IQ

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NEUBERGER | BERMAN

ASSET ALLOCATION'S HALO EFFECT

VOLATILITY, HIGHER RATES AND SHIFTING CORRELATIONS REINFORCE THE VALUE OF EFFECTIVE ASSET ALLOCATION.

IN THIS ISSUE

JOHN F. GEER, JR., *Managing Editor*

Finding Harmony in a Dissonant Market

Markets and economies have been sounding conflicting notes recently, in terms of growth, monetary policy and trade.

U.S. economic growth has been impressive. As Fed Chairman Jerome Powell recently put it, we are in a "good place." Supported by tax cuts and reduced regulation, second-quarter GDP hit an estimated 4.1% and corporate earnings potentially more than 20%. More folks are reentering the workforce, consumer spending is up and real estate markets are solid.

Other parts of the world are doing less well. The European economic recovery has slowed, hampered by Brexit and Italy's political turmoil, as well as energy prices and uncertainty over trade conflict. Japan's expansion remains sluggish. Dollar strength has been pressuring much of the emerging markets.

The dissonance extends to monetary policy. The Fed is on course to raise interest rates a total of four times this year, and three more times in 2019. Inflation is running hotter than its 2% target, which creates the danger that the central bank may need to be more aggressive. At the same time, the bond yield curve is near flat, suggesting that investors expect the economy to slow. The ECB, in contrast, isn't raising rates but has discontinued new bond purchases.

Finally, there's trade. The President jolted the G-7 by refusing to sign a joint statement in Canada, and has been imposing levies on a range of goods from allies and rivals alike. The U.S. and China seem to exchange trade volleys every week or so, as tension between the two nations intensifies. So far, markets appear to view all this as a "negotiation," and we think that the world's two largest economies will likely find compromise—hopefully before too much damage is done.

The net result of this cacophony has been a volatile market, with U.S. earnings and growth battling tightening, trade worries and global economic trends for dominance. In our view, there's enough strength in the economy to keep the cycle going into next year—something that could find voice in the market—but not without challenges along the way.

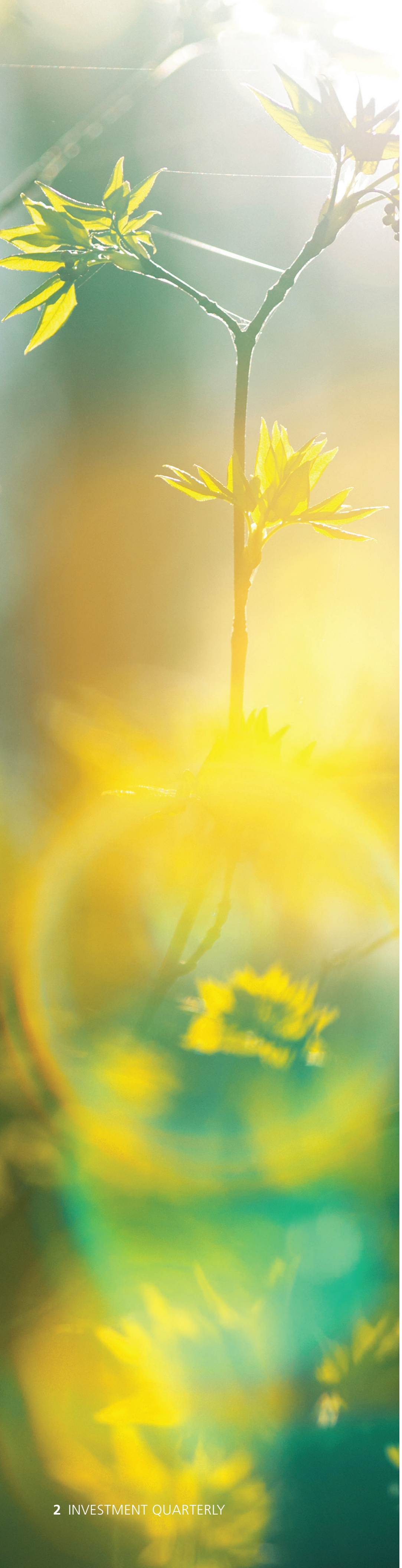
For investors, we believe the path in seeking portfolio "harmony" remains the same: customized asset allocation coupled with active management based on fundamental research. In this issue of *Investment Quarterly*, our lead article explores the continued value of asset allocation amid shifts in investment correlations. Other topics include ESG (environmental, social and governance) investing, an update of our "Ten for 2018" outlook, the implications of "5G" connectivity, financial planning across life stages, and the benefits of an external CIO for foundations, endowments and institutions.

I hope you enjoy this issue of *IQ*. As always, please do not hesitate to contact your Neuberger Berman representative with any questions about the markets or your portfolio.

Joseph V Amato

JOSEPH V. AMATO
President and Chief Investment Officer – Equities

Asset Matters



Asset Allocation's Halo Effect

Volatility, higher rates and shifting correlations reinforce the value of effective asset allocation.

INVESTMENT STRATEGY GROUP

Asset allocation has long been a foundation of personal investing. Its diversification of risk and return by allocating among multiple assets classes and sectors with varying historical performance patterns can provide an attractive overall investment profile that can mitigate downside risk. In essence, the whole portfolio becomes more appealing than its component parts.

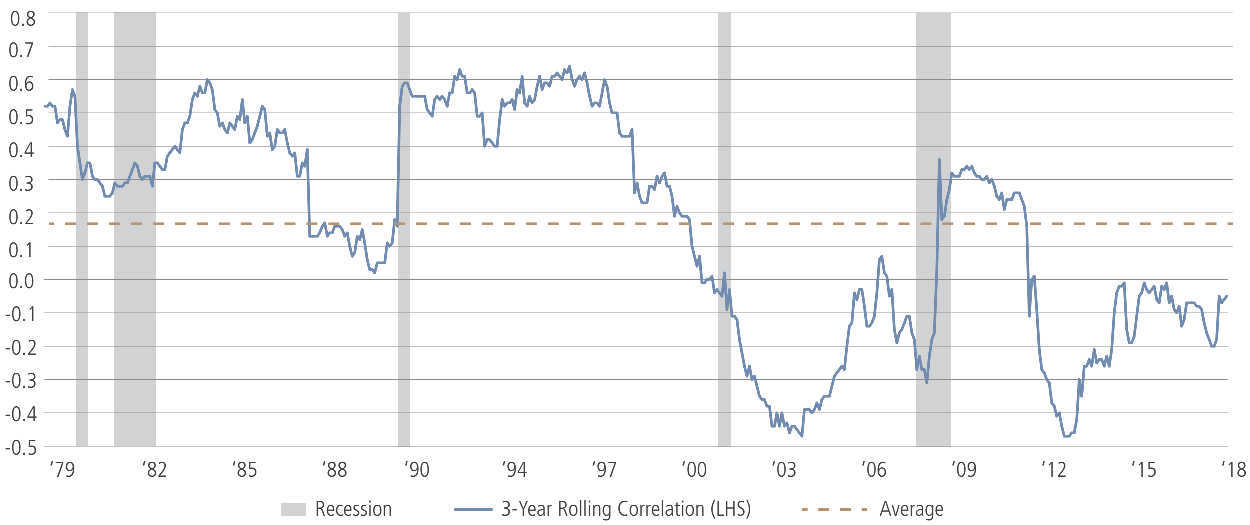
Despite its general acceptance, however, asset allocation has at times endured criticism and headwinds. During the 2008 financial crisis, for example, many investors were surprised at how multiple asset classes moved in tandem in response to market panic and liquidity failures, leading to a reassessment of certain risk practices. Later, risk assets' correlations (or their tendency to move together) increased with the influence of loose central bank policy and hyper-connected global markets, reducing their value as diversifiers.

Today, with increasing price inflation and the Fed's gradual withdrawal of monetary accommodation, markets have returned to higher, more normal levels of volatility than had been prevalent in the recent past. This might be considered an ideal time for diversification, but unfortunately we are seeing a potential unwinding of a relationship that has helped asset allocators for years: negative correlations between stocks and bonds.

For almost two decades, investors benefited from a general tendency of these two asset classes to move in different directions, which reduced portfolio volatility and, given the secular bull market in fixed income, enhanced the traditionally lower return profile associated with allocating to lower-risk assets. However, it was easy to forget that the relationship between stocks and bonds has been highly cyclical. Before the current regime, stocks' correlations with investment grade bonds were positive for much of the 1980s and 1990s, and have generally been slightly positive for the last 40 years overall (see display on facing page).

