

3 Unstoppable trends

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Private Bank



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3.1 What makes a trend unstoppable and why you should care

STEVEN WIETING, CHIEF INVESTMENT STRATEGIST AND CHIEF ECONOMIST

Unstoppable trends are transforming how we live and do business, creating long-term opportunities for your portfolio. We highlight three more of these trends, while reemphasizing those we identified last year.

KEY MESSAGES

- Unstoppable trends are powerful multi-year forces that are shaping the world around us
- We have identified trends that are investible, allowing portfolios potentially to benefit for years to come
- Our latest unstoppable trends are cybersecurity, fintech, and the future of energy
- We reiterate the importance of the rise of Asia, increasing longevity, and digital disruption

Powerful long-term forces are revolutionizing the ways in which we live and do business globally. These forces have implications for almost every industry, and they represent fundamental challenges to the status quo. They include technological advances, demographic developments and new behaviors. Many of them have been building up gradually for many years, but are now at a tipping point and are likely to gather momentum. As well as shaping our everyday lives and transforming the economy, they have major implications for investors' portfolios. We call these forces 'unstoppable trends.'

In **Outlook 2019** – published last December – we identified three unstoppable trends. **The rise of Asia** addressed the steady shift in global economic power from west to east, driven by the region's urbanization, growth of the middle class, and advancements in homegrown technologies. **Increasing longevity** explored how the aging of the world's population will impact future growth and consumption patterns. **Digital disruption** looked at how digital innovation is revolutionizing companies and industries, shaking up long established ways of doing business. Not only will we explain how they have performed over the last year, but also why we believe they will be sustained for the long term.

By their very nature, unstoppable trends are multi-year phenomena. Because they are both long-term and powerful, these trends can endure through an economic cycle. For this reason, we believe that having long-term portfolio exposure to the likely beneficiaries of unstoppable trends may offer resilient growth potential. In the same way, we stress the importance of avoiding excessive portfolio exposure to businesses and sectors most likely to be impacted negatively by unstoppable trends.

For 2020, we present three additional unstoppable trends:

Cybersecurity: Safeguarding the data revolution sets out the pressing need to protect the rapidly growing amount of digital information that people and companies are creating all the time.

Fintech: Disrupting financial services examines how technological innovators are breaking into the mainstream of an industry that has traditionally been insulated from new competition.

The future of energy highlights how we expect advancing technologies to drive global adoption of alternative energy while fossil fuels gradually fade into their twilight.

Getting appropriate investment exposure to these wide-ranging trends presents more of a challenge to investors than identifying the trends themselves. For each of them, therefore, we identify areas that we find attractive. These span a variety of public and private asset classes globally, and from straightforward to sophisticated strategies. Overall, we believe that a selective approach offers the most effective way of targeting our favored areas. In the section that follows, we explain why we think you ought to have exposure to them.

Reiterating our unstoppable trends

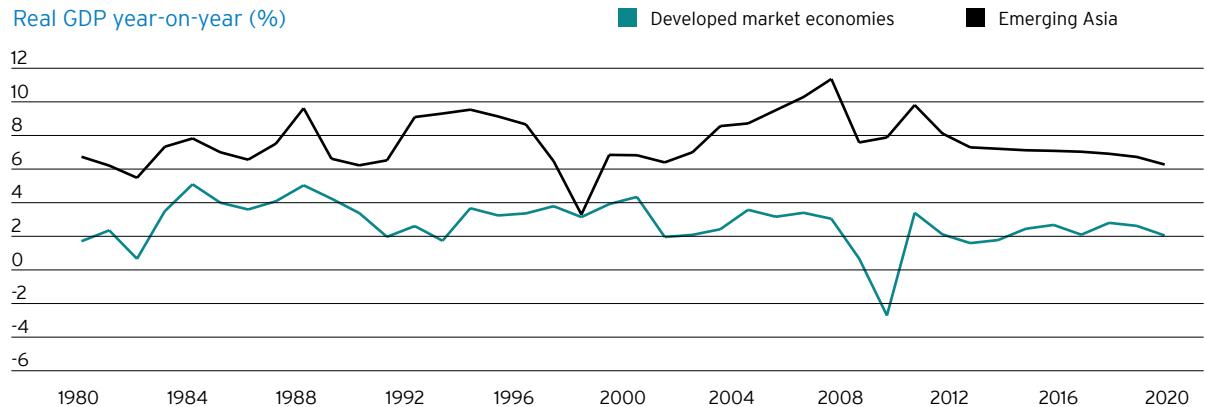
Just as our unstoppable trends are multi-year phenomena, we see them as long-term investment propositions. That said, however, they can also naturally make a near-term contribution, as they did in 2019. **Figure 1** shows how various indices and groups of equities linked to the unstoppable trends highlighted last year have since performed.

FIGURE 1. HOW OUR UNSTOPPABLE TRENDS DID IN 2019

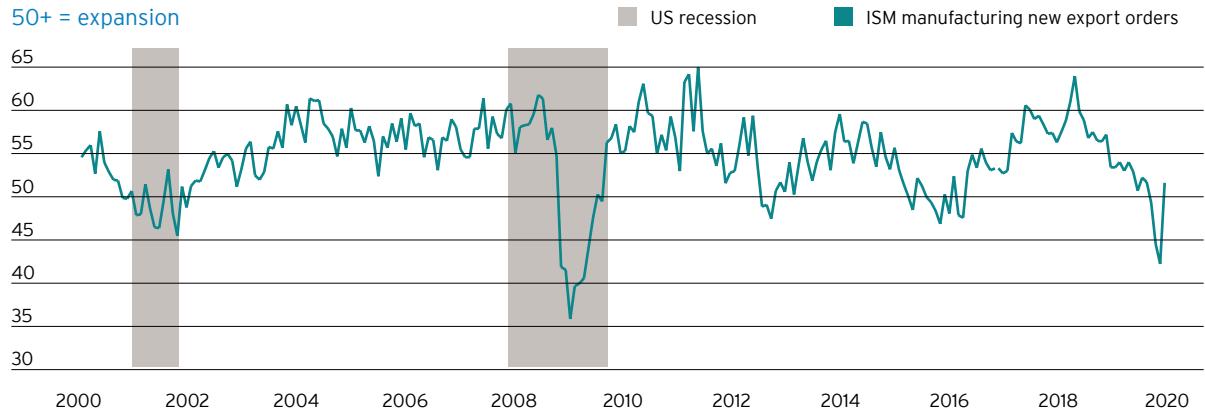
Rise of Asia	China CSI 300: +29.3%, MSCI EM Asia: +13.9%, S&P 500: +25.0%
Increasing longevity	MSCI Global Healthcare: +14.5%
Digital disruption	FAANG equities +(10 leading IT firms ¹): +26.1%

Past performance is no guarantee of future returns. Real results may vary. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only. This is neither a recommendation to buy nor sell equities of the companies mentioned. See Glossary for Index definitions.

¹ Equal weighted-members: E-Commerce: Amazon, Alibaba, Social Media: Facebook, Twitter, Search: Google, Baidu, Content: Netflix, Equipment: Apple, NVIDIA, Tesla

FIGURE 2. EM ASIA'S FASTER GROWTH

Source: Haver as of 20 Nov 2019.

FIGURE 3. TRADE GROWTH WITHIN ASIA BOUNCES BACK

Source: Haver as of 20 Nov 2019

The rise of Asia

When reflecting upon 2019, the US-led trade war and the political struggle in Hong Kong will inevitably come first to investors' minds. But these challenges did not prevent this bloc of 3.7bn people from experiencing real GDP growth in excess of 6% in 2019 – **figure 2**. As we highlighted last year, EM Asia's combination of high savings and investment growth and a rising population is unmatched by any other region.

Inequality within and between countries presents a challenge for the region's stability, just as it does in all others. However, fast rising incomes and technological development remain lasting drivers of underlying growth. This is apparent in the region's growth data, even as regional trade with the US saw its biggest drop since 2009 – **figure 3**. Growth of the emerging Asian middle class consumer remains a powerful opportunity for global firms.

A pressure point in US-China relations is the rising potential for Chinese firms to dominate the rollout of communications technology and standards, particularly 5G - see **Digital disruption and The challenges of de-globalization and populism**. Huawei and ZTE were among the leaders in filing and procuring US patents for such technology just before US steps to place limitations on these firms.² The US did so on various grounds, including broad issues of national security, and corporate interactions with Iran.

While Hong Kong's equity market rose marginally in 2019, it has underperformed that of mainland China by 25% since protests began in May 2019. This highlights why international investors need both exposure to and diversification within the region, including to the rest of Greater China, India, the ASEAN countries³ and others. Accounting for nearly half the world's population and more than a third of global GDP already, the region makes up less than one-fifth of the equity market capitalization of the US within global equity benchmarks. This low share is a result of both international investors' lack of exposure to the region's firms and their lower valuations.

Skepticism over the rise of Asia persists, as reflected in widespread underweighting of the region worldwide. We see potential Asian opportunities both near term and further out - see Regional asset class previews: Asia.

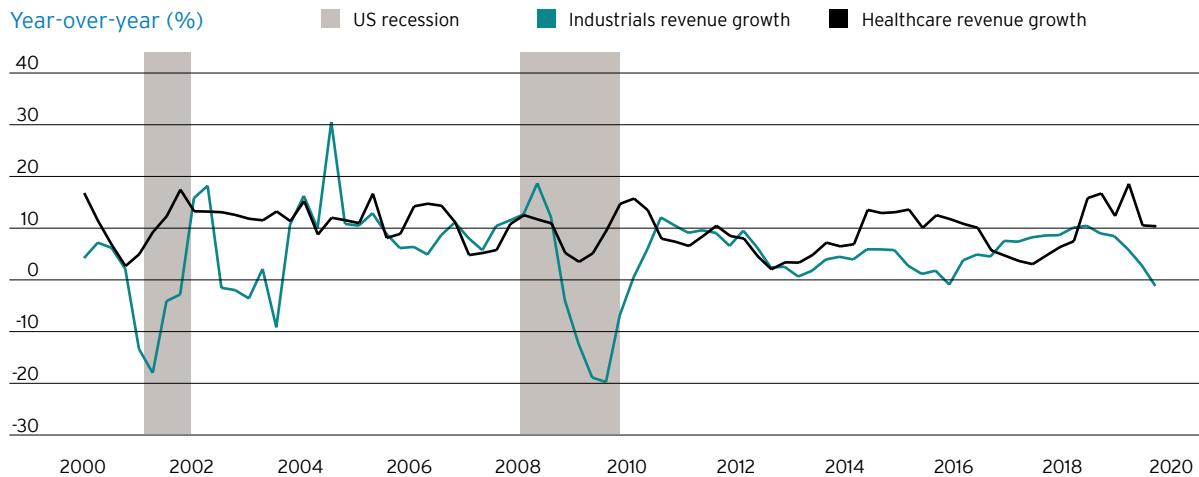
Increasing longevity

The waxing and waning of political concerns continue to dominate the healthcare sector's short-term relative performance. In the US, the healthcare sector outperformed by 10.9% during 2018's market decline. But during 2019's broad rebound, it has lagged behind the S&P 500 by 15%. Globally, where we have a greater preference for healthcare shares, the sector has lagged behind by a smaller 6.6% this year as confidence in cyclical industries bounced back.

We prefer strategies focusing on healthcare technology and under-penetrated emerging markets. Nonetheless, even in the US, we see the healthcare sector providing more stable, consistent growth than cyclical industries - **figure 4** - but without having higher valuations. This growth is underpinned partly by a growing older population that is increasing spending on what are considered medical necessities. As **figure 5** shows, the sector also provided greater immediate income than the more highly valued utility sector and is expected to continue doing so going forward - see also **The future of energy**.

