website at <http://www.sec.gov>.

## THE UNITED STATES OIL FUND, LP

All information contained in this underlying supplement regarding the United States USO Fund, LP (the “**USO Fund**”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, United States Commodity Funds LLC (“**USCF**”). The USO Fund is managed and controlled by USCF, a Delaware limited liability company that is registered as a commodity pool operator with the Commodity Futures Trading Commission and is a member of the National Futures Association. The USO Fund, a Delaware limited partnership, is a commodity pool that continuously issues common shares of beneficial interest that trade on NYSE Arca, Inc. (“**NYSE Arca**”) under the ticker symbol “USO.”

The investment objective of the USO Fund is for the daily changes in percentage terms of its shares’ net asset value to reflect the daily changes in percentage terms of the spot price of light, sweet crude oil delivered to Cushing, Oklahoma (the “**Underlying Commodity**” with respect to the USO Fund), as measured by the daily changes in the price of a specified short-term futures contract on light, sweet crude oil (the “**benchmark oil futures contract**”), plus interest earned on USO’s collateral holdings less the USO Fund’s expenses. The benchmark oil futures contract is the futures contract on light, sweet crude oil traded on the New York Mercantile Exchange that is the near month contract to expire, except when the near month contract is within two weeks of expiration, in which case it will be measured by the futures contract that is the next month contract to expire.

The USO Fund seeks to achieve its investment objective by investing primarily in futures contracts for light, sweet crude oil, other types of crude oil, diesel-heating oil, gasoline, natural gas and other petroleum-based fuels that are traded on the New York Mercantile Exchange, ICE Futures Europe and ICE Futures U.S. or other U.S. and foreign exchanges (collectively, “**oil futures contracts**”) and to a lesser extent, in order to comply with regulatory requirements or in view of market conditions, other oil-related investments such as cash-settled options on oil futures contracts, forward contracts for oil, cleared swap contracts and non-exchange traded (or over-the-counter) transactions that are based on the price of oil, other petroleum-based fuels, oil futures contracts and indices based on the foregoing. The USO Fund seeks to achieve its investment objective by investing so that the average daily percentage change in its net asset value for any period of 30 successive valuation days will be within plus/minus ten percent (10%) of the average daily percentage change in the price of the benchmark oil futures contract over the same period.

The daily changes in the price of the USO Fund’s shares on NYSE Arca on a percentage basis may not closely track the daily changes in the spot price of light, sweet crude oil on a percentage basis. This could happen if the price of shares traded on the NYSE Arca does not correlate closely with the value of the USO Fund’s net asset value; the changes in the USO Fund’s net asset value do not correlate closely with the changes in the price of the benchmark oil futures contract; or the changes in the price of the benchmark oil futures contract do not closely correlate with the changes in the cash or spot price of crude oil. The price relationship between the near month contract to expire and the next month contract to expire that compose the benchmark oil futures contract will vary and may impact both the total return over time of the USO Fund’s net asset value, as well as the degree to which its total return tracks other crude oil price indices’ total returns. In cases in which the near month contract’s price is lower than the next month contract’s price (a situation known as “contango” in the futures markets), then absent the impact of the overall movement in crude oil prices, the value of the benchmark contract would tend to decline as it approaches expiration. In cases in which the near month contract’s price is higher than the next month contract’s price (a situation known as “backwardation” in the futures markets), then absent the impact of the overall movement in crude oil prices, the value of the benchmark contract would tend to rise as it approaches expiration.

Information provided to or filed with the SEC by the USO Fund pursuant to the Securities Act of 1933, as amended, and the Securities Exchange Act of 1934, as amended, can be located by reference to SEC file numbers 333-237290 and 001-32834, respectively, through the SEC’s website at <http://www.sec.gov>. The USO Fund is not a mutual fund or any other type of investment company within the meaning of the Investment Company Act of 1940, as amended, and is not subject to regulation thereunder.



## THE VANECK VECTORS® ETFS

All information contained in this underlying supplement regarding the VanEck Vectors® Gold Miners, the VanEck Vectors® Junior Gold Miners ETF and the VanEck Vectors® Oil Services ETF (each, a “VanEck ETF” and collectively, the “VanEck ETFs”) has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, VanEck Vectors® ETF Trust (the “VanEck Trust”) and Van Eck Associates Corporation (“Van Eck”). Each VanEck ETF is an investment portfolio of the VanEck Trust. Van Eck is currently the investment adviser to the VanEck ETFs.

Each VanEck ETF uses a “passive” or indexing investment approach to attempt to approximate the investment performance of its underlying index by investing in a portfolio of securities that generally replicates its underlying index. Van Eck anticipates that, generally, a VanEck ETF will hold all of the securities that compose its underlying index in proportion to its weightings in that underlying index. However, under various circumstances, it may not be possible or practicable to purchase all of those securities in those weightings. In these circumstances, a VanEck ETF may purchase a sample of securities in its underlying index.

Each VanEck ETF’s return may not match the return of its underlying index for a number of reasons. For example, each VanEck ETF incurs a number of operating expenses, including taxes, not applicable to its underlying index and incurs costs associated with buying and selling securities, especially when rebalancing that VanEck ETF’s securities holdings to reflect changes in the composition of its underlying index, which are not factored into the return of its underlying index. Transaction costs, including brokerage costs, will decrease a VanEck ETF’s net asset value (“NAV”) to the extent not offset by the transaction fee payable by an authorized participant. Market disruptions and regulatory restrictions could have an adverse effect on a VanEck ETF’s ability to adjust its exposure to the required levels in order to track its underlying index. Errors in an underlying index’s data, an underlying index’s computations and/or the construction of an underlying index in accordance with its methodology may occur from time to time and may not be identified and corrected by the underlying index provider for a period of time or at all, which may have an adverse impact on the applicable VanEck ETF and its shareholders. In addition, a VanEck ETF may not invest in certain securities included in its underlying index, or invest in them in the exact proportions in which they are represented in its underlying index. A VanEck ETF’s performance may also deviate from the return of its underlying index due to legal restrictions or limitations imposed by the governments of certain countries, certain listing standards of that VanEck ETF’s listing exchange, a lack of liquidity on stock exchanges in which the securities trade, potential adverse tax consequences or other regulatory reasons (such as diversification requirements). A VanEck ETF may value certain of its investments and/or other assets based on fair value prices. To the extent a VanEck ETF calculates its NAV based on fair value prices and the value of its underlying index is based on securities’ closing prices (*i.e.*, the value of its underlying index is not based on fair value prices), that VanEck ETF’s ability to track its underlying index may be adversely affected. In addition, any issues a VanEck ETF encounters with regard to currency convertibility (including the cost of borrowing funds, if any) and repatriation may also increase the index tracking risk. For tax efficiency purposes, a VanEck ETF may sell certain securities, and such sale may cause that VanEck ETF to realize a loss and deviate from the performance of its underlying index. In light of the factors discussed above, a VanEck ETF’s return may deviate significantly from the return of its underlying index. Changes to the composition of its underlying index in connection with a rebalancing or reconstitution of its underlying index may cause a VanEck ETF to experience increased volatility, during which time that VanEck ETF’s index tracking risk may be heightened.

The VanEck Trust is a registered investment company that consists of numerous separate investment portfolios, including the VanEck ETFs. Information provided to or filed with the SEC by the VanEck Trust pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 333-123257 and 811-10325, respectively, through the SEC’s website at <http://www.sec.gov>.

## **The VanEck Vectors® Gold Miners ETF**

The VanEck Vectors® Gold Miners ETF (the “GDX Fund”) seeks to replicate as closely as possible, before fees and expenses, the price and yield performance of the NYSE Arca Gold Miners Index (the “Gold Miners Index”). For more information about the Gold Miners Index, please see “— Additional Information about the Underlying Indices for the VanEck ETFs — The NYSE Arca Gold Miners Index” below. The GDX Fund is an exchange-traded fund that trades on the NYSE Arca, Inc. (“NYSE Arca”) under the ticker symbol “GDX.”

## **The VanEck Vectors® Junior Gold Miners ETF**

The VanEck Vectors® Junior Gold Miners ETF (the “GDXJ Fund”) seeks to replicate as closely as possible, before fees and expenses, the price and yield performance of the MVIS® Global Junior Gold Miners Index (the “Junior Gold Miners Index”). For more information about the Junior Gold Miners Index, please see “— Additional Information about the Underlying Indices for the VanEck ETFs — The MVIS® Indices” below. The GDXJ Fund is an exchange-traded fund that trades on the NYSE Arca under the ticker symbol “GDXJ.”

## **The VanEck Vectors® Oil Services ETF**

The VanEck Vectors® Oil Services ETF (the “OIH Fund”) seeks to replicate as closely as possible, before fees and expenses, the price and yield performance of the MVIS® US Listed Oil Services 25 Index (the “Oil Services Index”). For more information about the Oil Services Index, please see “— Additional Information about the Underlying Indices for the VanEck ETFs — The MVIS® Indices” below. The OIH Fund is an exchange-traded fund that trades on the NYSE Arca, Inc. under the ticker symbol “OIH.”

## **Additional Information about the Underlying Indices for the VanEck ETFs**

### **The NYSE Arca Gold Miners Index**

All information contained in this underlying supplement regarding the Gold Miners Index, including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, the NYSE Arca. The Gold Miners Index is calculated, maintained and published by the NYSE Arca. The NYSE Arca has no obligation to continue to publish, and may discontinue the publication of, the Gold Miners Index.

