We live in an age of disruption, in which business models, industries and even our daily lives are being transformed. As the pace of disruption accelerates, we look at game-changing shifts that are redefining ideas around investment performance and value and how investors can navigate this new landscape.
ALL CHANGE

While macroeconomic conditions might suggest a return to “normal,” disruptions on all sides require investors to embrace change and look for the opportunities.

CHANGE THE GOAL, CHANGE THE GAME

In our latest investment roundtable, we look at how institutional investors are redefining ideas of performance and value beyond traditional metrics.

THE NEW ALTERNATIVES PARADIGM

Alternatives remain an important portfolio component, but liquidity lessons and factor approaches are transforming how investors build their exposures.

DISRUPTION IN ACTION

Automobiles, healthcare and retail are in the front lines of creative destruction: we look at what those disruptions mean for investors.

DEMOGRAPHIC DISRUPTION

Ageing populations around the world are challenging assumptions about saving and investing.
As we move into the final stretch of 2017, the global economy continues to grind higher, with overall growth for the year slated to improve for the first time in three years. While the stimulus expected from the new Trump administration has languished, the equity bull market in the US nonetheless is charging into its ninth year. Unemployment in many advanced economies has reached multi-year lows, yet wages and inflation remain tame.
With a more advanced recovery in the US, the Fed has already started to normalize monetary policy, while other central banks have signaled they will begin tapering their accommodative policies as well. Ten years after the first tremors of what would become a global financial crisis, are we finally returning to “normal”?

While we may have reached an important inflection point in the global economic recovery cycle, the kinds of structural forces that are transforming companies, industries and economies make it difficult to think in terms of any normal: new, old or otherwise. Instead, we expect that disruptions on many levels are set to accelerate, and discerning investors need to apply an all-change view to the world to understand and capitalize on them.

**Game-Changing Goals**

We start with disruptions in our own investment management industry, where long-term investors are broadening the definitions of value, performance and objectives beyond traditional metrics. Rather than risk-adjusted returns alone, we need...
to focus on risk-adjusted outcomes, defined across a far wider array of criteria. In our latest investment roundtable, we hear from the outgoing head of the second largest pension fund in the Netherlands, Else Bos, on why she believes large asset owners need to account for the broader economic, environmental and social impact of their investments. In her new role at the Dutch central bank overseeing pension plans and insurance companies, she will continue to promote the national sustainability development goals she helped spearhead during her time at PGGM.

Other institutional investors are developing similarly broad goals and are pushing their investment managers to develop better data and processes to achieve them, as we learn from Rebecca Fender of the CFA Institute, who leads their Future of Finance practice. We also get an update from Lou Maiuri of State Street’s Global Exchange group, which is already applying artificial intelligence (AI) and machine learning technologies to improve the quality and consistency of ESG data to help asset owners and asset managers better assess those non-financial impacts.

Continuing our all-change theme, we look at how dynamic factor-based strategies are disrupting the hedge fund world. A new generation of long/short systematic approaches is able to capture many of the same premia that were once the sole realm of traditional hedge fund trading strategies, and are now available in a far more fee-efficient format. We have now launched our own version of this approach for investors seeking uncorrelated sources of alpha, which also help to protect on the downside. In addition, we describe a new and more efficient way for institutional investors to source bond liquidity in order to acquire, dispose of, or tactically shift fixed income assets within our large pools of seasoned credit assets.
Sector Disruption

Perhaps the quickest acceleration of change is happening in some of the most traditional industries that are being disrupted and disintermediated beyond recognition, as our sector analysts describe. Major car companies are already planning for a not-too-distant future in which the owner-driver model that has prevailed since the industry’s inception gives way to large, automated car sharing platforms. As GM President Dan Amman has remarked, “we expect to see more change in our industry in the next five years than there has been over the last 50.” We look at the first stage of that transition, as battery electric vehicles overtake the machine that ruled the road for more than a century: the internal combustion engine.

The consumer discretionary sector is also transforming before our eyes, with Amazon redefining modern retail value chains. But what would a disruptor of Amazon look like? Our sector analysts describe the three technology-driven trends retailers need to harness to challenge the consumer behemoth.

Old Titans Versus New

While aging demographics and technology advances create tailwinds for the healthcare industry, pricing pressures are forcing companies to overhaul their business models to reduce costs and accelerate the time to market for blockbuster drugs. As big data and machine learning transform the drug discovery process itself, mergers and acquisitions (M&A) have become a new form of research and development (R&D), allowing companies to leapfrog the usual 10–15 year development process by acquiring more mature pipelines for innovative therapies.

Demographic Destinies

Finally, we introduce the work of Amlan Roy, our new Global Chief Retirement Strategist, who has spent his entire career analyzing the intricacies of global demographics and their effects on economies and markets. Amlan lays out the five most important impacts of demographic changes and discusses how policymakers and investors should respond. Along with technology-driven transformations, demographics is perhaps one of the most disruptive forces reshaping the global economy and capital flows. As such, we consider it a key input into our long-term, top-down analysis and investment decision-making.
As the age of disruption challenges long-held assumptions across companies and industries, it is not surprising that investment management is also undergoing major shifts.

New technology, big data and factor-based approaches are disrupting conventional approaches to portfolio management. However, we believe even more far-reaching changes are occurring as institutional investors redefine their objectives beyond traditional portfolio metrics and look at the broader impact of their investment choices. In this latest investment roundtable, we speak to industry stakeholders about what this shift in perspectives on performance and value will mean for asset owners and asset managers alike as well as for the future of the profession.
Lori, how do you describe the trends that are redefining how institutional investors think about performance and their investment objectives?

HEINEL I think there are three transformations underway. The first is moving from a short-term mindset to a long-term one. After all, most investors’ objectives are long-term, whether it is saving for retirement or financing long-term spending plans. Managers should align solutions to those longer horizons. Changing the lens to focus on the long-term has several benefits. The best example involves the tools that active managers have at their disposal, whether on the fundamental or quantitative side, to capture insights about a company’s future earnings power or growth prospects and generate alpha over the long-term. You also gain a very different perspective on risks and opportunities when you take a long-term perspective.

The second shift is recognizing that focusing on relative performance or conventional risk-adjusted return metrics doesn’t necessarily align with a client’s ultimate objective. We saw that very clearly, for example, with liability-driven investing (LDI). Just focusing on returns alone without understanding the liability stream did not always achieve the desired outcome. Yet LDI is just one example of a number of different client objectives that go beyond returns per unit of risk. You can think of various outcomes like income per unit of risk or inflation protection per unit of risk. In essence, this is also what is driving the shift from products to multi-asset solutions: a more holistic view of what investors are trying to achieve over a longer time horizon.

But I think the third trend is really a game-changer for the industry. That is the way in which clients are increasingly focused on outcomes that may be unrelated to conventional measures of performance at all. Investing with a view toward environmental, social and governance (ESG) factors is certainly is one of the strongest examples of that. And now we are beginning to see more asset owners responding to their stakeholders’ desire to understand the broader impact of their investments on the environment, the economy and society as a whole. That has huge implications for how we think about performance and value.
Else, in many ways the Netherlands has been at the forefront of this trend. How did that shift come about for PGGM?

**BOS** It was a journey that began about 15 years ago and was very much driven by the interests of our clients. As you know, we manage a very large pool of assets for the PFZW, which is the big pension plan for the Netherlands’ care and cure sector. So these are beneficiaries who are quite involved with what happens in the world around them. These ESG issues are important to them and they want us to incorporate those considerations into the investments we make on their behalf. The early steps in that direction involved both exclusion and engagement.