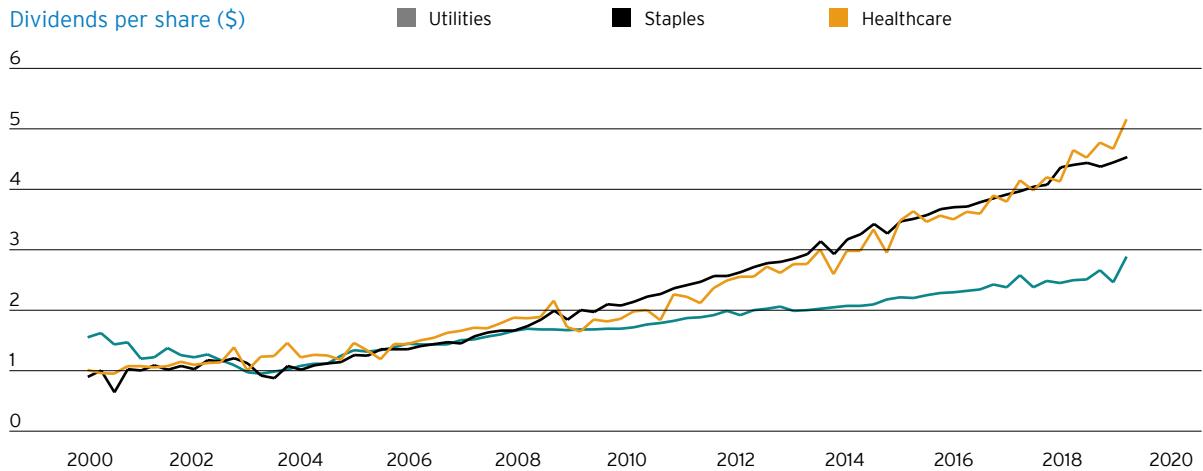
We reiterate the case for selective healthcare exposure based on the unstoppable trend of increasing longevity. The sector's current income potential adds to its overall appeal.

FIGURE 4. S&P INDUSTRIALS VS HEALTHCARE



Source: Haver Analytics, as of Nov 2019. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary.

FIGURE 5. DIVIDEND PAYMENTS: S&P HEALTHCARE, STAPLES, UTILITIES



Source: Haver Analytics through 11 Nov 2019. Chart shows S&P Healthcare, Staples, Utilities. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary.

Digital disruption

The internet connectivity revolution has many drivers, but the proliferation of connected devices and ever faster data transfer over networks have been critical. We believe the pace of digital connectivity may be about to accelerate once more, this time thanks to the deployment of 5G wireless networks.

Fifth generation (5G) wireless networks are expected to enter service in 2020 and become widespread over the next five years. 5G networks could be a hundred times faster, substantially more reliable, consume less energy, and have much greater capacity than today's 4G LTE and 3G networks. As such, many of our existing digital activities could become speedier and more valuable. Clearer voice calls, faster searches, and smoother streaming are the most obvious. But the real potential of 5G lies in enabling functions that are either difficult or impossible with existing networks.

The 5G combination of high speed and low downtime should allow many more industrial, urban, and household functions to be reliably connected and automated. These include self-driving vehicles, almost entirely automated factories where thousands of machines and processes communicate wirelessly with each other, and surgery performed on humans by a robot controlled by a surgeon from a remote location.

A race is taking place to see who will provide the winning 5G standards, or perhaps there will be two standards, one for the 'East' and one for the 'West.' Whichever the case, the real winners will likely be the best application providers for consumer and business broadband content.

As well as artificial intelligence, blockchain, and robotics, we are attracted to 5G exposure on a multi-year horizon.

2 This is neither a recommendation to buy nor sell equities of the companies mentioned.

3 Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Laos, Myanmar, Cambodia and Vietnam.

3.2 Cybersecurity: Safeguarding the data revolution

WIETSE NIJENHUIS, GLOBAL HEAD OF EQUITY STRATEGY

With the digital revolution set to intensify, protecting data from cybercriminals is critical and becoming more so.

KEY MESSAGES

- Breaches of data can do enormous practical, financial, and reputational harm, with losses to business of \$1.5tn in 2019
- We have high confidence that data security spending will remain high and accelerate
- We favor companies that are exposed to endpoint and cloud security



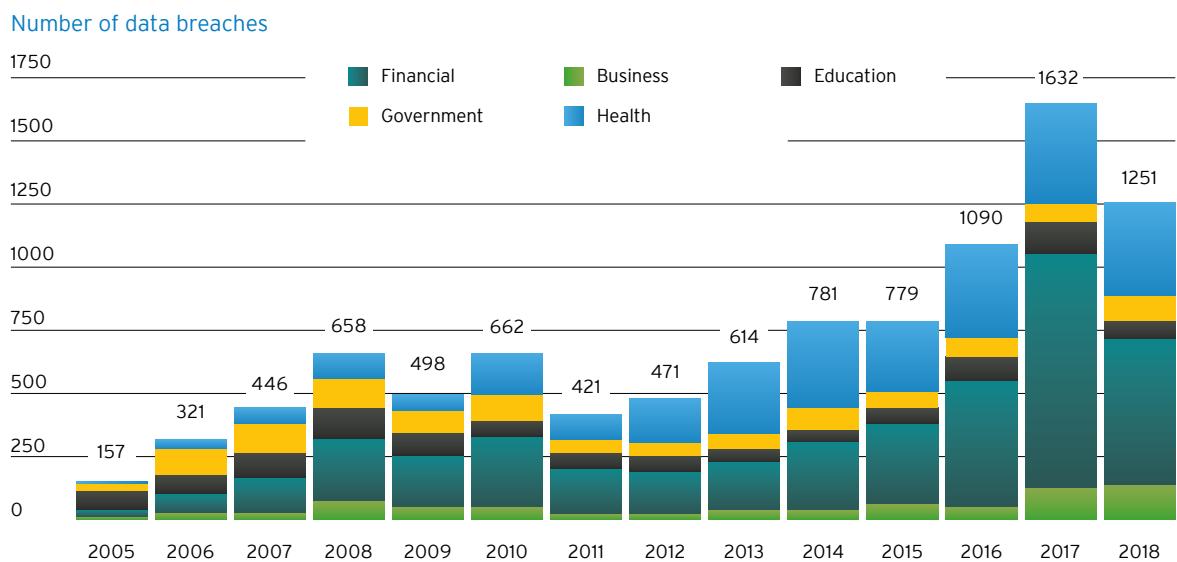
We are living through a data revolution. A rapidly growing proportion of information about our lives and business is now being created and stored digitally. This includes analogue information and information that was previously impractical to gather. Every day, we generate and share vast amounts of personal information. Obvious examples include posts on social media, credit card transactions, content streaming, as well as cloud-storing our calendars, photos, and shopping lists. Our car tells companies where we have been and where we are likely to go. Even more striking is the willingness of people to share intimate details of their lives, by sending DNA samples to medical and genealogical companies to be analyzed, stored, and compared to those of other users. And while we may not always be aware of it, our device keystrokes, bodily motions, and even heartbeats are often being captured digitally, too.

This data revolution is set to accelerate. It is estimated that 90% of all the data ever created came into existence in the last two years alone. With half of the world's population still without access to the internet and with new data intensive technologies emerging all the time, the proliferation of data is certain to continue. The advent of 5G cellular technology will result in billions of machines, microchips, and sensors becoming connected to the internet. Even basic day-to-day items such as clothing and household appliances could soon come with built-in connectivity. At the same time, we expect an increasing amount of the new data to be stored and processed in 'cloud-based' computers. All of this data will become increasingly influential in the decisions that we take about our own lives, but also the decisions that businesses and governments take about us. As a result, data is arguably the most valuable commodity in the world.

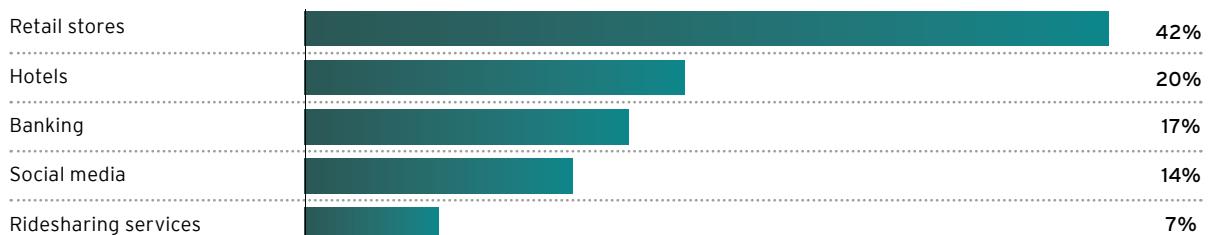
Data can be used for good and evil, and with and without our permission. As such, companies and individuals have the need to protect, secure, and monitor the use of their data all the time. This is in light of a growing number of ever more sophisticated criminal activities known as cybercrime. Actions known as cyberattacks are malicious and deliberate security breaches of individuals' or an organization's information systems, designed to steal or manipulate data with the intention of then using it fraudulently. Cybercrime also increasingly involves the deliberate destruction or distortion of data, often causing as much if not more disruption to businesses than theft.

Cyberattacks are increasing globally in number and sophistication. In the US alone, there has been a sharp increase in data breaches from 779 in 2015 to 1,251 in 2018 - **figure 1**.

FIGURE 1. US DATA BREACHES ON THE RISE



Source: Identity Theft Resource Center as of 18 Jun 2019.

FIGURE 2. WHO WOULD YOU MOST LIKELY SHOP WITH AGAIN AFTER A DATA BREACH?

Source: Varonis Systems as of 2019

The total financial cost to the global economy of data breaches has been estimated at \$1.5tn per year. Some sources believe this could rise to \$6tn by 2021. Businesses are the most prominent targets of such attacks. According to the World Economic Forum, cyberattacks and data fraud are two of the top five risks that company chief executive officers expect to face in 2019.¹ For modern businesses to thrive, they must therefore safeguard their customers' data and their trust. Accordingly, the expertise, time, and money needed to defend against and resolve cybercrime are also rising. Investment and spending on cybersecurity is estimated to be running around \$124bn a year in 2019, according to research firm Gartner, up from \$114bn in 2018 and \$102bn in 2017.²

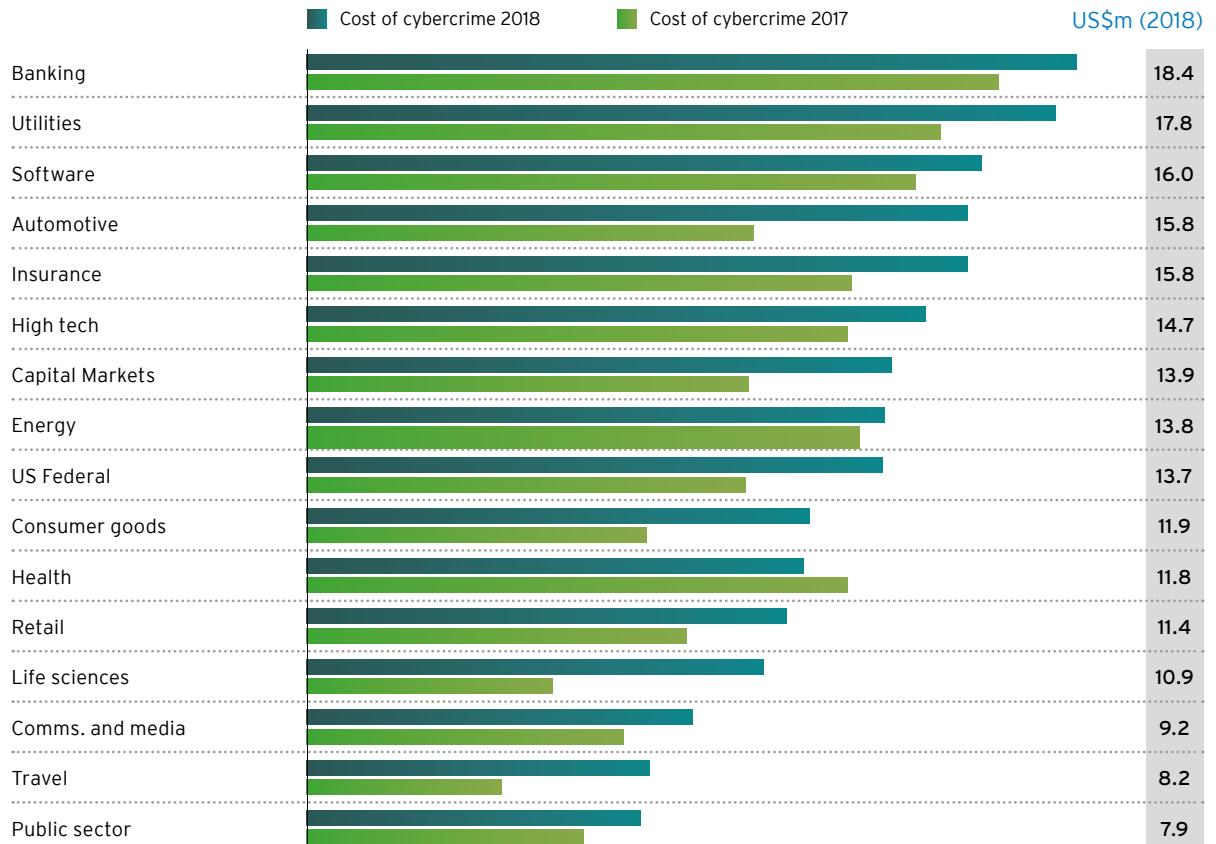
A 2019 survey of 1,000 people in the US conducted by internet security firm Varonis Systems found that consumers are much less likely to continue using businesses that have experienced a data breach. Trust erosion was greatest for new industries such as social media