STOCK/BOND CORRELATIONS COME IN CYCLES

Stock/Bond Return Correlation



Source: Bloomberg. Stocks and bonds are represented by the S&P 500 and BofA Merrill Lynch Broad Market Fixed Income Index, respectively. Three-year rolling correlations reflect monthly total returns of the two asset classes.

WHAT MAKES CORRELATIONS CHANGE?

The reasons for such shifts can be complex but typically involve prevailing market and economic conditions. Correlations tend to be negative during periods of low growth and low inflation, and positive when growth and inflation are higher. Positive correlations have generally hit their highest levels toward the end of a business cycle, when central banks attempt to cool down the economy by tightening monetary policy. This hurts existing bonds because their yields become less attractive versus new issuance as rates move higher. Meanwhile, stocks can face headwinds due to companies' increased financing costs and potential drops in demand, as well as their reduced appeal from a valuation perspective. Specifically, higher yields raise the discount rates with which the market assesses future earnings streams—the higher the discount rate, the lower the theoretical intrinsic value of a company.

Last year's Fed rate hikes had minimal impact on stocks given enthusiasm about tax cuts and still-loose credit conditions. But this year, inflation- and rates-related news has been more damaging. In early February, strong labor and inflation numbers contributed to a sharp downturn across equities and fixed income. And stocks have generally been more volatile amid pressure on bonds, with more examples of the two asset classes moving in the same direction on the same day. Indeed, the percentage of days the bond market has been down on days when the S&P 500 Index also posted a loss has increased from 36.4% last year to 48.1% so far in 2018. This compares to a 45.6% average rate since April 1989.[1]

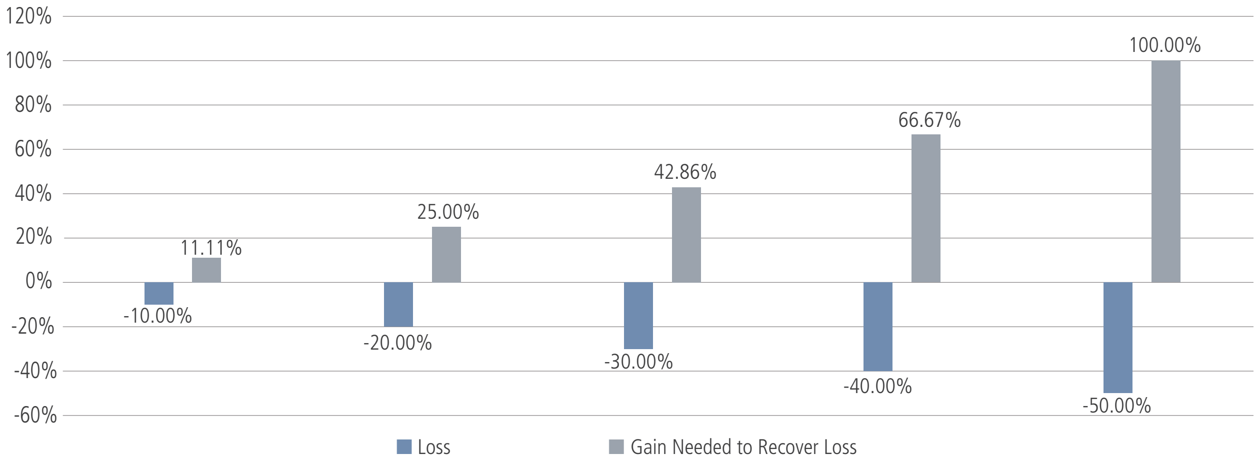
As it stands, the Fed anticipates two additional rate increases this year and then three in 2019. The impact on stocks could be dampening, although it depends to some degree on whether strong earnings can offset pressure from higher rates. For bonds, conditions will likely continue to be a challenge. If the next four rate hikes equate to a one percentage point increase in the 10-year Treasury yield, at current levels that would translate into an approximate 8.5% price decline.[2] Individual investors tend to be diversified, of course, but the "marked-to-market" impacts could still be negative, even more so if coupled with a drop in stocks.

TAKING SHIFTING CONDITIONS INTO ACCOUNT

How then should all this affect how investors think about asset allocation? Happily, for investors with well-constructed portfolios the general answer should be "not much." Taking a step back, in our view asset allocation should be individualized based on a thorough discussion of your financial situation, including your risk tolerance and specific investment goals and objectives. What this means is that it shouldn't hinge on a particular set of economic and market scenarios. It should have breathing room on the up- and downside to be truly effective.

[1]Source: Bloomberg, data through June 29. Stocks and bonds represented by the S&P 500 and the BofA Merrill Lynch Broad Market Fixed Income Index, respectively.
[2]Source: Ryan ALM, WSJ.com. As of June 19, 2018, the Ryan 10-Year Treasury Index had a duration (or sensitivity to a single percent change in interest rates) of 8.5%.

COMPOUNDING OBSTACLE: LARGER DECLINES REQUIRE LARGER RECOVERIES



Source: Neuberger Berman.

That being said, the assumptions that go into an asset allocation model need to be educated and should account for things like changes in correlations. It's worth noting that the inputs into a *strategic* allocation are by definition long term in nature. As a result, the variable character of the overall stock/bond relationship is likely to be captured as part of a large data set, while newer, shorter-term fluctuations are taken into account on an incremental basis.

There are some things investors can do. While having *strategic* long-term allocations is key, we favor asset allocations that allow for short-term *tactical* shifts (within defined ranges) that provide the ability to capitalize on shorter-term market dynamics. For example, it may make sense to lighten up on long-term Treasuries and other securities that are particularly vulnerable to rising interest rates, or introduce assets with a strong relationship to inflation or higher rates to offset potential weakness elsewhere in the asset mix. Looking at our Asset Allocation Committee views, within its 12-month outlook it currently has an overweight stance on emerging markets debt and equity, an underweight view of global bonds, and favors Treasury Inflation-Protected securities given current inflation risks.[3] An asset allocation framework that allows for *tactical* shifts can enable investors to express these types of short-term views in their portfolios. (See the Committee views on the back-inside cover of this publication.)

Beyond such tactical shifts, investors can consider broadening the universe of assets in which they look to invest. This could include a range of fixed income sectors—whether municipals, corporates, mortgage-backed securities or emerging markets debt—but also alternative investments. Private equity and hedge fund strategies, for example, often have risk/return characteristics that are quite different from traditional securities, and thus could help enhance the risk/return profile of an overall portfolio. And put-writing strategies, which sell downside protection in stocks in exchange for a premium, can provide equity market participation with lower volatility.

KEEPING MOVEMENTS IN CONTEXT

In thinking about these issues, it's worth keeping in mind that, at a basic level, asset allocation modeling relies on three key variables: return, risk and correlation. Generally, this combined stew serves up an "efficient" mix of assets, which is designed to optimize return potential for a given level of risk. As noted above, when assets tend to move together (correlation) that will typically reduce the effectiveness of portfolio diversification. However, the magnitude of such movements (risk) is also important. So, for example, although short- or intermediate-term municipal bonds may fall in price along with equities due to inflation news, they may fall less, cushioning the blow of a down market. By the same token, low correlations aren't attractive in isolation. Assets that bounce around like ping-pong balls may not enhance overall portfolio returns, while their volatility could hamper compounding (see display above).

[3]As of 3Q 2018. Views shown reflect near-term tactical asset allocation views and are based on a hypothetical reference portfolio. Nothing herein constitutes a recommendation, investment advice or a suggestion to engage in or refrain from any investment-related course of action. See disclosures at the end of this publication for additional information regarding the Asset Allocation Committee and the views expressed.

Circling back to the role of bonds, Treasuries endure a lot of criticism for their low yields and exposure to monetary tightening. Along with other quality bonds, however, many investors view them as a "safe haven" in times of crisis, contributing to their lower correlation to stocks than investment grade fixed income overall (see display below). In the event of geopolitical conflict or escalating trade wars, investors have tended to seek out Treasuries and other quality bonds until the storm has passed. In terms of rates, it is worth reiterating that, as they go up, so does the potential return of new, higher-yielding bond purchases, whether in a laddered or actively managed strategy.

IF DEVELOPED CAREFULLY, WITH PERSONALIZED NEEDS, RISK TOLERANCE AND TIME HORIZON IN MIND, YOUR OVERALL PORTFOLIO COULD BE MORE APPEALING THAN ITS INDIVIDUAL PARTS.