The Gold Miners Index is reported by Bloomberg L.P. under the ticker symbol “GDM.”

The Gold Miners Index is a modified market capitalization weighted index composed of publicly traded companies involved primarily in the mining of gold or silver.

### ***Eligibility Criteria for Index Components***

The Gold Miners Index includes common stocks, American Depositary Receipts (“ADRs”) and Global Depositary Receipts (“GDRs”) of selected companies that are involved in mining for gold and silver and that are listed for trading on a major stock market that is accessible by foreign investors. Only companies with market capitalization greater than \$750 million that have an average daily trading volume of at least 50,000 shares over the past three months and an average daily value traded of at least \$1 million over the past three months are eligible for inclusion in the Gold Miners Index. For companies that were already in the Gold Miners Index prior to the September 20, 2013 rebalance, the market capitalization requirement is \$450 million, the average daily trading volume requirement is at least 30,000 shares over the past three months and the average daily value traded requirement is at least \$600,000 over the past three months. Further, the universe of companies eligible for inclusion in the Gold Miners Index will specifically include those companies that derive at least 50% of their revenues from gold mining and related activities. Companies already in the Gold Miners Index will be removed from the Gold Miners Index in the following quarterly review only if their gold mining revenues fall below the 40% level. The

Gold Miners Index will maintain an exposure, of not more than 20% of the Gold Miners Index weight at rebalance, to companies with a significant revenue exposure to silver mining as well as gold mining. These are companies that either (1) have a revenue exposure to silver mining greater than 50% or (2) have a greater revenue exposure to silver mining than gold mining and have a combined gold/silver mining revenue exposure of greater than 50%.

In addition, both streaming companies and royalty companies are eligible for inclusion in the Gold Miners Index. Companies that have not yet commenced production are also eligible for inclusion in the Gold Miners Index, *provided* that they have tangible revenues that are related to the mining of either gold or silver ore. There are no restrictions imposed on the eligibility of company in how much the company has hedged in gold or silver production via futures, options or forward contracts.

### ***Index Calculation***

The Gold Miners Index is calculated using a modified market capitalization weighting methodology. The Gold Miners Index is weighted based on the market capitalization of each of the component securities, modified to conform to the following asset diversification requirements, which are applied in conjunction with the scheduled quarterly adjustments to the Gold Miners Index. The information utilized in this modification process will be taken from the close of trading on the second Friday of the rebalancing month:

- (1) the weight of any single component security may not account for more than 20% of the total value of the Gold Miners Index;
- (2) the component securities are split into two subgroups — (1) large and (2) small, which are ranked by their unadjusted market capitalization weight in the Gold Miners Index. Large stocks are defined as having a Gold Miners Index weight greater than or equal to 5%. Small securities are defined as having an Gold Miners Index weight below 5%; and
- (3) the final aggregate weight of those component securities which individually represent more than 4.5% of the total value of the Gold Miners Index may not account for more than 45% of the total Gold Miners Index value.

The Gold Miners Index is reviewed quarterly so that the Gold Miners Index components continue to represent the universe of companies involved in the gold mining industry. The NYSE Arca may at any time and from time to time change the number of securities composing the group by adding or deleting one or more securities, or replacing one or more securities contained in the group with one or more substitute securities of its choice, if in the NYSE Arca's discretion such addition, deletion or substitution is necessary or appropriate to maintain the quality and/or character of the Gold Miners Index. Changes to the Gold Miners Index compositions and/or the component share weights in the Gold Miners Index typically take effect after the close of trading on the third Friday of each calendar quarter month in connection with the quarterly index rebalance.

At the time of the quarterly rebalance, the quantities for the components stocks (taking into account expected component changes and share adjustments), are modified in accordance with the following procedures.

- **Diversification Rule 1:** If any component stock exceeds 20% of the total value of the Gold Miners Index, then all stocks greater than 20% of the Gold Miners Index are reduced to represent 20% of the value of the Gold Miners Index. The aggregate amount by which all component stocks are reduced is redistributed proportionately across the remaining stocks that represent less than 20% of the index value. After this redistribution, if any other stock then exceeds 20%, the stock is set to 20% of the index value and the redistribution is repeated. If there is no component stock over 20% of the total value of the Gold Miners Index, then Diversification Rule 1 is not executed.

- **Diversification Rule 2:** The components are sorted into two groups, (1) large components, with a starting index weight of 5% or greater, and (2) small components, with a weight of

under 5% (after any adjustments for Diversification Rule 1). If there are no components that are classified as large components after Diversification Rule 1 is run, then Diversification Rule 2 is not executed. In addition, if the starting aggregate weight of the large components after Diversification Rule 1 is run is not greater than 45% of the starting index weight, then Diversification Rule 2 is not executed. If Diversification Rule 2 is executed, then the large group and the small group will represent 45% and 55%, respectively, of the final index weight. This will be adjusted for through the following process:

- The weight of each of the large stocks will be scaled down proportionately with a floor of 5% so that the aggregate weight of the large components will be reduced to represent 45% of the Gold Miners Index. If any component stock falls below a weight equal to the product of 5% and the proportion by which the stocks were scaled down following this distribution, then the weight of the stock is set equal to the product of 5% and the proportion by which the stocks were scaled down, the components with weights greater than 5% will be reduced proportionately.
- The weight of each of the small components will be scaled up proportionately from the redistribution of the large components. If any component stock exceeds a weight equal to the product of 4.5% and the proportion by which the stocks were scaled up following this distribution, then the weight of the stock is set equal to the product of 4.5% and the proportion by which the stocks were scaled up. The redistribution of weight to the remaining stocks is repeated until the entire amount has been redistributed.

### ***Index Maintenance***

The Gold Miners Index is reviewed quarterly to ensure that at least 90% of the index weight is accounted for by index components that continue to meet the initial eligibility requirements. Components will be removed from the Gold Miners Index during the quarterly review if either (1) the market capitalization falls below \$450 million or (2) the average daily volume traded for the previous three months was lower than 30,000 shares and the average daily value traded for the previous three months was lower than \$600,000. In conjunction with the quarterly review, the share quantities used in the calculation of the Gold Miners Index are determined based upon current shares outstanding modified, if necessary, to provide greater index diversification, as described above. An ADR or GDR ratio would be incorporated into this shares figure so that the shares utilized in the Gold Miners Index for a depository receipt is equal to the shares outstanding of the local share class multiplied by the depository receipt ratio. The index components and their share quantities are determined and announced prior to taking effect. The share quantity of each component stock in the index portfolio remains fixed between quarterly reviews except in the event of certain types of corporate actions, such as stock splits, reverse stock splits, stock dividends or similar events. The share quantities used in the index calculation are not typically adjusted for shares issued or repurchased between quarterly reviews. However, in the event of a merger between two components, the share quantity of the surviving entity may be adjusted to account for any stock issued in the acquisition. The NYSE Arca may substitute stocks or change the number of stocks included in the Gold Miners Index based on changing conditions in the industry or in the event of certain types of corporate actions, including mergers, acquisitions, spin-offs, and reorganizations. In the event of component or share quantity changes to the index portfolio, the payment of dividends other than ordinary cash dividends, spin-offs, rights offerings, re-capitalization or other corporate actions affecting a component stock of the Gold Miners Index, the index divisor may be adjusted to ensure that there are no changes to the index level as a result of non-market forces.

### **The MVIS® Indices**

All information contained in this underlying supplement regarding the Junior Gold Miners Index and the Oil Services Index (each, an “MVIS® Index” and collectively, the “MVIS® Indices”), including, without limitation, their make-up, method of calculation and changes in their components, from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, MV Index Solutions GmbH (“MVIS”). The MVIS® Indices were developed by MVIS and are maintained and published by MVIS. Each MVIS® Index is calculated by Solactive AG. MVIS has no obligation to continue to publish, and may discontinue the publication of, the MVIS® Indices.

### *The MVIS® Global Junior Gold Miners Index*

The Junior Gold Miners Index is reported by Bloomberg L.P. under the ticker symbol “MVGDJ.”

The Junior Gold Miners Index is designed to track the performance of the global gold and silver mining small-cap segment that derive at least 50% (25% for current components) of their revenues from (a) gold mining/royalties/streaming and/or (b) silver mining/royalties/streaming or (c) with mining projects that have the potential to generate at least 50% of their revenues from gold and/or silver when developed. The Junior Gold Miners Index was launched on August 31, 2009 with a base index value of 1,000 as of December 31, 2003.

### *The MVIS® US Listed Oil Services 25 Index*

The Oil Services Index is reported by Bloomberg L.P. under the ticker symbol “MVOIH.”

The Oil Services Index is designed to track the performance of the largest and most liquid U.S.-listed companies that derive at least 50% (25% for current components) of their revenues from oil services to the upstream oil sector. The Oil Services Index was launched on August 12, 2011 with a base index value of 1,000 as of September 29, 2000.

## **Index Composition and Maintenance**

### *The Index Universe*

The index universe includes only common stocks and stocks with similar characteristics from financial markets that are freely investable for foreign investors and that provide real-time and historical component and currency pricing. Limited partnerships are excluded. Companies from financial markets that are not freely investable for foreign investors or that do not provide real-time and historical component and currency pricing may still be eligible if they have a listing on an eligible exchange and if they meet all the size and liquidity requirements on that exchange.

