Vanguard economic and market outlook for 2019: Down but not out

Vanguard Research

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- As the global economy enters its tenth year of expansion following the global financial crisis, concerns are growing that a recession may be imminent. Although several factors will raise the risk of recession in 2019, a slowdown in growth—led by the United States and China—with periodic "growth scares" is the most likely outcome. In short, economic growth should shift down but not out.
- Previous Vanguard outlooks anticipated that the secular forces of globalization and technological disruption would make achieving 2% inflation in the United States, Europe, Japan, and elsewhere more difficult. In 2018, we rightly anticipated a cyclical firming in core inflation across various economies. In 2019, we do not see a material risk of further strong rises in core inflation despite lower unemployment rates and higher wages. This is because higher wages are not likely to funnel through to higher consumer prices, as inflation expectations remain well-anchored.
- As inflation moves toward target, financial stability risks rise, and unemployment rates continue to approach or drop below estimates of full employment, global central banks will stay on their gradual normalization paths. In the United States, we still expect the Federal Reserve to reach terminal rate for this cycle in the summer of 2019, bringing the policy rate range to 2.75%–3% before halting further increases in the face of nonaccelerating inflation and decelerating top-line growth. Other developed-market central banks, though, will only begin to lift interest rates from postcrisis lows.
- With slowing growth, disparate rates of inflation, and continued policy normalization, volatility in financial markets is likely to accelerate. Long term, our ten-year outlook for investment returns remains guarded, given the backdrop of high valuations and depressed risk-free rates across major markets.

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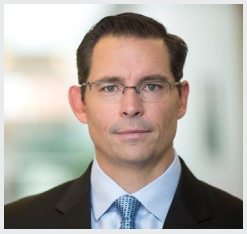

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Editorial note

This publication is an update of Vanguard's annual economic and market outlook for 2019 for key economies around the globe. Aided by Vanguard Capital Markets Model® simulations and other research, we also forecast future performance for a broad array of fixed income and equity asset classes.

Acknowledgments

We thank Kristen M. Storti, Donald B. Foote III, and Andrew S. Clarke, CFA, for their significant contributions to this piece and acknowledge the work of the Global Economics and Capital Markets Outlook Team. Further, we would like to acknowledge the work of Vanguard's broader Investment Strategy Group, without whose tireless research efforts this piece would not be possible.

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Notes on asset-return distributions

The asset-return distributions shown here represent Vanguard's view on the potential range of risk premiums that may occur over the next ten years; such long-term projections are not intended to be extrapolated into a short-term view. These potential outcomes for long-term investment returns are generated by the Vanguard Capital Markets Model® (VCMM) and reflect the collective perspective of our Investment Strategy Group. The expected risk premiums—and the uncertainty surrounding those expectations—are among a number of qualitative and quantitative inputs used in Vanguard's investment methodology and portfolio construction process.

IMPORTANT: The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of September 30, 2018. Results from the model may vary with each use and over time. For more information, see the Appendix section "About the Vanguard Capital Markets Model."

Vanguard's distinct approach to forecasting

To treat the future with the deference it deserves, Vanguard has long believed that market forecasts are best viewed in a probabilistic framework. This annual publication's primary objectives are to describe the projected long-term return distributions that contribute to strategic asset allocation decisions and to present the rationale for the ranges and probabilities of potential outcomes. This analysis discusses our global outlook from the perspective of a U.S. investor with a dollar-denominated portfolio.

Global outlook summary

Global economy: *Down but not out*

As the global economic expansion enters its tenth year, concerns are growing that a recession may be imminent. Although several factors will raise the risk of recession in 2019, a slowdown in growth—led by the United States and China—is the most likely outcome. In short, economic growth should shift down but not out.

We expect the global economy to continue to grow, albeit at a slightly slower pace, over the next two years, leading at times to so-called growth scares. In 2019, U.S. economic growth should drop back toward a more sustainable 2% as the benefits of expansionary fiscal and monetary policy abate. Europe and Japan are at an earlier stage of the business cycle, though we expect growth there to remain modest.

In emerging markets, China's growth will remain near 6%, with increasing policy stimulus applied to help maintain that trajectory. Unresolved U.S.-China trade tensions remain one of the largest risk factors to our view, in addition to stronger-than-expected tightening by the Federal Reserve should the U.S. unemployment rate approach 3%.

Global inflation: *Unlikely to shoot past 2%*

Previous Vanguard outlooks anticipated that the secular forces of globalization and technological disruption would make achieving 2% inflation in the United States, Europe, Japan, and elsewhere more difficult. In 2018, we rightly anticipated a cyclical firming in core inflation across various economies. In 2019, we do not see a material risk of further strong rises in core inflation despite lower unemployment rates and higher wages, as inflation expectations remain well-anchored.

In the U.S., we expect core inflation to remain near or below 2% throughout 2019; an escalation in tariffs would only temporarily affect U.S. core inflation. In Europe and Japan, price pressures will increase gradually as labor market slack erodes, though core inflation is likely to stay well below 2%. Higher wages are likely, yes, but higher inflation is not.

Monetary policy: *Convergence commences, with the Fed stopping near 3%*

As inflation moves toward target, financial-stability risks rise, and unemployment rates approach full employment, global central banks will stay on their gradual normalization paths.

In the United States, we still expect the Fed to reach terminal rate for this cycle in the summer of 2019, bringing the policy rate range to 2.75%–3% before halting further increases in the face of nonaccelerating inflation and decelerating growth. Other developed-market central banks will only begin to lift interest rates from postcrisis lows. We expect the first rate increase from the European Central Bank in late 2019, followed by a very gradual hiking path thereafter. Japan is late to the party and we do not expect any rate increases in 2019, though some fine-tuning of its policy framework is likely to ease growing financial-stability risk. Emerging-market countries don't control their own destiny and will be proactively forced to tighten along with the Fed, while further modest currency depreciation, tempered by tightened capital controls, is the most likely outcome in China.

Investment outlook: *No pain, no gain*

With slowing growth, disparate rates of inflation, and continued policy normalization, volatility in financial markets is likely to accelerate. Long term, our ten-year outlook for investment returns remains guarded, given the backdrop of high valuations and depressed risk-free rates across major markets.

U.S. fixed income returns are most likely to be in the 2.5%–4.5% range, driven by rising policy rates and higher yields across the maturity curve as policy normalizes. This results in a modestly higher outlook compared with last year's outlook of 1.5%–3.5%—albeit still more muted than the historical precedent of 4.7%.