But the big step forward has been focusing explicitly on impact over the last five years. Building on what Lori said, for us I think being a long-term investor means investing in companies that can make a difference in the real economy. The other very important part is that we continue to look at this from a risk-and-return perspective. So we look at risks beyond traditional metrics, and we look at opportunities in terms of both returns we can harvest but also as ways to improve the world we are living in. Taking those two dimensions together has been very important in the way we have handled this.
Fender When we did a major survey of more than 1,000 global investment leaders at the end of last year to get a sense of how they see the future of the investment management industry, the results showed that they are seeking a more purposeful capitalism. While only 11% said the investment industry currently has a very positive impact on society, more than half said it could in the future, contingent on stronger principles. We also found that having a long-term investment horizon means that there is deeper thinking about the interconnectedness of various players in the industry.

CFA Institute believes that we need a smarter way of thinking about investing. Central to that is recognizing that our profession is part of a complex ecosystem. There are many points of connection and a reflexivity dynamic of mutual effects. If you consider individual investors or the organizations that are investing on their behalf as well as the broader context of society, the environment and the economy, then there really are far more stakeholders than we’ve acknowledged in the past. Once you start to tease out those different connections, you begin to understand the broader impact of investment management.

Bos I agree that it is important to consider all of the players in the value chain. When I think of the Netherlands’ national plan of action for executing the United Nations’ Sustainable Development Goals (SDGs), bringing together all of the main players up front was a key accomplishment. So now, because we have the regulators and the asset managers, asset owners, companies and the government involved, it makes it easier for us to push the initiative forward. That broader coalition of stakeholders is important because it means you start to think differently. You focus not just on your own set of challenges but on the higher purpose behind the initiative.

A very important part of our efforts has to be the recognition that if you really want to get serious about moving sustainable investment and the SDGs forward, you need to get the public behind them. People have to start talking about them rather than just investors alone, because as beneficiaries they will then start asking questions of their asset owners like us and we can then start pushing our asset managers. Getting the regulators involved was important, too, as they influence the thinking of asset owners and drive the transparency and reporting around these goals.

Rebecca Fender’s evolution in thinking align with what your survey on the future of finance found?

Change the Lens, Change the Goal, Change the Game

The CFA Institute has long argued that we need a smarter way of thinking about investing. Central to that is recognizing that our profession is part of a complex ecosystem.

Rebecca Fender
Of course, one of the more difficult challenges as we move beyond traditional performance metrics is the question of how do we measure these new attributes? How do we get companies to report relevant data on a consistent basis? Moreover, it becomes even more challenging to measure intangible attributes around long-term value creation. For example, it is easier to measure the carbon or water intensity of a particular company than to measure how engaged their workforce is.

I think we’re all struggling with that measurement question. One of the reasons I like initiatives like Focusing Capital on the Long Term (FCLT), which both PGGM and State Street are part of, is that it brings together asset owners, asset managers, corporates and regulators to think through these problems collectively.

I agree, and it is good that we have so many great minds focused on this, whether it is the Task Force on Climate-Related Financial Disclosures or other groups. We work closely with SASB and recently announced a partnership with PRI in which we will be talking to investment professionals over the next six months about non-financial factors and the kind of data they will need to better analyze these factors. We want to see how we as a profession can move toward standards that help people make better decisions. Our Future of Finance survey showed that nearly three-quarters of investment leaders expect that ESG factors will become more influential in our profession. It’s just that we don’t have the standardized data yet to make that happen.

The quality and consistency of ESG data is a genuine problem. We’ve joined forces with some tech firms that are using artificial intelligence to scour unstructured ESG data to identify intangible value and related non-financial risk factors embedded in investment portfolios. Our dataset is based on SASB’s Materiality Framework and we are working with them to promote the industry data standard for ESG investing. Whether it’s risks or opportunities related to ESG, you can’t manage what you can’t measure.

At the same time, through our stewardship efforts we are trying to guide companies as to the kind of granular ESG reporting that would help us capture the data we need. We’re also involved with other asset owners and asset managers in a project EY is spearheading to come up with new accounting metrics that capture long-term value. EY’s CEO Mark Weinberger likes to illustrate the shortcomings of today’s metrics by pointing out that if, for example, a company spends a significant amount of money on robots, that is registered on its balance sheet as a capital investment. Yet if the company spends the same amount of money on retraining or up-skilling its workers, it is considered an expense.

Yes, I believe we need to adjust our views around what constitutes “value.”

That also means that as a profession, we need to continually update our training for the next generation of financial analysts, so that they will understand how to assess a broader set of new criteria.
So where do you think we go from here in terms of redefining performance and objectives to include the kinds of attributes and metrics that are important to a broader group of stakeholders: beneficiaries, employees, policymakers?

**MAIURI** First of all, I am confident that we will begin to make good progress on the measurement front by applying new technologies that will allow us to improve both the quality and consistency of ESG data, even when it comes to more intangible kinds of attributes. This is key for moving the industry forward, and that is the commitment that we are working toward.

**BOS** I believe that the focus on impact will continue to spread throughout the industry, driven by the interests of our beneficiaries but also by the realities of our world. The reason I am interested in circular economic principles is because, however you look at it, a rapidly growing middle class worldwide means we are going to bump up against resource constraints fairly soon. I think that will by definition force important questions around how we use and reuse resources. This will have an enormous impact on business models as companies change their thinking from “pay for ownership” to “pay for use.” It will change how manufacturers think about the lifecycle of products. This in turn should have a big effect on how investment analysts assess the sustainability of companies and their business models.

**HEINEL** I agree that asset managers will need to develop new kinds of scorecards for assessing performance. I use the analogy of cars to show how the definition of performance today is already broadening beyond alpha alone. For example, someone buying a Maserati is probably first and foremost interested in a high-performance engine. But what about buyers of Teslas, which offer both high performance and a lower carbon footprint? Or what about the emphasis on safety that draws buyers to Volvos? Or the emotional connection to classic old cars like a ’67 Mustang? The point is that as asset managers we need to expand our ideas around performance and value to encompass a much wider array of criteria than we have in the past.

Moreover, both asset owners and asset managers need to acknowledge the new reality that we face a broader group of stakeholders who are disrupting our conventional ideas about performance. As Else mentioned, it is the multiple players in the value chain who need to come together to move the industry to its next level. As asset managers, we need to work collaboratively to do the necessary research and develop the expertise and metrics to help all of our stakeholders invest in the kind of world they want for themselves and future generations.

“...as asset managers we need to expand our ideas around performance and value to encompass a much wider array of criteria than we have in the past.”

**LORI HEINEL**
The new investment reality of more challenging markets requires long-term investors to cast a critical eye on their portfolios to ensure they are allocating their capital in the most risk- and fee-efficient ways. As the underlying drivers of risk-and-return are better understood, institutional investors recognize that alternatives play an increasingly important role in enhancing return potential, diversifying risk and providing downside protection. But as with other portfolio components, investors need to understand the distinct risk-and-return trade-offs that come with alternative investments, including liquidity and operational risks.
Moreover, in the same way that factor-based approaches are challenging traditional long-only active managers, long-short factor approaches are disrupting many hedge fund managers, requiring them to demonstrate their distinctive value-add. Still, a growing number of institutional investors recognize that alternatives have moved into the mainstream and will remain a critical building block in helping them achieve their long-term investment objectives.

**Fit For Purpose**

**Sizing the Appropriate Alternatives Portfolio**

Clearly the size and type of alternatives allocations will vary according to investment objectives: corporate DB plans close to full funding and wishing to defease their liabilities are likely to have less of an appetite for illiquid alternatives with extended lock-ups than, say, public pension plans or endowments and foundations with long-term, ongoing liabilities or spending plans. Also, we acknowledge that “alternatives” is a broad term for very differentiated asset classes and trading strategies that provide orthogonal exposures with complementary characteristics. When it comes to creating an alternatives portfolio, there is no one-size-fits-all approach.