Only stocks that have a full market capitalization exceeding US\$50 million are eligible for the index universe.

### *Investable Index Universe*

Only companies with a free-float (or shares available to foreign investors) of 5% or more for existing index components or 10% or more for new components are eligible for inclusion.

In addition to the above, stocks that are currently not in the applicable MVIS® Index must meet the following size and liquidity requirements:

- a full market capitalization exceeding US\$150 million;
- a three-month average-daily-trading volume of at least US\$1 million at the current review and also at the previous two reviews; and
- at least 250,000 shares traded per month over the last six months at the current review and also at the previous two reviews.

For stocks already in the applicable MVIS® Index the following applies:

- a full market capitalization exceeding US\$75 million;
- a three-month average-daily-trading volume of at least US\$0.2 million in at least two of the latest three quarters (current review and also at previous two reviews); and

- a three-month average-daily-trading volume of at least US\$0.6 million at current review or at one of the previous two reviews; or at least 200,000 shares traded per month over the last six months at the current review or at one of the previous two reviews.

In case the number of investable stocks drops below the minimum component number for an MVIS® Index, additional companies are flagged eligible by MVIS's decision until the number of eligible stocks equals the minimum component count.

Only one share line of each company is eligible. In case more than one share line fulfills the above size and liquidity rules, only the largest share line by free-float market capitalization is eligible. MVIS can, in exceptional cases (e.g., significantly higher liquidity), decide for a different share line.

In case the free-float market capitalization of a non-component share line:

- exceeds the free-float market capitalization of a share line of the same company which is an index component by at least 25%; and
- fulfills all size and liquidity eligibility criteria for non-components,

the current component share line will be replaced by the larger one. MVIS can, in exceptional cases (e.g., significantly higher liquidity), decide to keep the current share line instead.

#### *The Junior Gold Miners Index Constituent Selection*

The Junior Gold Miners Index is reviewed on a quarterly basis.

The target coverage of the Junior Gold Miners Index is 100% of the free-float market capitalization of the investable small-cap universe with at least 25 companies. Junior Gold Miners Index constituents are selected using the following procedure:

- (1) Companies are valued by full market capitalization (all secondary lines are grouped). All companies (and not securities) are sorted by full market capitalization in descending order.
- (2) Companies covering the top 60% of the full market capitalization are excluded. Only companies ranking between 60% and 98% qualify for the selection. However, existing components ranking between 55% and 60% or 98% and 99% also qualify for the selection.
- (3) All companies which qualified in step 2 are now viewed as securities (companies with secondary lines are ungrouped and treated separately). Only securities that meet all requirements of the investable index universe are added to the Junior Gold Miners Index.
- (4) In case the number of eligible companies is below 25, additional companies are added by the MVIS's decision until the number of stocks equals 25.

#### *The Junior Gold Miners Index Review Schedule*

The reviews for the Junior Gold Miners Index are based on the closing data on the last business day in February, May, August and November. If a company does not trade on the last business day in February, May, August or November, the last available price for this company will be used.

The underlying index data (e.g., new number of shares, new free-float factors and new weighting cap factors) is announced on the second Friday in a quarter-end month (i.e., March, June, September and December). The weighting cap factors are based on closing data of the Wednesday prior to the second Friday in a quarter-end month (i.e., March, June, September and December). Changes to the Junior Gold Miners Index are implemented and based on the closing prices of the third Friday of every quarter-end month (i.e., March, June, September and December). If the third Friday is not a business day, then the review will take place on the last business day before the third Friday. If a constituent of the Junior

Gold Miners Index does not trade on the third Friday of a quarter-end month, then the last available price for that index constituent will be used. Changes become effective on the next business day.

For purposes of this description, “business day” means any day (other than a Saturday or Sunday) on which commercial banks and foreign exchange markets settle payments in Frankfurt.

#### *The Junior Gold Miners Index Ongoing Maintenance*

In addition to the periodic reviews, the Junior Gold Miners Index is continually reviewed for corporate events (e.g., mergers, takeovers, spin-offs, delistings and bankruptcies) that affect the Junior Gold Miners Index components.

*Replacements.* For all corporate events that result in a stock deletion from the Junior Gold Miners Index, the deleted stock will be replaced with the highest ranked non-component on the most recent selection list immediately only if the number of components in the Junior Gold Miners Index would drop below 20. The replacement stock will be added at the same weight as the deleted stock. Only in case the number of components drops below its minimum due to a merger of two or more index components, the replacement stock will be added with its uncapped free-float market capitalization weight. In all other cases, the additional weight resulting from the deletion will be redistributed proportionally across all other Junior Gold Miners Index constituents.

*Changes to Free-Float Factor and Number of Shares.* Changes to the number of shares or the free-float factors due to corporate actions like stock dividends, splits, rights issues, etc. are implemented immediately and will be effective the next trading day (i.e., the ex-date). Simple share/float changes are implemented after a 3-day notice period.

*Initial Public Offerings (IPOs) and Spin-Offs.* An IPO stock is eligible for fast-track addition to the index universe for the Junior Gold Miners Index once, either at the next quarterly review if it has been trading since at least the last trading day of the month prior to the review snapshot dates (i.e., the last trading day in February, May, August or November) or else at the then-following quarterly review. In order to be added to the Junior Gold Miners Index the IPO stock has to meet the size and liquidity requirements:

- the IPO must have a full market capitalization exceeding US\$150 million;
- the IPO must have a free-float factor of at least 10%;
- the IPO must have an average-daily-trading volume of at least US\$1 million; and
- the IPO must have traded at least 250,000 shares per month (or per 22 days).

This rule is applicable for newly spun-off companies as well.

*Changes due to Mergers & Takeovers.* A merger or takeover is deemed successful if it has been declared wholly unconditional and has received approval of all regulatory agencies with jurisdiction over the transaction. The result of a merger or takeover is typically one surviving stock and one or more non-surviving stocks that may not necessarily be de-listed from the respective trading system(s).

- If a Junior Gold Miners Index component merges with or takes over another Junior Gold Miners Index component: The surviving stock remains in the Junior Gold Miners Index and the other stock is deleted immediately from the Junior Gold Miners Index. Its shares and float are adjusted according to the terms of the merger/takeover. The index market capitalization of the merged company corresponds to the market capitalization of the two separate companies.
- If a Junior Gold Miners Index component merges with or takes over a non-Junior Gold Miners Index component: If the surviving stock meets the Junior Gold Miners Index requirements (for country/sector, market capitalization and free-float), it will remain in the Junior Gold Miners Index

and its shares (if the share change is greater than 10%) and float will be adjusted according to the terms of the merger/takeover. If the surviving stock does not meet the Junior Gold Miners Index requirements (for country/sector, market capitalization and free-float), it will be deleted immediately from the Junior Gold Miners Index.

- If a non-Junior Gold Miners Index component merges with or takes over a Junior Gold Miners Index component: If the surviving stock meets the Junior Gold Miners Index requirements (for country/sector, market capitalization and free-float), it will be added to the Junior Gold Miners Index (shares (if the share change is greater than 10%) and float adjusted according to the terms of the merger/takeover) and will replace the current Junior Gold Miners Index component. If the surviving stock does not meet the Junior Gold Miners Index requirements, it will not be added to the Junior Gold Miners Index and the current Junior Gold Miners Index component will be deleted immediately from the Junior Gold Miners Index.

*Changes due to Spin-Offs.* Each spin-off stock is immediately added to the Junior Gold Miners Index for at least two trading days, if traded on its ex-date. If a spin-off company does not qualify for the Junior Gold Miners Index, it will be deleted based on its respective closing price. Shares and floats of the surviving companies are adjusted according to the terms of the spin-off.

*Additions due to Replacements.* In case the number of Junior Gold Miners Index components drops below the minimum component number and no non-component stock is eligible as a replacement, the determination of the addition is subject to MVIS's decision.

#### *The Oil Services Index Constituent Selection*

The Oil Services Index is reviewed on a semi-annual basis in March and September.

The target coverage of the Oil Services Index is 25 companies from the investable universe. Oil Services Index constituents are selected using the following procedure:

- (1) The largest 50 stocks (by full market capitalization) from the investable universe that are U.S. exchange-listed companies that derive at least 50% (25% for current components) of their revenues from oil services to the upstream oil sector.
- (2) The 50 stocks are ranked in two different ways — by free-float market capitalization in descending order (the largest company receives rank “1”) and then by three-month average-daily-trading volume in descending order (the most liquid company receives rank “1”). These two ranks are added up.
- (3) The 50 stocks are then ranked by the sum of their two ranks in Step 2 in ascending order. If two companies have the same sum of ranks, the larger company is placed on top.
  - a. Initially, the highest ranked 25 companies made up the Oil Services Index.
  - b. On-going, a 10-40 buffer is applied: the highest ranked 10 companies qualify. The remaining 15 companies are selected from the highest ranked remaining current Oil Services Index components ranked between 11 and 40. If the number of selected companies is still below 25, then the highest ranked remaining stocks are selected until 25 companies have been selected.

#### *The Oil Services Index Review Schedule*

The reviews for the Oil Services Index are based on the closing data on the last business day in February and August. If a company does not trade on the last business day in February or August, the last available price for this company will be used.