Returns in global equity markets are likely to be about 4.5%–6.5% for U.S.-dollar-based investors. This remains significantly lower than the experience of previous decades and of the postcrisis years, when global equities have risen 12.6% a year since the trough of the market downturn. We do, however, foresee improving return prospects in non-U.S. developed markets, building on slightly more attractive valuations (a key driver of the equity risk premiums) combined with higher expected risk-free rates.

As was the case last year, the risk of a correction for equities and other high-beta assets is projected to be considerably higher than for high-quality fixed income portfolios.

Indexes used in our historical calculations

The long-term returns for our hypothetical portfolios are based on data for the appropriate market indexes through September 2018. We chose these benchmarks to provide the best history possible, and we split the global allocations to align with Vanguard's guidance in constructing diversified portfolios.

U.S. bonds: Standard & Poor's High Grade Corporate Index from 1926 through 1968; Citigroup High Grade Index from 1969 through 1972; Lehman Brothers U.S. Long Credit AA Index from 1973 through 1975; and Bloomberg Barclays U.S. Aggregate Bond Index thereafter.

Ex-U.S. bonds: Citigroup World Government Bond Ex-U.S. Index from 1985 through January 1989 and Bloomberg Barclays Global Aggregate ex-USD Index thereafter.

Global bonds: Before January 1990, 100% U.S. bonds, as defined above. January 1990 onward, 70% U.S. bonds and 30% ex-U.S. bonds, rebalanced monthly.

U.S. equities: S&P 90 Index from January 1926 through March 1957; S&P 500 Index from March 1957 through 1974; Dow Jones Wilshire 5000 Index from the beginning of 1975 through April 2005; and MSCI US Broad Market Index thereafter.

Ex-U.S. equities: MSCI World ex USA Index from January 1970 through 1987 and MSCI All Country World ex USA Index thereafter.

Global equities: Before January 1970, 100% U.S. equities, as defined above. January 1970 onward, 60% U.S. equities and 40% ex-U.S. equities, rebalanced monthly.

I. Global economic perspectives

Global economic outlook: Down but not out

As the global economic expansion enters its tenth year, concerns are growing that a recession may be imminent. Although several factors raise the risk of recession in 2019, a slowdown in growth—led by the United States and China—is the most likely outcome.

Our global economic outlook is based on:

- an assessment of the stage of the business cycle for each of the world's largest economies (**Figure I-1**);
- estimates of how recent and expected future policy actions (fiscal, monetary, and trade) will affect economic growth and inflation, among other factors, in 2019 and beyond (see regional outlooks); and
- the probabilities of various risk factors and scenarios that could alter our base case (see Figure I-5 on page 10).

Our analysis of fundamentals and the historical drivers of recession leads us to conclude that continued expansion, albeit at a slower pace—rather than imminent collapse—is the most likely scenario for the global economy in 2019. This forecast is not sanguine, however. The expected easing of global growth in the next two years—driven by a fading boost from U.S. fiscal stimulus, more restrictive Federal Reserve policy, and the continued slowing of growth in China—is fraught with economic and market risks.

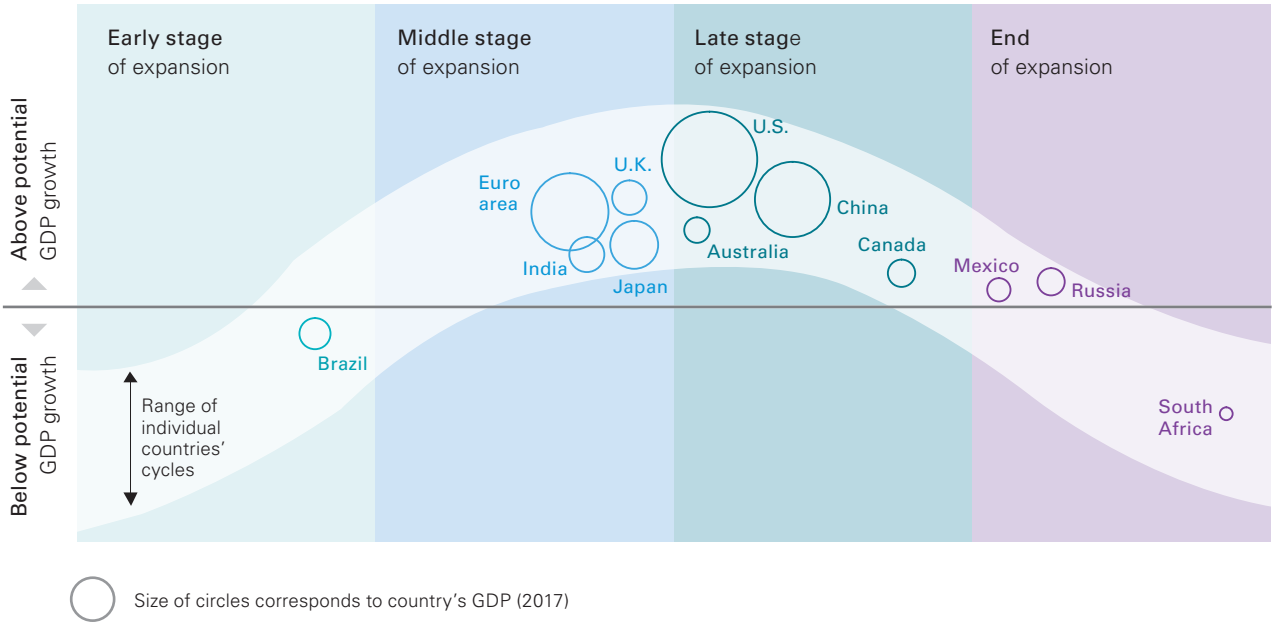
We provide explicit estimates from our Investment Strategy Group's economics team of the most prominent risks for 2019 (see Figure I-5 on page 10).

The global economic cycle

The concern about an imminent global recession often rests on the assumption that the U.S. expansion—which is among the longest on record—is clearly at the latest stage of the business cycle. The typical business cycle is characterized by an economy moving through a series of states: early cycle, when growth recovers strongly after a recession; mid-cycle, as an economy approaches and then exceeds full capacity and growth peaks; and late cycle, as the economy slows down and tips into recession

FIGURE I-1

Where are countries in their economic cycles?



Notes: The vertical axis represents GDP growth rate relative to each country's potential growth rate, represented by the horizontal line. There is no inherent time limit on the length of each stage; different economies progress through the stages at varying speeds. The end of an expansion represents below-trend growth, which may or may not match the common definition of recession of two consecutive quarters of negative real GDP growth.

