

P I M C O

Institutional Money Kongress
February 2019

Investing in commodities in a changing energy landscape, opportunities and pitfalls



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Presented in Germany

Agenda

1/Shale anchor, OPEC counter

2/Energy transition

3/Investment implications

Biographical information

Greg E. Sharenow

Mr. Sharenow is an executive vice president in the Newport Beach office and a portfolio manager focusing on real assets. Prior to joining PIMCO in 2011, he was an energy trader at Hess Energy Trading, Goldman Sachs, and DE Shaw. Mr. Sharenow was previously senior energy economist at Goldman Sachs. He has 19 years of investment and financial services experience and holds bachelor's degrees in mathematical methods in the social sciences and in economics from Northwestern University.

1.

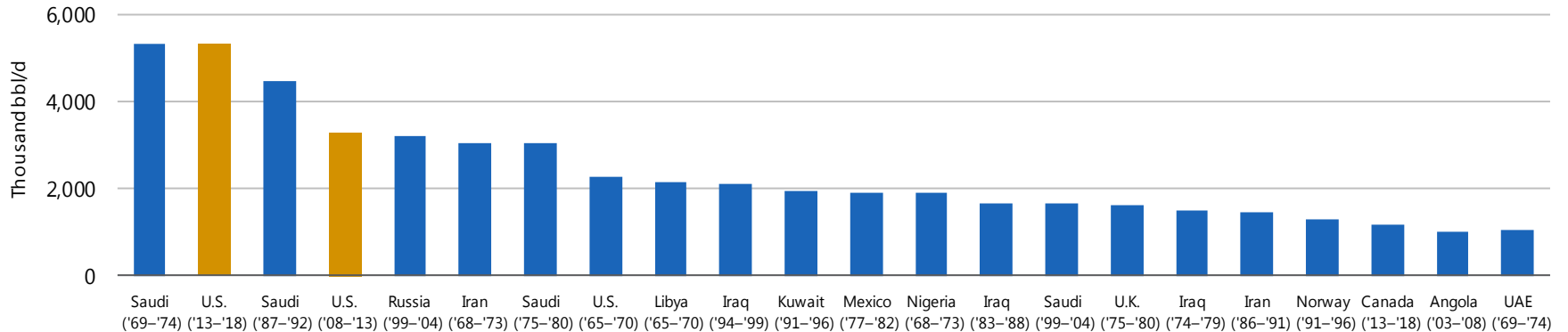
Shale anchor, OPEC counter:

U.S. shale growth has been historic and has played a crucial role in dampening prices

U.S. shale is reshaping global energy markets, the U.S. economy and geopolitical relations

- While energy efficiency improvements have trimmed U.S. energy demand growth, U.S. production growth is historic.
- Increases in U.S. production is changing the economic sensitivity to oil prices and impacting global relationships.
- Nowhere is this more true than in liquefied natural gas (LNG), where U.S. has become an exporter.
- The structure of the U.S. oil industry has truly propelled this production growth.
 - Clear mineral rights ownership
 - Large number of E&P and service companies that compete for survival
 - Deep developed capital markets that help spread risk and promote innovation

5-year increase in oil production

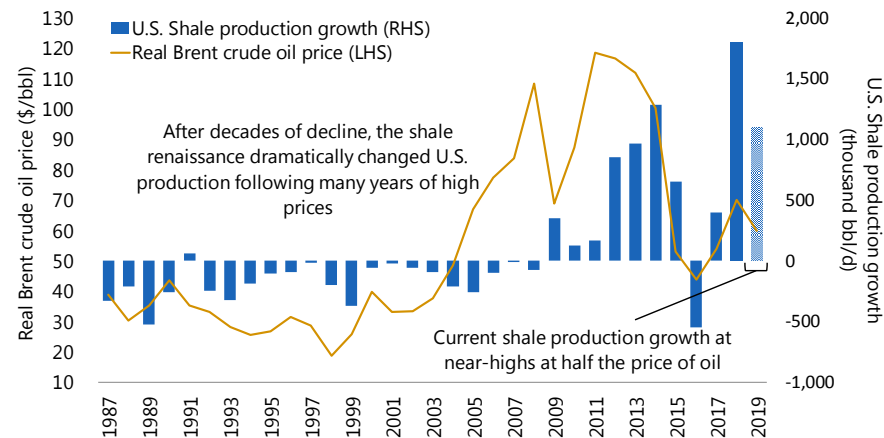


As of 31 January 2019. SOURCE: BP, IEA. Refer to Appendix for additional outlook information.

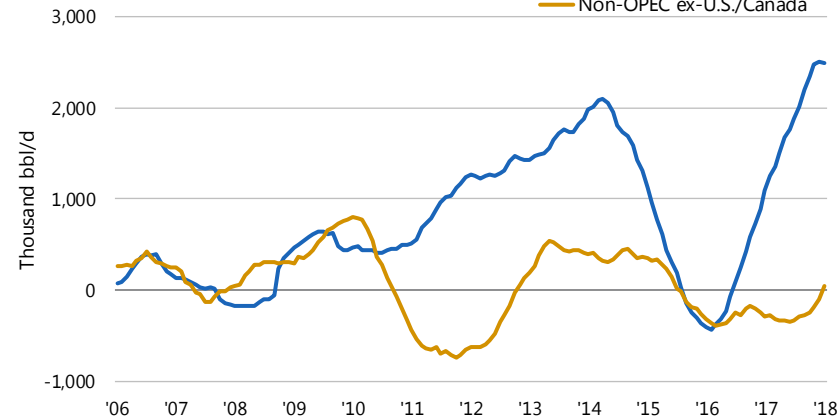
U.S. output is critical to meeting future oil demand growth. U.S. has materially reduced its cost structure to achieve growth at lower prices.

- U.S. shale production is forecasted to grow in 2019 at roughly the same level as when oil was trading \$100+ per barrel.
 - When oil is trading above \$45 per barrel, shale becomes viable and sees an increase in investment.
- Output growth outside of North America has been largely non-existent.
- Oil prices will need to find a level where growth remains robust, but not quite at 2018 levels.

U.S. shale production growth is reflective of lower



Production growth YoY: Crude oil and NGLs

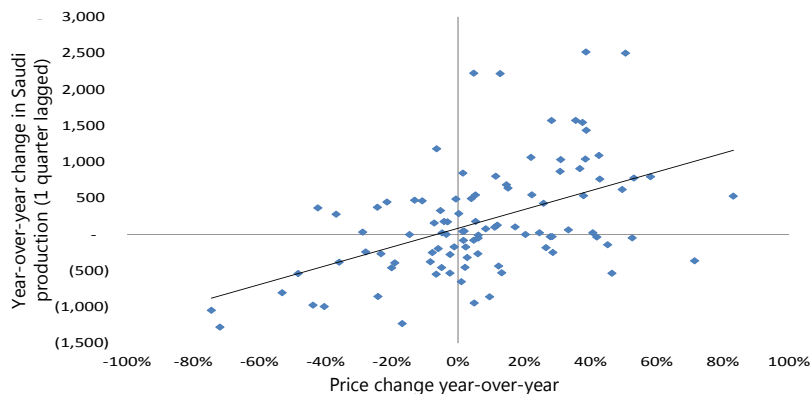


As of 31 January 2019. SOURCE: PIMCO, Bloomberg, IEA. Refer to Appendix for additional outlook and risk information.

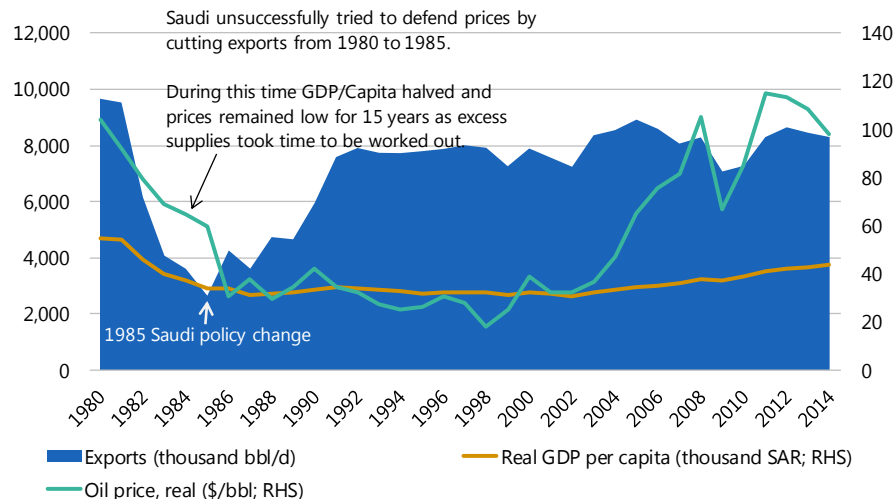
Fearing repeat of the 1980s/90s, Saudi Arabia changed production policy in 2014, forcing adjustment onto other suppliers. 2018 policy U-turn reflects economic reality.