The underlying index data (e.g., new number of shares, new free-float factors and new weighting cap factors) is announced on the second Friday in March or September. The weighting cap factors are based



on closing data of the Wednesday prior to the second Friday in March or September. Changes to the Oil Services Index are implemented and based on the closing prices of the third Friday in March or September. If the third Friday is not a business day, then the review will take place on the last business day before the third Friday. If a constituent of the Oil Services Index does not trade on the third Friday in March or September, then the last available price for that index constituent will be used. Changes become effective on the next business day.

For purposes of this description, “business day” means any day (other than a Saturday or Sunday) on which commercial banks and foreign exchange markets settle payments in Frankfurt.

#### *The Oil Services Index Ongoing Maintenance*

In addition to the periodic reviews, the Oil Services Index is continually reviewed for corporate events (e.g., mergers, takeovers, spin-offs, delistings and bankruptcies) that affect the Oil Services Index components.

*Replacements.* For all corporate events that result in a stock deletion from the Oil Services Index, the deleted stock will be replaced with the highest ranked non-component on the most recent selection list immediately only if the number of components in the index would drop below 20. The replacement stock will be added at the same weight as the deleted stock. Only in case the number of components drops below its minimum due to a merger of two or more index components, the replacement stock will be added with its free-float market capitalization, weighted with the capping factor of the uncapped components in the small-weight group of the weighting scheme. In all other cases, *i.e.*, there is no replacement, the additional weight resulting from the deletion will be redistributed proportionally across all other index constituents.

*Changes to Free-Float Factor and Number of Shares.* Changes to the number of shares or the free-float factors due to corporate actions like stock dividends, splits, rights issues, etc. are implemented immediately and will be effective the next trading day (*i.e.*, the ex-date). Simple share/float changes are implemented after a 3-day notice period.

*Initial Public Offerings (IPOs) and Spin-Offs.* An IPO stock is eligible for fast-track addition to the index universe for the Oil Services Index once, either at the next semi-annual review if it has been trading since at least the last trading day of the month prior to the review snapshot dates (*i.e.*, the last trading day in February or August) or else at the then-following semi-annual review. In order to be added to the Oil Services Index the IPO stock has to meet the size and liquidity requirements:

- the IPO must have a full market capitalization exceeding US\$150 million;
- the IPO must have a free-float factor of at least 10%;
- the IPO must have an average-daily-trading volume of at least US\$1 million; and
- the IPO must have traded at least 250,000 shares per month (or per 22 days).

This rule is applicable for newly spun-off companies as well.

*Changes due to Mergers & Takeovers.* A merger or takeover is deemed successful if it has been declared wholly unconditional and has received approval of all regulatory agencies with jurisdiction over the transaction. The result of a merger or takeover is typically one surviving stock and one or more non-surviving stocks that may not necessarily be de-listed from the respective trading system(s).

- If an Oil Services Index component merges with or takes over another Oil Services Index component: The surviving stock remains in the Oil Services Index and the other stock is deleted immediately from the Oil Services Index. Its shares and float are adjusted according to the terms of the merger/takeover. The index market capitalization of the merged company corresponds to the market capitalization of the two separate companies.

- If an Oil Services Index component merges with or takes over a non-Oil Services Index component: If the surviving stock meets the Oil Services Index requirements, then it remains in the Oil Services Index and its shares (if the share change is greater than 10%) and float are adjusted according to the terms of the merger/takeover. If the surviving stock does not meet the Oil Services Index requirements, then it is deleted immediately from the Oil Services Index.
- If a non-Oil Services Index component merges with or takes over an Oil Services Index component: If the surviving stock meets the Oil Services Index requirements, then it will be added to the Oil Services Index (shares (if the share change is greater than 10%) and float adjusted according to the terms of the merger/takeover) and will replace the current Oil Services Index component. If the surviving stock does not meet the Oil Services Index requirements, then it will not be added to the Oil Services Index and the current Oil Services Index component is deleted immediately from the Oil Services Index.

*Changes due to Spin-Offs.* Each spin-off stock is immediately added to the Oil Services Index for at least two trading days. If a spin-off company does not qualify for the Oil Services Index, it will be deleted based on its closing price. Shares and floats of the surviving companies are adjusted according to the terms of the spin-off.

*Additions due to Replacements.* In case the number of Oil Services Index components drops below the minimum component number and no non-component stock is eligible as a replacement, the determination of the addition is subject to MVIS's decision.

## Index Calculation

The value of each MVIS® Index is calculated using the Laspeyres' formula, rounded to two decimal places, with stock prices converted to U.S. dollars:

$$\text{Index Value} = \frac{\sum_{i=1}^n p_i \times q_i \times f_{fi} \times c_{fi} \times f_{xi}}{D} = \frac{M}{D}$$

where (for all stocks (i) in that MVIS® Index):

$p_i$  = stock price (rounded to four decimal places);

$q_i$  = number of shares;

$f_{fi}$  = free-float factor (rounded to two decimal places);

$f_{xi}$  = exchange rate (local currency to U.S. Dollar) (rounded to 12 decimal places);

$c_{fi}$  = company-weighting cap factor (if applicable, otherwise set to 1) (rounded to 16 decimal places);

$M$  = free-float market capitalization of that MVIS® Index; and

$D$  = divisor (rounded to six decimal places).

### Free-Float

Each MVIS® Index is free-float adjusted — that is, the number of shares outstanding is reduced to exclude closely held shares (amount larger than 5% of the company's full market capitalization) from the index calculation. At times, other adjustments are made to the share count to reflect foreign ownership limits. These are combined with the block-ownership adjustments into a single factor. To avoid unwanted double counting, either the block-ownership adjustment or the restricted stocks adjustment is applied, whichever produces the higher result. Free-float factors are reviewed quarterly.

## *Company-Weighting Cap Factors*

### *The Junior Gold Miners Index Company-Weighting Cap Factors*

Companies in the Junior Gold Miners Index are ranked according to their free-float market capitalization, as modified by the company-weighting cap factors. The Junior Gold Miners Index used the company-weighting cap factors to ensure diversification to avoid overweighting. The company-weighting cap factors are reviewed quarterly and applied, if necessary. The following weighting scheme applies to the Junior Gold Miners Index:

- (1) All Junior Gold Miners Index components are weighted by their free-float market capitalization. The maximum weight for any single stock is 8%. If a stock exceeds the maximum weight, then the weight will be reduced to the maximum weight and the excess weight shall be redistributed proportionally across all other Junior Gold Miners Index constituents. This process is repeated until no stocks have weights exceeding the respective maximum weight.
- (2) The 8%-cap weighting scheme will be applied to the largest stocks and the excess weight after each step shall be redistributed across all other (uncapped) stocks in the Junior Gold Miners Index on a proportional basis:
  - a. If the largest two stocks exceed 8%, both will be capped at 8%.
  - b. If the 3rd largest stock exceeds 7%, it will be capped at 7%.
  - c. If the 4th largest stock exceeds 6.5%, it will be capped at 6.5%.
  - d. If the 5th largest stock exceeds 6%, it will be capped at 6%.
  - e. If the 6th largest stock exceeds 5.5%, it will be capped at 5.5%.
  - f. If the 7th largest stock exceeds 5%, it will be capped at 5%.
  - g. If any other stock exceeds 4.5%, it will be capped at 4.5%.
- (3) The maximum weight for silver stocks is 4.5%.

### *Sector-Weighting Cap Factor*

Companies determined to be 'silver' stocks must not constitute more than 20% of the Junior Gold Miners Index. If at a quarterly review, the aggregated weighting of all silver stocks represents more than 20% of the Junior Gold Miners Index, a sector-weighting cap factor is applied. This sector-weighting cap factor is calculated to ensure that the aggregated weighting of all gold stocks will not be less than 80% and the aggregated weighting of all silver stocks is capped at 20%.

### *The Junior Gold Miners Index Company-Weighting Cap Factors*

Companies in the Oil Services Index are weighted according to their free-float market capitalization, as modified by the company-weighting cap factors. The Oil Services Index used the company-weighting cap factors to ensure diversification to avoid overweighting. The company-weighting cap factors are reviewed quarterly and applied, if necessary. The following weighting scheme applies to the Oil Services Index:

- (1) All Oil Services Index components are weighted by their free-float market capitalization.
- (2) All companies exceeding 4.5% but at least the largest five companies and at the maximum the largest 10 are grouped together (so called "Large-Weights") and all other companies are grouped together as well (so called "Small-Weights").

(3) The aggregated weighting of the Large-Weights is capped at 50%:

- a. Large-Weights: If the aggregated weighting of all companies in Large-Weight exceeds 50%, then a capping factor is calculated to bring the weighting down to 50%; at the same time, a second capping factor for the Small-Weights is calculated to increase the aggregated weight to 50%. These two factors are then applied to all companies in the Large-Weights or the Small-Weights respectively.
- b. Large-Weights: The maximum weight for any single stock is 20% and the minimum weighting is 5%. If a stock is above the maximum or below the minimum weight, then the weight will be reduced to the maximum weight or increased to the minimum weight and the excess weight will be re-distributed proportionally across all other remaining Oil Services Index constituents in the Large-Weights.
- c. Small-Weights: The maximum weight for any single stock is 4.5%. If a stock is above the maximum weight, then the weight will be reduced to the maximum weight and the excess weight will be re-distributed proportionally across all other remaining Oil Services Index constituents in the Small-Weights.