Private equity, real estate, and hedge funds are the three largest alternative asset classes; PWC projects that together the three will comprise nearly 75 percent of overall alternative assets by 2020.¹ Worldwide alternative assets under management reached a record of roughly $8 trillion as of year-end 2016, with private investments accounting for more than half of this total.² Alternatives have enjoyed exponential growth in recent years, as investors have searched for incremental risk-and-return in a modest return environment. Figure 1 shows the targeted...
allocations of more than 500 institutional investors surveyed by Prequin. While a notable, but diminishing portion of investors remain with minimal exposure, especially to private equity, we believe that the complexities related to manager sourcing, portfolio construction, and liquidity management will recede as barriers in this new investment reality. That said, liquidity management remains a crucial component of any alternatives allocation.

**GFC Lessons Learned**

**A Paradigm Shift in Liquidity**

One of the most dramatic lessons of the Global Financial Crisis (GFC) was a greater appreciation of liquidity risk during market shocks and the need to stress test portfolios for liquidity events. During the crisis we saw declining asset values along with private market alternatives that had capital commitments that spanned over a decade. The resulting denominator effect drove private market alternatives allocations much higher than the intended exposure, leaving portfolios less liquid and forcing some institutional investors to sell assets at distressed prices to fund portfolio liquidity needs.

Access to liquidity is not static. It is important to consider the liquidity of alternative investments and their underlying positions, specifically during periods of market duress. Allocations to the illiquid components of alternatives are and should be thought of as a long-term commitment of capital.

**Alternative Strategies**

**A Robust Opportunity Set**

By the latest count, public companies comprise just 0.1% of the more than 5.7 million total U.S. firms. Moreover, the number of listed US companies has declined by almost 50% over the last 20 years because of higher costs, greater regulatory burdens and other constraints. Private equity thus provides access to a vast opportunity set of less efficient markets. In our private equity investments, we expect to earn a return premium of 300 to 500 basis points over public markets. We expect that illiquidity premium to drift to the lower end of that range in the interim as public market returns move below trend and a surplus of market liquidity remains.

Real estate markets, meanwhile, remain relatively well supported by steady job growth, investors’ search for income, and low financing costs. Real assets like property may also provide investors with a measure of inflation protection and capital preservation. However, the distinctive attributes of individual properties and markets coupled with the risk of overpaying where prices...
have recovered since the global financial crisis highlight the need to work with managers who are well versed in local market conditions.

Within public markets, hedge funds provide greater access to price dispersion and idiosyncratic trading. The rise of factor-based, long/short investing is poised to disrupt the traditional hedge fund industry. Factor-based hedge funds can capture a diversified range of systematic returns, while providing enhanced transparency, lower fees, and better liquidity than traditional hedge funds. Hedge fund managers that provide a differentiated, skill-based approach that cannot be easily systematized will continue to command a premium. Many hedge fund managers have struggled in recent years to deliver on their investment mandate. However, we believe that as we move into a more normalized monetary policy environment, higher return dispersions along with lower asset class correlations should provide a more supportive environment for hedge funds.

**Alternatives for Pension Plans**

Large pension plans are increasingly adopting a liability-driven approach that seeks to match the duration of their assets to the duration of their liabilities. As funded status increases, sponsors are switching their portfolios away from risk-seeking investments and towards risk-reducing ones. We believe it is important that the components of an alternatives portfolio span the liquidity risk spectrum to best address an investor’s risk-and-return objectives. For example, pension plans with a lower funded status and longer-term liabilities can use their long time horizon as an opportunity to capture the illiquidity premium with a meaningful allocation to private equity.

A lesson we learned from the GFC, which we apply to the pension plans we manage through our outsourced CIO business, is to assign a dollar target to illiquid investments; as plans de-risk, that dollar value is reduced. We then fund alternative allocations pro rata based on the component mix of risk-reducing and risk-seeking assets. This is an important shift from the traditional portfolio percentage approach and needs to be addressed when determining the appropriate size and mix of an alternatives portfolio.

Other institutional investors like endowments, foundations and sovereign institutions might have a much more diversified alternatives program across both liquid and illiquid investments with alternatives comprising 25% or more of their portfolios. For the three major alternatives categories, here are the issues we think investors should keep in mind:

- **HEDGE FUNDS**
  - Disruption caused by factor-based strategies is raising the bar on hedge fund managers to demonstrate their value-add, net of fees.
  - Lower correlations should drive dispersion across securities, assets, and geographies
  - Combining systematic and discretionary strategies for complementary exposures can produce a more capital-efficient hedge fund program

- **REAL ESTATE**
  - Important to diversify across the capital structure and geographic regions
  - Provides long-term total returns and current income as investors search for yield in a low rate environment
  - Offers lower duration than private equity

- **PRIVATE EQUITY**
  - Considerable “dry powder,” so it is important to consider valuations
  - Important to be invested throughout the cycle, so diversify across sectors and vintages
  - Work with strong management teams with experience across economic cycles
  - Select managers that have access to a robust network to source deals
Alternatives Go Mainstream

We believe institutional investors will continue to need alternatives to augment public market returns and diversify away from public equity market risk. However, not all alternatives are created equal. Given the important role alternatives play in delivering non-correlated alpha and reducing portfolio risk, we think it is more important than ever to construct a durable, efficient, objectives-based alternatives portfolio.

Compensation for the illiquidity of private capital may ebb and flow. But for investors with long time horizons and known funding requirements, we believe exposure to the illiquidity premium, alpha opportunities and diversification benefits of private equity should be part of an alternatives portfolio.

Direct real estate investing is one of the oldest forms of alternative investments. Its characteristics of an attractive yield less tied to the direction of interest rates and purchasing power protection are as useful now as they have ever been.
Hedge funds will remain an important source of unconstrained access to public markets and downside risk protection. In our view, factor investing will disrupt a segment of the traditional hedge fund industry, while complementing discretionary hedge funds that provide true idiosyncratic alpha. The new paradigm for institutional investors will involve building more capital-efficient alternatives programs that are customized for their specific needs in a more transparent, fee-conscious and liquidity-aware format.

“We think it is more important than ever to construct a durable, efficient, objectives-based alternatives portfolio.”

3. Joan Farre-Mensa, “Comparing the Cash Policies of Public and Private Firms,” SSRN, April 2014. NYSE and NASDAQ capitalizations were approximately $12 trillion and $5 trillion as of July 2012.
5. 2016 Citi Prime Finance Survey.
Photo by Oli Scarff/Getty Images.
Workers at an Amazon fulfillment house prepare for Cyber Monday.
Technology-driven disruption and disintermediation have turbocharged Josef Schumpeter’s more gradual view of capitalism’s creative destruction and evolution. The pace of change is speeding up. Who can imagine life without smart phones, even though those pocket computers have only been around for a decade? Entire industries are being upended in ways investors need to understand in order to identify the winners and losers. automobiles, healthcare and retail are three sectors in the front lines of creative destruction and transformation, while new technology and regulation could alter how institutions access liquidity in the credit markets. Our analysts describe what the changes mean for investors.
Electric Vehicles Drive Change in the Auto Industry

JOHN SAAGER

Figure 1 Energy Density and Cost Reduction of Electric Vehicle Batteries by Generation

With battery electric vehicles (BEVs) rapidly approaching cost parity with internal combustion engines (ICEs), investors should be aware of the implications for the auto industry and its upstream partners — from raw materials mining and semiconductors to the utilities that support the charging infrastructure. In the future landscape of mobility services and autonomous vehicles, the very idea of owning and driving cars will change.