- Over the past 20+ years, changes in Saudi Arabia production generally followed changes in oil prices with a small lag as the Kingdom worked to rebalance markets and reduce volatility.
- However, the growth rate of U.S. supplies and rather slow growth rate of global demand changed the equation and refocused attention on Saudi's failed attempt to support prices in the 1980s and the subsequent decade plus of low prices that resulted.
- While demand reversed course following decision in 2014 to reduce prices, decline in U.S. cost structure and resilience of U.S. producers has forced OPEC to return to the pre-2014 game plan.

Saudi Arabia has generally been responsive to prices (with a few exceptions); 1990 through 1q2014



Lessons of the 1980s drive core-OPEC's decision to stay put on

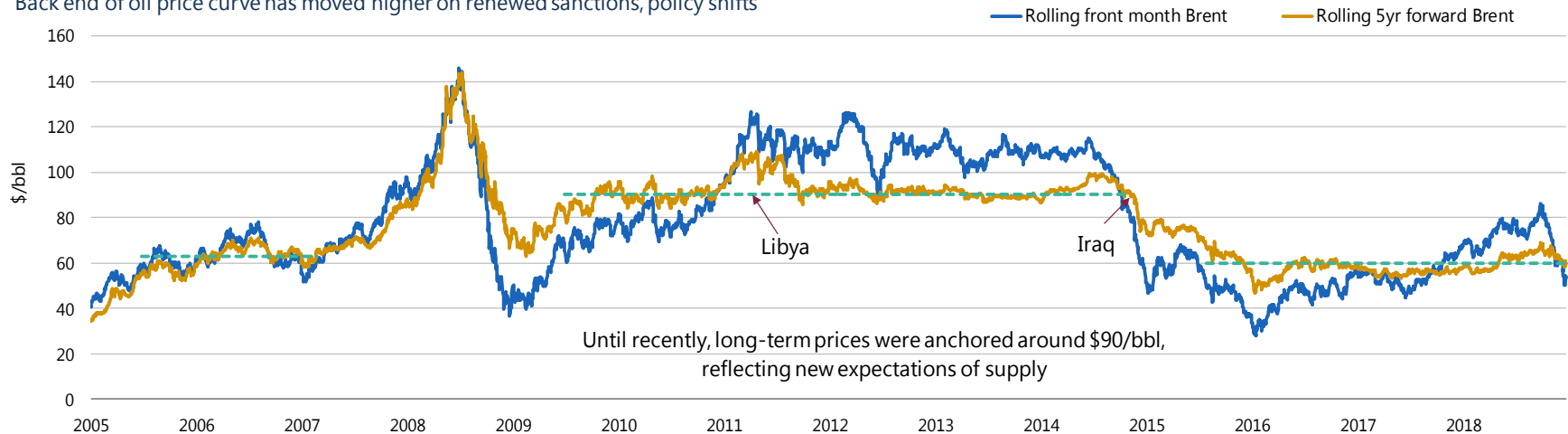


As of 31 March 2015. SOURCE: U.S. Energy Information Administration, Bloomberg
Refer to Appendix for additional outlook information.

Putting it all together: Shale oil is anchoring the back end of the forward curve. Front will move around this pivot point based on local fundamentals.

- Shale oil production has many important market implications:
 - Dampens crude oil price volatility
 - Supports U.S. economic growth and improves U.S. trade balance
 - A world without resource constraints is a good thing for the global economy

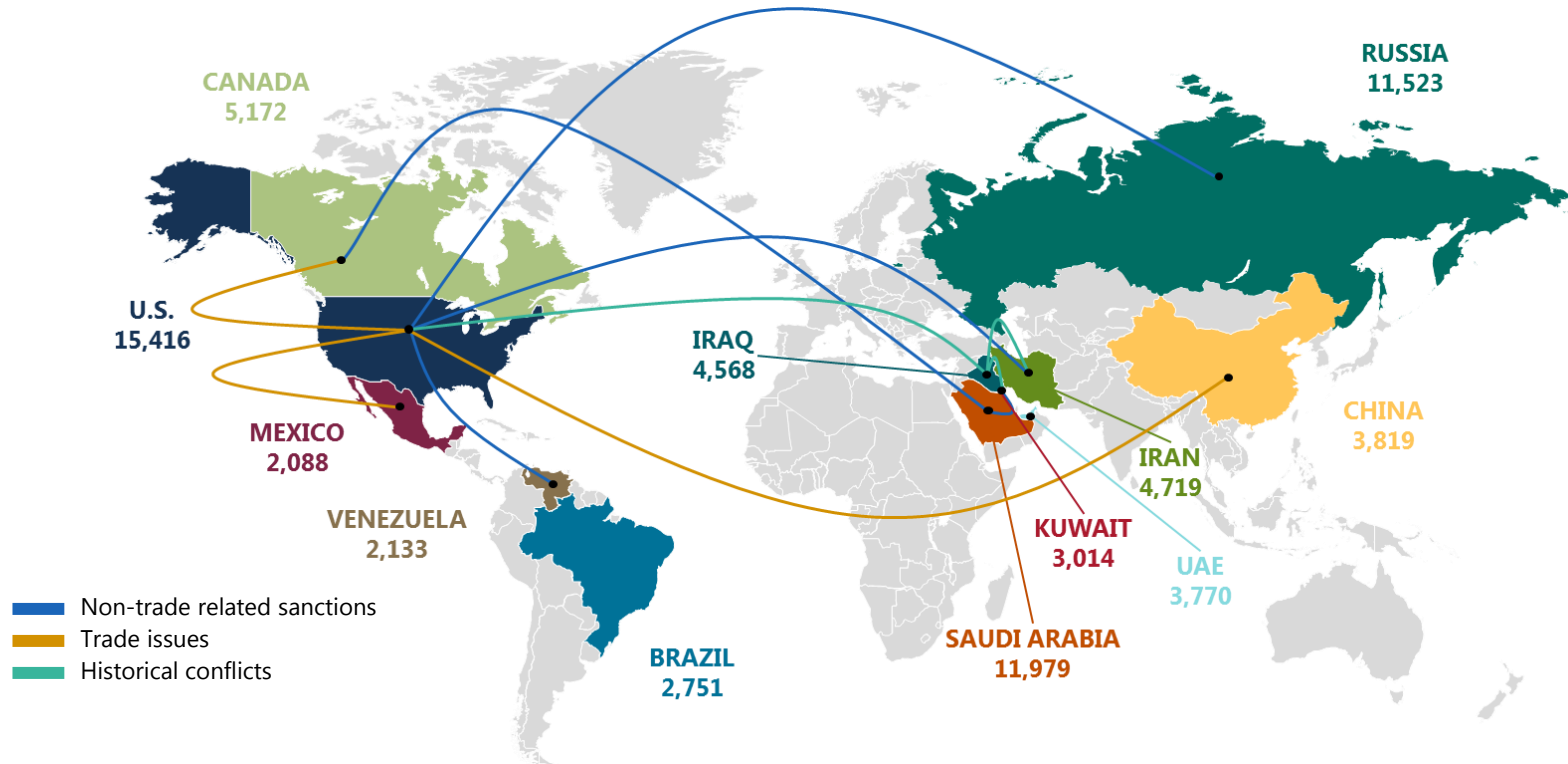
Back end of oil price curve has moved higher on renewed sanctions, policy shifts



As of 31 December 2018. SOURCE: Bloomberg. Refer to Appendix for additional outlook information.

Geopolitical tensions

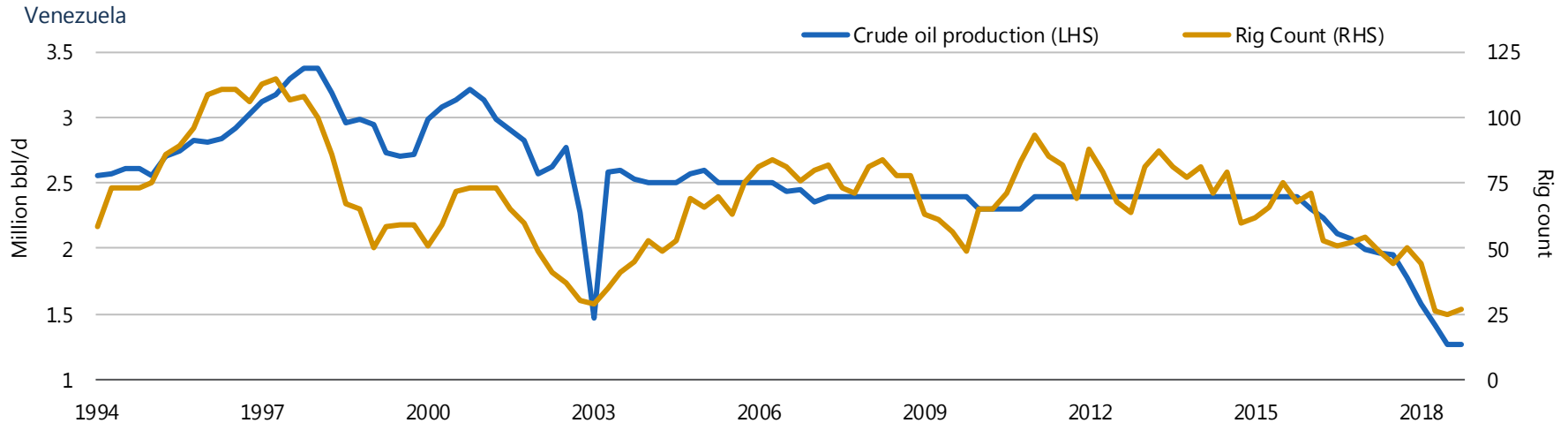
Sanctions, trade issues and conflicts among top petroleum producers



As of 31 December 2018. SOURCE: PIMCO. Production in MBbl/d. Refer to Appendix for additional outlook information.