#### *Divisor Adjustments*

Index maintenance (reflecting changes in, e.g., shares outstanding, capital actions, addition or deletion of stocks to an MVIS® Index) should not change the level of that MVIS® Index. This is accomplished with an adjustment to the divisor. Any change to the stocks in an MVIS® Index that alters the total market value of that MVIS® Index while holding stock prices constant will require a divisor adjustment.

$$\text{Divisor}_{\text{new}} = \text{Divisor}_{\text{old}} \times \frac{\sum_{i=1}^n p_i \times q_i \times ff_i \times cf_i \times fx_i \pm \Delta MC}{\sum_{i=0}^n p_i \times q_i \times ff_i \times cf_i \times fx_i}$$

where  $\Delta MC$  is the difference between closing market capitalization and adjusted closing market capitalization of that MVIS® Index.

#### *Data Correction*

Incorrect or missing input data will be corrected immediately.

#### *Corporate Action Related Adjustments*

Corporate actions range widely from routine share issuances or buy backs to unusual events like spin-offs or mergers. These are listed on the table below with notes about the necessary changes and whether the divisor will be adjusted. Implementation takes place on the ex-date.

**Special cash dividend**

Divisor change: Yes

$$p_{i, \text{adjusted}} = p_i - (\text{Dividend} \times (1 - \text{Withholding Tax}))$$
**Split**

Divisor change: No

Shareholders receive “B” new shares for every “A” share held.

$$p_{i, \text{adjusted}} = p_i \times \frac{A}{B}$$

$$q_{i, \text{adjusted}} = q_i \times \frac{B}{A}$$

**Rights offering**

Divisor change: Yes

Shareholders receive “B” new shares for every “A” share held.

If the subscription-price is either not available or not smaller than the closing price, then no adjustment will be done.

$$p_{i, \text{adjusted}} = \frac{(p_i \times A) + (\text{Subscription Price} \times B)}{(A + B)}$$

$$q_{i, \text{adjusted}} = q_i \times \frac{(A + B)}{A}$$

**Stock dividend**

Divisor change: No

Shareholders receive “B” new shares for every “A” share held.

$$p_{i, \text{adjusted}} = p_i \times \frac{A}{(A + B)}$$

$$q_{i, \text{adjusted}} = q_i \times \frac{(A + B)}{A}$$

**Stock dividend from treasury**

Divisor change: Yes

Stock dividends from treasury are adjusted as ordinary cash dividends.  
Shareholders receive ‘B’ new shares for every ‘A’ share held.

$$p_{i, \text{adjusted}} = p_i - \frac{p_i \times B}{(A + B)}$$

**Stock dividend of a different company security**

Divisor change: Yes

Shareholders receive “B” shares of a different company for every “A” share held.

$$p_{i, \text{adjusted}} = \frac{(p_i \times A) - (\text{Price of Different Security} \times B)}{A}$$

**Spin-offs**

Divisor change: Yes

Shareholders receive “B” new shares for every “A” share held.

$$p_{i, \text{adjusted}} = \frac{(p_i \times A) - (\text{Price of Spun-off Company} \times B)}{A}$$

**Addition/deletion of a company**

Divisor change: Yes

Net change in market value determines the divisor adjustment.

**Changes in shares outstanding/free-float**

Divisor change: Yes

Any secondary issuance, share repurchase, buy back, tender offer, Dutch auction, exchange offer, bought deal equity offering or prospectus offering will be updated at the quarterly review (with respect to the Junior Gold Miners Index) and semi-annual review (with respect to the Oil Services Index) if the change is smaller than 10%. Changes larger than 10% will be pre-announced (3 trading days' notice) and implemented on a best efforts basis. If necessary and information is available, resulting float changes are taken into consideration. Share changes will not be implemented in the week between review announcement and implementation.

**Changes due to a merger/takeover/spin-off**

Divisor change: Yes

Net change in free-float market value determines the divisor adjustment. In case of no change, the divisor change is 0.

With corporate actions where cash dividends or other corporate assets are distributed to shareholders, the price of the stock will drop on the ex-dividend day (the first day when a new shareholder is eligible to receive the distribution). The effect of the divisor adjustment is to prevent this price drop from causing a corresponding drop in an MVIS® Index.

Corporate actions are announced at least four days prior to implementation.

## **THE VANGUARD FTSE EMERGING MARKETS ETF**

All information contained in this underlying supplement regarding the Vanguard FTSE Emerging Markets ETF has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by, Vanguard International Equity Index Funds (the “Vanguard International Trust”) and The Vanguard Group, Inc. (“Vanguard”). The Vanguard FTSE Emerging Markets ETF is an investment portfolio of the Vanguard International Trust. Vanguard is the investment adviser to the Vanguard FTSE Emerging Markets ETF. The Vanguard FTSE Emerging Markets ETF is an exchange-traded fund that trades on the NYSE Arca, Inc. under the ticker symbol “VWO.”

The Vanguard FTSE Emerging Markets ETF seeks to track, before fees and expenses, the performance of a benchmark index that measures the investment return of stocks issued by companies located in emerging market countries. The benchmark index is currently the FTSE Emerging Markets All Cap China A Inclusion Index (the “Emerging Markets Index”). For more information about the Emerging Markets Index, see “— The FTSE Emerging Markets All Cap China A Inclusion Index” below.

The index tracked by the Vanguard FTSE Emerging Markets ETF has changed over time. The Vanguard FTSE Emerging Markets ETF tracked the Select Emerging Markets Index through August 23, 2006; the MSCI Emerging Markets Index through January 9, 2013; the FTSE Emerging Transition Index through June 27, 2013; the FTSE Emerging Markets Index through November 1, 2015; and the FTSE Emerging Markets All Cap China A Transition Index through September 18, 2016. Since September 19, 2016, the Vanguard FTSE Emerging Markets ETF has tracked the Emerging Markets Index. Korean companies were first included as part of the transition to the FTSE Emerging Markets Index, and small-capitalization stocks and China A-shares were first included as part of the transition to the Emerging Markets Index. These changes could adversely affect the performance of the Vanguard FTSE Emerging Markets ETF. In addition, there is limited historical information that reflects the Vanguard FTSE Emerging Markets ETF's tracking of the Emerging Markets Index.

The Vanguard FTSE Emerging Markets ETF employs an indexing investment approach designed to track the Emerging Markets Index. The Vanguard FTSE Emerging Markets ETF invests by sampling the Emerging Markets Index, meaning that it holds a broadly diversified collection of securities that, in the aggregate, approximates the Emerging Markets Index in terms of key characteristics. These key characteristics include industry weightings and market capitalization, as well as certain financial measures, such as price/earnings ratio and dividend yield. The Vanguard FTSE Emerging Markets ETF is subject to index sampling risk, which is the chance that the securities selected for the Vanguard FTSE Emerging Markets ETF, in the aggregate, will not provide investment performance matching that of the Emerging Markets Index. In addition, the Vanguard FTSE Emerging Markets ETF has operating expenses and transaction costs while the Emerging Markets Index does not.

The Vanguard International Trust is a registered investment company that consists of numerous separate investment portfolios, including the Vanguard FTSE Emerging Markets ETF. Information provided to or filed with the SEC by Vanguard pursuant to the Securities Act of 1933, as amended, and the Investment Company Act of 1940, as amended, can be located by reference to SEC file numbers 033-32548 and 811-05972, respectively, through the SEC's website at <http://www.sec.gov>. For additional information regarding the Vanguard International Trust, Vanguard and the Vanguard FTSE Emerging Markets ETF, please see the Vanguard FTSE Emerging Markets ETF's prospectus.

### **The FTSE Emerging Markets All Cap China A Inclusion Index**

All information in this underlying supplement regarding the Emerging Markets Index including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by FTSE Russell. FTSE Russell has no obligation to continue to publish, and may discontinue publication of, the Emerging Markets Index.

The Emerging Markets Index is a market-capitalization weighted index representing the performance of large-, mid- and small-cap companies in emerging markets. The Emerging Markets Index was launched on June 5, 2015, with a base date of December 30, 2005 and a base value of 1,000. The Emerging Markets Index is currently composed securities from 23 different countries.

The Emerging Markets Index applies the same methodology as the FTSE Emerging Markets Index, except that the Emerging Markets Index includes small-capitalization stocks and China A-shares at a weighting equivalent to the aggregate qualified foreign institutional investor (“QFII”) and/or Renminbi QFII (“RQFII”) approved quota for international investors. China A-shares, which are securities of Chinese-incorporated companies that trade on either the Shanghai or Shenzhen stock exchange, are quoted in Renminbi and can be traded only either by residents of the People’s Republic of China or under the QFII or RQFII rules and stock connect schemes. The China A-shares weighting will increase as total QFII and RQFII allocations increase. A built-in mechanism ensures that the allocation of China A-shares is adjusted proportional to the changes in the approved quota and is in line with the accessibility available to international investors. For more information about the FTSE Emerging Markets Index, see “The FTSE Emerging Markets Index” below.

### **The FTSE Emerging Markets Index**

All information in this underlying supplement regarding the FTSE Emerging Markets Index including, without limitation, its make-up, method of calculation and changes in its components, has been derived from publicly available information, without independent verification. This information reflects the policies of, and is subject to change by FTSE International Limited (“FTSE”). FTSE Russell has no obligation to continue to publish, and may discontinue publication of, the FTSE Emerging Markets Index.