As countries announce plans to ban sales of fossil fuel–powered ICEs to tackle air pollution, and battery costs fall faster than expected, Tesla’s progress in making BEVs popular and affordable is forcing auto industry leaders like Volkswagen, Toyota and Volvo to radically change their business plans. In our view, the path for BEVs to take the lead over ICEs is open, but there are hurdles to further market penetration that must be cleared. Consumers will adopt BEVs when the cars are well designed, with range at competitive cost and access to fast charging stations.

Range Anxiety

More efficient battery technologies could mollify consumers’ understandable anxiety about purchasing electric vehicles with limited driving range. For a lithium-ion battery to be cost effective relative to an ICE, it would need a range of around 300 miles at a price of $100 per kilowatt hour (kWh). Based on the long and steady history of improvements in battery chemistry and gains in production efficiency, cost parity between BEVs and ICEs could be reached by 2022 or 2023 (see Figure 1).
Charging Infrastructure and Efficiency

To allow wider use of BEVs over ICEs, significant capital expenditures will be required to provide adequate access to fast charging stations. The infrastructure improvement process has made a promising start, as the Environmental Protection Agency’s diesel emissions settlement with Volkswagen has mandated that $2 billion be spent on the construction of charging stations throughout the US. In addition, we have observed broad government commitments to expanding charging station networks globally in the coming years (see Figure 2).

BEV charging stations must also shorten the time to repower. Even the industry-leading Superchargers exclusive to Tesla take at least 30 minutes to fully recharge their batteries. So a 1000-mile trip would still take longer in a 300-mile range BEV than in a conventional ICE.

Figure 2: Electric Vehicle Charging Station Networks will Expand

Industry Realignment

Despite these obstacles, automakers have shifted gears to increase the variety of BEVs in development and on the market. Volvo has even announced that it will discontinue the production of pure ICE vehicles starting with its new models in 2019. This trend is likely to persist as global environmental regulations continue to tighten and consumer preferences shift toward the technologically advanced, socially responsible and increasingly fashionable BEVs.

As we see it, investors should recognize that the surge in BEV adoption will have massive implications for many different industries. Miners of raw materials used in batteries — including lithium, nickel, copper and cobalt — should experience positive fallout, along with producers of the chemicals, semiconductors, anodes and cathodes needed to meet increased demand from battery manufacturers. The benefits of rising BEV production may not be a boon to battery manufacturers themselves, however, as high government subsidies in Korea, Japan and China will likely keep competitors’ returns down despite the massive ramping up of both supply and demand.

Drilling and distribution of fossil fuels for ICEs will eventually be challenged by the transition from refueling to charging stations, although not for some time. Even with our ahead-of-consensus estimates for 8% to 12% BEV penetration by 2025, we expect that sales of cars with at least partially gas-powered engines will actually be higher in 2025 than today. What will likely change is that the gains in sales will be slower than their traditional pace in line with GDP and population growth.

Truly viable BEVs would clear a major roadblock to the development of autonomous vehicles by allowing them to be recharged cheaply and quickly while not in use. This in turn could accelerate the trend to replace car ownership with fleet vehicles for ride-sharing apps and other mobility services. While reliable self-driving technology may still take many years to perfect, we agree with the futurists that when it becomes widely available, it will pave the way for even more disruption in the auto industry.

In the meantime, we believe the better way to ride through these transformations is to go upstream in the value chain where there is already demand, rather than in the automobile industry itself. For example, we would look in the materials sector for companies that mine the lithium compounds used in batteries or in the technology sector for semiconductors and other devices. We expect to see little return among the automakers that have to invest so much capital to change their entire manufacturing processes, while automotive suppliers are at a point in the cycle where their valuations are stretched.

1 Estimates on cell costs vary, but we estimate that Tesla is somewhere in the $105–$115 per kWh range, with traditional automakers coming in near the $140–$150 range.

2 According to Matt Teske, 20-year automotive industry veteran, BEV marketing/strategy consultant and founder of Chargeway (www.chargeway.net). While slower charging stations with only 1–2 plugs rated at 50 kilowatts can cost as little as $50,000, each of Tesla’s supercharging stations with 4–8 plugs rated at 120 kilowatts is estimated at $450,000.
One of the sectors most affected by technological disruption and disintermediation is healthcare. Advances in technology and big data are expected to help accelerate the process of discovering the next blockbuster cure, even as the industry itself undergoes unprecedented consolidation and convergence. Pricing pressures are forcing the adoption of new business models that reduce intermediaries and emphasize efficiencies of scale and cost structures.

Despite new technologies, drug development remains a lengthy, expensive and highly risky process. The research and development (R&D) lifecycle for advancing new drugs through multi-stage testing and approvals still takes 10–15 years at a whopping average cost of USD 2.5 billion — and only 5% of compounds make it through to the end. Adding to big pharma’s cost pressures are those products close to the end of their patent protection cycles. Moreover, the huge growth in healthcare costs in markets like the US is putting pressure on drug makers to lower prices.

Taken together, these forces have helped drive periodic waves of merger and acquisition (M&A) activity in the sector over the past 25 years. In total, there have been close to 600 deals, each with a value above USD 1 billion, during this period. While M&A in healthcare tends to be less dilutive than in other sectors, there is still a large dispersion in outcomes (see Figure 1). According to our analysis, we estimate that around 40%–50% of deals actually destroy shareholder value. Each transaction must be considered on its own merits, of course, but we found that deals focused solely on cost-cutting tended to be unsuccessful.

**Innovate or Die**

In our experience, the most successful deals have focused on innovation and growth, rather than cost-cutting. Obviously if companies overpay for acquisitions, that destroys value as well. But with the cost of developing drugs so high,
many companies have found that acquiring an advanced drug pipeline and innovative therapies is one of the most cost-efficient ways to bypass years of research and billions of dollars spent on development. For many companies, we believe M&A has become the quickest and cheapest path to effective R&D. Acquiring new compounds that are more advanced in the R&D process can also be an effective way for companies to offset the declines in revenue from products whose patent protection is expiring (see Figure 2).

**Game-Changing Therapies**

So what are the more promising areas of drug innovation? We think the revolution in immunotherapy for cancer treatment offers some of the most exciting game-changing therapies. The first generation involves a new wave of drugs that can prime the immune system to seek out and destroy cancer cells, potentially improving cure rates and extending life expectancy for patients with certain types of tumors. For example, through Roche’s involvement with Genentech — first acquiring a majority stake in 1990 and then buying out the minority shareholders in 2009 — its clinics have discovered, developed and launched many monoclonal antibodies that have become the standard of care in the fight against cancer, including blockbusters like Herceptin, Avastin and Rituxan.

Another milestone M&A deal in oncology was Merck’s acquisition of Schering Plough in 2009, gaining access to a patented antibody.

Figure 2 **Leapfrogging the R&D Timeline**

<table>
<thead>
<tr>
<th>TYPICAL R&amp;D TIMELINE ~ 15 YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drug Discovery</strong></td>
</tr>
<tr>
<td>10,000 compounds</td>
</tr>
</tbody>
</table>

M&A can help companies leapfrog over several stages of the drug R&D cycle. It is also:

- **LOW RISK**
- **COST EFFECTIVE**
compound discovered by Organon, which Schering had acquired from Akzo Nobel in 2007. That compound, Keytruda, has been taken through the R&D process by Merck, approved for a range of tumors by the FDA and been on the market for three years, with sales projected to hit USD 11 billion by 2022.¹

Thanks to these acquisitions, Roche and Merck are likely to be major players in the next wave of therapies for cancer and other rare conditions, which may involve techniques like gene editing that hold the promise of not just treating but curing disease. Such curative approaches may initially be more expensive than current standards of care, but may lead to longer-term savings to the healthcare system as patients who get better will no longer require treatment for chronic conditions.