Venezuela, a case study: From success to failure to... ?

- Accelerating drop in Venezuelan production currently represents a country that was unable to adjust, for a variety of structural reasons, to the fall in oil prices.
- Opportunity to replicate success of the 1990s will require a political transformation and time.
- Until then, Venezuelan output declines support oil market.



As of 31 December 2018. SOURCE: U.S. Energy Information Administration, Baker Hughes. Refer to Appendix for additional outlook information.

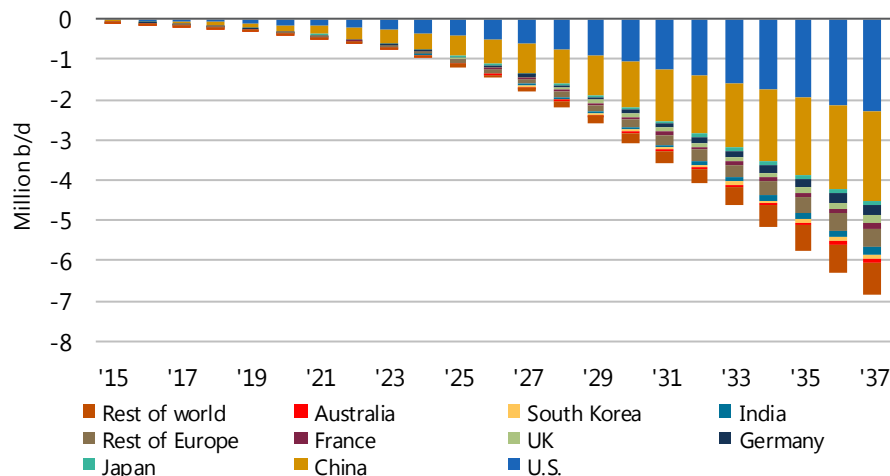
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**Energy transition is coming, but
hydrocarbons will continue to
play important role**

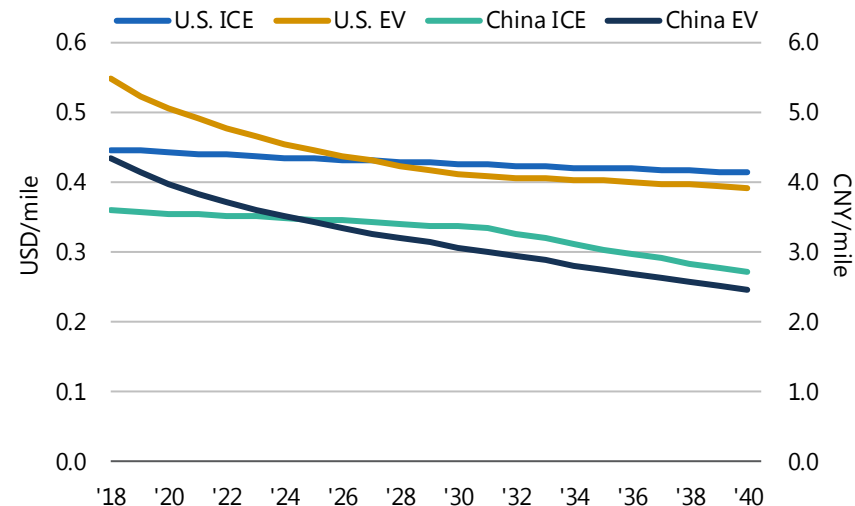
Global sales of EVs (electric vehicles) to accelerate as they achieve cost parity with traditional ICEs (internal combustion engines) over the next decade

- Global electric vehicles are exhibiting strong percentage growth, but from low base. Total oil displaced is only roughly 300 kb/d thus far.
- BNEF estimates potential fuel demand displacement from EVs by 2040 could be up to ~7mmb/d, which is ~6% of total oil demand (assuming 120mmb/d in 2040).
- However, we caution against overweighting reports that are hyper-bearish on oil demand, in part because most surveys assume not only falling costs of batteries, but also rising costs of ICE cars.

Potential fuel demand displacement from EV sales



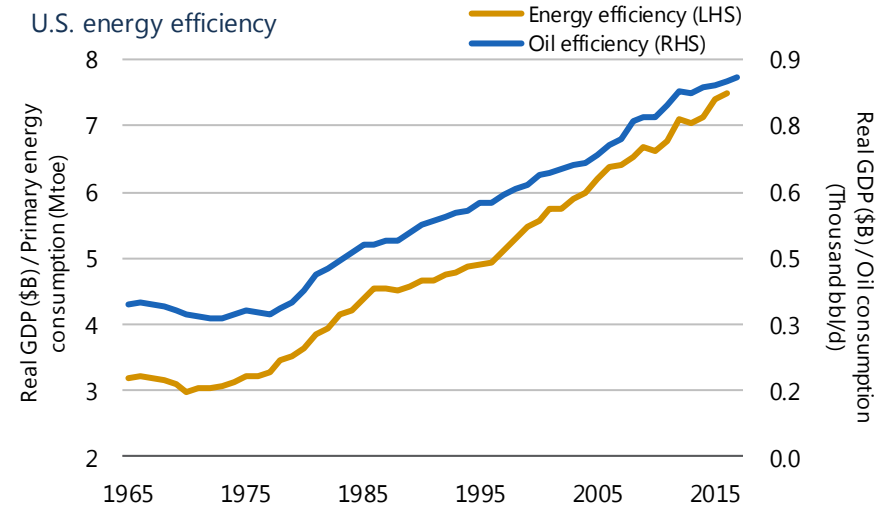
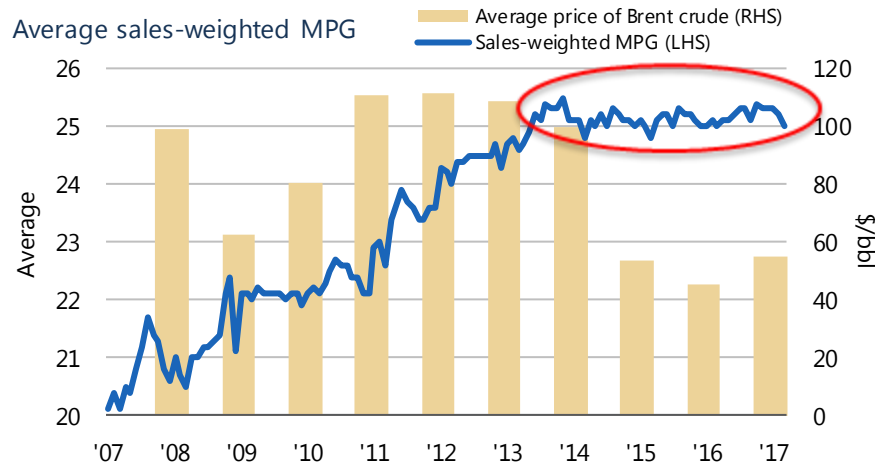
Total cost of ownership



As of 31 December 2018. SOURCE: Bloomberg New Energy Finance. Refer to Appendix for additional outlook information.

Latest vehicle sales data and ever improving fuel efficiency are evidence that forecasts for rapid declines in demand growth should be caveated