TREASURIES' ADDED DIVERSIFICATION BENEFIT
Three-Year Correlations Across Economic Cycles, December 1978 – May 2018

	Stocks/Bonds	Stocks/U.S. Treasuries (7 – 10 Years)
Dec. 1978 – July 1980	0.45	0.42
August 1980 – Nov. 1982	0.30	0.23
Dec. 1982 – Mar. 1991	0.34	0.31
April 1991 – Nov. 2001	0.42	0.38
Dec. 2001 – June 2009	-0.19	-0.33
July 2009 – Current	-0.06	-0.32
Average	0.17	0.06

Source: Bloomberg, NBER. Stocks are represented by the S&P 500, bonds by the BofA Merrill Lynch Broad Market Fixed Income Index, and Treasuries by the ICE BofA Merrill Lynch 7-10 Year U.S. Treasury Index.

Investors who see a decline in the value of their bond holdings naturally won't be happy about it, especially if it comes at a time of higher equity volatility. But such changes need to be looked at in the context of an overall asset allocation. The different characteristics of some assets could help dampen the negative impact of others in a given market environment. If developed carefully, with personalized needs, risk tolerance and time horizon in mind, your overall portfolio could be more appealing than its individual parts, providing a halo effect that could improve your ability to ride out market turbulence while seeking to achieve long-term goals.

Please see disclosures at the end of this publication, which are an important part of this document.

Investment Insights

ESG That Spans Portfolios

It's increasingly feasible to measure and manage the "impact" of investments across asset classes—whether in seeking to improve financial performance or to encourage change.

JONATHAN BAILEY — *Head of Environmental, Social and Governance Investing*

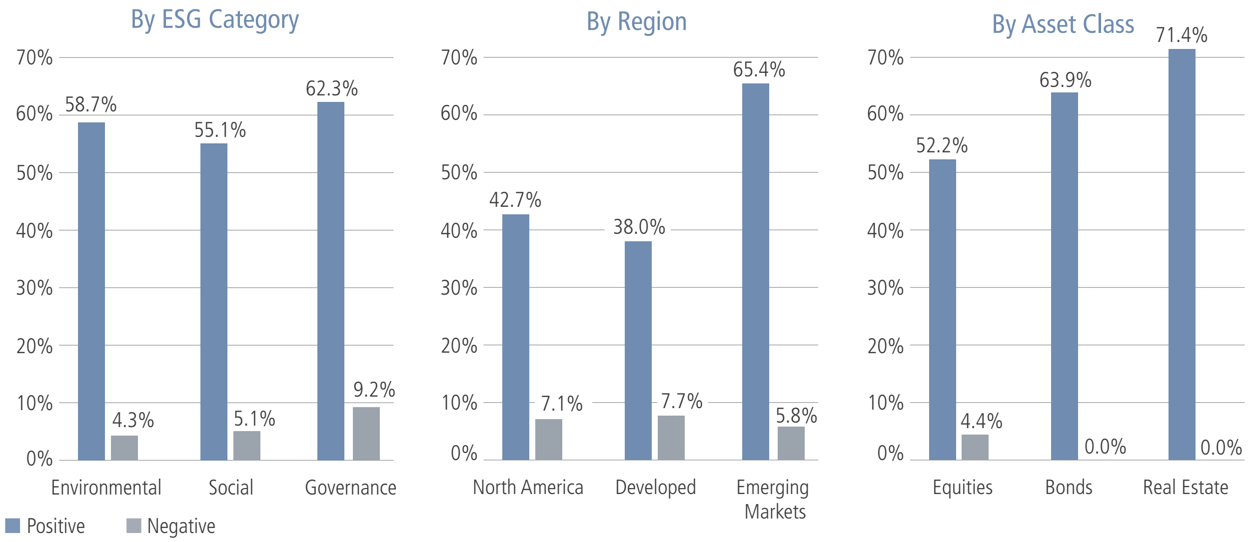
The notion of socially responsible portfolios has been around for many decades. Indeed, at Neuberger Berman we first began excluding certain sectors and business activities in response to client requests in the 1940s. Over the last three decades we, like many investors, have evolved our approach from simply screening out sectors like tobacco or alcohol to conducting bottom-up analysis of the financially material environmental, social and governance (ESG) risks and opportunities associated with individual securities.

In the past there was a debate as to whether considering environmental, social and governance characteristics in security valuation and portfolio construction would help or hinder portfolio performance. Some investors were rightly concerned that bluntly excluding sectors might lead to a portfolio underperforming a benchmark. But, over time, real-world track records have demonstrated that, when effectively applied, bottom-up ESG analysis can in fact be a driver of attractive long-term investment performance. Importantly, this acceptance is converging with another trend: increased demand to understand the social and environmental impact of portfolios.

Many clients now have an expectation that any robust investment process will take into account material ESG characteristics. Moving past the traditional ESG "territory" of public equities, investors want to see their managers define, measure and (where applicable) enhance their ESG impact in stocks, bonds and private markets—in others words, across all components of their portfolios.

OVER TIME, REAL-WORLD TRACK RECORDS HAVE DEMONSTRATED THAT, WHEN EFFECTIVELY APPLIED, BOTTOM-UP ESG ANALYSIS CAN IN FACT BE A DRIVER OF ATTRACTIVE LONG-TERM INVESTMENT PERFORMANCE.

RELATIONSHIP BETWEEN ESG FACTORS AND CORPORATE FINANCIAL PERFORMANCE



Represents a meta study combining the findings of at least 2,200 empirical studies on the relationship between ESG and corporate financial performance. The study aggregated 60 "review studies" using "vote-count" and meta-analysis methodologies to capture the results of underlying studies. A vote-count study counts the number of primary studies with significant positive, negative and non-significant results and "votes" the category with the highest share as the winner. A meta-analysis aggregates findings of studies econometrically, importing effect sizes and sample sizes of primary studies to compute a summary effect. "Corporate Financial Performance" encompasses a range of measures, including return on assets, return on equity, sales growth, return on sales and operating margin.

Their motivations vary. Some may seek to invest in issuers with best-in-class ESG practices because they believe this will not only lead to better investment returns, but also amplify improved social and environmental outcomes. Or they may want to address global challenges by investing in companies that seek positive change alongside investment returns. Cutting through the confusion that tends to affect nomenclature in this space, we propose the following categorization for the four different ways in which an investor can integrate ESG factors into portfolio construction:

APPROACHES TO ESG INTEGRATION

	AVOID	ASSESS	AMPLIFY	AIM FOR IMPACT
INTEGRATION APPROACH	Excluding **particular companies or whole sectors** from investment universe	Considering the **valuation implications of ESG risks and opportunities alongside traditional factors** in the investment process	Focusing on **'better' companies** based on environmental, social and governance characteristics	Seeking to **intentionally generate social and environmental impact** alongside a financial return

The first category, *Avoid*, is fairly straightforward, representing an exclusion approach. The second, *Assess,* involves the careful consideration of ESG risks and opportunities as part of security valuation, and which may make a security more or less attractive relative to considering it based on more simplistic investment criteria alone. The third, *Amplify*, involves only investing in good corporate citizens with strong financial prospects. Finally, *Aim for Impact* means what it says: targeting companies that are contributing to solutions to the world's problems, while also providing financial opportunities for investors.

DRILLING DOWN: ASSET CLASS CONSIDERATIONS

With those general categories in place, it's important to remember that effective ESG investing relies on both broad conceptual cohesion and fine bottom-up distinctions. ESG comes into play in many different ways, and may prove to be more or less material in light of various factors, such as asset class, sector, industry and geographic location. Here are some of the variations we believe apply to asset classes:

Equities: Environmental, social and governmental factors are typically seen in light of both risk and opportunity, and most often with respect to company operations. For example, a company that properly disposes of waste is more likely to avoid unnecessary legal or regulatory liability; one that develops a diverse workforce may be better able to attract potential talent to improve productivity; and a company with strong governance standards may keep its allocation of capital on track and improve its potential for effective management decisions. Responsible corporate behavior across ESG areas can minimize risk and build reputation, while some companies may find opportunities via products or services serving customers or markets geared toward solving or ameliorating environmental or social issues.

ACTIVE LARGE-CAP ESG FUNDS HAVE OUTPERFORMED THE S&P 500
Growth of $10,000 – Since Inception of the Dow Jones Sustainability Index (January 1, 1999 to June 30, 2018)

Source: Morningstar, as of June 30, 2018.

U.S. Active Large Cap - ESG is an equally weighted net-of-fee portfolio that includes all funds that meet the following criteria: Morningstar category of Large Blend, Large Growth or Large Value and deemed socially conscious by Morningstar. The number of funds that had aggregate fund assets of at least $500 million as of June 30, 2018 included in U.S. Active Large Cap - ESG with a 10-year track record was 22 out of 42; 15-year track record was 16 out of 29 and 20-year track record was 12 out of 18.