**Finding the Winners**

Despite a more recent slowing of M&A activity in the healthcare sector, we believe companies will continue to consolidate and restructure because of persistent price-cutting pressures. Healthcare is one of the last sectors to rationalize its supply chains, so we expect to see new business models developing that will also include service rationing to keep costs down.

In drug and device development, we expect the most successful companies will be those that can harness innovation through M&A and are adept at integrating the acquisition. They will be better protected against pricing pressures. At the same time, companies that fail to innovate will be negatively affected in an outsized way.

We think large-cap biotech can be an attractive area of opportunity, as bigger companies may be better positioned to expedite the regulatory approval and patent processes. And with deeper distribution networks for selling their newly acquired innovations to a wider audience, they can accelerate revenue generation to offset the high costs of R&D. With populations aging around the world, the sector will continue to enjoy strong tailwinds. The individual winners will be those who use innovation to keep their pipelines filled, lower their costs and grow their revenue base.

¹ Bloomberg consensus estimate as of August 10, 2017.
New Ways to Make the Consumer Connection

JEFFREY LOOBY & MICHAEL NEFT

### REASONS CONSUMERS SHOP ONLINE*

(Averages shown in percents)

<table>
<thead>
<tr>
<th>CONVENIENCE</th>
<th>BETTER PRICE</th>
<th>NOT AVAILABLE IN LOCAL STORES</th>
<th>OTHER REASON</th>
<th>BETTER QUALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.9</td>
<td>29.6</td>
<td>10.6</td>
<td>3.0</td>
<td>1.8</td>
</tr>
</tbody>
</table>

#### Averages Breakdown

<table>
<thead>
<tr>
<th>Category</th>
<th>Convenience</th>
<th>Better Price</th>
<th>Not Available in Local Stores</th>
<th>Other Reason</th>
<th>Better Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groceries or personal care items*</td>
<td>48.3</td>
<td>29.2</td>
<td>12.5</td>
<td>5.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Clothing†</td>
<td>45.5</td>
<td>28.6</td>
<td>19.2</td>
<td>2.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Furniture or household goods†</td>
<td>40.7</td>
<td>39.7</td>
<td>12.3</td>
<td>3.0</td>
<td>2.9</td>
</tr>
<tr>
<td>Electronics or appliances‡</td>
<td>38.3</td>
<td>50.5</td>
<td>6.8</td>
<td>1.8</td>
<td>2.0</td>
</tr>
<tr>
<td>Books, music or DVDs†</td>
<td>48.7</td>
<td>34.9</td>
<td>12.0</td>
<td>2.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Travel-related items (plane tickets, hotel rooms)†</td>
<td>58.9</td>
<td>29.4</td>
<td>8.5</td>
<td>1.8</td>
<td>1.0</td>
</tr>
<tr>
<td>Tickets to live events, like sporting events, concerts or movies†</td>
<td>68.5</td>
<td>14.4</td>
<td>12.7</td>
<td>2.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Food delivery or carryout†</td>
<td>82.2</td>
<td>10.3</td>
<td>1.0</td>
<td>3.9</td>
<td>1.1</td>
</tr>
</tbody>
</table>
Disintermediation of the value chain and personalization of products and services will change everything about the customer’s experience of buying. This will fundamentally alter what it takes to be profitable in the consumer sector and influence the types of companies investors should consider.

Amazon is king of the hill now. When it comes to selling standardized goods out of centralized distribution centers, we would argue that no one — not even Wal-Mart — offers greater choice and convenience at lower cost, which are by far the primary reasons that shoppers go online (see Figure 1).

Growing from an online bookseller to the largest supplier of cloud services, Amazon has captured market share across a vast array of products and services that consumers are now looking to buy online. This is especially remarkable in the ever-changing retail landscape, where yesterday’s prince has become today’s pauper — think Sears.

What could challenge Amazon’s dominance? In an industry characterized by constantly shifting consumer preferences, we see rapidly evolving technology amplifying three forces that are likely to determine tomorrow’s leaders: disintermediation, personalization and customer experience. In our view, other firms will be able to challenge Amazon’s leadership position if they are as good or better at anticipating the future state and adapting their business models to master these trends.

**Disintermediating the Value Chain**

The consumer value chain has conventionally been broken down into product branding/intellectual property, manufacturing, logistics and retailing. Technology has allowed many firms to consolidate these multiple functions into their businesses, creating advantages over traditional models.

For instance, technology has enabled Amazon to establish direct relationships with its customers, build an online marketplace offering hundreds of millions of goods and guarantee two-day delivery on millions of these items. The company has invested large amounts of capital to internalize many logistics functions typically provided by third parties. Amazon has done this at a scale whereby the company can deliver goods to customers with shorter shipping windows and at a lower cost versus the competition.

To date, companies with more traditional models have lost share to Amazon, as they have had difficulty combining new technologies with existing bricks-and-mortar assets.

**Personalizing Products**

As long as Amazon’s value proposition depends on wide selection, low price and fast delivery of mass-produced goods, we think personalization may prove to be an area where competitors can make inroads. Again with technology facilitating the link between brands and consumers, firms could engage with market segments as small as one individual. Digital connectivity
enables two-way information sharing so that products can be customized to meet the explicit tastes of consumers — think of Nike and Converse inspiring buyers to design their own unique footwear, L’Oréal blending makeup to match a particular skin tone, Modern Tailor or Proper Cloth making a custom shirt to measure.

Brands offering this degree of personalization may be able to differentiate themselves from the mass-selling business model and build deeper emotional bonds with consumers. And we are already seeing advances in manufacturing technology helping to ring in an era of mass personalization and local production, as more versatile automated factory equipment can accelerate retooling and make small batch sizes economically viable.

**Enhancing the Customer Experience**

Owners of intellectual property also have the potential to leverage their brand equity by exercising more control over the sales process and creating a better buying experience. Through e-commerce data analytics, brand websites can track browsing activity to learn what interests shoppers, then suggest related products and extend discounts to tempt reluctant buyers. When a desired item is out of stock, this can be an opportunity for upselling to a more expensive alternative, rather than losing the sale to a competitor. Brands can add value through product education and services offered both before and after purchases, such as free shipping and returns.

But for brands to outperform aggregators on experience outside of personalized products, they have to provide brand-specific opportunities — for example, early access to new releases, exclusive invitations to events and interactions with brand ambassadors. When the exchange of information between buyers and sellers is viewed as mutually beneficial, the direct-to-customer model allows brands to be more responsive, enabling them to maintain a deeper knowledge of their markets. This trend creates space for niche players to defend or expand market share against low-cost competitors by connecting and resonating with their customers, building even more brand equity in the process.

**Positioning to Fend Off Competitive Challenges**

For the time being, Amazon is still the dominant force in retail, taking a 36% share within e-commerce, which accounted for 11.5% of retail excluding food service, autos and gas in 2016. But even with Amazon’s supremacy, we have found opportunities as global investors in select luxury and mass affluent brands, like athletic footwear, which have been able to defend their franchises through customer loyalty and their reputations for quality. We are also interested in categories that are more immune from the current challenges posed by Amazon, such as home improvement, convenience stores and restaurants.

Going forward, we are looking to invest in companies with strong brands that can offer personalized and unique customer products and experiences, while controlling manufacturing and delivering those products directly to consumers.