Sources: Vanguard and the International Monetary Fund (IMF).

again. Yet Figure I-1 illustrates that the United States is only now approaching the later stages of expansion, in which imbalances grow larger, growth begins to decelerate, and recession risks increase. Other major economies, such as Europe and Japan, are even further behind given the slower progress made in their return to full capacity.

As the world's largest economy, the United States is naturally a critical driver of the global business cycle, and so most U.S. recessions are part of global recessions.

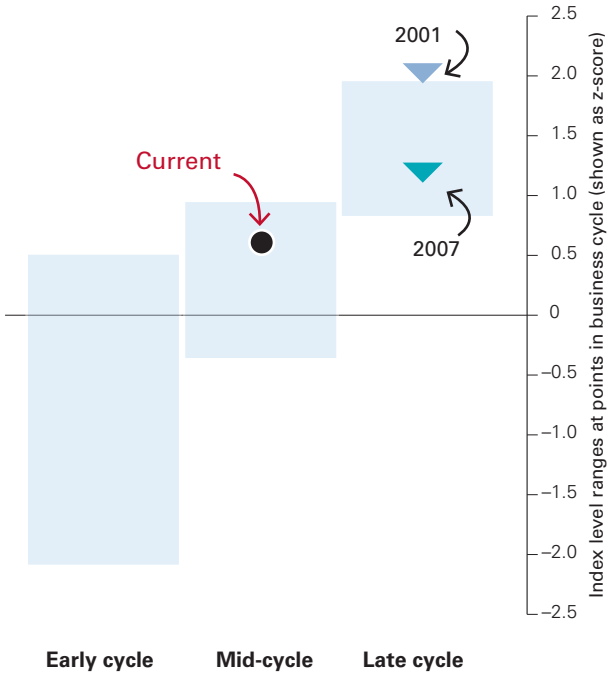
One way to assess the risk of a U.S. recession is to gauge the economy's proximity to the tipping point in the business cycle. **Figure I-2** displays a quantitative assessment of the present stage of the U.S. business cycle (that is, early, mid-, or late cycle). The colored circles indicate that the U.S. economy is only *now* transitioning toward the later stages of the expansion, despite the recovery's near-record length. In other words, current fundamentals such as consumer demand, household balance sheets, price inflation, and the present stance of monetary policy suggest that the U.S. recovery could persist at least through 2020. Other indicators,

FIGURE I-2

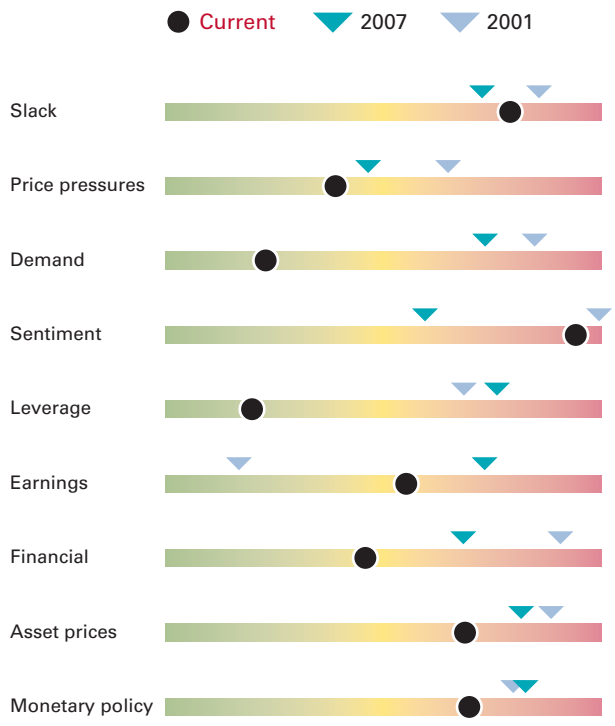
Still too early to call recession in the U.S.

A comparison of the current state of fundamentals with previous business cycles

a. Cyclical index just now moving toward later cycle levels



b. Lack of extremes broadly present across a range of indicators



Notes: Figure I-2a displays the historical ranges of a cyclical index at various points in the business cycle. Index is shown as a z-score and weighted by first principal components of 25 economic indicators (below). The business cycle is determined by historical observations of the output gap. Figure I-2b displays the underlying components of the cyclical index in Figure I-2a, presenting the current level relative to historical observations. The 2007 and 2001 data points indicate the index and component position 12 months prior to the onset of recession. Underlying indicators: slack = output gap, U3 and U6 unemployment rate gap relative to NAIRU. Price pressures = personal consumption expenditures (PCE), core PCE, average hourly earnings, unit labor costs. Demand = housing starts, residential investment, non-residential investment, durable goods consumption. Sentiment = business optimism, consumer sentiment, consumer confidence. Leverage = household financial obligations ratio, nonfinancial corporate debt, FRB Senior Loan Officer Opinion Survey for consumer and commercial and industrial credit terms. Earnings = corporate profits. Financial = Vanguard financial conditions index, yield curve (measured as the 10 year-3 month Treasury yield) Asset prices = Vanguard's fair-value CAPE, corporate OAS spread, high-yield OAS spread. Monetary policy = federal funds rate versus neutral rate estimated by the Laubach-Williams (2003) model. Data range is 1980 Q1-present.

Sources: Vanguard, Moody's Analytics Data Buffet, Federal Reserve Bank of St. Louis, Laubach-Williams (2003).

however, are clearly consistent with a slowdown in growth and a more elevated risk of recession, including tight labor markets and high asset valuations (such as equity price/earnings ratios and tight credit spreads).

Figure I-2 suggests that the chances of a U.S. recession occurring and thereby derailing growth in the global economy are roughly 30% as we enter 2019. U.S. growth in 2019 is likely headed lower, but not below zero—in other words, down but not out.