The FTSE Emerging Markets Index is included in the FTSE Global Equity Index Series. The FTSE Global Equity Index Series covers securities in 49 different countries. It attempts to represent every equity and sector relevant to international investors’ needs and has a modular structure. The universe is divided into Developed, Advanced Emerging and Secondary Emerging segments, with indexes calculated at regional, national and sector level. The FTSE Emerging Markets Index is the aggregate of the Advanced and Secondary Emerging segments of the FTSE Global Equity Index Series universe.

### ***Country Inclusion Criteria***

FTSE classifies countries included in its global indices into one of three categories: Developed, Advanced Emerging and Secondary Emerging. FTSE maintains a set of criteria to assess market status and minimum standards for each category for countries and markets to achieve in order to be eligible for that category. The minimum standards increase from Secondary Emerging to Advanced Emerging and from Advanced Emerging to Developed. A country will be classified under the category with the highest standards that it meets. FTSE conducts an annual review of all countries included in its global indices and those being considered for inclusion. A country’s classification as Developed, Advanced Emerging or Secondary Emerging is dependent on the following criteria:

- Market and regulatory environment: formal stock market regulatory authorities actively monitor the market; fair and non-prejudicial treatment of minority shareholders; no or selective incidence of foreign ownership restrictions; no objection to or significant restrictions or penalties applied to the investment of capital or the repatriation of capital and income; no or simple registration process for foreign investors.
- Foreign exchange market: developed foreign exchange market.
- Equity market: sufficient competition to ensure high-quality broker services; implicit and explicit costs to be reasonable and competitive; stock lending permitted; short sales permitted; developed derivatives market; off-exchange transactions permitted; efficient trading mechanism; market depth information/visibility and timely trade reporting process.



- Custody and settlement: rare incidence of failed trades in settlement; settlement cycle; central securities depository; central counterparty clearing house; free delivery available; sufficient competition to ensure high-quality custodian services; account structure operating at the custodian level (securities and cash).

Once a country has met the required standards, it will be eligible for inclusion in the FTSE Global Equity Index Series. However, for a country index to be constructed and included in the FTSE Global Equity Index Series, a minimum of 3 companies must pass the securities eligibility criteria and screens for index inclusion. An existing country index will remain in the FTSE Global Equity Index Series while any eligible constituents representing the country remain within the index. On the deletion of the last constituent, the country will continue to be eligible, but the country index will be immediately removed from the FTSE Global Equity Index Series and will only be reconsidered for index inclusion if it meets the minimum requirement of 3 eligible companies.

FTSE Russell conducts an annual review of all countries included in its global indices and those being considered for possible inclusion. Countries already in the indices will be assessed against the minimum standards for each category and prior to any reclassification or removal from the index will be placed on a watch-list. Countries not in the index will be assessed against the minimum standards for each category and, if appropriate, will be added to the watch list for possible future inclusion to one of the categories. In conducting the annual review, FTSE Russell will consult the FTSE Russell Country Classification Advisory Committee. In March and September of each year, FTSE will publish a watch list of countries being monitored for possible promotion or demotion. FTSE Russell releases the results of its annual review in September of each year. FTSE Russell will normally give at least six months' notice before changing the classification of any country. Countries may be added to the indices at any time after a prior announcement. New regional indices may be added at any time after a prior announcement. Companies in the newly added countries will be reviewed in line with the relevant semi-annual regional review and any changes implemented after a prior announcement.

### ***Determining Nationality***

A company will be allocated to a single country. If a company is incorporated in one country and has its sole listing in the same country, FTSE Russell will allocate the company to that country. In all other circumstances, FTSE Russell will base its decision on an assessment of various factors including, but not necessarily limited to, the following:

- The investor protection regulations present in the country of incorporation;
- The country in which the company is domiciled for tax purposes;
- The location of its factors of production;
- The location of its headquarters;
- The location of company meetings;
- The composition of its shareholder base;
- The membership of its board of directors;
- The currency denomination of the company's shares;
- The perception of investors.

If a company is incorporated in a country, has a listing in that country and listings in other countries, FTSE Russell will normally assign the company to the country of incorporation. If the company fails FTSE Russell's liquidity test in the country of incorporation, FTSE Russell may assign the company to the country which exhibits the greatest liquidity. However, save for certain exceptions, a company

incorporated in a country other than a developed country (as classified in the FTSE Global Equity Index Series) may not be assigned to a developed country. If a company is incorporated in a country, and is listed only in countries other than the country of incorporation, FTSE Russell will normally allocate the company to the country with the greatest liquidity. If a company is incorporated in a country other than a developed country, has no listing in that country and is listed only in one or more developed countries, that company will only be eligible for FTSE Global Equity Index Series inclusion if the country of incorporation is internationally recognized as having a low taxation status that has been approved by FTSE Russell. For companies incorporated in approved low taxation countries, FTSE Russell will normally assign the company to the developed country with the greatest liquidity. The country allocation of the FTSE Emerging Markets Index constituents may be reassessed at any time at the FTSE Russell's discretion.

### ***Eligible Securities***

Ineligible securities include those whose business is that of holding equity and other investments, those of Limited Liability Partnerships, Limited Partnerships, Master Limited Partnerships, Limited Liability Companies and Business Development Company, and a stapled unit if it comprises an eligible security and a non-eligible security, and convertible preference shares and loan stocks until converted. Shares that have been listed but do not form part of a company's current issued share capital, such as treasury shares and shares pending issuance to an employee scheme, will be excluded from the full market capitalization calculation.

Securities that are subject to surveillance by the stock exchanges and have been assigned to any of the following segments will not be eligible for index inclusion. Where an existing constituent is assigned to an ineligible segment, it will normally be deleted from the FTSE Emerging Markets Index at the next quarterly review and it will only be reconsidered for index inclusion after a period of 12 months from its deletion subject to it no longer being under surveillance. For the purposes of the index eligibility, it will be treated as a new issue.

Country	Exchange	Segment
China	Shanghai Stock Exchange Shenzhen Stock Exchange	Special Treatment (ST)
India	Bombay Stock Exchange National Stock Exchange of India	Graded Surveillance Measure (GSM)
Malaysia	Bursa Malaysia	PN17
Poland	Warsaw Stock Exchange	Alert List
Taiwan	Taiwan Stock Exchange	Altered Trading Method (ATM)
Thailand	Stock Exchange of Thailand	Companies facing possible delisting according to No. 9(g) of Stock Exchange of Thailand's Regulations on Delisting of Securities
Turkey	Borsa Istanbul	Watch-list

Securities that are assigned to the above segments after the review announcement date but before the FTSE Emerging Markets Index review effective date are assessed on a case-by-case basis which may generally result in scheduled FTSE Emerging Markets Index review additions, investability weight and shares in issue changes no longer being implemented at the forthcoming review.

### ***Trading Screens***

Existing and non-constituent securities that have not traded on 60 or more trading days during the past year (up to and including the review cut-off date), will not be eligible for index inclusion. Regular/ad-hoc market holidays, and unscheduled market closures will not count towards the total; otherwise, the

reason(s) for a security's non-trading will not be considered. If a security does not have a full year of trading, the 60 day period will be pro-rated according to the number of available trading days passed since its listing. Please note:

- All standard trading days will be incorporated within the calculation (Friday and Sundays as appropriate);
- Ad-hoc non-standard trading days will not be incorporated within the calculation (e.g. ad-hoc Saturday trading will not be considered);
- Where a pro-rata calculation is necessary, the number of available trading days on the underlying market during the previous year up to and including the review cut-off date will be used as the basis of the calculation (e.g. Market ABC has 253 available trading days for the annual period to the review cut-off date; therefore the security would not be eligible if for 23.7% (60/253) or more of its available trading days since listing, it did not trade);
- A security which has been removed from an index as a result of this screen will only be re-considered for inclusion after a period of 12 months from its deletion. For the purposes of index eligibility, it will be treated as a new issue.

### **Algorithm and Calculation Method**

The FTSE Global Equity Index Series uses actual closing mid-market or last trade prices, where available, for securities with local market quotations. Thomson Reuters real time exchange rates are used in the index calculations which are disseminated in real-time. Exchange rates used in the End of Day calculations are WM/Reuters Closing Spot Rates™, collected at 16:00 hrs London time.