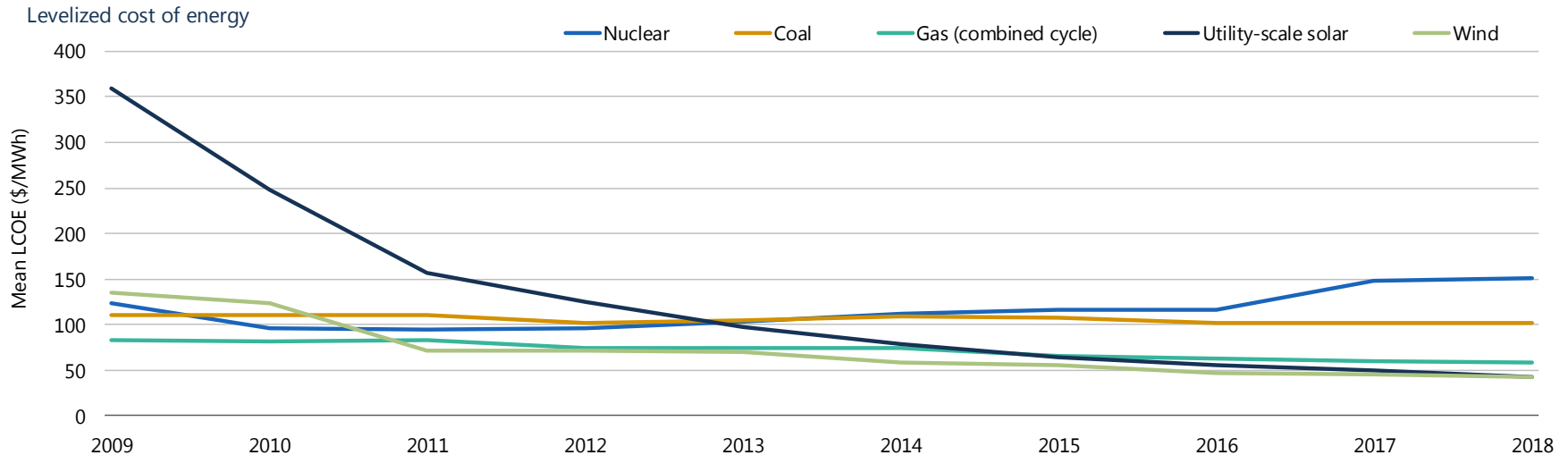
- The precipitous drop in oil prices in 2014 through 2016 dramatically changed the type of vehicles consumers demanded, ending nearly a decade of ever improving average fuel efficiency. This points to the importance of prices in determining vehicle demand and driving patterns.
- Changes to U.S. CAFE standards proposed by the Trump administration will likely help support oil demand in long run. World is currently more committed to efficiency improvements than the U.S.
- It is also worth noting that the economy has been persistently getting more efficient through time. This is nothing new. Key question is how much does the slope of these lines change going forward.



As of 30 June 2018. SOURCE: BP, Bloomberg, University of Michigan. Refer to Appendix for additional outlook information.

Continued cost declines in renewable resources have helped maintain a fast pace of market growth as state support has declined

- Wind has won at auction without any subsidies in Northern Europe. Solar power plants are being built in the Middle East at economics that thermal plants cannot compete with. Wind turbines are being built bigger than ever with more controls to improve efficiencies.
- The growth in renewables is not without challenges, particularly to existing utility models and grid reliability.
- Natural gas is benefitting from efforts to develop a fuel capable of being flexible yet at the same time more environmentally friendly.



As of 30 November 2018. SOURCE: Lazard. Refer to Appendix for additional outlook information.

3.

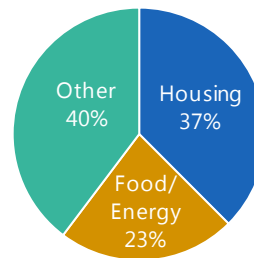
Investment opportunity I:
“Smart” commodity investing

Commodities tend to drive inflation volatility and exhibit a strong beta to changes in inflation

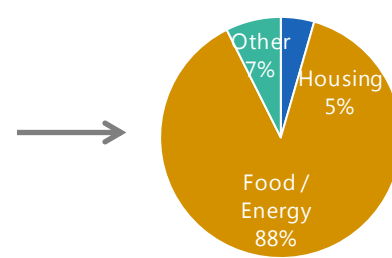
- Food and energy comprise 23% of the CPI basket
- However, they drive the majority of inflation volatility

- Inflation beta is a measure of the responsiveness of an asset's returns to observed changes in inflation
 - For example, one dollar worth of commodity investment has the potential to provide five dollars worth of inflation hedging
- Over extended time periods, commodities tend to exhibit positive inflation betas while traditional assets tend to exhibit negative inflation betas

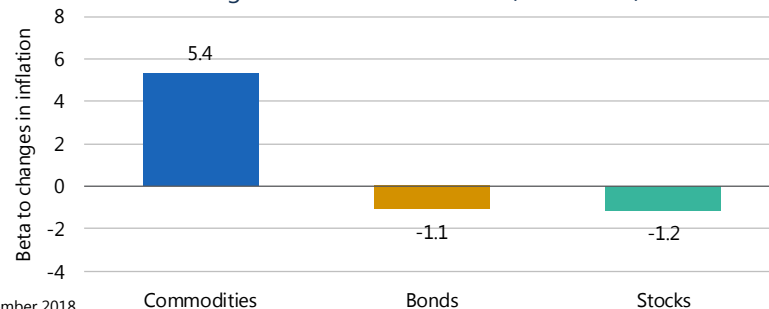
CPI weights (as of 31 Dec '18)



Contribution to CPI volatility



Betas to changes in the rate of inflation (1973-2018)



As of 31 December 2018

SOURCE: Bloomberg, Survey of Professional Forecasters (conducted by Federal Reserve Bank of Philadelphia). PIMCO; March 1973 – September 2018

* From 2001 to 2018

Beta to changes in inflation based on regressions of quarterly rolling annual returns of the asset class vs. changes in the annual rate of inflation (U.S. CPI)

Asset classes represented by: Commodities (Composite Commodity Index model represents a fully-collateralized total return index, whose methodology is based

on Ibbotson's Strategic Asset Allocation and Commodities (2006). The index model is an equally-weighted, monthly rebalanced composite of the following six commodity indexes: S&P

Goldman Sachs Commodity Index Total Return (since 1970), Dow Jones-UBS Commodity Index Total Return (since 1991), Reuters/Jefferies CRB Total Return Index (since 1994), Gorton and

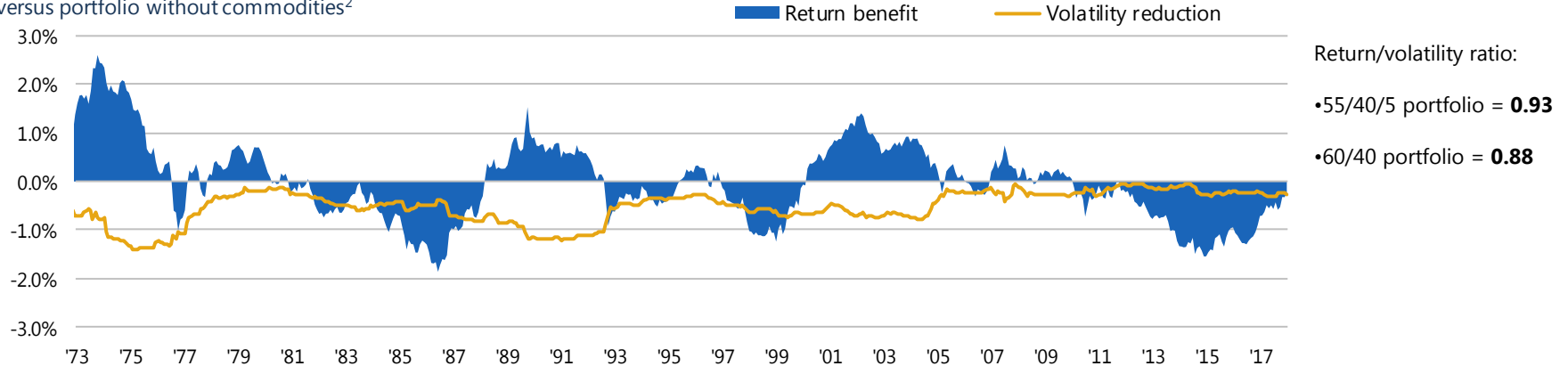
Rouwenhorst Commodity Total Return Index (1959-2007), JPMorgan Commodity Futures Index (1970-2001), and Credit Suisse Commodity Benchmark Total Return Index (since 2001)), Bonds (Barclay's Intermediate Gov't Bond TR), Stocks (S&P500

TR). Refer to Appendix for additional index and risk information.

A commodity allocation may help reduce volatility of the overall portfolio

- Commodity asset class returns tend to go through cycles of positive and negative performance – recent years of commodity returns are not an isolated event, but also not the norm
- The diversification benefit of commodities has been consistent over time

Relative performance of portfolio with commodities¹
versus portfolio without commodities²



As of 31 December 2018. Source: Bloomberg.

¹55/40/5 portfolio is comprised of 55% in MSCI World, 40% in Barclays U.S. Aggregate Index and 5% in a Blended commodity index. Blended Commodity Index is a fully-collateralized total return index, whose methodology is based on Ibbotson's Strategic Asset Allocation and Commodities (2006). The index model is an equally-weighted, monthly rebalanced composite of the following six commodity indexes: S&P Goldman Sachs Commodity Index Total Return (since 1970), Dow Jones-UBS Commodity Index Total Return (since 1991), Reuters/Jefferies CRB Total Return Index (since 1994), Gorton and Rouwenhorst Commodity Total Return Index (1959-2007), JPMorgan Commodity Futures Index (1970-2001), and Credit Suisse Commodity Benchmark Total Return Index (since 2001).

²60/40 portfolio is comprised of 60% in MSCI World and 40% in Barclays U.S. Aggregate Index

Return difference is based on 3-year rolling annualized returns of each portfolio. Volatility difference is based on 3-year rolling volatilities of monthly returns of each portfolio.

Refer to Appendix for additional index, investment strategy and risk information.