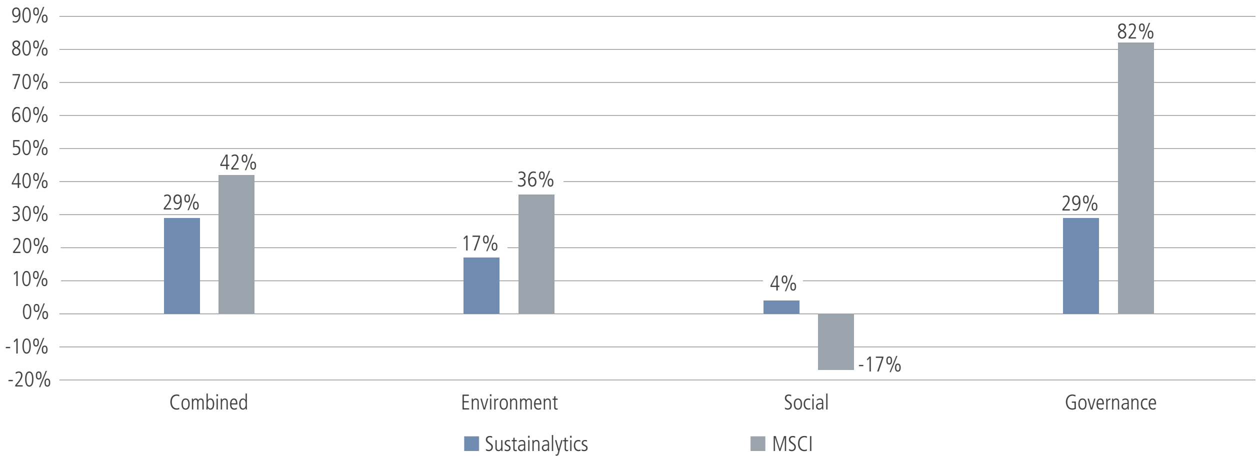
The hypothetical analysis assumes an initial investment of $10,000 made on January 1, 1998 in the oldest share class of each respective fund equally. This analysis assumes the reinvestment of all income dividends and other distributions, if any. The analysis does not reflect the effect of taxes that would be paid on fund distributions. The analysis is based on hypothetical past performance and does not indicate future results. Given the potential fluctuation of each of the funds' Net Asset Value (NAV), the hypothetical market value may be less than the hypothetical initial investment at any point during the time period considered. See additional disclosures at the end of this publication, which are an important part of this article. Unless otherwise indicated, returns shown reflect reinvestment of dividends and distributions. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

Corporate Bonds: Fixed income managers are largely focused on credit risks to principal and interest payments, rather than the upside potential that equity "owners" may enjoy. As such, ESG factors may come into play as an effective means to gauge the health of revenues, earnings and cash flows, as well as balance sheet condition. Indeed, one study compared portfolios of high and low ESG-scored U.S. investment-grade corporate credits using two well-known ESG rating systems and found that the higher-rated ESG group had a performance advantage associated with fewer downgrades (see display).

Patterns of behavior, such as loose safety conditions, may not carry an immediate penalty but point to the potential for future liability. Also certain shareholder rights, even if appealing from a governance perspective for equity investors, may be unattractive in terms of credit risk. The tenor of a credit instrument and time horizon will greatly influence the nature of ESG analysis.

RELEVANCE OF ESG RATINGS TO BOND PERFORMANCE

Return Difference (%/year) Between Portfolios With High and Low Scores for ESG



Source: "Sustainable Investing and Bond Returns: Research study into the impact of ESG on credit portfolio performance," Barclays, November 2016. Figures indicate the return difference between high- and low-scored portfolios as measured by ESG providers Sustainalytics and MSCI from August 2009 until April 2016. Indexes are unmanaged and are not available for direct investment. Investing entails risks, including possible loss of principal. **Past performance is no guarantee of future results.**

Municipal Bonds: The municipal market includes many financings that are positive for society, and others that are neutral or negative. For example, water-sewer bonds or bonds for recycling plants could potentially help the environment and support sustainability while issuances to build sports arenas may provide a concentrated benefit to private owners instead of the broader community. Creating a portfolio oriented toward impact is particularly feasible given the relative size of the municipal market and the ability to connect to the bond use of proceeds and geographical place.

Emerging Markets: In equities, a key area of focus is governance, as many companies are controlled by governments or families. Environmental considerations may be affected by the high sector concentrations in some markets, while social criteria need to be considered in the context of both the local and global standards. Within emerging markets debt, we've found that ESG issues have been highly useful as a forward-looking tool for assessing the potential risks affecting sovereign debt, as well as corporate issuers.

Private Investments: ESG characteristics are an important part of due diligence relating to private equity and debt. When investing via a private equity fund or directly into a company (through a primary, secondary, co-investment or general partner stake), the track record and commitment to ESG integration on the part of general partners can be an indicator of their quality and approach to risk management and value creation.

ESG ISSUES THAT IMPACT THE BOTTOM LINE (BY SECTOR/INDUSTRY)

A study of large U.S. corporations from 1991 to 2013 found that companies that performed in the top quartile on material ESG issues (as defined by the SASB standards for each sector) but in the bottom quartile on immaterial ESG issues were associated with 4.8% annualized alpha after controlling for firm size, valuation, profitability and other issues. This compared to -2.2% annualized alpha for companies that performed in the bottom quartile on both material and immaterial ESG issues, and 0.5% for companies that performed in the bottom quartile on material and top quartile on immaterial ESG issues.

ENVIRONMENT	HEALTH CARE	FINANCIALS	TECHNOLOGY & COMMS	NON-RENEWABLE RESOURCES
GHG emissions	○	○	◐	●
Air quality	○	○	○	●
Energy management	●	○	●	◐
Fuel management	◐	○	○	◐
Water and wastewater management	●	○	●	●
Waste and hazardous materials management	●	○	◐	●
Biodiversity impacts	○	○	○	●
SOCIAL CAPITAL				
Human rights and community relations	◐	○	○	◐
Access and affordability	●	◐	○	○
Customer welfare	●	◐	○	○
Data security and customer privacy	◐	◐	●	○
Fair disclosure and labeling	◐	○	○	○
Fair marketing and advertising	◐	●	○	○
HUMAN CAPITAL				
Labor relations	○	○	◐	◐
Fair labor practices	○	○	◐	○
Employee health, safety and well-being	◐	○	◐	●
Diversity and inclusion	○	◐	●	○
Compensation and benefits	○	◐	○	○
Recruitment. development and retention	●	○	●	○
BUSINESS MODEL AND INNOVATION				
Lifecycle impacts of products and services	●	●	●	◐
Environmental/social impacts on assets and operations	◐	◐	○	◐
Product packaging	◐	○	○	○
Product quality and safety	●	○	○	○
LEADERSHIP AND GOVERNANCE				
Systemic risk management	○	●	○	●
Accident and safety management	○	○	○	◐
Business ethics and transparency of payments	●	●	○	◐
Competitive behavior	○	◐	●	◐
Regulatory capture and political influence	○	○	○	◐
Materials sourcing	◐	○	●	◐
Supply chain management	●	○	◐	◐

● Likely material for >50% of industries in sector ◐ Likely material for <50% of industries in sector ○ Likely not material for any industries in sector

Source: Sustainability Accounting Standards Board Navigator. Khan, Mozafar and Serafeim, George and Yoon, Aaron S., "Corporate Sustainability: First Evidence on Materiality," November 9, 2016. The Accounting Review, Vol. 91, No. 6, pp. 1697 – 1724 (last revised February 1, 2017).

FORMERLY A NICHE IDEA, THE PAIRING OF IMPACT ANALYSIS AND TRADITIONAL FUNDAMENTAL RESEARCH IS GAINING MOMENTUM AND LIKELY TO BECOME A MAJOR FORCE AS WE MOVE INTO THE FUTURE.

RELEVANCE BY SECTOR AND INDUSTRY

When viewed in light of corporate sector and industry, the distinctions become more nuanced. The Sustainability Accounting Standards Board (SASB), a nonprofit backed by portfolio managers, developed standards for the disclosure of "material sustainability issues" specific to 79 different industries. Negative issues can pose financial risks to companies, lead to more regulation, engender criticism from investors and stakeholders or threaten brands/licenses to operate. Positive issues can involve the use of industry best practices or represent opportunities for innovation and growth. Some observations based on the groupings should not be surprising: Oil and other sectors focused on nonrenewable resources face the most environmental risk, while financials face the least. But others are more nuanced: Social issues confronting health care companies are significant, as are human capital challenges for technology companies. Consistent with other studies, material SASB factors have been found to have a substantial link with the generation of alpha (see display on page 11).