and ridesharing companies rather than for more traditional industries such as retail stores - **figure 2**. Virtually every industry is therefore at risk, rather than just more obvious cases like technology and financial services - **figure 3**.

Besides the need to maintain consumers' trust, there are intensifying legal requirements for companies and other organizations to safeguard data. Custodians of personal and other third-party data will be held increasingly accountable for protecting this information. Europe is leading the way so far, with the introduction of the General Data Protection Regulations (GDPR) in May 2018. This legal framework sets strict guidelines for the collection and processing of personal information from individuals living inside the European Union. Ernst & Young estimated in 2018 that the world's five hundred largest companies spent close to \$8bn in the run-up to GDPR, while ongoing costs include expenditures on technology, lawyers, compliance staff and consultants. Data privacy regulation in the US is also changing, with the authorities placing the onus on companies to

1 World Economic Forum Global Risks Report 2019, www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf
 2 Gartner, Forecast: Information Security, Worldwide, 2016-2022, 2018 Update, as of August 2018

FIGURE 3. NO INDUSTRY IS IMMUNE FROM CYBER THREATS



Source: Accenture as of 2019. Average annual cybercrime costs per organization by industry (US\$ million)

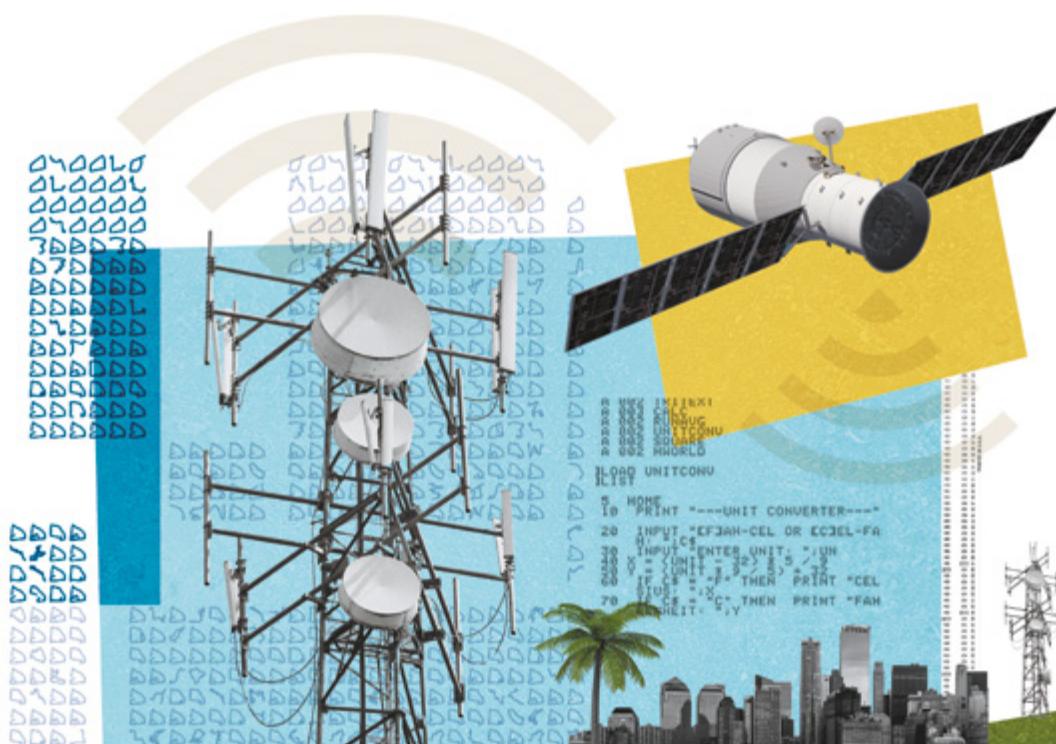
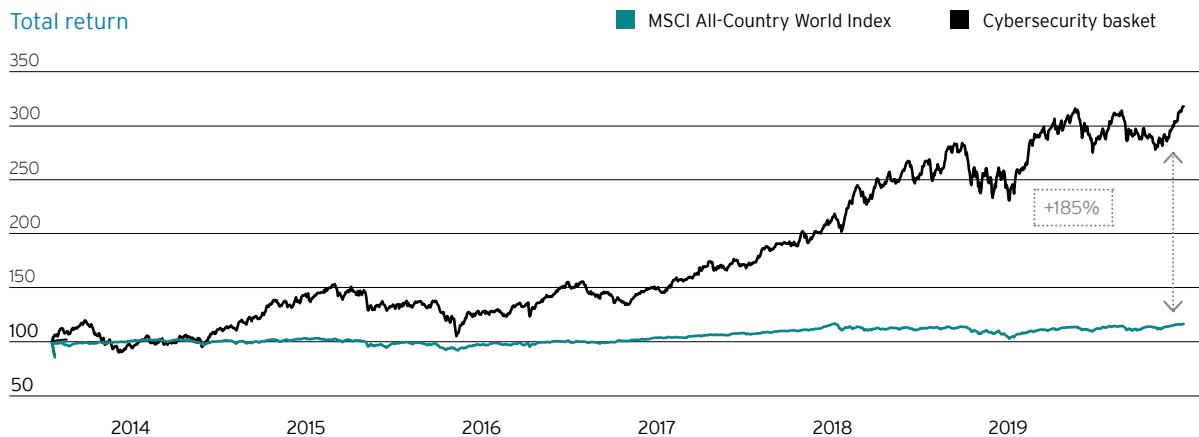


FIGURE 4. DATA PROTECTION'S ROBUST PERFORMANCE



Sources: Citi Private Bank and Bloomberg, as of Jun 2019. *The chart shows the performance of a basket of Cybersecurity stocks on an equal weighted basis. The stocks included are Palo Alto Networks, Splunk, Check Point Software Technologies, Okta, Fortinet, Symantec, Zscaler, Proofpoint, Trend Micro, Aisino, Avast, Qualys, FireEye, Mimecast, Sophos Group, Rapid7, Varonis Systems, NextDC, Sailpoint Technologies, ForeScout Technologies, SecureWorks, NCC Group and Ahnlab. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Past performance is no guarantee of future results, and future results may not meet our expectations due to a variety of economic, market and other factors. Real results may vary. For illustrative purposes only. This is neither a solicitation to buy nor a recommendation to sell any of the aforementioned securities.

manage the risks around customer data.

Given the ongoing proliferation of data we expect and the need to defend against the mounting threats to it, we see cybersecurity as an unstoppable trend. Spending on internet security is expected to grow at 9% a year between 2018 and 2022. Even if overall IT budgets shrink, companies are still likely to prioritize security, given stricter compliance requirements and the ongoing shift to cloud storage. The rollout of 5G networks presents another catalyst for

increased internet security investment.

Companies providing internet security products have performed strongly in recent years. For example, the equally weighted basket of cybersecurity stocks shown in **figure 4** has outperformed global equities by 185% since 2014. And we believe that the outlook for the sector remains bright, albeit not all areas exhibit the same long-term prospects. Our approach therefore screens for companies that are more exposed to growth areas such as cloud security and next generation endpoint security, rather than slowing growth areas such as anti-virus and firewall software. This cybersecurity sector could be used to help strengthen your portfolio, as well as potentially safeguarding your data.



3.3 Fintech: Disrupting financial services

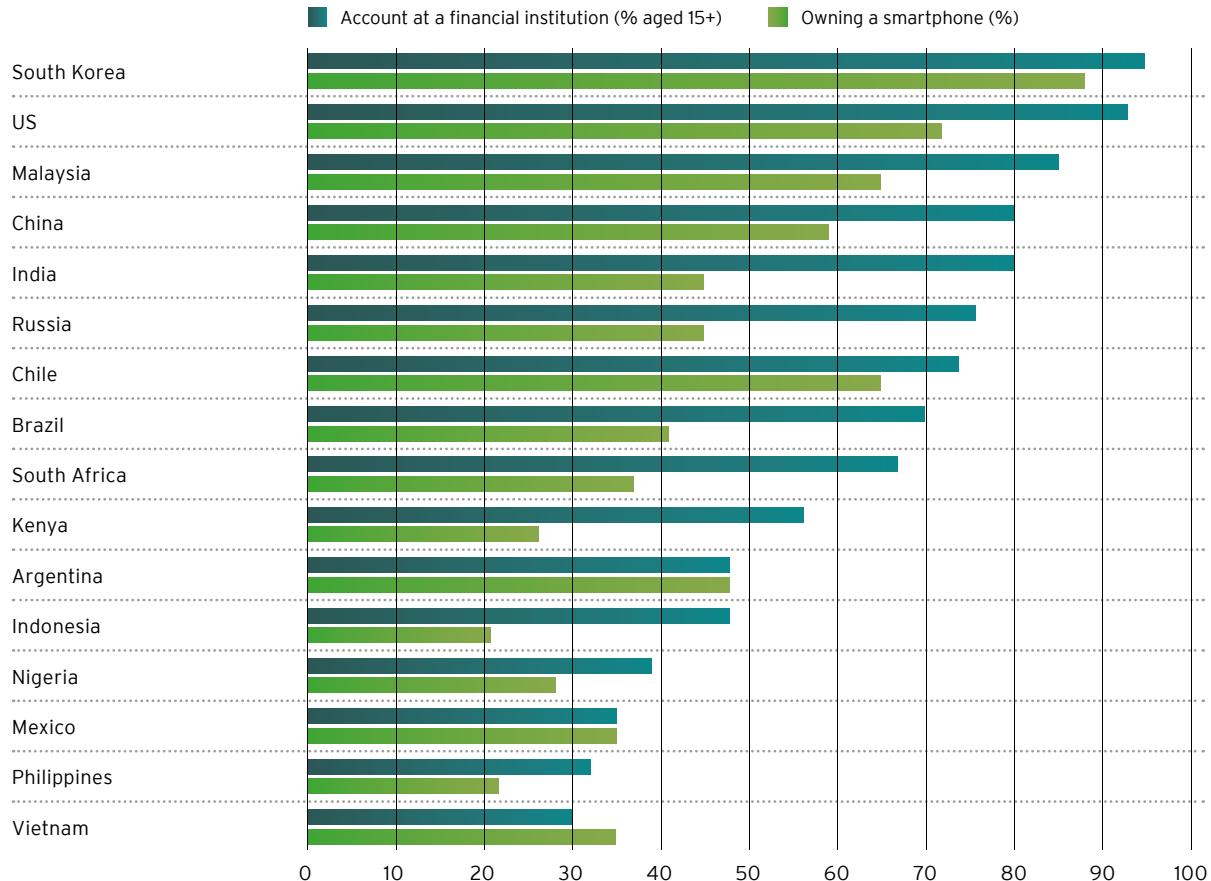
WIETSE NIJENHUIS, GLOBAL HEAD OF EQUITY STRATEGY

The financial services industry is facing sustained disruption. We advise building portfolio exposure to some of the innovators, while avoiding potential victims.