Low correlation among sectors makes commodities unique relative to other asset classes

- Recent correlations have declined across individual commodities as the markets have come out of the global financial crisis
 - This is further evidence that supply fundamentals are once again taking over commodity returns, as each commodity is responding to its own idiosyncratic conditions rather than to the effect of aggregate demand on the entire asset class
- Low correlations between commodity sectors stand in stark contrast to generally high sector cross-correlations within other asset classes, including equities, which allows commodities to be a potentially better diversifier within a portfolio context

Rolling 3yr cross correlation between commodity and equity sector returns



As of 31 December 2018. Source: Bloomberg, Standard & Poor's

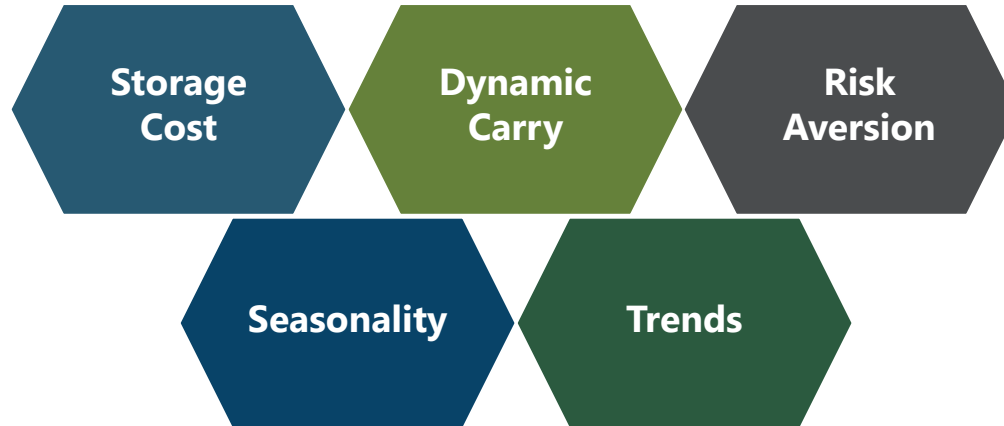
Based on 3-year returns, rolling monthly. Equity sectors represented by the S&P 500 GICS sector sub-indexes. Commodity sectors represented by the S&P GSCI sector sub-indexes

Refer to Appendix for additional correlation, index, investment strategy and risk information.

Building blocks of a factor-based approach to commodity investing

Enhancing commodity beta through five distinct approaches

- Commodity markets offer multiple sources of persistent structural risk premia
- An investment strategy based on these sources of returns may offer a more targeted and thoughtful approach to commodity investing



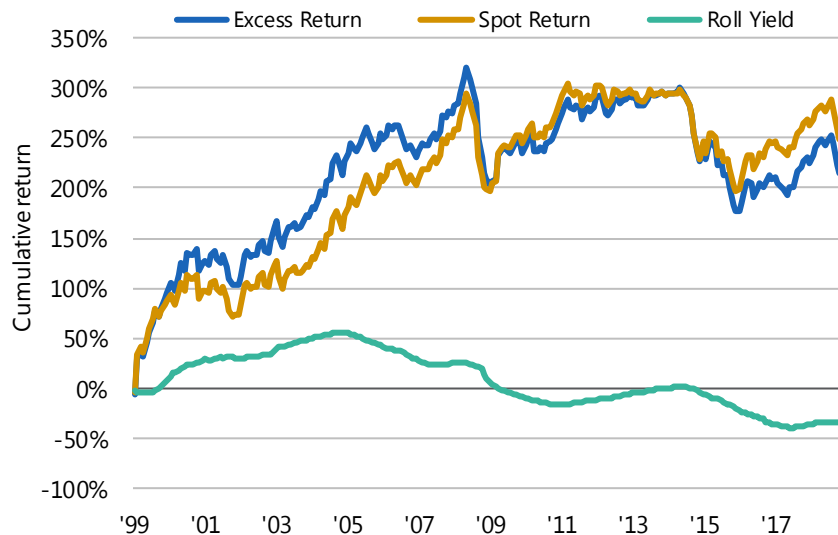
Refer to Appendix for additional investment strategy and risk information.

Building blocks of commodity returns

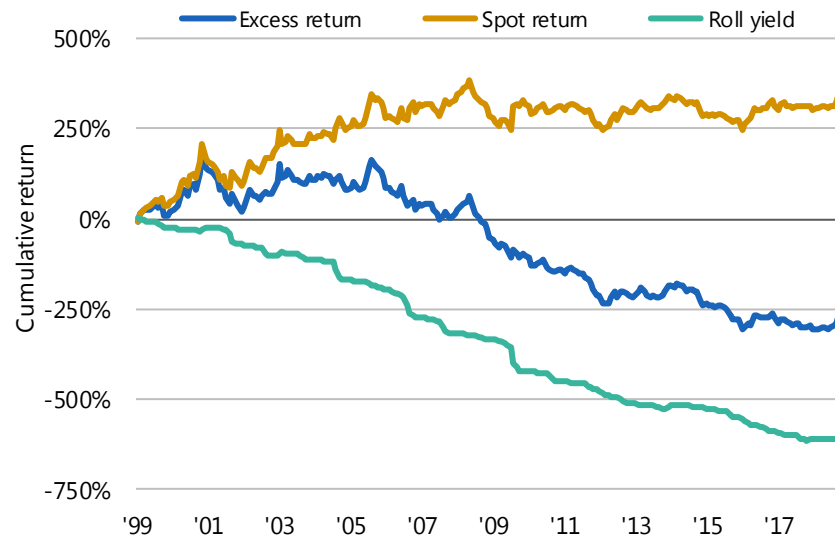
Excess return (i.e. commodity return) = spot price return + roll yield

Total return = excess return + collateral return

Brent crude: Cumulative monthly returns



Natural gas: Cumulative monthly returns



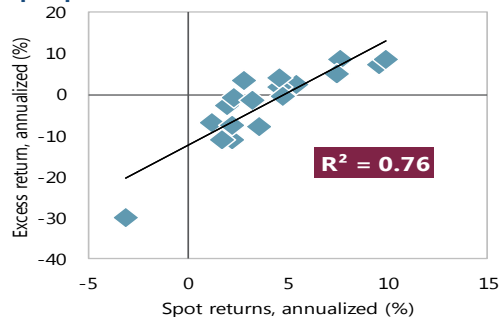
As of 31 December 2018. SOURCE: Bloomberg. **For illustrative purposes only**
Refer to Appendix for additional investment strategy and risk information.

We believe roll yields explain the majority of long-term commodity performance

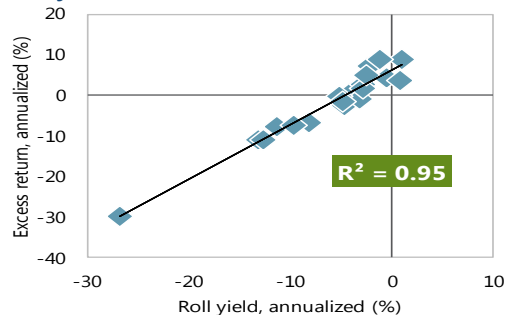
Can roll yield be predicted?

Long term returns, we believe, are better explained by **roll yield**

Spot price vs. returns

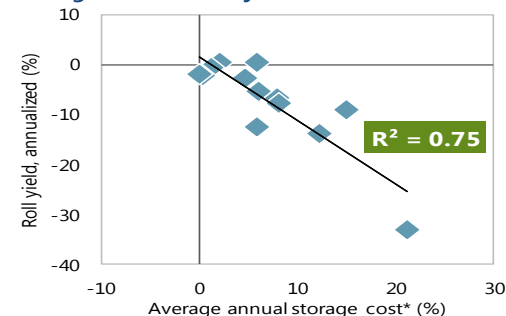


Roll yield vs. returns



Storage costs are the largest explanatory factor of roll yields over long periods of time

Storage costs vs. roll yield



As of 31 December 2018. Returns measured from 1999-2018.

* Storage costs as of 30 June 2018. Storage costs historically have not changed materially over time, and are intended show the relationship between storage costs and roll yield.