CONNECTING THE DOTS

How can ESG become part of a portfolio? For investors focused exclusively on risk-adjusted return, having managers include such factors as part of the research process may be enough, and many managers already do this as part of a robust investment approach. Other investors may wish their portfolio to be tilted toward achieving certain environmental and social impacts along with favorable investment results.

The integration of "impact" need not be all or nothing. There may be practical limitations, depending on the size of a portfolio, risk profile or liquidity needs. For example, the use of a highly liquid equity or investment-grade bond strategy with an ESG orientation may be more appropriate for a retiree than a private equity fund with a long lockup period. Out of caution, investors may simply wish to take things slowly: dedicating only a sleeve of portfolios to impact-driven investing before diving in more comprehensively.

This is an exciting time for investors. ESG integration requires innovation and resources on the part of portfolio managers, and we believe those with grounding in fundamental research and a history in socially responsible and ESG investing have a decided advantage. For clients, the task is largely to stay alert, look to understand the developing landscape and seek to capitalize on opportunities where appropriate. Formerly a niche idea, the pairing of impact analysis and traditional fundamental research is gaining momentum and likely to become a major force as we move into the future.

See disclosures at the end of this publication, which are an important part of this article.

Financial Fitness

Planning in Stages

Each period of your life poses distinct challenges, requiring appropriate steps to keep your finances on the right path.

STEPHEN POLIZZI, CFP® — *Head of Wealth Planning*

Procrastination is a common malady. We all have busy lives, and immediate issues usually trump more remote ones—sometimes harmlessly, other times not. When it comes to financial planning, I'm in the camp that it's better to act early and often; to regularly assess your situation, goals and the structures you have in place to accomplish them.

In my opinion, effective, consistent planning is about three core ideas: control, understanding and aspiration. With planning that starts early and hits all the right notes, you have the potential to exert more *control* over your future than if you lack such focus. Partly this is because you *understand* your financial picture: your cash flows, savings, asset allocation, emergency funds and more. By virtue of this control and understanding, you have the ability to *aspire* for more—whether in terms of providing for family, funding retirement or leaving a legacy.

How these elements fit together isn't static. In fact, it changes constantly throughout every stage of a person's life. In this column, I seek to briefly highlight some of the challenges that you or your family members may face in different periods, along with ideas and strategies that may be effective at those times. The idea is to encourage a holistic mindset and an interest in planning over the long term.

EARLY CAREER: GETTING STARTED

In your 20s, and early 30s financial planning is all about laying the groundwork for the future: getting a first job, establishing credit, paying down student loans, and if possible putting dollars aside for costs down the road—a home, marriage, family, even retirement. A key underlying goal is to develop healthy financial habits: balancing spending and resources, avoiding living paycheck to paycheck or depending too much on credit card balances to pay your bills.

Where possible, consider contributing to your company's 401(k) or other retirement plan—at least up to the company match. Often it's hard to make the decision to cut into current resources in this way, but even a small set-aside will get you used to the exercise of saving—something that's useful no matter how extensive your resources ultimately become. Moreover, the long timeframe that's available to young investors is a huge advantage in seeking to build capital. Investing at this stage can help you become more educated about markets and used to evaluating portfolio managers—which will be helpful as you accumulate wealth.

Marriage, if it occurs during this time, obviously brings with it a general re-framing of your financial life. Couples differ in how they want to integrate their assets, and it may depend on the extent of the resources they bring to the table. Some may want to keep accounts separate, and (at least at first) take a more formal approach in contributing to bill paying. Others may be more comfortable "merging" right away. Openness is crucial, as is coordinated planning, so that the couple can have an appropriately diversified overall portfolio and more effectively reach for their goals.

MIDCAREER: BALANCING ACT

The task of midcareer years (30s through 50s) is often one of dealing with various, sometimes conflicting needs: intense focus on work, building a family, buying or upgrading a home, funding college (and in some cases private school before that), and continuing to save for retirement. It's especially important at this stage to prioritize and not let the seeming difficulty of "getting everything done at once" interfere with getting anything done at all.

Capitalizing on tax-advantaged accounts can be crucial. 529 accounts provide generous tax-deferred savings for private school and college; 529As offer a means to transfer assets to disabled children without affecting their government benefits; IRAs (traditional and Roth) and defined contribution plans can help with retirement savings; for those in a high deductible health plan, health savings accounts can offer triple tax benefits, with tax-deductible contributions, tax-free earnings and tax-free withdrawals for qualified medical expenses.

At this stage, you may still want to be fairly aggressive with your retirement assets, based on the idea that you can afford more volatility in an effort to generate greater long-term performance. This means that you may be more heavily weighted toward "risk assets" such as equities and certain parts of the bond market, such as high yield or emerging markets debt, while keeping traditional bond holdings at lower levels.

Insurance is also a key part of the equation: having the appropriate level of replacement coverage on your home, life insurance to cover your family's key expenses, disability insurance in the event you cannot work, to name some examples. Relatedly, it is prudent to maintain an emergency fund in the event of job or income loss, or unexpected uncovered medical expenses.

Finally, with the growth of your family and assets, estate planning may become a larger part of the picture: structuring your legacy, choosing guardians for your minor children, and arranging powers of attorney and health care proxies in case of your incapacity.

PRE-RETIREMENT: BUILDING FINANCIAL FLEXIBILITY

The period from your 50s through mid-60s is often one of eliminating or reducing certain obligations, and accelerating savings. College funding may require fewer assets, and as your kids leave the nest, you may find your life insurance needs have been reduced as well. At this time, it's common to pay off mortgage debt—an attractive way to generate "return" from interest savings. For some people, it may make sense to downsize to a smaller home, whether due to less need for space or to generate additional resources.

Depending on the individual, however, certain financial challenges can be particularly intense at this time. For instance, you may face a "sandwich generation" issue: looking out for and supporting your own children while assuming more responsibility for your aging parents. The latter may be simply a matter of time spent (arranging care, helping managing their affairs) or a financial burden—for example, drawing on your assets to pay for assisted living or nursing home care. Taking care of such obligations while minimizing the disruption to your own life and plans is a key aspect of navigating such issues.

Within your portfolio, now may be a time to begin stepping off the gas, and allocating some of your equity dollars into bonds to help preserve capital and mitigate volatility. However, keep in mind that with long lifespans you may need growth-oriented assets to maintain your portfolio over an extended retirement.

RETIREMENT: REWARDS AND PLANNING

If things have largely gone as hoped, you've generated enough wealth by your 60s to shift from saving to spending. This can open up potential to fulfill lifelong dreams for travel and lifestyle, volunteerism or starting a new career. At this stage, however, your well-being will likely depend on two variables: accurately gauging and controlling your level of expenses and then generating enough income to cover the balance of your retirement years.

In terms of expenses, it's important to carefully think about how you want to live. Travel may be an initial goal, but people often pull back on such plans as retirement progresses. On the flipside, downsizing may seem practical, but ultimately not suit you or the extended family that pays you visits. Relief from the stresses of work may sound appealing, but a few restless months on the couch could prompt thoughts of doing charitable work or some paid consulting.

Looking ahead to potential long-term care needs is also crucial. Typically the age to consider insurance coverage is in your 50s, but costs are still viable on hybrid life/long-term care policies well into your 60s. Even if you self-insure, you should be thinking about where you may live in your later retirement years—staying in your own home or perhaps moving into communities that may offer independent and assisted living, progressing to more acute care facilities.

On the portfolio side, you'll want to make sure you have a sufficient income stream—often accomplished through the use of bucketing shorter-term and longer-term investment assets.[1] Early in retirement, the use of some risk assets in seeking to build capital can be appropriate, often with a gradual shift to a more conservative mix as time goes on.

Finally, this is the stage in life to really pin down your wealth transfer strategy. Assuming you have enough resources for your own needs, it may involve annual gifting, the payment of grandchildren's education or medical expenses, and the use of trusts to limit income and/or estate tax liability, among other strategies.

TAKE STEPS, EVEN INCOMPLETE ONES

I've lightly covered topics that could take up whole textbooks due to their nuance and complexity. But the idea again is to highlight the need to think strategically about all potential factors that could impact your financial well-being, and then take reasonable steps at the appropriate time to put them in order.

This is not an "all-or-nothing" proposition. At every stage—particularly those busy middle years—it may simply not be possible to accomplish everything on your list. So, don't over-plan, and be prepared to introduce tactical and strategic measures. Combining both, you should be able to make progress toward achieving your goals.

See disclosures at the end of this publication, which are important part of this article.

[1] See "Financial Fitness: `Bucketing' and Your Retirement Plan," *Investment Quarterly*, Fall 2017.