KEY MESSAGES

- For the first time, financial services are facing genuine and sustained disruption from fintech
- Payments firms are among the most attractive for investment within fintech

FIGURE 1. MANY IN EMERGING MARKETS ARE GOING STRAIGHT TO MOBILE BANKING



Source: Pew Research Center, World Bank Financial Inclusion Index, Smartphone penetration measured by the Pew Research Center survey conducted in 40 nations among 45,435 respondents as of 2017.

Perhaps for the first time, financial services are facing genuine and sustained disruption. A number of key developments have made the industry more susceptible to disruption today than it was around the millennium. These include shifting demographics and greater availability of funding, especially from well-resourced investors like sovereign wealth funds and venture capitalists. 'Millennials' - the generation born between the early 1980s and 2000s - now make up a larger proportion of the population. Having grown up with digital technology, millennials are much more open to non-traditional banking services. What's more, governmental and regulatory support for innovation has increased. The proliferation of

internet connectivity via smartphones is also opening up access to banking to people who never had traditional bank accounts - **figure 1**. While the World Bank estimates that 1.7bn adults globally are still without access to financial services, this number is falling rapidly.

Given these powerful demographic and technological drivers, certain financial technology - or 'fintech' - companies have now managed to break into the financial services mainstream. So far, they may have only captured a small share of the consumer banking market. However, we see considerable scope for disruptors to grab a much larger share.

The tipping point

Many aspects of banking have barely changed for centuries. In medieval Italy, the Medici family gathered data concerning their customers and then applied their judgement to decide whether or not to extend credit to them. In essence, today's banks do very much the same thing. One reason for this continuity is that the financial services industry has been relatively well insulated from disruptive technological forces that might otherwise have shaken up many of its business practices as well as the size and structure of its workforce. Likewise, high barriers to entry have helped prevent new competitors from breaking into the industry.

There are still many barriers today. They include capital adequacy requirements, licensing, and heavy compliance costs. In the decades leading up to the global financial crisis, such barriers served to keep banks' average returns on equity high. The advent of the internet and the dotcom boom around the turn of the millennium did provide a test of financial services' resilience to technological disruption. But the industry emerged unscathed from that initial encounter, with new entrants into the sector during that period few and far between. This is no longer the case, however. We believe that sufficient investment and independent challengers have now entered this space to create a tipping point as we enter the 2020s. In countries that lack the Western world's regulatory and governmental barriers, entire new financial ecosystems have been built with such speed and success that the term 'bank' may have little meaning to many local consumers. Across China and Africa, payments are predominantly digital. And we are now seeing those same technologies entering the developed market mainstream. Given the ongoing funding going into fintech, the great scope for disruption in traditional financial services, and the momentum achieved so far, Citi Private Bank believes fintech represents an unstoppable trend.

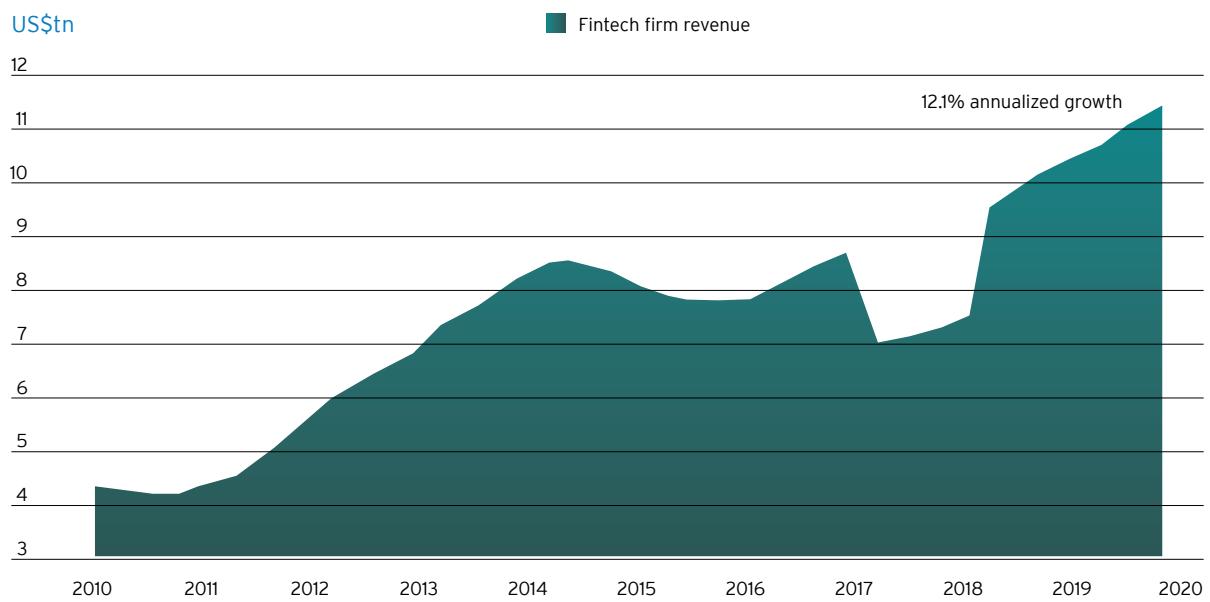
Disruptors and the disrupted

Fintech disruptors come in many shapes and sizes. They include online payment platforms, digital lenders, micro-loan providers in developing countries, mobile-only stock trading apps, regulatory and compliance software makers, and cryptocurrency providers. Whereas many traditional financial services groups offer a broad range of products and services, many fintech disruptors focus upon a single niche, such as a particular segment of business loans.

Those at greatest risk from the fintech disruptors are traditional financial services providers. The threat they face comes not only from fintech startups, but also from established internet retailers and giant tech companies. New technologies could sweep away the need for many customer-facing staff in banks and call centers, as well as many back office personnel such as payment processors and compliance officers. Workforce reductions could in turn lead to savings on the premises currently needed to accommodate them, including physical bank branches, call centers, and back office space.

This process is already well underway. As customers increasingly shift their banking online, Nordic and Dutch banks have already cut total branches by around 50% from recent peak levels. Savings might also be made as a result of innovative automation in areas such as regulatory compliance, where banks have had to spend billions of dollars since the global financial crisis in response to intensifying regulations.

That said, the relationship between fintech and traditional incumbents is not always that of predator and prey. Many fintech firms actually seek partnerships with incumbents. After all, each has what the other wants: the new entrants need customers and data, while incumbents require innovative technologies and cultural change.

FIGURE 2. FINTECH FIRM REVENUE

Source: Factset and Citi Research as of 11 Nov 2019. Fintech revenue is aggregated from global firms identified by Citi Research as deriving more than 50% of revenues from products or services related to financial innovation.

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Portfolios should log on to fintech

To date, fintech companies have largely plugged gaps in the market. For example, they have focused upon new activities such as peer-to-peer lending or improving customer experience at the moment of sale. For incumbents, therefore, this has been more of a case of opportunities foregone, rather than actual profits lost. However, this does not mean that incumbents can sleep easy. It is important to remember that disruption typically progresses through stages. Initially, disruptors eat into industry growth by targeting new market segments, while coexisting with the incumbents. Having achieved a certain scale and established their reputation, they eventually start competing head-to-head for the incumbent's core business revenues.

Over the last decade, fintech firm revenues have grown at an annualized rate of 12.1% - see **figure 2**. By comparison, S&P 500 companies overall have seen revenue growth of 4.2%. It is our expectation that fintech will continue to experience strong growth now that this industry has reached a tipping point. We think this growth can drive stock prices as well as the valuations of privately held fintech players. Fintech firms come in many shapes and sizes, from fairly recent start-ups to giant tech companies who are moving into financial services. We see the most attractive potential in the payments space. At the same time, we are closely monitoring traditional providers' response to fintech. Our aim is to reduce or avoid exposure to the most susceptible. Further and wider ranging fintech disruption is coming. Investors should log on to this unstoppable trend sooner rather than later.

¹ This is not a recommendation to buy or sell a securities. It is for illustrative purposes only.



3.4 The future of energy

STEVEN WIETING, CHIEF INVESTMENT STRATEGIST AND CHIEF ECONOMIST
MALCOLM SPITTLER, GLOBAL INVESTMENT STRATEGIST

The Earth receives more energy from the sun in a single hour than humanity consumes from all energy sources in a year. Advances in technology will drive global adoption of solar energy and battery storage while fossil fuels gradually fade into their twilight.

KEY MESSAGES

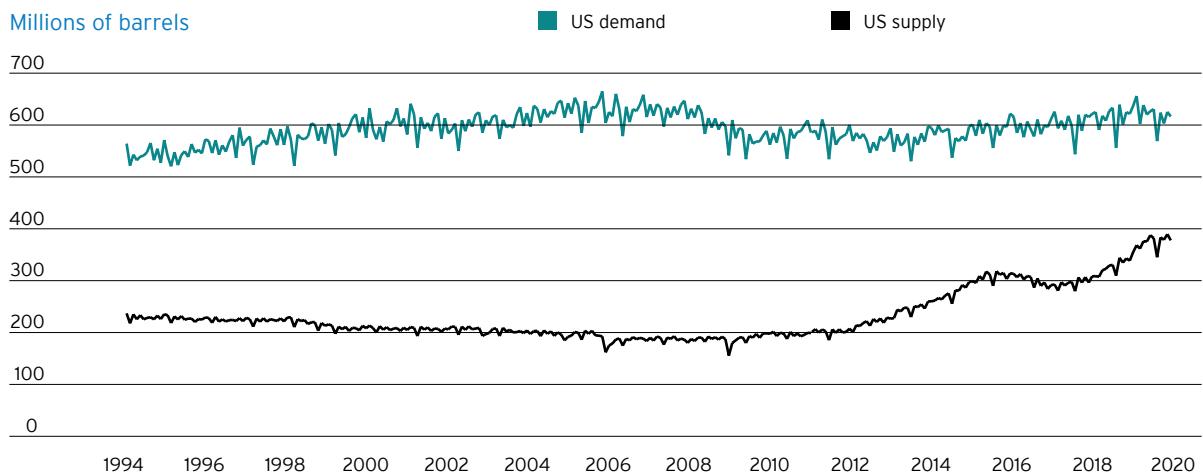
- Rising US oil supplies have depressed the global petroleum price, but technology is accelerating the deep underperformance of the oil & gas sectors.¹ Even without any environmental preference for cleaner sources, the economics of alternative energy production, whether solar, hydro or wind, will displace fossil fuels.
- Global solar energy costs are now below the cost of coal per kilowatt of electricity produced. Improving battery technology has meant rapid growth rates for electric cars and hybrids. This will increasingly cut into the growth rate of gasoline and diesel fuel consumption.
- The weakening utilization of oil appears to be following the historical precedent of the gradual phase out of earlier energy sources. Though this will take decades, it suggests a falling perpetuity value for fossil fuel energy sources. It does not, however, preclude 'trading bounces' for the unloved sector from time to time.
- The Trump administration has rolled back numerous fossil fuel regulations, yet US energy sector equities have strongly underperformed. Some US Democratic contenders threaten to ban much US oil production if elected in 2020. This would, ironically, save the conventional oil sector and boost the commodity for a time.

1 All forecasts are expressions of opinion and are subject to change without notice and are not intended to be a guarantee of future events.