---

1 “AWS dominates cloud computing infrastructure market, bigger than IBM/Google/Microsoft combined” zdnet.com as of February 6, 2017.
2 Sources: US Census Bureau, Department of Commerce “Advance Monthly Sales for Retail & Food Services” as of July 14, 2017 and “Quarterly Retail Sales Report” as of May 16, 2017; Amazon.com Inc. as of July 28, 2017; SSGA estimates as of July 31, 2017.
Credit in the Cloud?
MATT NEST

Institutions have struggled to find liquidity in fixed income markets ever since financial regulations restricted investment banks from warehousing risk, especially in smaller, less frequently traded areas of the market. But the large pools of seasoned credit assets managed by big global firms, like State Street Global Advisors, offer a new avenue for investors to source liquidity in a faster, more transparent and cost-efficient way.

State Street’s vast pool of global fixed income assets increasingly resembles a liquidity model similar to the cloud computing model that has transformed information technology (IT). Large investors can acquire, dispose of or tactically shift fixed income assets at a lower cost with more scale, volume and efficiency by working directly with a large asset manager. This is especially important for those parts of the market, like high yield, where liquidity is thinner. State Street is well positioned to work closely with counterparties and clients to ensure that we appropriately balance the various trade-offs with respect to liquidity, cost and time, helping to benefit both new clients and existing shareholders in our products. Below we highlight one of the many ways we are working with institutions to provide new, disintermediated ways to access the fixed income liquidity they need.

**Challenge**
A large corporate pension plan approached State Street with a problem: they wanted to increase an already sizable allocation to high yield bonds, but they were unhappy with their active manager. When they asked us to index the portfolio, they were also concerned about the cost and time it would take to make the transition, as regulatory changes have reduced the amount of bonds warehoused at banks. Typically such transitions can take a number of business days and involve additional costs paid to intermediaries.

**Solution**
In this scenario, we suggested that the client transition assets and cash into an ETF. Then we moved a slice of assets out of the ETF into a commingled fund, and the client received shares in that fund. This approach resulted in an extremely diversified portfolio of indexed high yield bond exposure, implemented in days at a cost that would be hard to replicate accessing capital markets directly. Now the client also has their high yield assets managed by State Street at a lower cost.

We believe this is just one of the many new ways a combination of regulation and technology is disrupting institutional fixed income investing.

**Engagement**
As one of the world’s largest asset managers, State Street manages USD 21 billion in high yield assets in index and active strategies in exchange traded and commingled fund formats. Clients move into and out of these products daily, so we trade billions in volume each year. Given State Street’s large and varied participation in the high yield markets, we have insight, access and tools that few others managers can bring to bear. We also have a client-centric, solutions-oriented approach that allows us to help find the best approach for our clients.

1 As of August 2017.
Unprecedented demographic changes are under way across the world, and their speed and magnitude are greater than ever before. Like the technology disruptions overturning conventional wisdom about industries and business models, demographic disruptions will force countries to rethink foundational policies around retirement, labor force participation, healthcare and much more. Investors will need to rethink savings and spending objectives over much longer time horizons. We believe the impacts of these demographic shifts have not been adequately assessed and accounted for.
Demographics Is About More Than Aging

Demographics are often thought to refer only to increases in life expectancy and the numbers of young versus old. In fact, demographics pertain to a much broader set of “people characteristics,” that is, those of every consumer and worker. At a macro level, both consumer and worker behavior affects GDP: the former consumes much of what the latter produces. At a micro level, consumers and workers influence the income statements and balance sheets of individuals, households, companies and countries.

While age is a factor in how people behave, it is not the only one. People behave differently as workers and consumers depending on their gender, income, education, wealth, family background and environment. Technological advances and globalization trends also exert a big influence. This heterogeneity of behaviors has complex effects on economic growth, inflation, debt, asset prices, geopolitics, migration and sustainability, all of which need to be understood in order to formulate the correct policy responses from governments and help investors construct their portfolios.
First is the so-called demographic time-bomb, which describes the combination of big increases in life expectancy with dramatic drops in fertility rates, to an extent that is unprecedented in human history. Below is a chart showing how global life expectancy and fertility rates have changed since 1700 (see Figure 1).

The greatest increase in life expectancy occurred in the 20th century, with the average life span more than doubling from 30 years to 65 years due to advances in medicine and healthcare. Meanwhile, global fertility rates have decreased from five children per woman in 1950–55 to 2.5 children per woman in 2010–15. This has been driven primarily by changes in developed markets, for example, greater female participation in the workforce, better access to contraception and lower infant mortality rates. Such a change is also historically unprecedented.

However, the impact on economic growth of these changes has been significant. Economic growth relies on growth in population, productivity and hours worked. As population growth falls and the available labor force shrinks, GDP growth weakens — something we are already witnessing in some advanced economies, even as they recover from the 2008 financial crisis. Lower growth, inflation and interest rates coupled with rapid urbanization across the world are exacerbating inequality and creating environmental problems. Just under half of us currently live in cities. By 2030, that proportion will be closer to three-quarters.
2 Unsustainable Pressure on National Budgets

The second disruptive change has been the growing pressure on the budgets and national debt of advanced countries from past promises made on pensions, healthcare and long-term care. As people live longer and require more care, but still retire in their 60s, governments are switching money away from public services to fund pensions and health, as we can see in the example for the European Union in Figure 2.

In most countries, age-related expenditures currently account for 20%+ of GDP and are projected to increase further. This is unsustainable now and will become even more so in the future without radical reform. Company pension plans are facing shortfalls for similar reasons and matching or reducing liabilities has become the focus for many schemes.

3 Demographic Dividend in Emerging Markets

The third important disruptor is the “demographic dividend” of emerging markets, which is crucial to EM growth. Many assume that this applies to the higher number of young people in emerging markets as opposed to developed markets, which coupled with better population growth, should result in a bigger workforce. While these developments are occurring, they are not enough for emerging markets to grow. To achieve this, countries need to invest in the education and skills of their young people, ensure greater female participation and create more jobs.
Mass Migration in a Globalized World

Large flows of people within and between countries for economic or security reasons are proving to be a challenge for even the most liberal countries. From 1990 to 2013, global migration increased by 50% from 154 million to 232 million and has continued to rise in the wake of conflict in the Middle East and the prospects of a better life in the West. Figure 3 shows how migration in 2013 broke down across countries and reasons for migration.

Work, or economic migration, was the main reason for migrant inflows into Japan, while it was family in France, Italy and the US and free movement in Germany and the UK. Such mass movements of people are creating tensions between migrants and natives, furthering geopolitical unrest and triggering surprise electoral outcomes such as Brexit and the election of President Trump.

Figure 3 Migrant Inflows, 2013

<table>
<thead>
<tr>
<th>REASON</th>
<th>US</th>
<th>GERMANY</th>
<th>UK</th>
<th>FRANCE</th>
<th>ITALY</th>
<th>JAPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>75.9k</td>
<td>24.3k</td>
<td>86.4k</td>
<td>26.8k</td>
<td>73.1k</td>
<td>25.1k</td>
</tr>
<tr>
<td>Family</td>
<td>735.0k</td>
<td>56.0k</td>
<td>64.7k</td>
<td>104.6k</td>
<td>81.1k</td>
<td>20.6k</td>
</tr>
<tr>
<td>Humanitarian</td>
<td>119.6k</td>
<td>30.7k</td>
<td>20.7k</td>
<td>11.7k</td>
<td>8.8k</td>
<td>0.2k</td>
</tr>
<tr>
<td>Free Movement</td>
<td>N/A</td>
<td>354.8k</td>
<td>98.3k</td>
<td>95.5k</td>
<td>77.9k</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Source: OECD, ILO, CS.
Numbers within circles represent the biggest reason for inflows into a given country.
Behavioral Differences Between Generations

The final disruptor is unexpected differences in behavior across the generations. Many had assumed that so-called millennials (born in 1983–2000) would behave in the same way as the post-war baby boomers. In fact, millennials are getting married and having children later, not seeking a single occupation for lifetime employment and having a different economic impact.