Market Focus

TEN FOR 2018

Midyear Update

JOSEPH V. AMATO — *President and Chief Investment Officer – Equities*
ERIK L. KNUTZEN, CFA, CAIA — *Chief Investment Officer – Multi-Asset Class*
BRAD TANK — *Chief Investment Officer – Fixed Income*
ANTHONY D. TUTRONE — *Global Head of Alternatives*

In January, the heads of our four investment platforms identified the key themes they anticipated would guide investment decisions in 2018. With the year now half over, we revisited these concepts to see how they've played out thus far. Below, we present a midyear assessment of our expectations and an update for the back half of 2018.

MACRO: GLOBAL INFLECTION POINT NEARS

1 "Goldilocks" Gives Way to Something More Complicated — TRUE

What we said: Though the strength of global economic momentum is undeniable, a confluence of factors—including tightening central bank policy, plateauing economic growth and rising market volatility—suggests that conditions are unlikely to remain "just right" for all of 2018.

What we've seen: After a placid January, interest rate and inflation pressures and geopolitical disquiet introduced anxiety to markets, even as global economic fundamentals remained supportive if somewhat divergent.

2 Both Monetary and Fiscal Policy Are in Motion Globally — TRUE

What we said: As major central banks wind down unprecedented levels of monetary stimulus, their efforts are being met—and potentially complicated—by expansionary fiscal policy and reform initiatives taking root in a number of countries.

What we've seen: Fed normalization has continued apace even as fiscal stimulus and tax reform complicate its path, though trade tensions and contentious elections threaten to exacerbate the already unprecedented challenge facing it and other central banks.

RISKS: CLOUDS GATHER AS THE YEAR PROGRESSES

3 Geopolitical Climate Remains Unsettled — TRUE

What we said: Though 2017 mostly failed to deliver the electoral fireworks of 2016, elections this year in Italy, Mexico, Brazil and the U.S.—in addition to ongoing disrupters like North Korea, special investigations, Brexit, etc.—could upset the current order.

What we've seen: While the Italian election threw markets for a bit of a loop, the backloaded 2018 political calendar offers even greater challenges in the face of increasingly heated trade rhetoric.

4 China Accelerates Structural Reforms — PARTIALLY TRUE

What we said: An emboldened Xi will be more aggressive in reducing leverage and re-orienting China's economy toward more sustainable, high-quality development, to the potential detriment of near-term growth.

What we've seen: China remains oriented toward reform, but trade tensions and their impact on already-slowing economic growth may further test Xi's resolve.

FIXED INCOME: THE CHASE CONTINUES

5 No End to the Search for Yield

TRUE

What we said: Biased higher but still low, long-term interest rates continue to send investors into less-familiar corners of the fixed income markets in the hunt for yield, with high valuations leaving little cushion to absorb a volatility shock.

What we've seen: To balance the need for income with the more challenging investment environment, investors are exploring strategies with varying degrees of risk, like bank loans, CLOs, lower-quality high yield, short duration and private credit.

6 Credit Drivers Begin to Change

TRUE

What we said: Continued low default rates suggest global credit spreads likely will be impacted less by fundamentals and more by technical developments such as hedging costs, LDI-related flows and regulatory changes.

What we've seen: Despite an attractive fundamental environment, relative performance in credit was driven largely by technical factors, notably hedging costs and supply/demand dynamics.

EQUITIES: TWO-WAY MARKETS RETURN

7 Market Momentum Could Present Opportunities to Reduce Beta Exposure

TRUE

What we said: Strong earnings growth could fuel equities in early 2018, providing investors with chances to trim holdings in high-valuation stocks and redeploy into more attractive risk-adjusted exposures.

What we've seen: Though equity valuations on a forward basis have eased given expectations for very strong earnings growth in the quarters ahead, caution is still warranted given the ample risks to these forecasts.

8 Active Management Positioned to Shine

PARTIALLY TRUE

What we said: Market dynamics continue to shift in favor of active management, which could extend the comeback mounted by stock pickers last year after a period of underperformance.

What we've seen: Market dynamics have grown less supportive of active management this year, and relative performance has been mixed as a result.

ALTERNATIVES: FINDING OPPORTUNITIES AMID HIGH VALUATIONS

9 Low-Vol Strategies for a More Volatile World

PARTIALLY TRUE

What we said: Market-neutral and relative-value hedge funds may help investors earn returns with lower volatility.

What we've seen: Though volatility eased after a first-quarter spike, we expect the respite to be brief, highlighting the benefit of strategies that can provide ballast against tumultuous markets.

10 Sharpen Quality Focus in Private Assets

TRUE

What we said: Given high private equity valuations, investors can help mitigate risk by targeting experienced private equity sponsors with a history of adding operational value or by moving up the capital structure to first-lien private debt.

What we've seen: Investment discipline is vital in the current environment, and there remain high-quality opportunities for private equity and debt investors who pick their spots carefully.

For more details, view our full-length Ten for 2018 Midyear Update at nb.com/midyearupdate2018.

See disclosures at the end of this publication, which are an important part of this article.

Trust Company Corner

Outsourcing the Role of Chief Investment Officer

The use of an external 'CIO' offers significant benefits to foundations, endowments and institutions.

EDWARD L. BERMAN — *Head of Institutional Fiduciary Services, Neuberger Berman Trust Company*
ALAN H. DORSEY, CFA — *Chief Investment Officer, Wealth Management and the Neuberger Berman Trust Company*
STEPHEN POLITO — *Head of Investment Strategy Group*

The concept of outsourcing holds a well-established position in today's global business environment. In the asset management world, we're increasingly seeing entities like foundations, endowments and institutions with retirement plans look out-of-house for help in managing numerous aspects of their investments—responsibilities that typically fall under the purview of the chief investment officer. The benefits of outsourcing can be substantial, enabling companies to leverage the core competencies of their provider, including asset allocation and manager selection expertise, a robust investment platform, deep industry knowledge and resources and, potentially, mitigate fiduciary liability.

A LOOK AT THE JOB OF CIO

CIOs are responsible for designing and managing investment plans of companies, retirement pools, endowments, foundations or other organizations with financial assets and obligations. The job requires a deep understanding of the organization and requirements of the plan, significant investment and risk management expertise, and the ability to stay up-to-date on regulatory developments. CIOs often serve as fiduciaries and thus have a responsibility to manage assets prudently.

Within this larger mandate, a CIO is tasked with understanding current and future needs and goals of the organization, and setting a risk tolerance that balances the organization's investment needs and culture. This often requires setting outflow and inflow expectations (which may require actuarial analysis of defined benefit plans) and establishing an optimized asset allocation framework that can help the organization meet its obligations within the confines of its risk tolerance. CIOs must also select managers or strategies to implement the investment plan, then monitor the portfolio and its managers, rebalancing or making tactical moves according to the market environment, and terminate managers or strategies as necessary.

DIFFERENT LEVELS OF CIO OUTSOURCING

For entities with a CIO or an investment team in place, an "outsourced CIO" can represent an additional source of input for decision-making. In this situation, outsourced CIO services can include input on capital market assumptions and tactical market opportunities. They may also provide a comprehensive view of risk analysis, or simply a connection to the financial community and the networks of social information they provide.

It's increasingly common for organizations to seek a more complete set of services from an "outsourced CIO," in which case the role may include fiduciary responsibility across asset allocation, implementation and rebalancing processes. Within this scope, entities hold onto review and oversight responsibilities and have the ability to retain or terminate the outsourced CIO, but are generally able to delegate significant responsibilities in overseeing and implementing the investment plan to the outsourced partner.

POTENTIAL BENEFITS OF OUTSOURCING

Businesses may choose to outsource a task when the cost/benefit of outsourcing is a more attractive balance than the cost/benefit of doing a task in-house. The same way that this can apply to manufacturing curtain rods, it can apply to designing and managing an investment plan.

Extensive investment infrastructure at a potentially lower cost

CIO outsourcing can allow entities to access a substantial investment infrastructure for potentially less than it would cost to build it in-house. Hiring a CIO or an investment team can represent a significant financial commitment—especially for a company, a foundation or an endowment with a small to mid-size asset pool. Additionally, smaller organizations may be able to hire only one

QUESTIONS TO ASK AN OUTSOURCED CIO CANDIDATE

What is your process for choosing an asset allocation?

How do you decide to change managers?

Can you implement tactical market solutions? How frequently do you make changes and recommendations?

Do you have ESG investment options? How do managers incorporate ESG factors into their investment process?

Do you work with clients like us (by size, by industry, by investment goals) today? What solutions have you designed for them?

professional who, however knowledgeable, may lack the time or expertise to do every task related to the job well.