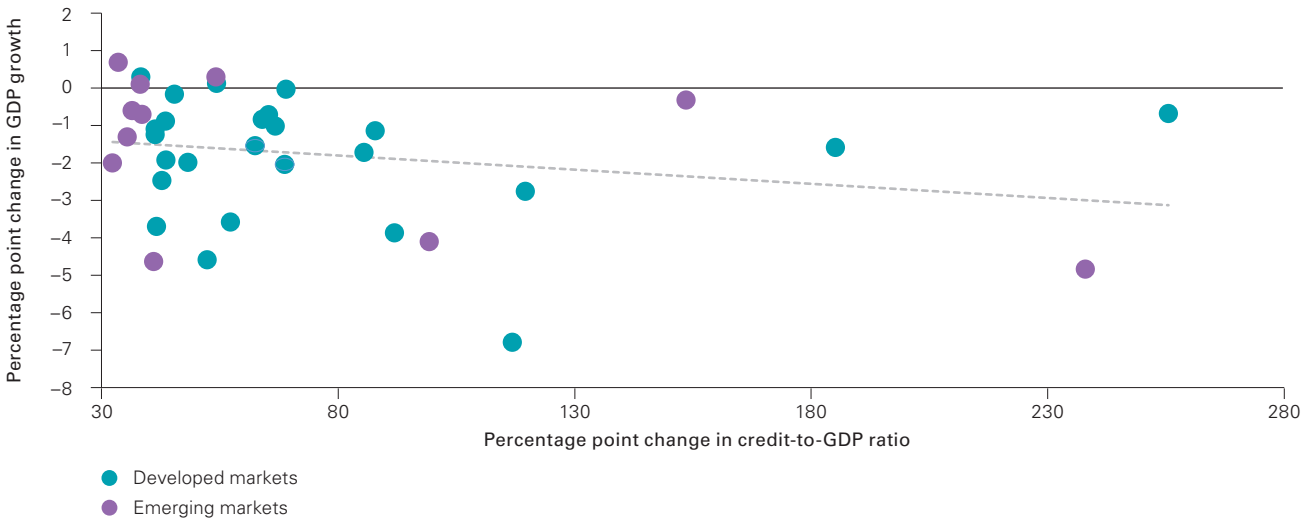
A modest yet persistent challenge that the global economy will face in 2019 (and beyond) is the growth in global debt. In part because of ultrastimulative global monetary policy, global debt levels have rarely if ever been higher, and may be sowing the seeds for the next crisis. The global debt-to-GDP ratio stood at 220% in 2018, up from 175% in 2008.

Specifically, two segments of the global debt markets are concerning: emerging-market debt denominated in hard currency and nonfinancial corporate debt in the U.S. and Europe. In the case of the latter, rapid growth in so-called leveraged loans is particularly alarming, having accounted for about 50% of the total corporate debt issuance in 2018, according to the International Monetary Fund (IMF). As the business cycle continues to mature and financial conditions gradually tighten in 2019, the global economy will be less able to sustain such credit growth (Chen and Kang, 2018). **Figure I-3** illustrates that credit booms eventually fade, helping to contribute to economic slowdowns.

Although many emerging-market economies are vulnerable, China is the key risk factor given the size of its economy, hefty corporate debt, and rapidly rising household debt. China's credit profile stabilized moderately in 2017 and 2018, thanks to a recovery in nominal growth and the government's financial deleveraging campaign. Furthermore, a typical emerging-market debt crisis that is triggered by withdrawal of foreign funding is unlikely, given that over 90% of Chinese debt is domestic. Meanwhile, as downside risk to growth emerges, the Chinese government has engaged in further monetary

FIGURE I-3

Most credit booms eventually lead to slower growth, a headwind for 2019



Notes: Credit booms are defined as periods where the credit-to-GDP ratio is growing at a rate of at least 30 percentage points over a rolling five-year window. The change in credit-to-GDP ratio is the difference between the credit-to-GDP ratio at the start of the credit boom and the credit-to-GDP ratio when credit is growing at its fastest rate, again over a rolling five-year window. The change in GDP growth is the average growth differential between the five-year post-boom and five-year pre-boom periods.

Sources: Vanguard calculations, based on data from Bloomberg, the IMF, and the Bank for International Settlements (BIS).

and fiscal easing. These stimulus measures, alongside strengthened capital controls, will most likely avert a near-term crisis in China and spillover to the global economy. Although China may be delaying important long-term reforms, its near-term growth is unlikely to collapse.

Where could the next recession come from?

To understand what factors might cause a global recession today, it is useful to examine what precipitated such downturns in the past (**Figure I-4**). A more systematic analysis, involving a historical sample of 108 recessions in 23 developed markets over the last 60 years, shows that the length of the expansion is a necessary but not sufficient condition for recession; thus, the duration of the recovery provides little insight into the causes, depth, or even timing of the next recession.

As inflation in most developed markets has fallen to more desired levels since the early 1990s, mainly because of a focus on explicit or implicit inflation-targeting by central banks, the sources of (or catalysts for) global or regional downturns have expanded beyond typical inflation pressures, as they did in the 1970s.

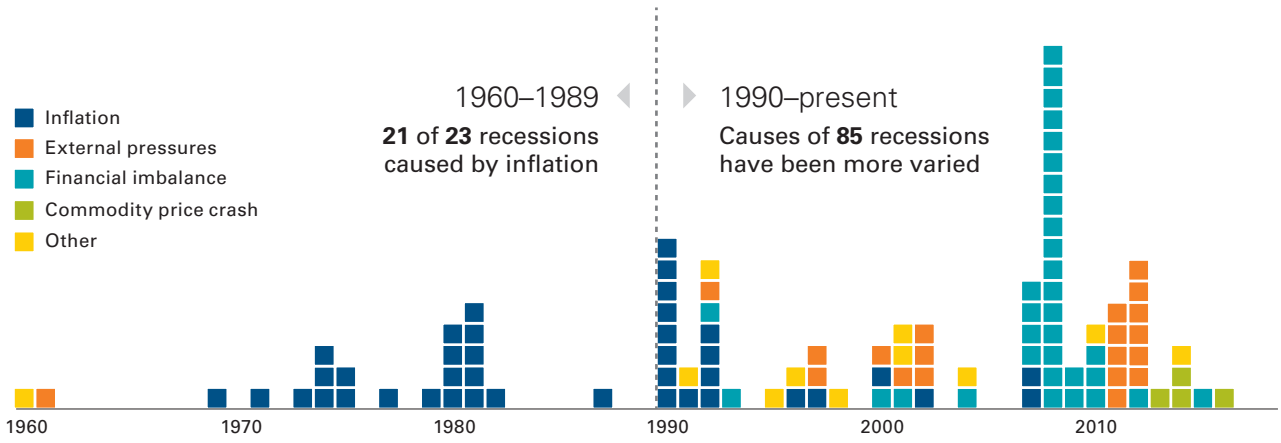
However, there has been no absence of significant inflation shocks to the global economy in the previous four decades. The reason behind the dramatic decline in inflation-induced recessions since the 1980s is that central banks learned to act preemptively in the face of inflation shocks, getting ahead of any price-wage inflationary spirals by better managing market expectations.

In 2019, we do not see a material risk of a strong rise in core inflation despite lower unemployment rates and higher wages, assuming inflation expectations remain well-anchored.