Today’s young adults, for example, consume relatively less than their corresponding cohorts born a generation or two earlier. They start accumulating assets later due to longer years in education. High youth unemployment and high student debt levels have created additional pressures, causing them to embrace the “sharing economy.” Job uncertainty is also leading to increased precautionary saving among workers and can affect overall economic confidence. Simultaneously, differences in savings and investment patterns across generations are affecting capital flows and current accounts.

The effects of all these disruptions are deep, long-lasting and accelerating. From an economic standpoint, the greatest consequences will be for growth, inflation, debt and asset prices. Demographics are also weighing on mechanisms such as monetary policy levers and, in some cases, rendering them ineffective amid low interest rates and inflation. (This topic has been widely discussed at central bank conferences over the last decade.)

From a social perspective, the most profound impact is on geopolitics, climate change and dealing with the human costs of migration.
How Should Policymakers and Investors Respond?

Governments

Governments will need to take multiple actions to deal with these complex issues, the most pressing of which is to increase economic growth. Lower long-term growth will mean lower GDP per capita — a measure of prosperity — that is, future generations will be less well off than their parents and burdened by large amounts of public debt. To achieve higher growth, governments need to encourage more people of working age into the labor force, improve their productivity or increase the hours that they work. This has implications for labor market reform, gender equality, immigration, productivity and technology, as well as skills and education.

Figure 4 shows the different rates of labor force participation across advanced countries in the G6. Older countries such as Japan, Germany, Italy and France could all increase growth by encouraging more women to enter and remain in the workplace. Several countries have already switched from incentivizing all workers to retire early to persuading them to work for longer.

One way to encourage people to stay in work is to abolish mandatory retirement ages and allow flexible retirement for workers into their 60s and 70s. Another is to promote lifelong training and education, so that people can switch careers or upskill later in life. There may also be a role for selective migration with benefits to both host and donor countries and the movement of jobs rather than people via outsourcing and offshoring.

Governments also have to wrestle with inequality and youth unemployment even as technology and automation threaten further disruption. The best outcome may be to marry the experience of older employers with the energy and drive of younger ones, making both more productive.

Figure 4 Labor Force Participation G6 — 2015 Gender Labor Participation Differences

<table>
<thead>
<tr>
<th>Country</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>52%</td>
<td>61%</td>
</tr>
<tr>
<td>Germany</td>
<td>54%</td>
<td>66%</td>
</tr>
<tr>
<td>Italy</td>
<td>40%</td>
<td>58%</td>
</tr>
<tr>
<td>Japan</td>
<td>49%</td>
<td>70%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>57%</td>
<td>68%</td>
</tr>
<tr>
<td>United States</td>
<td>56%</td>
<td>69%</td>
</tr>
</tbody>
</table>

Investors

Consumers and workers influence economic fundamentals, which in turn drive growth and investment returns, and affect how capital markets behave. So the most important action investors can take is to integrate an understanding of demographic effects into their decision-making.

Pension funds and insurers, in particular, need to evaluate how demographics will affect not only liabilities, but also assets. They also need to encourage pension holders to save more and seek independent advice when considering how to invest for a longer retirement.

To cope with the complexity of the new environment, investors need to adopt multi-period financial models\(^1\) that can handle a broader range of asset classes, time-varying risk premia, correlations and volatility. Finally, they need flexible, lower-cost, multi-asset solutions that factor in future scenarios for growth, inflation and asset prices and can adapt to different market conditions.

Without this appreciation of how demographic forces are disrupting our world and how we should respond, investment opportunities may be missed and longer-term risks may become acute.

---

10. See footnote above: the author has been advocating the need for reduced gender inequality across more than 50 countries.
Commingled Fund refers to a mutual fund that pools the assets of multiple accounts in order to reduce risks and costs.

CPB World Trade Monitor is a monthly time series that aggregates and summarizes data on both international trade and industrial production.

Demographic Dividend describes the rise in a country’s economic growth that is fueled by its working-age population becoming a larger share of the population than its non-working-age population.

Denominator Effect describes the phenomenon of falling values in public markets causing allocations to illiquid asset classes to go over the (generally) strict allocation guidelines. Portfolios then must sell out of their best performing assets in order to meet allocation requirements.

Factor-based Hedge Funds are hedge funds that employ strategies to capture the factors driving risk-and-return in various asset classes.

Group of Six (G6) refers to the US, UK, Germany, France, Italy and Japan.

Illiquidity Premium is the amount an investor must be compensated for holding an asset that cannot be easily converted into cash.

Liquidity Event is the process through which investors in illiquid assets convert their investments to cash.

Time-varying Risk Premia refers to the fluctuations over time in financial compensation demanded by investors.
CONTACTS

AUSTRALIA
State Street Global Advisors, Australia Ltd.
Level 17, 420 George Street
Sydney, NSW 2000
T +61 2 9240 7600
F +61 2 9240 7611
(ABN 42 003 914 225) is the holder of an Australian
Financial Services Licence (AFSL Number 238276).

BELGIUM
State Street Global Advisors Belgium
Chausse de la Hulpe 120
1000 Brussels, Belgium
T +32 (0)2 633 2036
F +32 (0)2 672 2077
State Street Global Advisors Belgium is a branch office
of State Street Global Advisors Limited. State Street
Global Advisors Limited is authorized and regulated by
the Financial Conduct Authority in the United Kingdom.

CANADA
State Street Global Advisors Ltd.
770 Sherbrooke Street West, Suite 1200
Montréal, Quebec, H3A 1G1
T +1 514 282 2400
F +1 514 282 3048
State Street Global Advisors Ltd.
30 Adelaide Street East, Suite 500
Toronto, Ontario M5C 3G6
T +1 416 463 3000
F +1 416 463 3300

FRANCE
State Street Global Advisors France
Immeuble Défense Plaza
23–25 rue Delarivière-Lefoullon
92064 Paris La Défense Cedex
T (+33) (0) 1 44 45 40 00
F (+33) (0) 1 44 45 41 92
Authorized and regulated by the Autorité des
Marchés Financiers. Registered with the Register
of Commerce and Companies of Nanterre under
the number 412 052 680.

GERMANY
State Street Global Advisors GmbH
Brienner Strasse 59
D-80333 Munich
T +49 (0)89 55878 100
F +49 (0)89 55878 440

HONG KONG
State Street Global Advisors Asia Ltd.
6th Floor
Two International Finance Centre
8 Finance Street
Central, Hong Kong
T +852 2103 0288
F +852 2103 0200

IRELAND
State Street Global Advisors Ireland Ltd.
Two Park Place, Upper Hatch Street
Dublin 2
T +353 1 776 3000
F +353 1 776 3300
State Street Global Advisors Ireland Limited
is regulated by the Central Bank of Ireland.

ITALY
State Street Global Advisors Ltd.
Sede Secondaria di Milano Via dei Bossi,
4 20121 Milan
T +39 02 32066 100
F +39 02 32066 155

JAPAN
State Street Global Advisors (Japan) Co. Ltd.
Toranomon Hills Mori Tower 25F1–23–1
Toranomon, Minato-ku Tokyo
105–8325 Japan
T +81 3 4530 7380
F +81 3 4530 7364

NETHERLANDS
State Street Global Advisors Netherlands Ltd.
Apollo Building, 7th floor
Herikerbergweg 29
1101 CN Amsterdam
T +31 (0) 20 7181701
F +31 (0) 20 7087329
A branch office of State Street Global Advisors
Limited; authorized and regulated by the Financial
Conduct Authority in the United Kingdom.