Back in our Outlook and Mid-Year Outlook reports of 2013, we wrote about the new American energy revolution. After decades of US crude oil production declines, so-called 'frackers' managed to push US oil output 55% higher in just three years by the end of 2014. They pushed on further until a production peak in 2015. After the global oil price cracked under the new supplies, with oil falling as much as 75% in price, US production recovered and jumped 115% from its 2012 level - **figure 1**.

In spite of production cuts and global supply disruption over the past year, there is still relatively little mystery why the global crude oil price remains below \$65 per barrel, less than half 2008's historic peak price. US sanctions have forced Iran's oil production down to the lowest level since 1989. After years of decline, Venezuela's oil production is down 75%. Yet the growth in global oil - and in many cases in gas - supplies is eclipsing the growth rate of demand - **figure 2**.

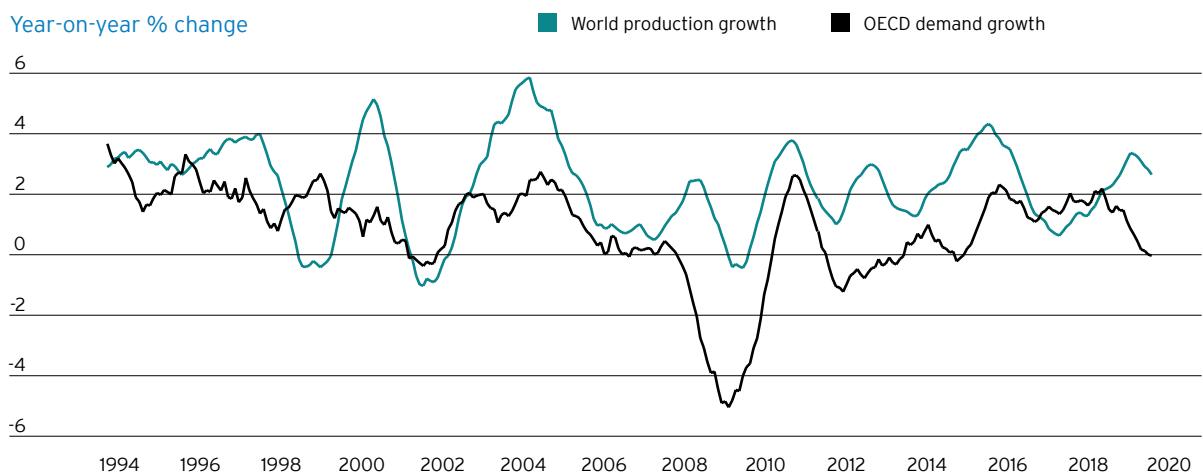
FIGURE 1. US CRUDE OIL PRODUCTION SURGES



Source: Haver Analytics through 1 Nov 2019

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FIGURE 2. WORLD OIL SUPPLY RISES, WHILE DEVELOPED WORLD DEMAND FALLS



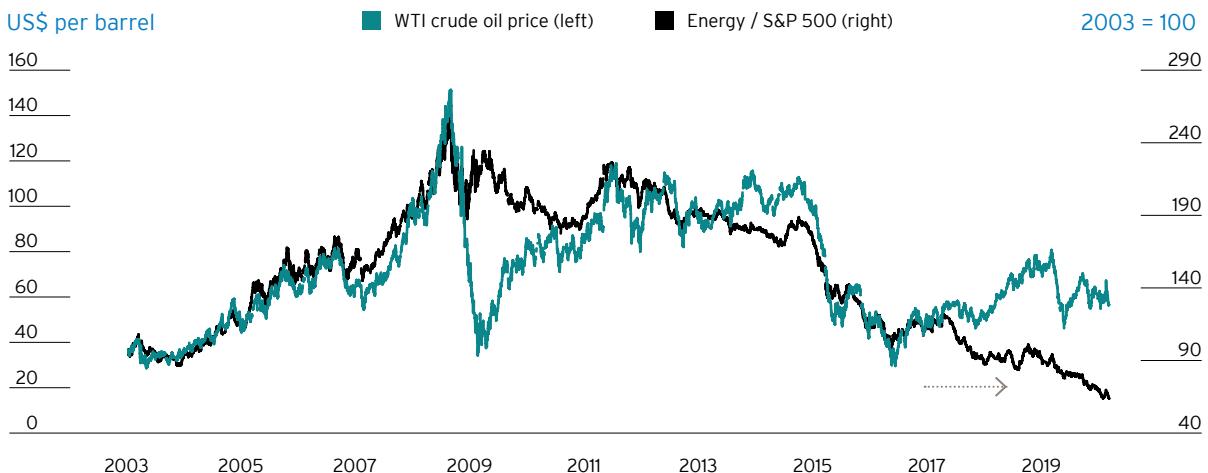
Source: Haver Analytics through 1 Nov 2019

However, crude oil extraction technology and surging supply is just one part of the story. With the gradual transition away from fossil fuels, energy equities are significantly underperforming the oil price, falling to the lowest market capitalization share of the S&P 500 since 2000 - **figure 3**. That is in spite of low oil prices and notable efforts to support the industry. The latter include crude oil production cuts by OPEC in the past two years and President Trump's efforts to repeal subsidies for renewable energy sources.

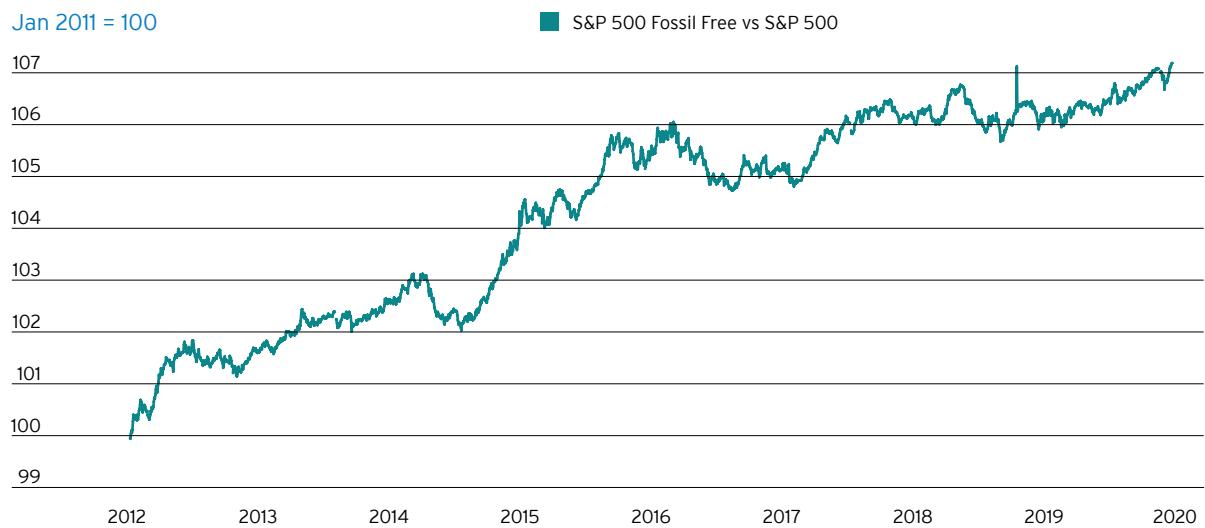
After years of being safe from the transformation of the energy sector, petroleum is finally at risk. Despite a record-breaking 126% increase in US oil production over the last ten years that has transformed the global oil markets, an investor who avoided oil over those same years would have outperformed the broader S&P 500 Index by more than 6% - **figure 4**.

An analogy for the fate of oil may be the US coal industry. Year after year, coal production has declined and profits have collapsed. The last coal company was demoted from the S&P 500 in 2016. Coal companies in the broader S&P 1500 have shown an annualized decline of 23.5% per year for the last ten years. In other words, a hundred dollars invested in coal in 2009 would now be worth just under \$7, even including dividends - **figure 5**. This is despite President Trump announcing a goal of saving the US coal industry and slashing environmental restrictions - see **Changes in US environmental regulations by the Trump administration to date**. US coal production has slumped amid disuse. The same fate awaits coal industries globally over time. Despite a strong consumption growth rate in a handful of countries - India in particular - coal demand is flattening worldwide.

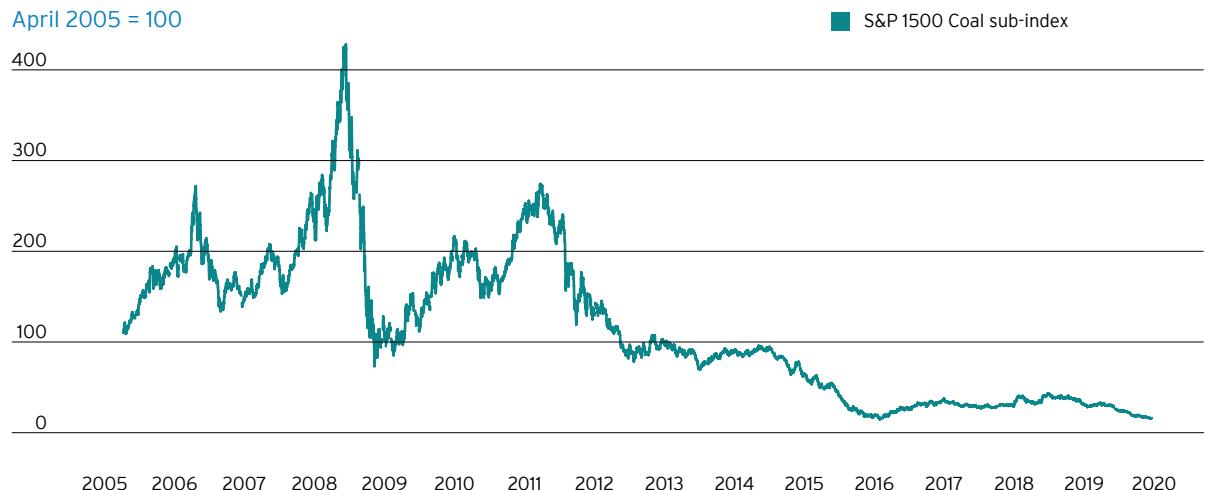
FIGURE 3. ENERGY EQUITIES HAVE UNDERPERFORMED



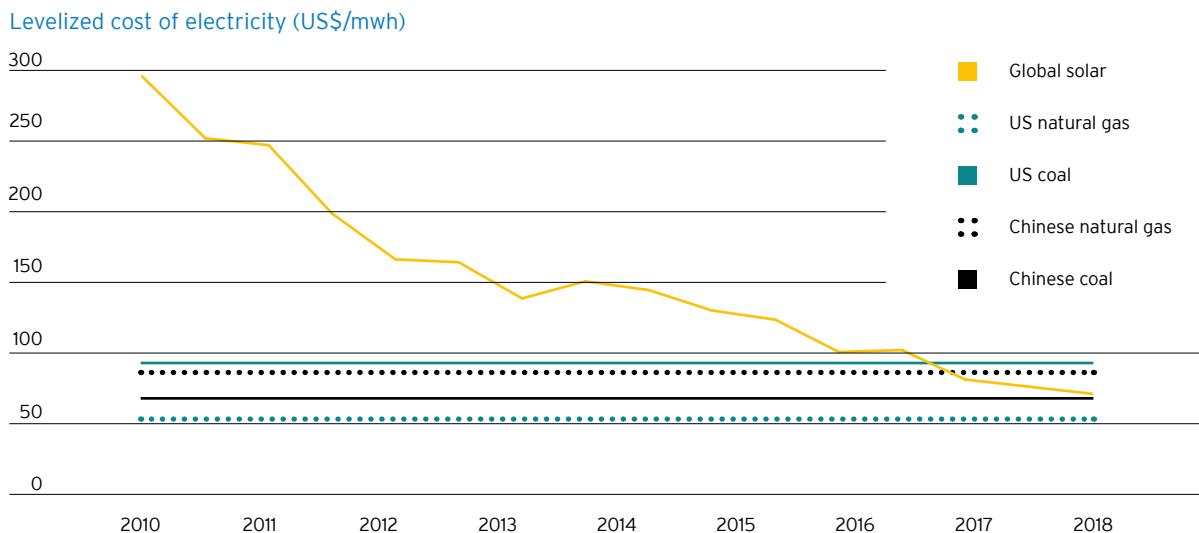
Source: Bloomberg, Haver Analytics through 1 Nov 2019. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary.