FIGURE I-4

Drivers of recessions vary

Drivers of 108 country-specific recessions since 1960



Notes: Recessions are defined as two consecutive quarters of negative real GDP growth. We examined 23 developed economies starting in 1960, or with the earliest available quarterly data. Recessions were categorized using a variety of macroeconomic indicators and historical analysis. Inflation recessions are those where regional inflation averaged greater than 4% in the 12 months preceding the recession's start. External pressures signify recessions caused by export-demand weakness. Financial imbalance broadly represents a misallocation of capital, either through unsustainable equity, housing, or credit valuations resulting in elevated financial sector stress. Commodity price crashes are most likely to affect commodity export-driven economies. Examples of idiosyncratic factors (other) include weather events, tax increases, and political developments.

Source: Vanguard calculations, based on data from Thomson Reuters, Moody's Analytics Data Buffet, and the Associated Press.

Vanguard's risk scorecard

Although we are not predicting a global recession in our central case, a wide range of triggers could spark a global downturn.

Figure I-5 describes some of the global concerns that are front and center for investors as we head into 2019. For each potential risk, it indicates the odds attached to upside, downside, and base-case scenarios based on our assessment of risks.

Overall, the largest single risk to our forecasts is if an overly aggressive Federal Reserve continues to raise rates beyond 3% in 2019, perhaps because of a temporary rise in core inflation or wages. This risk, if it materialized sometime in 2019, would significantly raise the odds of a U.S. recession in 2020. This would also adversely affect emerging-market countries that are dependent on dollar funding and vulnerable to a strengthening dollar. Other risks are rated at lower odds, yet some of them are interrelated.

FIGURE I-5

Global risks to the outlook

2019 global risks	Description	Vanguard assessment of risks: Negative scenario	Vanguard assessment of risks: Base case	Vanguard assessment of risks: Positive scenario
Global monetary policy normalization	Extreme nature of existing policy stimulus, uncharted territory of quantitative tightening, and uncertainty about the neutral setting for policy (r*).	**27%** Policy mistake in the U.S.: Fed continues tightening beyond r* and the yield curve inverts. ECB/BOE hold off on normalization plans, increasing the divergence of global policy rates.	**52%** Soft landing in the U.S. at 2.75%–3%. Gradual ECB/BOE normalization commences. Global growth slowing back to trend.	**21%** Soft landing in the U.S. at 3% or higher. Jump in productivity growth leads to higher growth with no inflation and shifts r* up. Global trend growth increases without global inflation.
Trade war and protectionism	Bilateral U.S.-China trade war continues to escalate. Tariffs can be increased further and non-tariff barriers can be put in place.	**18%** Trade war extends beyond tariffs to quantitative restrictions, boycotts, etc., with major retaliations from China. Geopolitical risks rise. Impact to GDP growth could be more than 100 basis points.	**53%** Trade war escalates in intensity, with level of existing tariffs and coverage of imports increased. Impact on the global economy of 30–50 basis points.	**29%** The U.S. and China reach a bilateral agreement. Tariffs are rolled back.
Instability of Chinese economy	Fears are rising about a potential hard landing in China, given the collateral damage of financial deleveraging and the expectation of continued deterioration in China-U.S. relations.	**23%** Capital flows intensify amid further escalation in the trade war and rising Fed policy rate. Policymakers fail to provide enough stimulus. Headline growth falls below 6%.	**57%** Further monetary and fiscal easing will support domestic demand, while financial stability risk remains under control. Headline growth likely moderates to 6.0%–6.3% for 2019.	**20%** U.S.-China striking a trade deal and/or policy over-easing represent upside risks to growth.

Two factors that we have built into our *base case* for 2019 are escalating U.S.-China trade tensions and some further moderation in China's economic growth. Those two (interrelated) factors are already acting as a small impediment to global growth in our base case, but the risk is that they could further undermine global demand and ultimately global growth.

We also think there is a nontrivial risk of disruption to economic activity from a flare-up of the standoff in Europe between Italy's government and European policymakers that, *in extremis,* could lead to Italy's exit from the euro area. Brexit-related risks continue to drag on the United Kingdom's economy and, to a lesser extent, Europe's, but we do not see this as one of the major risks likely to lead to a global downturn.

FIGURE I-5 (continued)

Global risks to the outlook

2019 global risks	Description	Vanguard assessment of risks		
		Negative scenario	Base case	Positive scenario
Euro breakup risk	An escalation in tensions relating to Italy. The risk is that the European Commission will assess penalties on Italy, which further stokes Italian resentment toward the European Union and provokes an Italian exit from the euro.	**16%** The Italian government maintains a loose fiscal policy that results in EU sanctions, prompting a political crisis and eventual departure from the euro. This results in a wider crisis in the euro area and the departure of more countries.	**68%** The Italian government revises fiscal policy to abide by EU rules and market tensions subside, but public and private sector deleveraging is still minimal. Euro breakup concerns are diminished but have not disappeared.	**16%** The Italian government backs down completely and submits a fiscal austerity plan that causes public debt to fall more quickly than currently expected and euro breakup concerns to subside.
Emerging-market debt crises	Key drivers of emerging-market cycles are global monetary divergence, the effect of the U.S. dollar on dollar-denominated debt, and global/China demand for commodities.	**24%** Trade wars, a slowdown of the Chinese economy, or a strong U.S. dollar due to continued divergence of monetary policy lead to spillovers and broader emerging-market crises.	**57%** Emerging-market debt crises remain contained to a few idiosyncratic cases. Global monetary convergence and the stabilization of the Chinese economy ease the risk of contagion to all emerging markets.	**19%** U.S. dollar level normalizes as developed-market central banks commence normalization. Risk-on environment helps emerging markets undergo V-shape bounce-back.

Note: Odds for each scenario are based on median responses to a poll of Vanguard's Global Economics and Capital Markets Outlook Team.
Source: Vanguard.