SINGAPORE
State Street Global Advisors Singapore Ltd.
168 Robinson Road, #33–01 Capital Tower
Singapore 068912
T +65 6826 7500
F +65 6826 7501
Company Reg. No: 200002719D

SWITZERLAND
State Street Global Advisors AG
Beethovenstrasse 19
Postfach, CH–8027 Zurich
T +41 (0)44 245 70 00
F +41 (0)44 245 70 16

UNITED KINGDOM
State Street Global Advisors Ltd.
20 Churchill Place
Canary Wharf, London, E14 5HJ
T +44 (0)20 3395 6000
F +44 (0)20 3395 6350
Authorized and regulated by the Financial
Conduct Authority. Registered in England,
Number 2509928; VAT No. 5776591 81.

UNITED STATES
State Street Global Advisors
State Street Financial Center
One Lincoln Street
Boston, MA 02111–2900
T +1 617 664 7727
F +1 617 664 4024
State Street Global Advisors Worldwide Entities

**Australia:** State Street Global Advisors, Australia, Limited (ABN 42 003 914 225) is the holder of an Australian Financial Services Licence (AFSL Number 238276). Registered office: Level 17, 420 George Street, Sydney NSW 2000, Australia. T: +612 9240 7800. F: +612 9240 7611.

**Belgium:** State Street Global Advisors Belgium, Chaussée de La Hulpe 120, 1000 Brussels, Belgium. T: 32 2 663 2038. F: 32 2 672 2077.

**Canada:** State Street Global Advisors, Ltd., 770 Sherbrooke Street West, Suite 1200 Montreal, Quebec, H3A 1G1, T: +1 514 282 2400 and 30 Adelaide Street East Suite 500, Toronto, Ontario M5C 3G6. T: +647 775 9900.

**Dubai:** State Street Bank and Trust Company (Representative Office), Boulevard Plaza 1, 17th Floor, Office 1703 Near Dubai Mall & Burj Khalifa, P.O Box 28838, Dubai, United Arab Emirates. T: +971 (0)4 4372800. F: +971 (04) 4372618.

**France:** State Street Global Advisors France. Authorised and regulated by the Autorité des Marchés Financiers. Registered with the Register of Commerce and Companies of Nanterre under the number 412 052 680. Registered office: Immeuble Défense Plaza, 23-25 rue Delarivière-Lefouillon, 92064 Paris La Défense Cedex, France. T: (+33) 1 44 45 40 00. F: (+33) 1 44 45 41 92.

**Germany:** State Street Global Advisors GmbH, Brienner Strasse 59, 80336 Munich. Authorised and regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht ("BaFin"). Registered with the Register of Commerce Munich HRB 121381. T: +49 (0)89 55878 400. F: +49 (0)89 55878 440.

**Hong Kong:** State Street Global Advisors Asia Limited, 6B/F, Two International Finance Centre, 8 Finance Street, Central, Hong Kong. T: +852 2103 0288. F: +852 2103 0289.

**Ireland:** State Street Global Advisors Ireland Limited is regulated by the Central Bank of Ireland. Incorporated and registered in Ireland at Two Park Place, Upper Hatch Street, Dublin 2. Registered Number: 145221. Member of the Irish Association of Investment Managers. T: +353 (0)1 776 3000. F: +353 (01) 776 3300.

**Italy:** State Street Global Advisors Limited, Milan Branch (Sede Secondaria di Milano) is a branch of State Street Global Advisors Limited, a company registered in the UK, authorised and regulated by the Financial Conduct Authority (FCA), with a capital of GBP 71,850,000.00, and whose registered office is at 20 Churchill Place, London E14 5HJ. State Street Global Advisors Limited, Milan Branch (Sede Secondaria di Milano), is registered in Italy with company number 06353340968 - R.E.A. 1867090 and VAT number 06353340968 and whose office is at Via dei Bassi, 4 - 20121 Milano, Italy. T: 39 02 32066 108. F: 39 02 32066 155.


**Netherlands:** State Street Global Advisors Netherlands, Apollo Building, 7th floor Heinkenbergweg 29 1101 CN Amsterdam, Netherlands. T: 31 20 7187101. SSAGA Netherlands is a branch office of State Street Global Advisors Limited. State Street Global Advisors Limited is authorised and regulated by the Financial Conduct Authority in the United Kingdom.

**Singapore:** State Street Global Advisors Singapore Limited, 188, Robinson Road, #33-01 Capital Tower, Singapore 068912 (Company Reg. No. 200002719D, regulated by the Monetary Authority of Singapore). T: +65 6826 7555. F: +65 6826 7501.

**Switzerland:** State Street Global Advisors AG, Bahnhofstr. 19, CH-8027 Zurich. Authorised and regulated by the Eidgenössische Finanzmarktaufsicht (“FINMA”). Registered with the Register of Commerce Zurich HRB 7600. T: +41 (0)44 245 70 00, F: +41 (0)44 245 70 10.


**United States:** State Street Global Advisors, One Lincoln Street, Boston, MA 02111-2900. T: +1 617 786 3000.

Investing involves risk including the risk of loss. The whole or any part of this work may not be reproduced, copied or transmitted or any of its contents disclosed to third parties without SSGA’s express written consent. The information provided does not constitute investment advice and it should not be relied on as such. It should not be considered a solicitation to buy or an offer to sell a security. It does not take into account any investor’s particular investment objectives, strategies, tax status or investment horizon. You should consult your tax and financial advisor. All material has been obtained from sources believed to be reliable. There is no representation or warranty as to the accuracy of the information and State Street shall have no liability for decisions based on such information.

The views expressed in this material are the views of each of the respective authors noted as of 14 September 2017 and are subject to change based on market and other conditions. This document contains certain statements that may be deemed forward-looking statements. Please note that any such statements are not guarantees of any future performance and actual results or developments may differ materially from those projected.

Equity securities are volatile and can decline significantly in response to broad market and economic conditions.

Diversification does not ensure a profit or guarantee against loss.

The trademarks and service marks referenced herein are the property of their respective owners. Third party data providers make no warranties or representations of any kind relating to the accuracy, completeness or timeliness of the data and have no liability for damages of any kind relating to the use of such data.

Companies with large market capitalizations go in and out of favor based on market and economic conditions. Larger companies tend to be less volatile than companies with smaller market capitalizations.

Investments in small mid sized companies may involve greater risks than in those of larger, better known companies.

Investing in foreign domiciled securities may involve risk of capital loss from unfavorable fluctuation in currency values, withholding taxes, from differences in generally accepted accounting principles or from economic or political instability in other nations.

Investments in emerging or developing markets may be more volatile and less liquid than investing in developed markets and may involve exposure to economic structures that are generally less diverse and mature and to political systems which have less stability than those of more developed countries.

All the index performance results referred to are provided exclusively for comparison purposes only. It should not be assumed that they represent the performance of any particular investment.
About Us

For nearly four decades, State Street Global Advisors has been committed to helping our clients, and those who rely on them, achieve their investment objectives. We partner with many of the world’s largest, most sophisticated investors and financial intermediaries to help them reach their goals through a rigorous, research-driven investment process spanning both indexing and active disciplines. With trillions* in assets under management, our scale and global reach offer clients access to markets, geographies and asset classes, and allow us to deliver thoughtful insights and innovative solutions.

State Street Global Advisors is the investment management arm of State Street Corporation.

* Assets under management were $2.61 trillion as of June 30, 2017. AUM reflects approx. $34.06 billion (as of June 30, 2017) with respect to which State Street Global Advisors Funds Distributors, LLC serves as marketing agent. State Street Global Advisors Funds Distributors, LLC and State Street Global Advisors are affiliated.