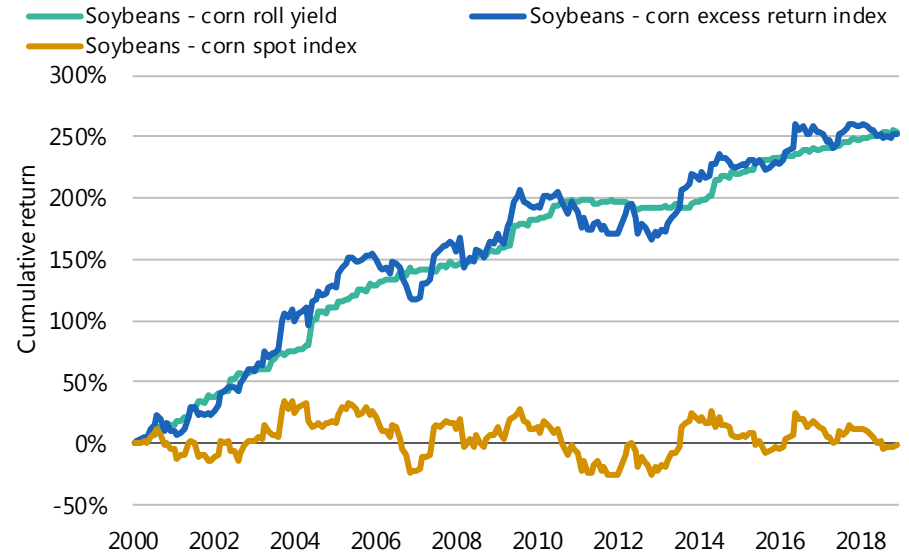
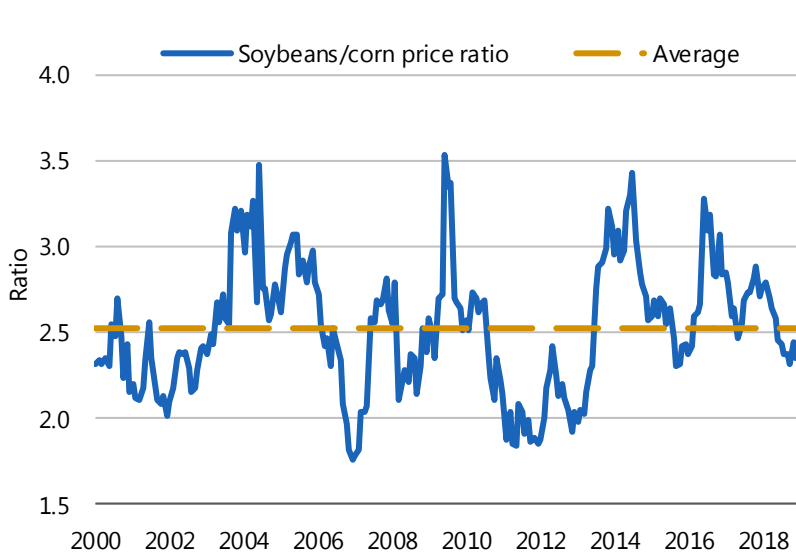
SOURCE: Bloomberg

For illustrative purposes only

Refer to Appendix for additional investment strategy and risk information.

Example in agriculture: Soybeans versus corn

- Relative soybean/corn prices tend to mean revert over time as farmers can alternate crops depending on the relative profit of growing each one
- However, soybeans historically outperformed due to better roll yield relative to corn, which is driven by lower storage costs

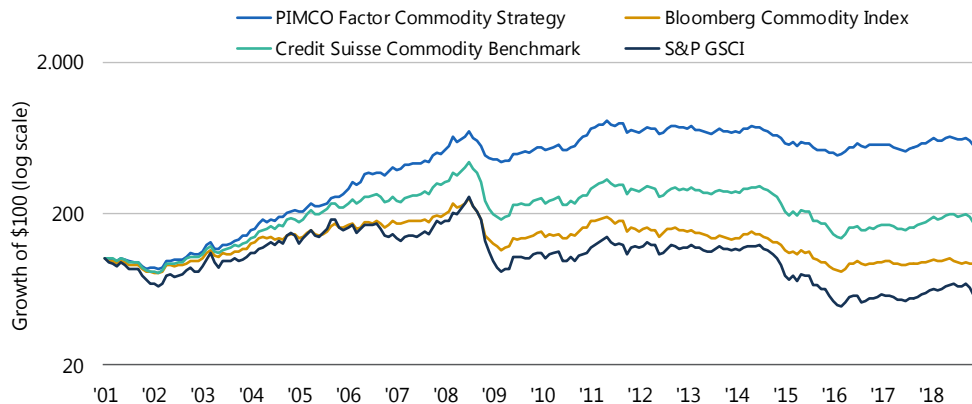


As of 31 December 2018. SOURCE: PIMCO, Bloomberg
For illustrative purposes only
Refer to Appendix for additional investment strategy and risk information.

PIMCO Factor Commodity Strategy*

Putting it all together

- The five “factor-based” strategies – Low Storage Cost, Dynamic Carry, Trends, Risk Aversion, and Seasonality – all take advantage of structural features of the commodity market
- Combining these largely uncorrelated components into a blended portfolio that seeks to deliver commodity beta with improved expected returns



	PIMCO Factor Commodity Strategy*	Bloomberg Commodity Index
Annualized return	9.8%	-0.8%
Annualized volatility	15.3%	15.9%
Sharpe ratio	0.55	-0.14
Inflation beta	5.17	5.60
Correlation to equities	0.32	0.38
Correlation to bonds	0.02	0.04
Correlation to BCOM	0.92	--
Tracking error to BCOM	6.6%	--

As of 31 December 2018

Hypothetical example for illustrative purposes only. Past performance is not a guarantee or reliable indicator of future results

Volatility measured by standardized deviation of annual returns

* PIMCO Factor Commodity Strategy is an alternative commodities strategy that allocates equal exposure to Low Storage Cost, Dynamic Carry, Trends, Risk Aversion and Seasonality components. Performance for PIMCO Factor Commodity Strategy is hypothetical back test results. Returns for the PIMCO Factor Commodity Strategy are total returns reported on a before fee basis.

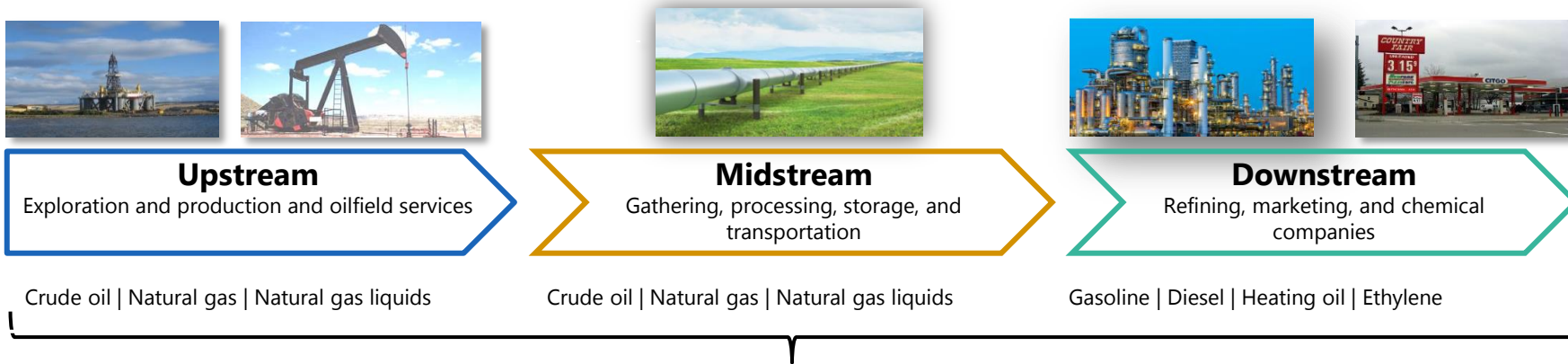
Refer to Appendix for additional chart, correlation, hypothetical example, index, investment strategy, model and risk information

3.

Investment opportunity II:
Investing in the midstream sector.
Capitalizing on North American
energy renaissance

Introduction to midstream companies and where they fit in the energy value chain

- Midstream firms are publicly traded U.S. infrastructure assets operating essential energy toll roads. They earn steady, recurring, fee-based cash flows with less direct commodity price exposure relative to the upstream sector.
- Within midstream, MLPs are “pass-through entities” that are not subject to U.S. income taxes.



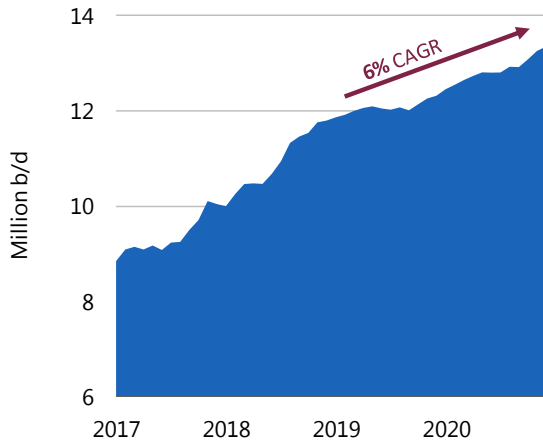
- Commodity prices affect outcomes along the whole value chain, highlighting the need of an integrated investment process

SOURCE: PIMCO
PIMCO does not provide legal or tax advice. Please consult your tax and/or legal counsel for specific tax or legal questions and concerns.
Refer to Appendix for additional investment strategy, issuer, risk and tax information.