Global growth outlook: Moderating to trend

Vanguard dashboards of leading economic indicators and implied economic growth for 2019

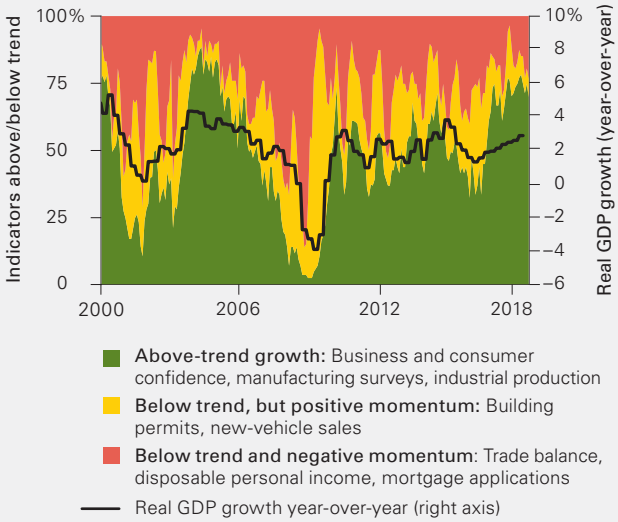
United States: Above trend but falling

Our proprietary U.S. leading indicators dashboard is a statistical model based on more than 80 leading economic indicators from major sectors of the U.S. economy. As **Figure I-6a** shows, in spite of a high proportion of green indicators (above-trend readings) in the dashboard at present, there is an incipient increasein red indicators, signaling the start of a gradual slowdown in the U.S. economy. The most positive (green) indicators are those associated with increased business and consumer confidence, a tightening labor market, and a stronger manufacturing sector. The negative (red) indicators are associated with trade balance, disposable personal income, and mortgage applications. Building permits and new-vehicle sales are below trend but show positive momentum (yellow indicators).

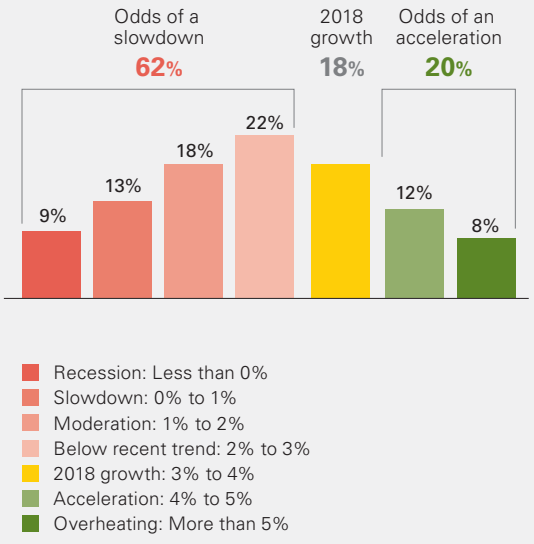
Using regression analysis, we mapped our proprietary indicators to a distribution of potential scenarios for U.S. economic growth in 2019, as shown in **Figure I-6b**. The odds of growth at or exceeding 3% in 2019 (38%) are lower than the odds of growth slowing down (62%). Our base case is for U.S. growth to moderate toward its long-term trend of 2%.

Figure I-6

a. Economic indicators



b. Estimated distribution of U.S. growth outcomes



Notes: Distribution of growth outcomes generated by bootstrapping the residuals from a regression based on a proprietary set of leading economic indicators and historical data, estimated from 1960 to 2018 and adjusting for the time-varying trend growth rate. Trend growth represents projected future estimated trend growth.

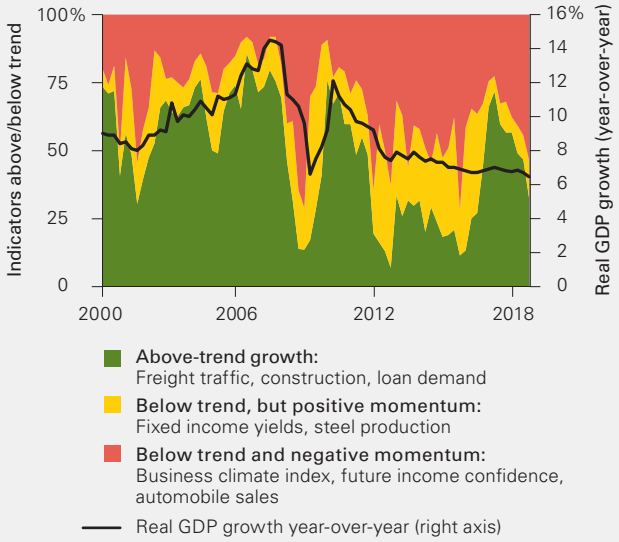
Source: Vanguard calculations, based on data from Moody's Analytics Data Buffet and Thomson Reuters Datastream.

China: Continued deceleration

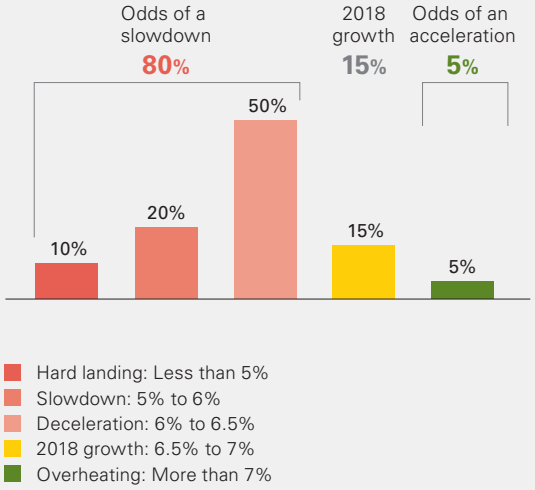
China is expected to continue its modest deceleration in 2019, with risks tilted to the downside, according to our proprietary China leading indicators dashboard (**Figure I-6c**). Specifically, despite ongoing policy efforts to stabilize near-term economic growth and combat international headwinds (as evident in improving fixed asset investment and commodity production), yellow and red indicators associated with softening sentiment and worsening asset returns suggest that more-aggressive stimulus measures may be needed to bolster private enterprise. Against this backdrop, China's economy is expected to grow by about 6%–6.3% in 2019 (**Figure I-6d**), with the risks of a downside slightly greater than those of a growth acceleration.

Figure I-6 (continued)

c. Economic indicators



d. Estimated distribution of China growth outcomes



Notes: Distribution of growth outcomes generated by bootstrapping the residuals from a regression based on a proprietary set of leading economic indicators and historical data, estimated from 1960 to 2018 and adjusting for the time-varying trend growth rate. Trend growth represents projected future estimated trend growth.

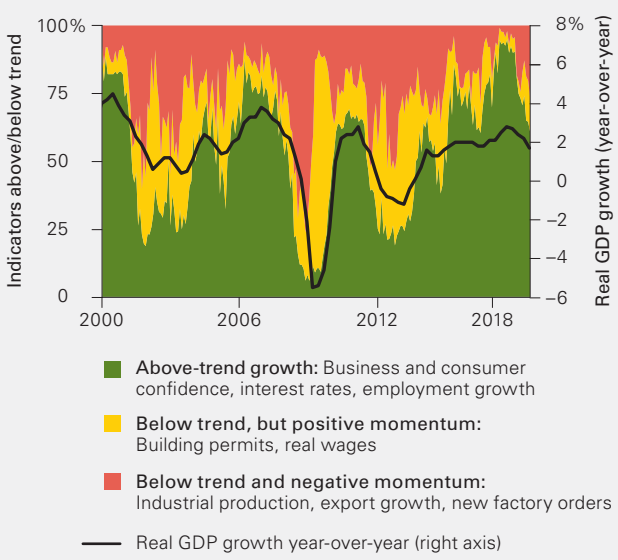
Source: Vanguard calculations, based on data from CEIC and Thomson Reuters Datastream.