The FTSE Emerging Markets Index may consist of individual securities denominated in a range of currencies, necessitating the conversion of stock prices to a common currency using the following formula:

$$CI_{j,t}^{\$} = \frac{\sum_{i=1}^n p_{i,t} \times s_{i,t} \times f_{i,t} \times e_{i,t}^{\$}}{Divisor_{j,t}^{\$}} \quad i \in j$$

Where

$CI_{j,t}^{\$}$  is the U.S. dollar capital index of country j on day t

$n$  is the number of index constituents

$p_{i,t}$  is the price of stock i in local currency on day t

$s_{i,t}$  is the shares in issue of stock i on day t

$f_{i,t}$  is the free float percentage of ordinary shares in issue of stock i on day t

$e_{i,t}^{\$}$  is the exchange rate to U.S. dollar of stock i on day t

The currency effect is removed by holding exchange rates constant at the previous day's level using the following formula:

$$Divisor_{j,t}^L = \sum_{i=1}^n p_{i,t}^* \times s_{i,t} \times f_{i,t} \times e_{i,t-1}^L \quad i \in j$$

Where

$e_{i,t}^L$  is local currency exchange rate of stock i on day t

$p_{i,t}^*$  is the price of stock i on day t-1 adjusted for corporate actions effective on day t

The U.S. dollar index may also be derived as:

$$CI_{j,t}^{\$} = CI_{j,t}^x \times e_{x,t=0}^{\$} / e_{x,t}^{\$}$$

Where  $CI_{j,t}^x$  is country index j expressed in another currency (x) and  $e_{x,t=0}^{\$}$  is the currency x to U.S. dollar exchange rate on the index base date. Note the exchange rate is expressed in units of x per dollar. Similarly, a pound sterling index may be derived as:

$$CI_{j,t}^{\pounds} = CI_{j,t}^x \times e_{x,t=0}^{\pounds} / e_{x,t}^{\pounds}$$

or

$$CI_{j,t}^{\pounds} = CI_{j,t}^{\$} \times e_{\$,t=0}^{\pounds} / e_{\$,t}^{\pounds}$$

Where  $e_{\$,t}^{\pounds}$  is the number of U.S. dollars per pound sterling at time t.

The performance of the FTSE Emerging Markets Index on a given day is determined by calculating the percentage difference between:

- the FTSE Emerging Markets Index's market capitalization as at the close of that day and
- the market capitalization at the start of that day

"Start of the day" is defined as the previous day's close adjusted for capital changes, investability weight changes, additions and deletions.

Adjustments are applied whenever capital changes take place, so that the performance of the FTSE Global Equity Index Series reflects the experience of investors. Eligible companies may be subject to adjustment for free float and multiple lines.

### ***Free Float and Multiple Lines Adjustments***

Free Float: The FTSE Global Equity Index Series is adjusted for free float and foreign ownership limits. Free float restrictions include:

- Shares directly owned by State, Regional, Municipal and Local governments (excluding shares held by independently managed pension schemes for governments).
- Shares held by directors, senior executives and managers of the company, and by their family and direct relations, and by companies with which they are affiliated\*.
- Shares held within employee share plans.
- Shares held by public companies or by non-listed subsidiaries of public companies.
- All shares where the holder is subject to a lock-in clause (for the duration of that clause)\*\*.

- All shares where the holder has a stated incentive to retain the shares (e.g. bonus shares paid if holding is retained for a set period of time).<sup>\*\*</sup>
- Shares held by an investor, investment company or an investment fund for strategic reasons as evidenced by specific statements to that effect in publicly available announcements, has an employee on the board of directors of a company, has a shareholder agreement, has successfully placed a current member to the board of directors, or has nominated a current member to the board of directors alongside a shareholder agreement with the company.
- Shares that are subject to on-going contractual agreements (such as swaps) where they would ordinarily be treated as restricted.

\* For the analysis of U.S. company free float, holdings of options, warrants and convertibles will be removed from the officer and director holdings when those shares are provided in summed format within the footnotes of the SEC filings. Where FTSE Russell determines that a company is being excluded from index membership solely on the basis of the minimum float requirement, FTSE Russell will use the best available information contained in the SEC filings to determine the free float.

<sup>\*\*</sup> Free float changes resulting from the expiry of a lock-in or incentive will be implemented at the next quarterly review subject to the lock-in or incentive expiry date occurring on or prior to the share and float change information cut-off date.

Holdings that are not considered as restricted free float include portfolio holdings, nominee holdings, holdings by investment companies and ETFs. If in addition to the above restricted holdings, the company's shareholders are subject to legal restrictions, including foreign ownership restrictions, that are more restrictive, the legal restriction will be considered a free float restriction. While shares disclosed as being held by a nominee account are typically regarded as free float, if a restricted shareholder (as described above) is identified as holding shares through a nominee account, then that portion of shares will be restricted. If a company changes its foreign ownership restriction, the change will be implemented at the subsequent quarterly review.

Free float is calculated using available published information rounded to 12 decimal places. Except where the investable market capitalization of the security exceeds 10 times the regional inclusion percentage level, securities with a free float of 5% or below are not eligible for inclusion in the FTSE Emerging Markets Index.

The FTSE Global Equity Index Series will be periodically reviewed for changes in free float.

Multiple Lines: Where there are multiple lines of equity capital in a company, all are included and priced separately, provided that they pass index eligibility screens in their own right and all partly-paid classes of equity are priced on a fully-paid basis if the calls are fixed and are payable at known future dates. Those where future calls are uncertain in either respect are priced on a partly-paid basis.

### ***Liquidity***

Each security will be tested for liquidity semi-annually in March and September by calculation of its monthly median of daily trading volume.

Liquidity will be calculated for the March review from the first business day of January to the last business day of December of the previous year and for the September review from the first business day of July of the previous year to the last business day of June. When calculating the median of daily trading volume of any security for a particular month, a minimum of five trading days in that month must exist, otherwise the month will be excluded from the test.

For each month, the daily trade total for each security is calculated as a percentage of the shares in issue for that day adjusted by the free float at the review cutoff date. These daily values are then ranked in descending order and the median is taken by selecting the value for the middle ranking day if there is

an odd number of days and the mean of the middle two if there is an even number of days. Daily totals with zero trades are included in the ranking, therefore a security that fails to trade for more than half of the days in a month will have a zero median trading volume for that month. Any period of suspension will not be included in the test. For newly eligible securities where the testing period is less than 12 months, the liquidity test will be applied on a pro-rata basis.

#### Liquidity Thresholds:

- An existing constituent which, based on its median daily trading volume per month does not turnover at least 0.04% of its shares in issue (after the application of any free float weightings\*) for at least eight of the twelve months prior to a full market review will be removed from the FTSE Global Equity Index Series. If an existing constituent fails this test, then that existing constituent will be subject to a further test whereby the last 6 months of the testing period will be assessed on a pro-rata basis. If the existing constituent passes at least 4 out of the last 6 months (equating to 8 out of 12 months on a pro-rata basis), it will be considered to have passed the liquidity test.
- A non-constituent which, based on its median daily trading volume per month, does not turnover at least 0.05% of its shares in issue (after the application of any free float weightings\*) for at least ten of the twelve months prior to a full market review will continue to be excluded from the FTSE Global Equity Index Series.
- New issues that do not have a twelve-month trading record must have a minimum three-month trading record when reviewed. They must turnover at least 0.05% of their shares in issue (after the application of any free float weightings)\* based on their median daily trading volume each month, on a pro-rata basis since listing. This rule will not apply to new issues added under the Fast Entry Rule. Newly eligible securities will be treated as new issues and liquidity will be tested from the date of eligibility. Trading records prior to this date will generally not be taken into account.

In assessing liquidity, data will be aggregated from trading volume in the country in which the company is classified by FTSE Russell and from any other trading venues, as approved by FTSE Russell, operating in a similar time zone. In the event that a company fails the liquidity test based on its underlying shares, and the company has an equivalent Depositary Receipt ("DR"), then the DR may be considered for inclusion in the FTSE Emerging Markets Index if it passes the liquidity test in its own right and is traded on an exchange within the similar regional time-zone to where the underlying shares are listed. Where the DR has been included it will remain in the FTSE Emerging Markets Index until such a time it either fails the liquidity test or the underlying share pass the liquidity test for two future consecutive reviews.

The above percentage figures may be adjusted by up to 0.01% at a market review so that, in FTSE Russell's opinion, the FTSE Emerging Markets Index better reflects the liquid investable market of the region. This discretion may only be exercised across the whole of a region and may not be applied to individual securities or countries.

\* When testing liquidity, the free float weight as at the last date in the testing period will be used for the calculation for the whole of that period.

#### ***Periodic Review of Index Constituents***

Countries are usually reviewed semi-annually in March and September, on a region by region basis, based on data as at the close of business on the last business day of December and June (where the last business day of the month falls on a Saturday or Sunday for any individual countries, data will be taken as at close of the last business day before Saturday). Any constituent changes resulting from the periodic review will be implemented after the close of business on the third Friday (*i.e.*, effective the following Monday) of March and September. The review process is designed to reflect market movements since the previous review and to minimize turnover. As of the March 2019 semi-annual review, the different

China Share classes will be reviewed as a standalone region. China A Shares that passed the March 2019 semi-annual index eligibility criteria were added to the FTSE Global Equity Index Series in June 2019, subject to them continuing to be available on the Northbound China Stock Connect Scheme Buy-and-Sell List.

In order to determine which companies are included in the FTSE Emerging Markets Index, first the 100% regional universe is defined by ranking all companies in each Regional Universe by their full market capitalization. Companies are then ranked by full market capitalization (companies that are capped will be ranked based on their capped market capitalization) in descending order, and the top 98% by weight of the regional universe is selected as the Index Universe. Investability weights are assigned to all companies in accordance with the free float rules, the multiple lines rule is applied, all secondary lines which fail are eliminated, and the liquidity rule is applied to all remaining eligible lines of stock. From there, each company is evaluated for inclusion in the FTSE Emerging Markets Index:

To reduce turnover, existing and potential constituents are subject to a series of 'buffer zones' to determine the cut-off points between Large, Mid and Small Cap – the buffers are detailed in the table below.