CIO outsourcing provides immediate, turnkey access to asset allocation, manager research and selection expertise, ongoing monitoring and risk management. Outsourced CIOs can take responsibility for navigating the array of available investment options—active, passive and flexible strategies, products that use derivatives and leverage, and those with lockups and alternate fee structures.

An outsourced CIO may also have connections to industry information via proprietary and third-party research and relationships with other industry professionals that can also be extremely valuable to an organization. Thanks to their position within the industry, for example, an outsourced partner can have insight into working with a particular portfolio manager or strategy that an in-house CIO or investment team might not have.

Potentially mitigate personal liability for board members and business owners
Board members of endowments and foundations, and business owners—particularly those with responsibility for ERISA plans—are often fiduciaries and thus held to the associated fiduciary standard and the potential for liability if those standards aren't fulfilled. While in-house CIOs or investment committees may approach their fiduciary role with best efforts and intentions, they may not have the capacity or resources to perform extensive asset allocation, due diligence, implementation and monitoring, and risk management. Partnering with an outside fiduciary can provide the dual benefit of delegating to a firm with strengths in these areas, as well as potentially mitigating some of the associated fiduciary responsibilities and risks.

CHOOSING A PARTNER

An ideal "outsourced CIO" has deep asset allocation and manager selection expertise and access to a robust investment platform of traditional and alternative portfolio managers and strategies. The provider should also be able provide access to environmental, social and governance (ESG) oriented solutions. It's important to seek out partners with deep industry resources and knowledge. Additionally, it's critical to find a partner with an open and adaptable communication style, who can clearly explain the asset allocation process and rationale for hiring and firing managers, and answer questions about performance.

Although looking outside an organization for such expertise may involve a conceptual leap and a departure from past practices, it can serve as a cost-effective and prudent alternative to shouldering the investment and fiduciary burdens in-house. For more information on outsourced CIO services, please contact your Neuberger Berman representative.

OUTSOURCED CIO: 7 KEY TASKS AND TRAITS

1 Act as investment fiduciary
2 Oversee initial evaluation of risk profile and investment goals
3 Design customized asset allocation and manager implementation
4 Address customized income needs, growth objectives and risk tolerance
5 Offer access to a robust investment platform across equities, fixed income and alternatives
6 Provide access to ESG-oriented solutions
7 Provide ongoing oversight and risk management

See disclosures at the end of this publication, which are an important part of this article.

Sector Spotlight

The Coming 5G World

The next generation of wireless will be about a lot more than cell phones—and investors will need to think strategically to capitalize.

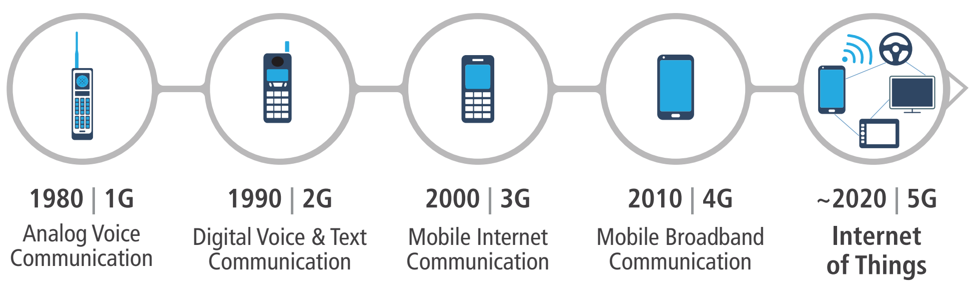
DANIEL E. FLAX — *Analyst, Global Equity Research Department*

Imagine the world of on-demand entertainment, virtual reality, the "internet of things," robotics, artificial intelligence and autonomous driving. It's not hard to do, considering all the ink that's been consumed contemplating the electronic future and its implications for humanity. The practical reality, however, is that you need massive capacity, transmission speed and connectivity to achieve any of those things. Trains without a track will just sit in the station.

Stepping into this breach is 5G, the latest generation of wireless infrastructure, which will enable the new wave of applications to take hold and transform entertainment, business and our day-to-day lives along the way.

Let's quickly review what's come before. The first wireless standard, 1G, brought us cell phones back in the 1980s; 2G introduced texting in the '90s; 3G provided mobile access to the internet by the '00s and 4G has offered faster speeds to make multifunction smartphones a practical necessity and introduce a wave of innovative business models (such as Uber, with ridesharing) to capitalize on the new mobile environment.

THE EVOLUTION TO 5G

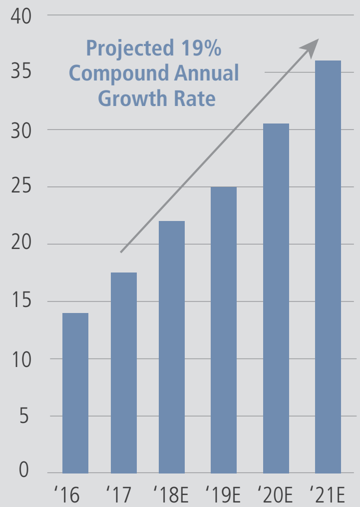


But there are already capacity restraints on the current system. Bandwidth is filling up even as people are demanding more and more data for video and other applications. And although much faster than its precursors, 4G doesn't have what it takes to introduce a truly connected world.

What exactly is 5G? It's an amalgam of technologies and strategies employed to capitalize on a broader range of wireless frequency. The current system involves sending signals to and from users via large cell towers along lower radio frequencies. But now, 5G will also draw on higher frequencies that have never been used for wireless. The shorter "millimeter" waves in this range open up significant bandwidth and have the potential to increase transmission speeds by 100 times. However, they have difficulty traveling through buildings and can get absorbed by rain and trees. So, rather than rely on fewer widely spaced cell towers, the new system will require the installation of more fiber and many "small cells"—on lampposts, buildings, etc.—that will

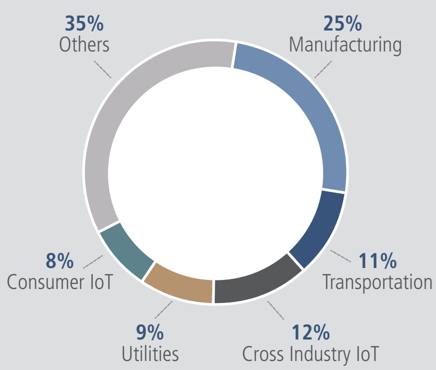
Growth of Internet of Things (IoT)

Worldwide IoT Installed Base (billions)



Source: IDC, Macquarie Research, March 2018.

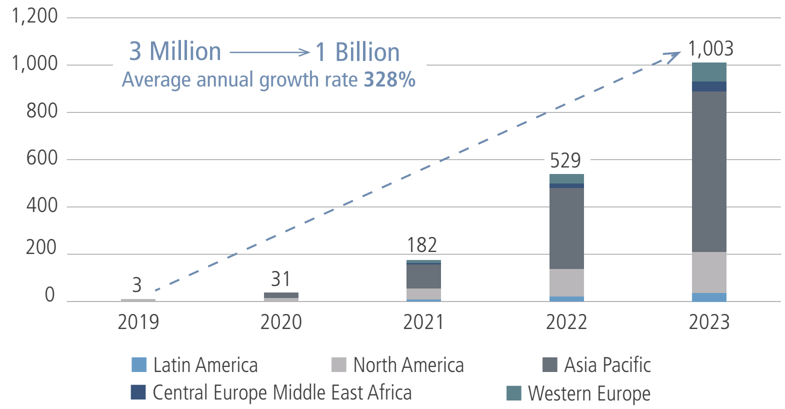
Global IoT Spending by Industry (2018E)



Source: IDC, Macquarie Research, March 2018.

ONCE IN PLACE, 5G USAGE IS LIKELY TO SOAR

Estimated Subscriptions (millions)



Source: Ericsson.

transmit signals to each other at short distances. This idea leads to its own complications, and various additional technologies are being employed and further developed to deal with them—such as Massive "MIMO" (or multiple input/multiple output) antennas to expand capacity and extend coverage.

It's important to note that the cloud will play a critical role in the 5G world. Given the need to shorten the distance from users and reduce the chances of interruption or delay, individual systems and devices will process and store some of the information at the cloud's "edge." Providers will be able to slice the network for user types, for example allocating faster downloads to some groups that need them, and especially brief latency (or online reaction time) to others.

All told, the move from 4G to 5G will require a significant multiyear upgrade and build-out of infrastructure. In December, the Third Generation Partnership Project, or 3GPP, introduced the first set of global 5G standards (updated in June, with more to come), allowing equipment manufacturers, telecom companies and software developers to move forward with development. Major carriers anticipate rolling out trial programs in a handful of cities in 2018, initially involving home service (fixed wireless), but introducing limited mobile offerings next year. Overall, the transition to 5G will last well into the next decade and depend partly on government auctions of more spectrum to open up capacity for carriers.