Euro area: Above trend but falling

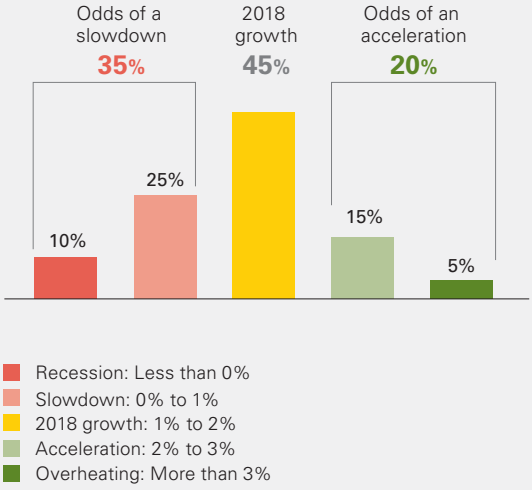
The euro area is expected to grow at a moderate rate of about 1.5% in 2019, which is slightly above trend. As illustrated by our leading indicators dashboard (**Figure I-6e**), the proportion of indicators that are tracking above trend fell throughout 2018, primarily driven by a weaker industrial sector and net trade. A slowdown in the global trade and industrial cycle, in addition to delays in German car production, explains most of this deterioration in economic momentum; German exports and German industrial production are both currently in the red category, indicating below-trend growth and negative momentum. We expect growth to stabilize in the first half of 2019 as car production recovers. Moreover, a large proportion of leading indicators are still in green territory, including business and consumer sentiment, labor market data, and monetary policy. This should provide support to growth next year. However, as shown in **Figure I-6f**, the risks to the growth outlook are skewed to the downside given China's continuing slowdown, U.S.-China trade tensions, and elevated political risks concerning Brexit and Italy.

Figure I-6 (continued)

e. Economic indicators



f. Estimated distribution of euro-area growth outcomes



Notes: Distribution of growth outcomes generated by bootstrapping the residuals from a regression based on a proprietary set of leading economic indicators and historical data, estimated from 1960 to 2018 and adjusting for the time-varying trend growth rate. Trend growth represents projected future estimated trend growth.

Source: Vanguard calculations, based on data from Bloomberg and Macrobond.

United States: Going for a soft landing

Much of our global outlook hinges on our expectations for conditions in the United States. In 2019, U.S. economic growth should decline from current levels toward trend growth of about 2%. While we believe a recession remains some time off (see Figure I-2 on page 7), we expect the U.S. labor market will cool, with employment growth falling closer in line with the trend growth of the labor force (80,000–100,000 per month), and structural factors such as technology and globalization should prevent inflation from rising significantly above the Federal Reserve's 2% target.

The strong performance of the U.S. economy over the last two years is in part explained by significant support from expansionary monetary and fiscal policies. We estimate that the latter contributed over 50 basis points to headline growth in 2018. (A basis point is one-hundredth of a percentage point.) In 2019, we expect monetary policy to dial back to "neutral," with the federal funds rate reaching 2.75%–3% in June of 2019. On the fiscal policy front, we may continue to see the expansionary effects of the Tax Cuts and Jobs Act through the first part of the year. However, we expect the boost to the year-over-year GDP growth rates from consumer spending to begin fading away toward the second half.

But the strong performance of the U.S. economy has been due to more than just policy. The U.S. consumer has been the key engine of growth during the recovery from the global financial crisis, with almost all drivers of spending firing on all cylinders, including recent support from lower income-tax payroll withholdings (see **Figure I-7**). Looking ahead to 2019, the dashboard gets a bit more muddled. Nothing is flashing red, but, with the exception of household debt measures and wage growth, all indicators get worse. Higher interest rates will start to bleed through to mortgage rates and rates for auto and personal loans. They will also affect asset valuations in credit-sensitive sectors such as housing. On the jobs front, it will be hard for the U.S. economy

FIGURE I-7

Dashboard of consumer drivers

	2017/ 2018	2019	Assessment
Wage growth	→	→	Further improvement in wages will be limited by low labor productivity growth
Jobs (growth, lower unemployment)	↑	→	Employment growth will level off
Household debt to disposable income	↑	↑	Outstanding debt and the cost of servicing it will remain low
Wealth effects	↑	→	High equity valuations and market volatility on the rise could be a drag on financial wealth. Rising rates will affect credit-sensitive sectors, including home prices. Year-over-year tax cuts will disappear.
Interest rates and cost of credit	↑	→	Mortgage rates and rates for auto and personal loans will rise
Consumer confidence	↑	→	Unknown; policy uncertainty and market volatility will rise
Consumer prices (inflation and import prices)	↑	→	Inflation will stay close to the Fed's target

Source: Vanguard's Global Economics and Capital Markets Outlook Team.

to replicate the impressive pace of job creation of the last two years. While the labor market will stay strong, it may not provide similar contributions to growth in 2019. And several unknowns such as trade policy uncertainty, increased market volatility, and high equity valuations will possibly affect consumer confidence and stock market wealth.

One of the most puzzling aspects of an otherwise strong U.S. economy continues to be subpar wage growth. As the unemployment rate (3.7% as of November 2018) has fallen to the lowest level since the 1960s, why does wage growth, which is only now reaching 3%, remain so tepid by historical standards?

All else equal, stronger demand for workers should result in higher wages, but all else is not equal. Fundamentally, we should not expect inflation-adjusted (real) wages to exceed the levels of labor productivity growth and inflation. Productivity growth rates have been (1% since the recovery began in 2010, compared with 2% before the global financial crisis. This means we should not expect pre-crisis levels of wage growth, particularly after incorporating inflation, which has struggled to consistently achieve the Fed's 2% target (see **Figure I-8**).[1]

While low labor productivity can explain subdued real wage growth, one concern that investors have for 2019 is that ever tighter labor markets could eventually fuel a wage-inflation spiral involving nominal wages and final consumer prices. The concern is rooted in the strong historical relationship between nominal wages and inflation. However, as shown in **Figure I-9a**, the beta of nominal wage growth on consumer inflation has declined significantly since the 1990s. At the core of this shift in the wage-inflation relationship is the Fed's ability to manage inflation expectations effectively. If they

FIGURE I-8

Absent a significant increase in productivity, higher wage growth is unlikely

Notes: Real wage growth is calculated as the growth rate of hourly wages as reported in the Employment Cost Index (ECI) minus core PCE inflation rate for that year. Trend for real wage growth is estimated as a centered three-year moving average of real wage growth.