FIGURE 4. FOSSIL FREE INVESTMENTS HAVE OUTPERFORMED

Source: Haver Analytics through 1 Nov 2019. Chart shows S&P Fossil Fuel Free Index Relative to the S&P 500 Index. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary. See Glossary for definition.

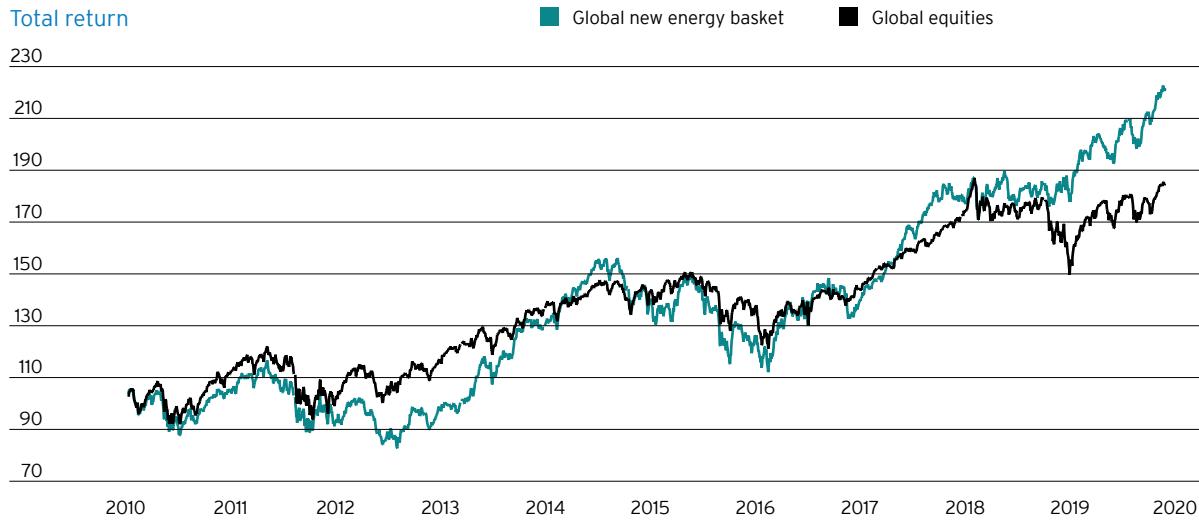
FIGURE 5. US COAL EQUITIES' LONG DECLINE

Source: Haver Analytics through 1 Nov 2019. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary.

FIGURE 6. FALLING COSTS TO PRODUCE SOLAR ELECTRICITY

Source: Bloomberg as of October 2019.

38

FIGURE 7. ALTERNATIVE ENERGY'S OUTPERFORMANCE

Source: Haver, as of 25 Nov 2019. Global equities represented by MSCI All Countries World Index. Shares in Citi Research theme baskets for Solar, Wind, Hydro, Energy Storage, Energy efficiency, and Smart Grids, as highlighted in Citi GPS Energy 2030: Financing A Greener Future, 2018. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary.

The price of new solar capacity has fallen below that of coal - **figure 6**. This sort of progress has been accompanied by alternative energy equity price outperformance globally - **figure 7**. This contrasts with traditional energy's underperformance in recent years. In other words, even without any environmental preference for cleaner sources, the market has disproportionately favored new solar, hydro, and wind solutions to the more expensive fossil fuels.

Importantly for crude oil demand, increasingly effective batteries at ever lower prices now enable electric and electric hybrid vehicles to begin displacing traditional fossil fuels in transportation. Even without expansion or renewal of price subsidies for electric vehicles in the US, it is highly likely that at least at the margin there will be pressure on petroleum-based vehicles and by extension petroleum itself in the years ahead. In fact, twelve nations² have already set dates in law for when the last gas fueled cars are to be sold. China, meanwhile, has announced

a ban without setting a date. In Norway, where hybrid or electric vehicles already comprise more than half of sales, the ban on traditional gas vehicles begins in 2025 for new sales.

This does not mean oil for transportation fuels will be suddenly and wholly displaced. For oil, a finely balanced, sensitive commodity, displacing just 1.5% of demand - all else constant - would mean sending a typical year's increase in world supplies into inventories. Very small changes in supply or demand have a large impact on this volatile commodity's price.

To understand how bad it might get for oil, US petroleum production has more than doubled in the last ten years. However, an investor who avoided the sector entirely would have outperformed someone who invested in the broader market including energy - **figure 4**. In addition to trends currently in force, the petroleum sector faces unknown risks due to regulation of carbon. The latter seems likely to outlast any political regime on a global view.

² Costa Rica, Denmark, France, Iceland, Ireland, Israel, Netherlands, Norway, United Kingdom, Sri Lanka, and Sweden.



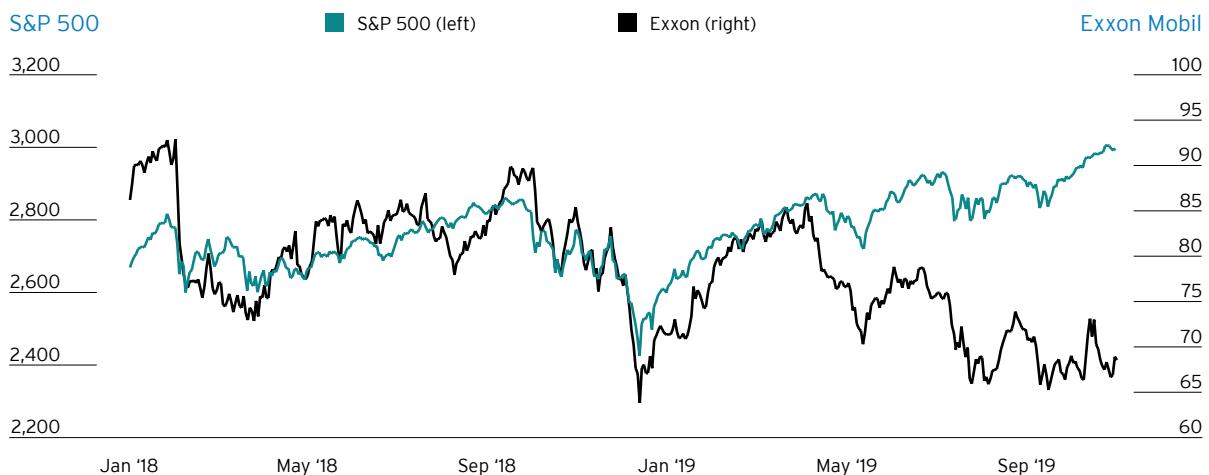
Litigation against energy companies and utilities represent a further risk. The unfavorable treatment of PG&E - a Californian utility - may prove the first truly large-scale climate change corporate casualty. It was driven out of the S&P 500 Index and into bankruptcy owing to liabilities related to a string of catastrophic wildfires in California that were exacerbated by changing temperature and rainfall patterns.

More dangerously perhaps, there is the US precedent for holding corporations responsible for damages done long ago. A template could be the lawsuits against the tobacco industry at the beginning of the twenty-first century, which resulted in large awards of damages. It is not unthinkable, therefore, that some localities may force petroleum companies to pay sizeable settlements for general environmental damage previously done rather than for specific incidents, as suggested by New York State's current suit against Exxon - **figure 8**.

In addition to changing market conditions and legal challenges, consumer opinion is shifting on climate change. In a worldwide poll, fully 68% of consumers in the median country consider climate change a major threat, and only 9% consider it not a threat at all, according to a study by the Pew Research Center. As alternative energy sources become more affordable, many consumers who were previously hesitant to reduce their use of petroleum and other fossil fuels will find it less costly to alter their behavior. At Citi Private Bank, we also increasingly encounter clients wanting to reduce their portfolio exposure to fossil fuel producers and other carbon emitters.

We do not seek to imply that the day of the last oil well is near. Nor even do we necessarily believe that we have reached peak fossil fuel production. As we wrote in Quadrant in November 2019, the shorter-term prospects for the sector look stronger after their deep

FIGURE 8. S&P 500 AND EXXON MOBIL'S SHARE PRICE



Source: Haver as of 25 Nov 2019. Indices are unmanaged. An investor cannot invest directly in an index. They are shown for illustrative purposes only and do not represent the performance of any specific investment. Index returns do not include any expenses, fees or sales charges, which would lower performance. For illustrative purposes only. Past performance is no guarantee of future results. Real results may vary.

underperformance. Our analysis suggests, however, that we are at or very near to a tipping point, and that fossil fuels and the companies associated with them may be on the wane.

A historical precedent for the slow drag this process might produce upon a portfolio comes from the early days of the petroleum industry itself. Petroleum as lighting fuel in the form of kerosene was discovered in 1859. But it took more than forty years for the whale oil industry to phase out and ultimately perish - **figure 9**. And yet during those decades, investors in whale ships saw their assets losing value year after year, so would have been far better served divesting in year one than in year forty.

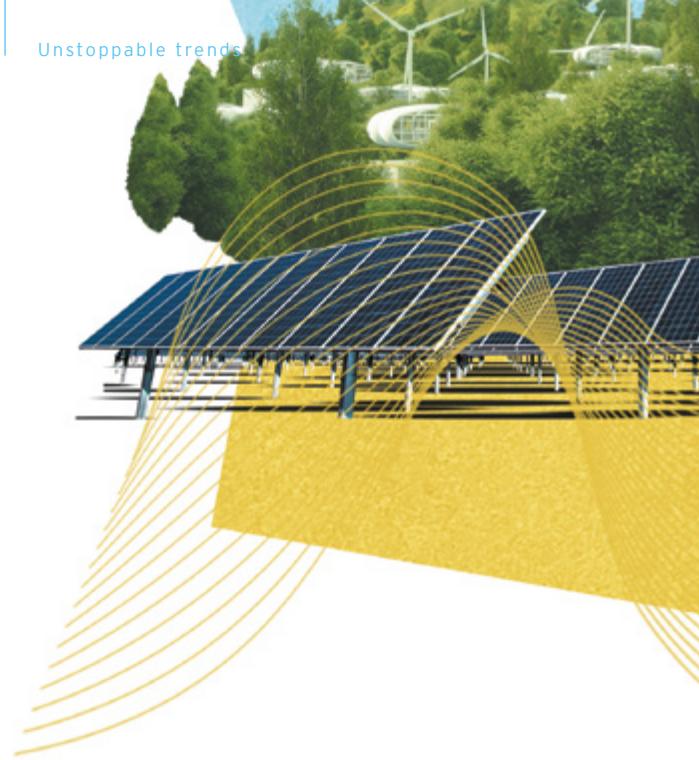
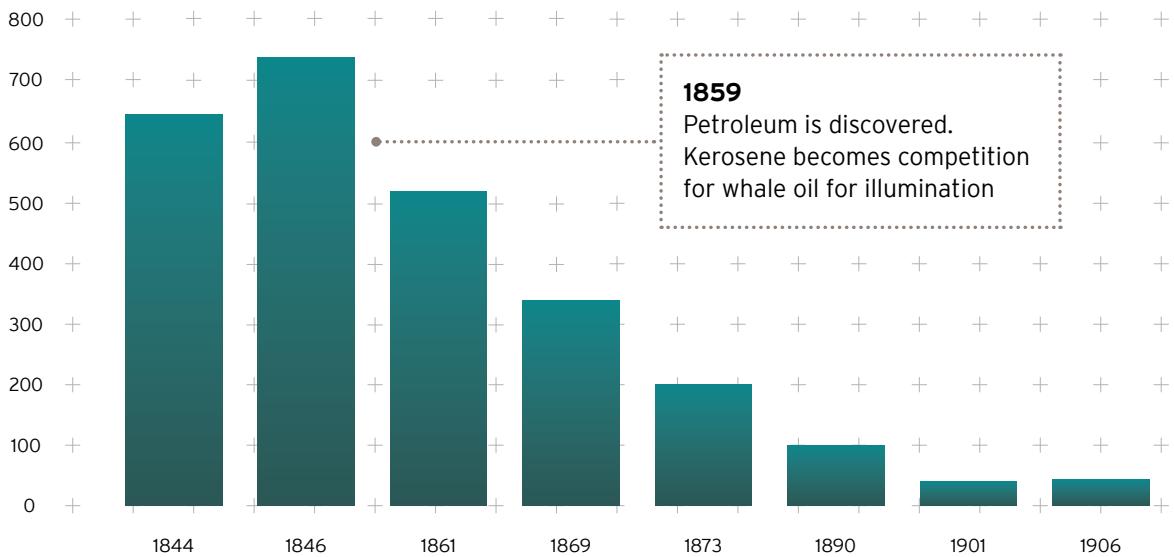


FIGURE 9. ACTIVE NUMBER OF AMERICAN WHALING SHIPS

American whaling ships



Source: W. Tower, 1907. *A History of the American Whale Fisher*. Philadelphia, The University of Philadelphia.