Will all the effort and expense be worth it? We believe the answer is yes. Most basically, the upgrade should increase transmission speed, with the download time for a two-hour movie moving from many hours just a few years ago to less than a minute with 5G. Latency will also dramatically improve, along with the capacity to handle an ever-increasing volume of digital traffic. Most significantly, 5G will introduce a new era of network connectivity, moving beyond smartphones to connect practically everything within reach, introducing new devices, systems and services, and changing industry and consumer demand in ways we can't even contemplate today.

When it comes to the internet of things, the numbers could be astronomical. As of 2016, there were some 15 billion connected IoT "end points" in electronics, sensors, cars and other objects. By 2021—still very early in the 5G timeline—that figure could rise to 35 billion end points, found across homes, businesses, infrastructure and transportation systems.

Applications that depend on faster networks continue to increase as well, whether involving high definition video, virtual reality, wearable health care devices, education or security/safety. Some high-profile examples:

- Autonomous driving is heavily dependent on the successful rollout of 5G. To navigate successfully on the roadways, cars will need not only current mapping, but information about weather, driving conditions, fellow drivers and pedestrians, all delivered in real time to assure safe, event-free traveling. Here, reduced latency will be particularly important, so that cars can react successfully and safely.
- Entertainment will likely undergo considerable change, particularly in the realm of augmented and virtual reality. For example, watching a sporting event could become a much more immersive experience. With the help of 5G, you'll be able to view it from the perspective of a single player throughout an entire game, or any number of other ways depending on your preference. Like autonomous driving, virtual reality and gaming will require a high level of responsiveness to be effective.
- Perhaps most significantly, 5G will enable an array of industrial applications, connecting devices in factories, oil rigs and distribution centers, among others, onto networks. As devices increasingly communicate with each other, this will likely contribute to changes in factory design and business methods as managements seek to capitalize on information flow to make processes more efficient. Artificial intelligence will enable robust real-time data analysis, and provide more actionable insights on ever-expanding data resources.

THE DEVELOPMENT OF NEXT-GENERATION INFRASTRUCTURE WILL AFFECT VIRTUALLY EVERY AREA OF THE ECONOMY, CREATING WINNERS AND LOSERS BASED ON BUSINESS MODEL, INTELLECTUAL PROPERTY, EXECUTION AND A HOST OF OTHER FACTORS.

UNCERTAINTY INCLUDES M&A, GEOPOLITICS

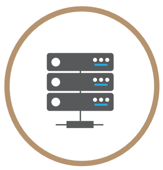
Despite its great potential, the extensive nature of the build-out, unresolved technical issues and a shifting regulatory backdrop could all have an impact on how next-generation connectivity plays out in the years ahead. Already, Sprint and T-Mobile have announced their intention to merge in order to gain the upper hand in building out 5G capabilities. Competition among rival nations will also be a key influence, given the economic, strategic and social impacts that next-generation technology could have in the coming years. Tensions between the U.S. and China have been simmering—to a large degree around tariffs and open markets, but also tied to the intellectual property and other building blocks needed to participate successfully in 5G. Hence, the U.S. decision to bar (then) Singapore-based Broadcom's proposed acquisition of Qualcomm in the U.S., due to concerns that it would undermine the U.S. role in broadband and damage national security. And China telecom giant ZTE was recently allowed to resume U.S. business after a ban tied to its violations of sanctions, but also seemed like a pawn in jockeying over broader technology issues.

The friction is understandable—and likely to continue. The explosive growth of Amazon, Google and Alibaba, among others, has been a function of a healthy digital environment. And with the global economy increasingly centered around harnessing information, countries want to be in a position to harvest that valuable "natural resource" and set the table for the growth it could provide in the decades ahead.

INVESTMENT PERSPECTIVE

Like any large-scale, long-term business trend, the question of how to capitalize within investment portfolios is a tricky one. The development of next-generation infrastructure will affect virtually every area of the economy, creating winners and losers based on business model, intellectual property, execution and a host of other factors, as players adapt to an information-driven and device-heavy economy. At a very minimum, we believe investors should be cognizant of companies' digital battle plan and their ability to adapt to the fast-changing environment.

POTENTIAL BENEFICIARIES OF NEXT-GENERATION CONNECTIVITY



Network Infrastructure

Test & Measurement

Network Equipment

Hardware, Semiconductors

IoT Devices

Sensors

Radio Frequency Components

IoT Hardware / Software

Application & Services

Telecommunication Services

Data Centers & Cloud

Applications

Source: Neuberger Berman.

That said, there are specific industries that will be directly involved in the build-out of 5G or could particularly benefit from its progress and the availability of more rapid and voluminous data flow. We see more upside potential for the key enablers of 5G network infrastructure, internet of things devices and applications, and service providers supporting next-generation connectivity. Companies with differentiated technology or control of a strategic platform (or one that will become strategic) may be particularly attractive.

For example, let's look at the public safety sector. When dealing with a crisis, police, firefighters and others value essentially flawless performance from their communications systems, and so they are designed to work rapidly, with many devices able to connect directly to each other—rather than just using a network—in case of a disruption to cell towers or other issues. However, the nature of emergency communications is changing. Many people are less likely to call 911 than they are to text, but most public safety answering points aren't equipped to receive texts, or video for that matter. The ability to integrate both, along with social media and other sources, would make it easier for first responders to take advantage of the power of the public's ubiquitous devices. Companies with the technology to serve these needs, as well as insights and relationships within public safety, will likely be able to capitalize on increased connectivity to grow their businesses.

Stories like this can be told across the industrial complex as companies look to capitalize on the benefits of connectivity. Providers that are enablers and can offer some or all the pieces—hardware, software, services—should be well positioned to take clients into the digital world. All the better if they can develop a platform or ecosystem to make their customers more productive—encouraging more use and innovation, and potentially creating a virtuous cycle around technology. As part of this, ensuring security and privacy will be crucial in order to build the confidence and trust of those who use the network.

For investors, it will be important to understand the differences among companies and sectors in relation to the new 5G environment, and seek to identify those that appear best poised to capitalize on disruption and change. Some companies may find that 5G will account for only a portion of earnings potential, requiring investors to consider their broad range of businesses in any assessment. Other firms may be specialized players, with revenues driven by acceptance of certain standards or technology niches—conceivably providing more upside potential, but also carrying more risk. Overall, the potential of 5G and its pervasive character suggest that the new standard, along with the broad complementary trends of artificial intelligence, data mining and the internet of things, should be part of investors' thinking from here on out.

Please see disclosures at the end of this publication, which are an important part of this article.

Highlights 3Q18

FROM THE ASSET ALLOCATION COMMITTEE

U.S. EQUITIES: Our 12-month outlook on large-cap stocks moved from underweight to neutral given strong U.S. economic growth and earnings bolstered by tax reform, combined with reduced valuations. Small- and midcaps remain at neutral.

NON-U.S. DEVELOPED EQUITIES: We downgraded our outlook to neutral in view of weaker economic readings in Europe and Japan. Still, the ECB remains accommodative and the Bank of Japan is committed to boosting growth, while a soft yen could boost earnings of Japanese exporters.

U.S. FIXED INCOME: Government bonds face pressure from Fed tightening, but Treasury Inflation Protected Securities appear better positioned given inflation risks. We upgraded our 12-month outlook on high yield to neutral in light of opportunities in the sector's short-duration segment.

EMERGING MARKETS: Trade wars and China's managed slowdown are key risks, as well as any signs that global growth may peter out. But with sustained growth in the U.S. and stabilizing expansion in Europe and Japan, we believe recent emerging market declines are an opportunity, informing our overweight view.

COMMODITIES: We downgraded our outlook on the asset class to neutral given the risk of lower oil prices tied to potential production increases, while dampened growth in some regions raises concern about demand. Still, commodities could act as a hedge against inflation, which has been rising.

HEDGE FUNDS: We added an overweight 12-month view on directional funds to that of low-volatility funds. Long-short equity and credit managers have been benefiting from rising dispersion of individual securities, while trend-following strategies have been picking up on momentum in certain markets.

PRIVATE EQUITY: Despite elevated valuations and leverage in some transactions, we believe that niche strategies focused on high-quality and growth investments can potentially provide opportunities not available in public markets.

As of 3Q 2018. Views shown reflect near-term tactical asset allocation views and are based on a hypothetical reference portfolio. See disclosures at the end of this publication, which include additional information regarding the Asset Allocation Committee and the views expressed.

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