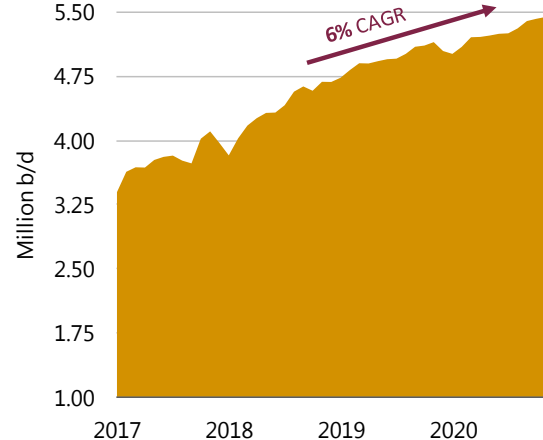
Potentially bright outlook for energy growth on the horizon

- Midstream fundamentals are more exposed to overall U.S. production levels than to commodity prices
- Contrary to the declining volume trends that the sector experienced in 2015 and 2016, we believe the production outlook now looks favorable for the next several years
 - **Resiliency:** Decline in U.S. cost structure
 - **Growth:** U.S. becomes a leading exporter of many products
- Midstream may start to experience positive operating leverage from increased asset utilization in 2019 and beyond

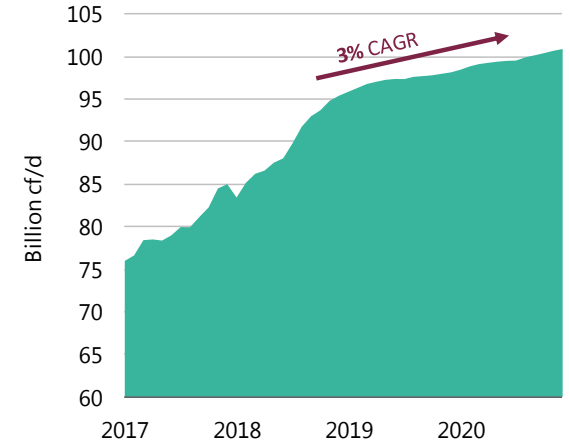
U.S. crude production



U.S. NGL production

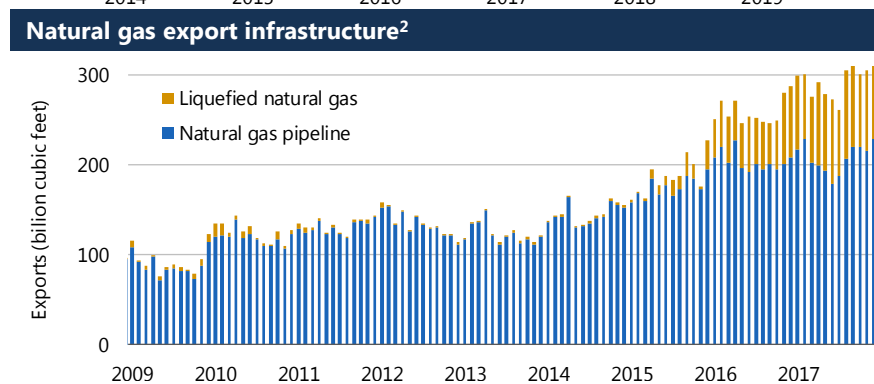
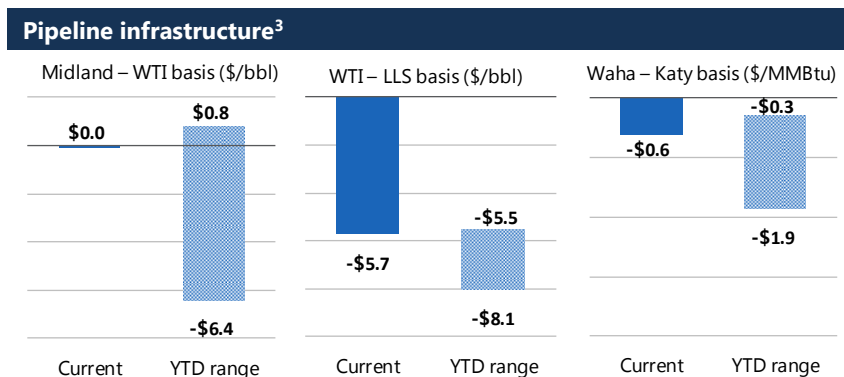
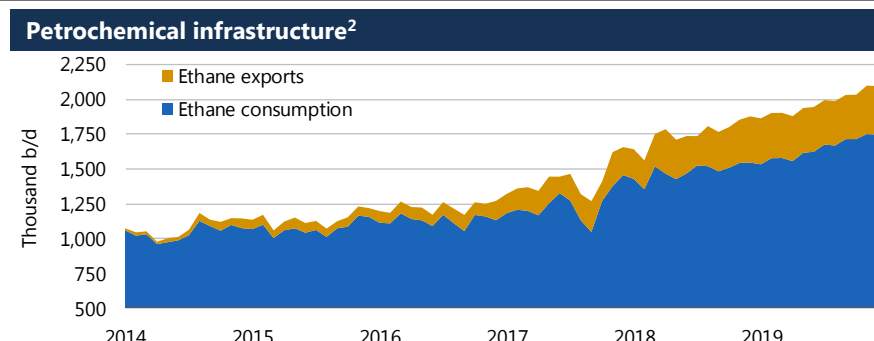
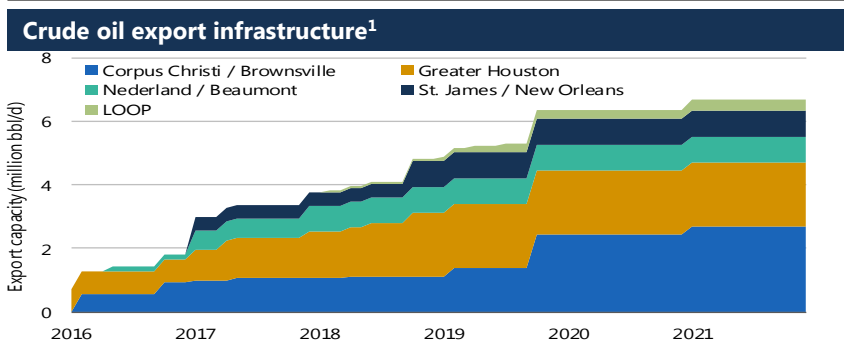


U.S. natural gas production



As of 31 January 2019. SOURCE: EIA. Refer to Appendix for additional investment strategy, outlook and risk information.

Secular themes underpinning need for investments in energy infrastructure

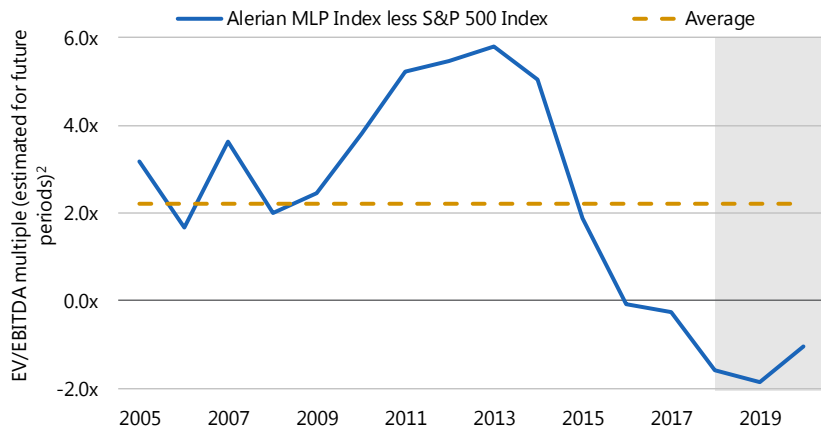


As of 31 January 2019. SOURCE: ¹ S&P Platts as of 9 August 2018; ² U.S. Energy Information Administration as of 31 January 2019; ³ Bloomberg; \$/bbl: U.S. dollars per barrel; Bbl/d: Barrels per day; \$/MMBtu: U.S. dollar per million British Thermal Units; Midland – WTI basis: Price difference between Midland and WTI oil; WTI – LLS basis: Price difference between WTI and LLS oil; Waha – Katy differential: Price difference between Waha Hub and Katy Hub natural gas. Refer to Appendix for additional investment strategy, outlook and risk information.

We believe the U.S. energy revolution is a sustainable investment opportunity...*But the entry point matters*

Excess growth opportunities may lead to excess returns...