A political paradox?

One of the best case scenarios at least for non-US based traditional oil companies may come from a surprising source. Three out of the top five Democratic contenders have promised to ban fracking if they are elected President in November 2020.³ If truly enacted, this might put an end to the US shale oil boom and offer the prospect of higher price and investment returns for traditional well operators, such as they enjoyed in the 1990s and early 2000s. Such a price boost would likely only be temporary, however. In fact, it would probably accelerate the transition to a post-petroleum economy by making traditional internal combustion vehicles less competitive.

More simply, the energy sector's deep underperformance has already encouraged investors to underweight the sector, many in fear of the lawsuits Exxon and others may face. When such fears get overblown relative to current profits and dividends, counter-trend share price rebounds can be quite strong. Our sense is a trading 'bounce' is coming for major oil producers in 2020. However, such an outcome would merely be a short-term reprieve.

Prepare for the future of energy

By nature, we are skeptics of long-term economic forecast extrapolations, but the trends we have identified are accelerating. The price of energy production from non-carbon sources has fallen so far that it seems inevitable that sustainable substitutes for fossil fuels will gain 'critical mass.' Concerns about CO₂ and other emissions are likely to outlast any politician's tenure. While there are skeptics and pessimists on both sides, the remarkable human capacity for adaptation will ultimately prevail, in our view.

As noted, many socially-driven investors have asked us to modify portfolios to eliminate ownership or funding for carbon. This appears to have driven some of the deep underperformance of the sector relative to energy commodities. Even more fundamentally, technological disruption – pervasive in so many other industries – appears to be accelerating across the energy sector.

Debate about the moral imperative to address climate change was intense in 2019. Technology once again seems likely to play the most critical role in addressing such imperatives, with powerful impacts upon investment portfolios. We'd note that the Earth receives more energy from the sun in a single hour than humanity consumes from all energy sources in a year. With much competitive experimentation ahead, we think solar energy and its applications in particular look to be the ascendant technologies, while fossil fuels gradually fade into their twilight.

³ Candidate Warren, Sanders and Harris have all called for outright Fracking bans, while Biden and Buttigieg have called for increase regulation - Politico, as of 11 Sep 2019

FIGURE 10. CHANGES IN US ENVIRONMENTAL REGULATIONS BY THE TRUMP ADMINISTRATION TO DATE

● COMPLETED ● IN PROCESS ● STUCK IN LEGAL BATTLE

FREEZE CAFE STANDARDS	● COMPLETED
SOLAR TECH TARIFFS ON CHINA	● COMPLETED
CANCELED OIL AND GAS COMPANY REPORTING METHANE EMISSIONS	● COMPLETED
ORDERED EPA TO REVIEW OBAMA ERA CLEAN POWER PLAN	● COMPLETED
ROLLBACK OF WATERS OF THE UNITED STATES RULE	● COMPLETED
REPEALED RULE REQUIRING STATES TRACK TAILPIPE EMISSIONS OF FEDERAL HIGHWAYS	● COMPLETED
REPEALED RULE THAT INCLUDED 'SOCIAL COST' OF CARBON EMISSIONS	● COMPLETED
WITHDREW GUIDANCE THAT FEDERAL AGENCIES INCLUDE GREEN HOUSE GASSES IN IMPACT ANALYSIS	● COMPLETED
STOP REQUIRING COMPANIES TO INSTALL METHANE LEAK DETECTION EQUIPMENT IN WELLS, PIPELINES AND REFINERIES	● COMPLETED
ELIMINATE REQUIREMENT THAT NEW COAL PLANTS CAPTURE CARBON EMISSIONS	● COMPLETED
AMEND RULES THAT GOVERN HOW REFINERIES MONITOR POLLUTION IN SURROUNDING COMMUNITIES	● COMPLETED
NEW EMISSIONS STANDARDS ON POWER PLANTS	● COMPLETED
LIMIT INDIVIDUALS'ABILITY TO CHALLENGE POPULATION PERMITS	● COMPLETED
CUT SIZE OF TWO NATIONAL MONUMENTS TO ALLOW FOR MORE DRILLING	● COMPLETED
RESCINDED WATER POLLUTION REGULATIONS ON FEDERAL AND INDIAN LAND	● COMPLETED
SCRAPPED A PROPOSED RULE THAT MINES PROVE THEY CAN PAY FOR CLEAN UP OF POLLUTION	● COMPLETED
SCRAPPED A PROPOSED RULE THAT GULF RIGS PROVE THEY CAN PAY FOR RIG REMOVAL WHEN FINISHED	● COMPLETED
APPROVED CONSTRUCTION OF CONTROVERSIAL DAKOTA ACCESS PIPELINE	● COMPLETED
PERMITTED THE USE OF SEISMIC AIR GUNS FOR GAS AND OIL EXPLORATION IN THE ATLANTIC OCEAN	● COMPLETED
LOOSEND OFFSHORE DRILLING REGULATIONS THAT FOLLOWED DEEPWATER HORIZONS SPILL	● COMPLETED
COMPLETED PRELIMINARY REVIEWS TO ALLOW DRILLING IN THE ARCTIC NATIONAL PRESERVE	● COMPLETED
LIFTED A FREEZE ON NEW COAL MINING LEASES ON PUBLIC LAND	● COMPLETED
REPEALED AN OBAMA ERA RULE ON ROYALTIES PAID TO THE GOVERNMENT FOR OIL, GAS AND COAL LEASES	● COMPLETED
REVOKE AN OBAMA ERA ORDER PROMOTING ENVIRONMENTAL RESILIENCE IN THE BERING SEA	● COMPLETED
ELIMINATED PLANNING SYSTEM DESIGNED TO MINIMIZE HARM FROM OIL AND GAS ACTIVITY ON SENSITIVE LANDSCAPES	● COMPLETED
OPENED NINE MILLION ACRES OF LAND TO OIL & GAS DRILLING BY WEAKENING PROTECTIONS OF THE SAGE GROUSE	● COMPLETED
REVERSED A RULE REQUIRING BRAKING SYSTEM UPGRADES FOR 'HIGH HAZARD' TRAINS HAULING FLAMMABLE LIQUIDS	● COMPLETED
REVOKE RULE PRVENTING COAL COMPANIES FROM DUMPING MINING DEBRIS IN STREAMS	● COMPLETED
WEAKENED REGULATION OF THE DISPOSAL & STORAGE OF COAL ASH WASTE FROM POWER PLANTS	● COMPLETED
 CUT SOLAR SUBSIDIES	● COMPLETED
ELECTRIC VEHICLE TAX CREDIT END	● COMPLETED
WITHDRAWING FROM PARIS CLIMATE ACCORD	● COMPLETED
PROPOSED STREAMLINING APPROVAL PROCESS FOR OIL AND GAS DRILLING IN FEDERAL FORESTS	● COMPLETED
ORDERED REVIEW OF REGULATIONS ON OIL & GAS DRILLING IN NATIONAL PARKS WHERE MINERAL RIGHTS ARE PRIVATELY HELD	● COMPLETED
ORDERED REVIEW OF REGULATIONS ON FLOATING OIL & GAS EXPLORATION IN THE ARCTIC	● COMPLETED
REVIEW OF LIMITS ON COAL DUST IN MINES	● COMPLETED
DELAYED IMPLEMENTATION OF LIMITS ON TOXIC DISCHARGE FROM POWER PLANTS INTO WATERWAYS	● COMPLETED
RE-EVALUATING SECTION OF THE CLEAN WATER ACT THAT ALLOWS STATES TO CONTEST FEDERAL PROJECTS, INCLUDING PIPELINES	● COMPLETED
PROPOSED WITHDRAWING EFFICIENCY STANDARDS FOR RESIDENTIAL FURNACES AND COMMERCIAL WATER HEATERS	● COMPLETED
 CHALLENGE CALIFORNIA'S RIGHT TO SEPARATE FUEL ECONOMY STANDARDS	● IN PROCESS
LAWSUIT TO REMOVE MERCURY EMISSIONS RESTRICTIONS ON COAL PLANTS	● IN PROCESS
APPROVED KEYSTONE XL PIPELINE	● IN PROCESS
GRANTED A 'PRESIDENTIAL PERMIT' FOR KEYSTONE XL PIPELINE	● IN PROCESS

Source: New York Times, as of 10 Nov 2019

Glossary

ASSET CLASS DEFINITIONS

Cash is represented by US 3-month Government Bond TR, measuring the US dollar-denominated active 3-Month, fixed-rate, nominal debt issues by the US Treasury.

Commodities asset class contains the index composites – GSCI Precious Metals Index, GSCI Energy Index, GSCI Industrial Metals Index, and GSCI Agricultural Index – measuring investment performance in different markets, namely precious metals (e.g., gold, silver), energy commodity (e.g., oil, coal), industrial metals (e.g., copper, iron ore), and agricultural commodity (i.e., soy, coffee) respectively. Reuters/ Jeffries CRB Spot Price Index, the TR/CC CRB Excess Return Index, an arithmetic average of commodity futures prices with monthly rebalancing, is used for supplemental historical data.

Emerging Markets (EM) Hard Currency Fixed Income is represented by the FTSE Emerging Market Sovereign Bond Index (ESBI), covering hard currency emerging market sovereign debt.

Global Developed Market Corporate Fixed Income is composed of Bloomberg Barclays indices capturing investment debt from seven different local currency markets. The composite includes investment grade rated corporate bonds from the developed-market issuers.

Global Developed Market Equity is composed of MSCI indices capturing large-, mid- and small-cap representation across 23 individual developed-market countries, as weighted by the market capitalization of these countries. The composite covers approximately 95% of the free float-adjusted market capitalization in each country.

Global Developed Investment Grade Fixed Income is composed of Barclays indices capturing investment grade debt from twenty different local currency markets. The composite includes fixed-rate treasury, government-related, and investment grade rated corporate and securitized bonds from the developed-market issuers. Local market indices for US, UK and Japan are used for supplemental historical data.

Global Emerging Market Fixed Income is composed of Barclays indices measuring performance of fixed-rate local currency emerging markets government debt for 19 different markets across Latin America, EMEA and Asia regions. iBoxx ABF China Govt. Bond, the Markit iBoxx ABF Index comprising local currency debt from China, is used for supplemental historical data.

Global High Yield Fixed Income is composed of Barclays indices measuring the non-investment grade, fixed-rate corporate bonds denominated in US dollars, British pounds and Euros. Securities are classified as high yield if the middle rating of Moody's, Fitch, and S&P is Ba1/BB+/BB+ or below, excluding emerging market debt. Ibbotson High Yield Index, a broad high yield index including bonds across the maturity spectrum, within the BB-B rated credit quality spectrum, included in the below-investment grade universe, is used for supplemental historical data.