	<b>Turnover Bands (Based on Index Universe)</b>	
	<b>Eligible for Inclusion</b>	<b>Eligible For Exclusion</b>
Large Cap	68%	72%
Mid Cap	86%	92%
Small Cap	98%	101%

For companies not currently in the FTSE Index:

- Companies at or above 68% of the Index Universe by full market capitalization with a weight greater than 0.04% of the current respective regional All-World Index by full market capitalization, and with a weight greater than the inclusion percentage for the respective region by investable market capitalization, will be included in the Large Cap Index for the region under review.
- Companies ranked below 68%, but within the top 86% of the Index Universe by full market capitalization with a weight greater than 0.04% of the current respective regional All-World Index by full market capitalization, and with a weight greater than the inclusion percentage levels for the respective region by investable market capitalization, will be included in the Mid Cap Index for the region under review.
- Companies ranked below the top 86%, but within the top 98% of the Index Universe by full market capitalization or have a weight less than 0.04% of the current respective regional All-World Index by full market capitalization, and with a weight greater than the inclusion percentage levels for the respective region by investable market capitalization will be included in the Small Cap Index for the region under review.

For existing FTSE constituents:

- Existing Large Cap constituents will remain in the Large Cap Index if they fall within the top 72% of the ranking described above. If they are ranked between 72% and 92% of the Index Universe they will move to the Mid Cap. If they are ranked below 92% of the Index Universe but within the top 101% of the Index Universe, they will move to the Small Cap. If they are ranked below 101% of the Index Universe by full market capitalization or have a weight less

than the exclusion percentage levels for the respective region by investable market capitalization, they will be excluded from the FTSE Emerging Markets Index.

- Existing Mid Cap constituents will move to the Large Cap if they fall within the top 68% of the ranking described above. If they are ranked between 68% and 92% of the Index Universe they will remain in the Mid Cap. If they are ranked below 92% of the Index Universe but within the top 101% of the Index Universe, they will move to the Small Cap. If they are ranked below 101% of the Index Universe by full market capitalization or have a weight less than the exclusion percentage levels for the respective region by investable market capitalization, they will be excluded from the FTSE Emerging Markets Index.
- Existing Small Cap constituents will move to the Large Cap if they fall within the top 68% of the ranking described above. If they are ranked between 68% and 86% of the Index Universe by full market capitalization and have a weight greater than 0.04% of the current respective regional All-World Index by full market capitalization they will move to the Mid Cap. If they are ranked below 86% of the Index Universe or have a weight less than 0.04% of the current respective regional All-World Index by full market capitalization, but within the top 101% of the Index Universe, they will remain in the Small Cap. If they are ranked below 101% of the Index Universe by full market capitalization or have a weight less than the exclusion percentage levels for the respective region by investable market capitalization, they will be excluded from the FTSE Emerging Markets Index.

Inclusion and exclusion percentage levels by investable market capitalization for all the regions in the FTSE Global Equity Index Series to determine additions and deletions and other changes in the FTSE Emerging Markets Index are shown below. These percentages are based from the respective regional Small Cap Index. Individual securities will be tested against the relevant regional levels.

Region	For Inclusion (New Stocks)	For Inclusion (Current Stocks)
Asia Pacific ex China ex Japan	0.05%	0.01%
China (A, B, H, N Share, P, Red and S Chip)	0.10%	0.02%
Latin America	0.50%	0.20%
Emerging Europe  Middle East & Africa	1.00%	0.20%

In exceptional circumstances where FTSE Russell believes that strict adherence to the inclusion and exclusion levels listed in the above table would produce either excessive turnover at an index review, or an index that inaccurately represented different size segments, FTSE Russell reserves the right to vary the percentage levels.

#### ***Fast Entry Rule***

Non-constituent securities may be added to the FTSE Index in between semiannual review dates if it meets either of the following:



- Large Cap inclusion level: Full market capitalization of the smallest company that falls wholly within the top 68% of the Index Universe by full market capitalization of the respective region when ranked according to the procedure outline above under “— Periodic Review of Index Constituents.”
- Mid Cap inclusion level: Full market capitalization of the smallest company that falls wholly within the top 86% of the Index Universe by full market capitalization of the respective region when ranked according to the procedure outline above under “— Periodic Review of Index Constituents.” Shares being offered as a greenshoe (over allotment option) will be excluded from the investable market capitalization calculation.

A security with a free float of 5% or below must have an investable market capitalization that exceeds 10 times the regional inclusion percentage level to be eligible for fast entry. These securities will be assigned to the Large Cap index. A security with a free float exceeding 5% must meet both a full market capitalization threshold at company level and an investable market capitalization threshold at security level in order to be eligible for fast entry. The full market capitalization threshold is defined as 1.5 times the Mid Cap inclusion level above. For example, if the 86% Mid Cap inclusion level is \$10 billion, the full market capitalization fast entry threshold at company level will be \$10 billion multiplied by 1.5, which is \$15 billion. The investable market capitalization threshold is defined as 0.5 times the Mid Cap inclusion level. For example, if the 86% Mid Cap inclusion level is \$10 billion, the investable market capitalization fast entry threshold at security level will be \$10 billion multiplied by 0.5, which is \$5 billion.

Where a security passes both the full market capitalization and investable market capitalization test, it will be assigned to the Large Cap index subject to its full market capitalization breaching the Large Cap inclusion level above, otherwise it will be assigned to the Mid Cap index. Only shares offered at the time of the IPO will be included within the investable market capitalization calculation for the purposes of evaluating fast entry eligibility, and if eligible, the offering shares only will be included within the index calculation. When evaluating the investability weight of a potential IPO fast entry, FTSE Russell will restrict all shares that are only available to domestic retail investors. The shares that are only available to domestic retail investors will be evaluated for free float at a subsequent review. Additionally, any incentives to hold the offered shares will render those shares restricted from free float until the incentives have expired. Foreign investors are prohibited from participating in China A IPO's via the Stock Connect access route; hence China A Share IPO's will be assessed for index eligibility at the next index review, subjecting to certain meeting requirements. Shares being offered as a greenshoe (over allotment option) and locked-up shares will be excluded from the investable market capitalization calculation and excluded from the index calculation at the time of fast entry.

The fast entry level thresholds will be set at the time of the semiannual reviews in March and September using data at the last trading day in December and June. The fast entry levels thresholds will be adjusted up to February 11 or August 11 (previous trading day's data will be taken if any of these dates are on a non-trading day), respectively, to reflect the performance of the regional FTSE All Cap Equity Index Series, and will be published by FTSE Russell.

The fast entry level thresholds for each region will be set at the time of the semiannual review in March and September and will be published by FTSE Russell. In June and December the fast entry levels thresholds will be adjusted up to May 11 or November 11 (previous trading day's data will be taken if any of these dates are on a non-trading day), as appropriate, to reflect the performance of the region in the regional FTSE All Cap Equity Index Series, and an updated figure will be published by FTSE Russell.

### ***Changes to Constituent Companies***

Under certain circumstances, companies can be added to the list of constituent stocks outside of a review when meeting certain market capitalization thresholds. Stocks can be deleted from the list of constituents if their market capitalization or weight falls below certain levels, there exists evidence of a change in circumstance regarding investability, or the constituent stock becomes delisted or becomes bankrupt, insolvent or is liquidated. Constituents can also be deleted under certain circumstances involving delisting, suspension or relisting.

If an existing constituent is acquired for eligible shares (or a combination of eligible shares and cash) by another constituent in its own or another country, then the existing constituent is deleted on the effective date of the acquisition. The enlarged company remains a constituent of the same benchmarks within the FTSE Global Equity Index Series as the acquired company.

Mergers between a constituent and non-constituent:

- Within one country: If an existing constituent is acquired for eligible shares (or a combination of eligible shares and cash) by a quoted non-constituent in the same country, then the purchasing company is added to the same benchmarks within the FTSE Global Equity Index Series as the acquired company on the effective date of the acquisition, if eligible in all other respects. The existing constituent is deleted on the same date.
- Cross border: If an existing constituent is acquired for eligible shares (or a combination of eligible shares and cash) by a quoted non-constituent in another country, the acquiring company will be included in its own country index on the effective date of acquisition, providing it is eligible in all other respects. The existing constituent will be deleted on the same date.

### **Corporate Actions**

FTSE Russell applies corporate actions and events to the FTSE Emerging Markets Indices on a daily basis. A company's index membership and its weight in the index can be impacted by these corporate actions and events. FTSE Russell uses a variety of public sources to determine when an event is final, including a company's press releases and regulatory filings, local exchange notifications, and official updates from other data providers. Prior to the completion of a corporate event, FTSE Russell estimates the effective date on the basis of the same above sources. As new information becomes available, FTSE Russell may revise the anticipated effective date and the terms of the corporate event, before confirming its effective date.

Depending upon the time an event is determined to be final, FTSE Russell either (1) applies the event before the open on the ex-date or (2) applies the event providing appropriate notice if it is deemed to be "actionable" for passive index managers. The impact of the event and the effective date will be communicated to clients on a regular schedule, via the daily corporate actions and events deliverables.

If FTSE Russell has confirmed the completion of a corporate event, scheduled to become effective subsequent to a rebalance or index review, the event may be implemented in conjunction with the rebalance to limit turnover, providing appropriate notice can be given.

The FTSE Emerging Markets Indices recognize a minimum two day notice requirement for "actionable" corporate event implementation such as mergers and acquisitions. This provides an appropriate window for global managers to receive a notification of intended index treatment and consequently act upon it.