However, be mindful of valuations



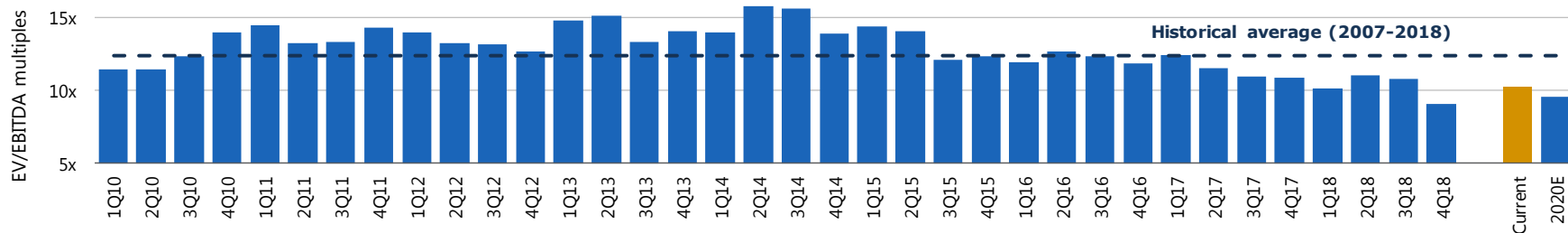
We believe the long-term investment thesis is supported by much improved fundamentals

	2014	Current	
VALUATION			
Enterprise value-to-EBITDA ¹	15.5x	10.0x	✓
EARNINGS QUALITY			
Fee-based cash flows ¹	80%	90%	✓
DISTRIBUTION SUSTAINABILITY			
Coverage ratio ⁺	1.1x	1.3x	✓
LEVERAGE			
Debt-to-EBITDA ²	5.6x	4.6x	✓

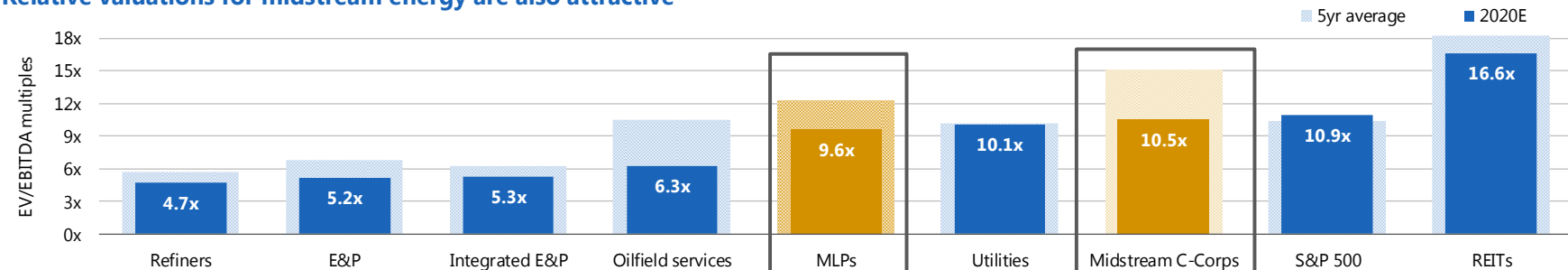
SOURCE: ¹ Goldman Sachs as of 14 December 2018; ² Citi as of 30 November 2018
Past performance is not a guarantee or a reliable indicator of future results.
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Midstream energy appears cheap in a fair to rich world

Absolute valuations (EV/EBITDA and P/DCF) remain attractive



Relative valuations for midstream energy are also attractive



As of 31 January 2019. SOURCE: Wells Fargo

For illustrative purposes only. Past performance is not a guarantee or reliable indicator of future results

The terms "cheap" and "rich" as used herein generally refer to a security or asset class that is deemed to be substantially under- or overpriced compared to both its historical average as well as to the investment manager's future expectations. There is no guarantee of future results or that a security's valuation will ensure a profit or protect against a loss.

Refer to Appendix for additional forecast, outlook and risk information.

Appendix

PERFORMANCE AND FEES

Past performance is not a guarantee or a reliable indicator of future results. Model performance figures do not reflect the deduction of investment advisory fees (for Pacific Investment Management Company LLC described in Part 2 of its Form ADV). Such fees that a client may incur in the management of their investment advisory account may reduce the client's return. For example, over a five-year period, annual advisory fees of 0.425% would reduce compounding at 10% annually from 61.05% before fees to 57.96% after fees. Separate account clients may elect to include PIMCO sector funds in their portfolio; sector funds may be subject to additional terms and fees. For a copy of net of fees performance, unless included otherwise, please contact your PIMCO representative.

Past performance is not a guarantee or a reliable indicator of future results.

CHART

Charts are provided for illustrative purposes and are not indicative of the past or future performance of any PIMCO product.

HYPOTHETICAL EXAMPLE

Hypothetical and simulated examples have many inherent limitations and are generally prepared with the benefit of hindsight. There are frequently sharp differences between simulated results and the actual results. There are numerous factors related to the markets in general or the implementation of any specific investment strategy, which cannot be fully accounted for in the preparation of simulated results and all of which can adversely affect actual results. No guarantee is being made that the stated results will be achieved.

INVESTMENT STRATEGY

There is no guarantee that these investment strategies will work under all market conditions or are suitable for all investors and each investor should evaluate their ability to invest long-term, especially during periods of downturn in the market. No representation is being made that any account, product, or strategy will or is likely to achieve profits, losses, or results similar to those shown.

MODEL

PIMCO Factory Commodity Strategy: The model portfolio allocates equal exposure to the following components: Low Storage Cost strategy, Dynamic Carry strategy, Trends strategy, Risk Aversion strategy, and Seasonality strategy. It does not represent the portfolio characteristics or performance of an actual account. The model portfolio was created in April 2016. Security selection is based on PIMCO proprietary research and is created with the benefit of hindsight. The model portfolio does not represent actual trading and does not reflect the impact that economic and market factors might have on management of the portfolio. The model is actively managed and may vary between reporting periods. Results include reinvestment of dividends and other earnings. Fees were not taken into account and thus, performance would be lower if applied. No guarantee is being made that the securities selected would be available for purchase or that the structure or actual account holdings of any portfolio will be the same or that similar returns will be achieved. References to specific securities and their issuers are for illustrative purposes only and are not intended to be, and should not be interpreted as, a recommendation to purchase or sell such securities.

OUTLOOK

Statements concerning financial market trends or portfolio strategies are based on current market conditions, which will fluctuate. There is no guarantee that these investment strategies will work under all market conditions or are suitable for all investors and each investor should evaluate their ability to invest for the long term, especially during periods of downturn in the market. Outlook and strategies are subject to change without notice.

PORTFOLIO STRUCTURE

The portfolio structure is a representation of a sample portfolio and no guarantee is being made that the structure of the portfolio will remain the same or that similar returns will be achieved.

Appendix

RISK

All investments contain risk and may lose value. **Commodities** contain heightened risk, including market, political, regulatory and natural conditions, and may not be suitable for all investors. **Derivatives and commodity-linked derivatives** may involve certain costs and risks, such as liquidity, interest rate, market, credit, management and the risk that a position could not be closed when most advantageous. Commodity-linked derivative instruments may involve additional costs and risks such as changes in commodity index volatility or factors affecting a particular industry or commodity, such as drought, floods, weather, livestock disease, embargoes, tariffs and international economic, political and regulatory developments. Investing in derivatives could lose more than the amount invested.

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STRATEGY AVAILABILITY

Strategy availability may be limited to certain investment vehicles; not all investment vehicles may be available to all investors. Please contact your PIMCO representative for more information.

INDEX DESCRIPTIONS

The Bloomberg Commodity Total Return Index is an unmanaged index composed of futures contracts on 20 physical commodities. The index is designed to be a highly liquid and diversified benchmark for commodities as an asset class. Prior to 30 June 2014, this index was known as the Dow Jones UBS Commodity Total Return Index.

The Dow Jones UBS Commodity Total Return Index is an unmanaged index composed of futures contracts on 19 physical commodities. The index is designed to be a highly liquid and diversified benchmark for commodities as an asset class. Prior to May 7 2009, this index was known as the Dow Jones AIG Commodity Total Return Index.

The S&P 500 Index is an unmanaged market index generally considered representative of the stock market as a whole. The index focuses on the Large-Cap segment of the U.S. equities market.

The S&P Goldman Sachs Commodity Index (S&P GSCI) is a composite index of commodity sector returns, representing an unleveraged, long-only investment in commodity futures that is broadly diversified across the spectrum of commodities. Inception Date: 31 December 1969

Barclays U.S. Aggregate Index represents securities that are SEC-registered, taxable, and dollar denominated. The index covers the U.S. investment grade fixed rate bond market, with index components for government and corporate securities, mortgage pass-through securities, and asset-backed securities. These major sectors are subdivided into more specific indices that are calculated and reported on a regular basis.

The Credit Suisse Commodity Benchmark Index is an unmanaged index composed of futures contracts on 30 physical commodities. The objective of the benchmark is to gain exposure to the broad commodity universe while maintaining sufficient liquidity. Commodities were chosen based on world production levels, sufficient open interest, and volume of trading. The index is designed to be a highly liquid and diversified benchmark for commodities as an asset class.

The MSCI World Index is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets. Since June 2007 the MSCI World Index consisted of the following 23 developed market country indices: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The index represents the unhedged performance of the constituent stocks, in U.S. dollars.

Appendix

INDEX DESCRIPTIONS (cont'd)

The Reuters/Jefferies CRB Total Return Index is designed to provide timely and accurate representation of a long-only, broadly diversified investment in commodities through a transparent and disciplined calculation methodology.

The Gorton & Rouwenhorst Commodity Total Return Index represents an equally-weighted, monthly rebalanced index of 31 commodity futures.

The JPMorgan Commodity Futures Index tracks 33 different U.S. dollar-denominated publicly exchange-traded physical commodities. The commodity must have a minimum estimated market size of \$250 million. Commodities are weighed by open interest, with the index holding exposure along the entire futures curve in proportion to open interest.

The Bloomberg Barclays Intermediate Government Bond TR Index is comprised of the US Treasury and US Agency Indices. The index includes US dollar-denominated, fixed-rate, nominal US Treasuries and US agency debentures.

It is not possible to invest directly in an unmanaged index.

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