Hedge Funds is composed of investment managers employing different investment styles as characterized by different sub categories - HFRI Equity Long/Short: Positions both long and short in primarily equity and equity derivative securities; HFRI Credit: Positions in corporate fixed income securities; HFRI Event Driven: Positions in companies currently or prospectively involved in wide variety of corporate transactions; HFRI Relative Value: Positions based on a valuation discrepancy between multiple securities; HFRI Multi Strategy: Positions based on realization of a spread between related yield instruments; HFRI Macro: Positions based on movements in underlying economic variables and their impact on different markets; Barclays

Trader CTA Index: The composite performance of established programs (Commodity Trading Advisors) with more than four years of performance history.

High Yield Bank Loans are debt financing obligations issued by a bank or other financial institution to a company or individual that holds legal claim to the borrower's assets in the event of a corporate bankruptcy. These loans are usually secured by a company's assets, and often pay a high coupon due to a company's poor (non-investment grade) credit worthiness.

Private Equity characteristics are driven by those for Developed Market Small-Cap Equities, adjusted for illiquidity, sector concentration, and greater leverage.

INDEX DEFINITIONS

The **Bloomberg Barclays Global Aggregate Bond Index** is a flagship measure of global investment grade debt from twenty-four local currency markets. This multi-currency benchmark includes treasury, government-related, corporate and securitized fixed-rate bonds from both developed and emerging markets issuers.

The **Bloomberg-JP Morgan Asia Currency Index** is designed as a spot index of the most actively traded currency pairs in Asia's emerging markets valued against the US dollar.

The **Bloomberg JP Morgan Latin American Currency Index** represents Latin America's currency markets on an aggregate basis. It is a spot index of Latin America's most actively traded currency pairs valued against the US dollar, whose composition is based primarily on trade weights, with an added liquidity filter.

The **CSI 300** is a capitalization-weighted stock market index designed to replicate the performance of top 300 stocks traded in the Shanghai and Shenzhen stock exchanges. It was considered as a blue chip index for mainland China stock exchanges

Citi US Broad Investment Grade Index (USBIG)-Corporate, is a subsector of the USBIG. The index includes fixed rate US dollar denominated investment grade corporate debt within the finance, industrial and utility sectors. This index includes US and non-US corporate securities (excludes US government-guaranteed and non-US sovereign and provincial securities).

Citi Emerging Markets Sovereign Bond Index includes local currency sovereign bond indices for 14 emerging markets countries. These indices comprise fixed-rate sovereign debt with at least one-year until maturity. They are market capitalization-weighted and rebalanced monthly for Brazil, Chile, Colombia, Hungary, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Thailand, Turkey, and South Africa.

The **Citi Euro Broad Investment Grade Index** is a multi-asset benchmark for Investment grade, Euro-denominated fixed income bonds. It includes government, government-sponsored, collateralized, and corporate debt.

Citi's US High Yield Market Index is a US dollar-denominated index which measures the performance of high yield debt issued by corporations domiciled in the US or Canada. Recognized as a broad measure of the North American high-yield market amongst all Citi's fixed income indices, it includes cash-pay and deferred-interest securities. All the bonds are publically placed, have a fixed coupon, and are non-convertible.

The **Citi World Broad Investment Grade Index** is a multi-asset, multicurrency benchmark which provides a measure of the global fixed income markets.

The **Euro Stoxx 50 Index** is a blue-chip index for the Eurozone, provides a blue-chip representation of supersector leaders in the region. The index covers fifty stocks from eleven Eurozone countries.

The **FTSE All-World Index** is a stock market index representing global equity performance that covers over 3,100 companies in 47 countries starting in 1986.

The **MSCI Emerging Markets Index** captures large- and mid- cap representation across twenty-four Emerging Markets (EM) countries. With 837 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

The **MSCI Emerging Markets (EM) Latin America Index** captures large and mid-cap representation across five Emerging Markets (EM) countries in Latin America. With 113 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

The **MSCI World Index** represents the performance of more than 1,600 large- and mid-cap stocks across 23 developed markets countries. The index covers approximately 85% of the free float-adjusted market capitalization in each country

The **MSCI World ex-USA Index** represents the performance of large and mid-cap representation across 22 of 23 developed markets countries excluding the United States. With 1,005 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

The **S&P 500 Index** is a capitalization-weighted index that includes a representative sample of 500 leading companies in leading industries of the US economy. Although the S&P 500 focuses on the large-cap segment of the market, with over 80% coverage of US equities, it is also an ideal proxy for the total market.

The **S&P 1500 Index** combines three leading indices, the S&P 500, the S&P MidCap 400, and the S&P SmallCap 600, to cover approximately 90% of US market capitalization. It is designed for investors seeking to replicate the performance of the US equity market or benchmark against a representative universe of tradable stocks.

The **S&P 500 Fossil Fuel Free Index** is designed to measure the performance of companies in the S&P 500 that do not own fossil fuel reserves. Fossil fuel reserves are defined as economically and technically recoverable sources of crude oil, natural gas and thermal coal.

The **S&P Global Dividend Aristocrats** is designed to measure the performance of the highest dividend yielding companies within the S&P Global Broad Market Index (BMI) that have followed a policy of increasing or stable dividends for at least ten consecutive years.

The **U.S. Dollar Index** (DXY) is an of the value of the US dollar relative to a basket of major US trade partners' currencies.

OTHER TERMINOLOGY

Adaptive Valuations Strategies is Citi Private Bank's own strategic asset allocation methodology. It determines the suitable long-term mix of assets for each client's investment portfolio. Correlation is a statistical measure of how two assets or asset classes move in relation to one another. Correlation is measured on a scale of 1 to -1. A correlation of 1 implies perfect positive correlation, meaning that two assets or asset classes move in the same direction all of the time. A correlation of -1 implies perfect negative correlation, such that two assets or asset classes move in the opposite direction to each other all the time. A correlation of 0 implies zero correlation, such that there is no relationship between the movements in the two over time.

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LIBOR - The London interbank offered rate is the rate of interest at which banks offer to lend funds to each other. It is used a reference rate for large amounts of financial contracts.

Price-to-book ratio (P/B) compares the capitalization of an individual stock or of an index of stocks to the value of that stock or that index's combined shareholder capital. It is calculated by dividing the current closing price of the stock by the most recently reported book value per share. A low P/B can indicate a lowly-valued company or index, while a high P/B can indicate high valuation.

Price-earnings ratio (P/E) measures a company's or an index of companies' current share price relative to its earnings per share. A low P/E can indicate a lowly-valued company or index, while a high P/E can indicate high valuation.

Return on equity (ROE) is the amount of net income earned as a percentage of shareholders equity. It captures a company's profitability - or aggregate profitability among numerous companies - by showing how much profit is achieved with shareholders' capital.

Strategic asset allocation is the process of creating a long-term investment plan by assembling an appropriate mix of equities, fixed income, cash and other investments. It can potentially enhance portfolio returns and help manage risk. Strategic Return Estimates are Citi Private Bank's forecast of returns for specific asset classes over a 10-year time horizon. The forecast for each specific asset class is made using a proprietary methodology that is appropriate for that asset class. Equity asset classes are forecast using a proprietary methodology based on the calculation of valuation levels with the assumption these valuation levels revert to their longterm trends over time. Fixed Income asset classes are forecast using a proprietary methodology based on current yield levels. Other asset classes have other specific forecasting methodologies. Please note that hedge funds, private equity, real estate, structured products and managed futures are generally illiquid investments and are subject to restrictions on transferability and resale. Each SRE is gross of actual client fees and expenses. Components of the methodology used to create the SREs include the rate of return for various asset classes based on indices. Termination and replacement of investments may subject investors to new or different charges. Past performance is not indicative of future results. Future rates of return cannot be predicted with certainty. Investments that pay higher rates of return are often subject to higher risk and greater potential loss in an extreme scenario. The actual rate of return on investments can vary widely over time, especially for long-term investments. This includes the potential loss of principal on your investment. It is not possible to invest directly in an index.

Tactical asset allocation looks to adjust the strategic asset allocation of a client's investment portfolio to incorporate shorter-term market insights.

Volatility - is a statistical measure of the variation of returns for a given security, market index, or asset class. It is most often measured by way of standard deviation. The higher the volatility, the riskier the underlying asset is considered to be.

Yield-to-Maturity (YTM) is the total return received on a bond or index of bonds when held to maturity. The total return includes both the payment of coupons and the return of the principal at maturity.

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Bond rating equivalence

Alpha and/or numeric symbols used to give indications of relative credit quality. In the municipal market, these designations are published by the rating services. Internal ratings are also used by other market participants to indicate credit quality.

Bond credit quality ratings	Rating agencies		
Credit risk	Moody's ¹	Standard and Poor's ²	Fitch Ratings ²
Investment Grade			
Highest quality	Aaa	AAA	AAA
High quality (very strong)	Aa	AA	AA
Upper medium grade (Strong)	A	A	A
Medium grade	Baa	BBB	BBB
Not Investment Grade			
Lower medium grade (somewhat speculative)	Ba	BB	BB
Low grade (speculative)	B	B	B
Poor quality (may default)	Caa	CCC	CCC
Most speculative	Ca	CC	CC
No interest being paid or bankruptcy petition filed	C	D	C
In default	C	D	D

¹ The ratings from Aa to Ca by Moody's may be modified by the addition of a 1, 2, or 3 to show relative standing within the category.

² The ratings from AA to CC by Standard and Poor's and Fitch Ratings may be modified by the addition of a plus or a minus to show relative standing within the category.

(MLP's) - Energy Related MLPs May Exhibit High Volatility. While not historically very volatile, in certain market environments Energy Related MLPs may exhibit high volatility.

Changes in Regulatory or Tax Treatment of Energy Related MLPs. If the IRS changes the current tax treatment of the master limited partnerships included in the Basket of Energy Related MLPs thereby subjecting them to higher rates of taxation, or if other regulatory authorities enact regulations which negatively affect the ability of the master limited partnerships to generate income or distribute dividends to holders of common units, the return on the Notes, if any, could be dramatically reduced. Investment in a basket of Energy Related MLPs may expose the investor to concentration risk due to industry, geographical, political, and regulatory concentration.

Mortgage-backed securities ("MBS"), which include collateralized mortgage obligations ("CMOs"), also referred to as real estate mortgage investment conduits ("REMICs"), may not be suitable for all investors. There is the possibility of early return of principal due to mortgage prepayments, which can reduce expected yield and result in reinvestment risk. Conversely, return of principal may be slower than initial prepayment speed assumptions, extending the average life of the security up to its listed maturity date (also referred to as extension risk).

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MBS are also sensitive to interest rate changes which can negatively impact the market value of the security. During times of heightened volatility, MBS can experience greater levels of illiquidity and larger price movements. Price volatility may also occur from other factors including, but not limited to, prepayments, future prepayment expectations, credit concerns, underlying collateral performance and technical changes in the market.

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Investing in smaller companies involves greater risks not associated with investing in more established companies, such as business risk, significant stock price fluctuations and illiquidity.

64 Factors affecting commodities generally, index components composed of futures contracts on nickel or copper, which are industrial metals, may be subject to a number of additional factors specific to industrial metals that might cause price volatility. These include changes in the level of industrial activity using industrial metals (including the availability of substitutes such as manmade or synthetic substitutes); disruptions in the supply chain, from mining to storage to smelting or refining; adjustments to inventory; variations in production costs, including storage, labor and energy costs; costs associated with regulatory compliance, including environmental regulations; and changes in industrial, government and consumer demand, both in individual consuming nations and internationally. Index components concentrated in futures contracts on agricultural products, including grains, may be subject to a number of additional factors specific to agricultural products that might cause price volatility. These include weather conditions, including floods, drought and freezing conditions; changes in government policies; planting decisions; and changes in demand for agricultural products, both with end users and as inputs into various industries.

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