Sources: Congressional Budget Office, Bureau of Labor Statistics.

1 See the 2017 Vanguard Global Macro Matters paper *Why Is Inflation So Low? The Growing Deflationary Effects of Moore's Law.*

remain in check, workers would have little reason to fear high inflation and thus would not demand higher nominal wages above and beyond any labor productivity gains plus reasonable levels of inflation around the Fed's 2% target. If wage gains keep pace with productivity and inflation expectations remain near the Fed's target, unit labor costs for businesses would not rise faster than inflation and there would be no impact on final consumer prices.

Inflation expectations and the Fed's ability to manage them (that is, the Fed's credibility) are often overlooked in Phillips curve models that correlate rising inflation with low unemployment. **Figure I-9b** shows our inflation estimates from an augmented Phillips curve model that incorporates not only labor market slack but also inflation expectations and other secular forces affecting inflation, such as globalization and technology.[2] Core inflation is projected to hover closely near the Fed's inflation target in 2019.

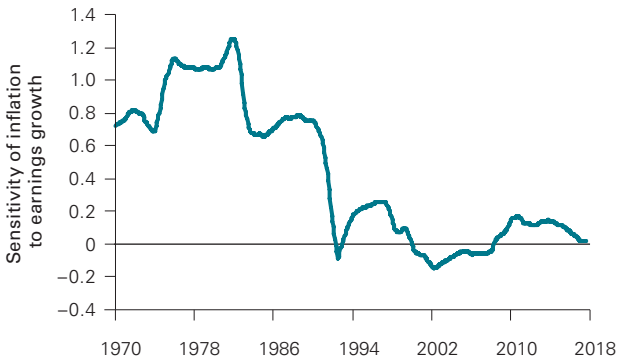
Yet it is this Phillips curve logic that has many who are attempting to anticipate the Fed's next move very focused on the labor market. However, in 2019, the Fed will be able to worry less about the unemployment-inflation link by leaning heavily on its credibility with the market. It will instead rely more on its assessment of a neutral policy stance as its guiding principle.

Calibrating policy rates to neutral is an extremely complex exercise full of risks. The so-called soft landing requires significant skill by policymakers. The neutral rate (usually referred to as r*) is a moving target and not directly observable, as it has to be estimated with statistical models. The Fed's extremely gradualist approach during this rate-hiking cycle does help increase the odds of a successful landing this time, however. Our best attempt to estimate the neutral rate places it somewhere in the 2.5%–3% range. If this is correct, the Fed is likely to

FIGURE I-9

Runaway inflation remains unlikely

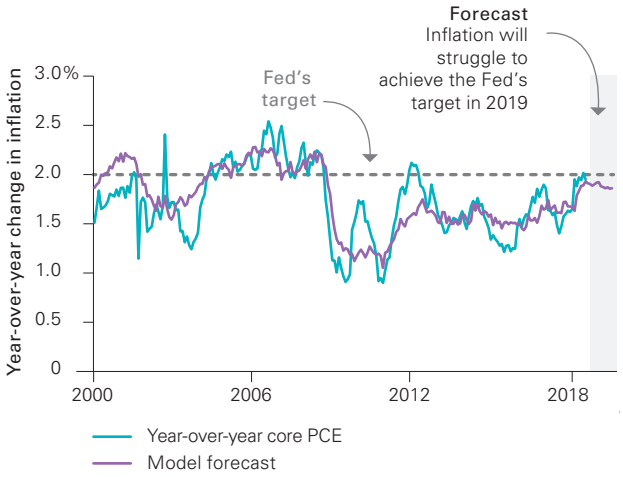
a. Pass-through of earnings to inflation has waned with anchored inflation expectations



Notes: Figure indicates the sensitivity of core PCE inflation to year-over-year growth in average hourly earnings using rolling ten-year regression coefficients. Data cover January 1960–September 2018.

Sources: Vanguard calculations, Moody's Analytics Data Buffet.

b. An "augmented" Phillips curve model



Notes: Core PCE model is a root mean square error (RMSE)-weighted average of two models: a bottom-up model where we model the deviation of augmented Phillips curve fitted values to each major component in the core PCE and a top-down macro model. The RMSE is 0.35 for the bottom-up model and 0.24 for the top-down model. This leads to a 40% weight for the bottom-up model and a 60% weight for the top-down model in the weighted model.

Source: Vanguard calculations, based on Thomson Reuters Datastream, Bureau of Economic Analysis, Bureau of Labor Statistics, Philadelphia Federal Reserve Bank Survey of Professional Forecasters, Congressional Budget Office, and Bloomberg Commodity Index.

2 See the 2018 Vanguard Global Macro Matters paper *From Reflation to Inflation: What's the Tipping Point for Portfolios?*

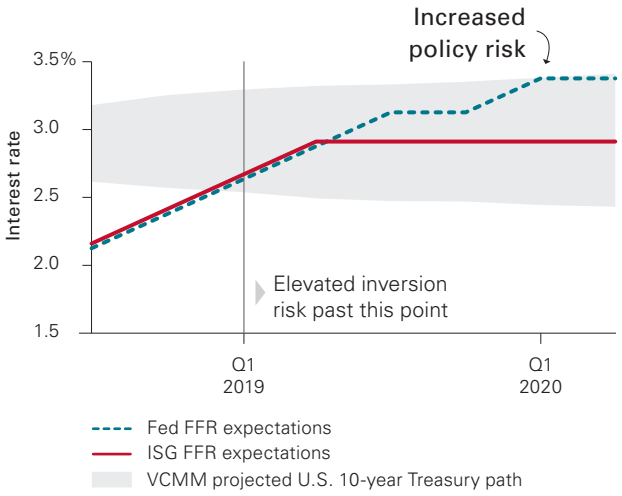
increase the policy rate to a range of 2.75%–3% by June of 2019 and then stop or at least pause to reassess conditions.

The risks to our view are not negligible. Historically, the U.S. Treasury yield curve has provided one of the clearest real-time indicators of overly tight policy. If policy becomes too restrictive, the slope of the yield curve falls, and at some point before a recession, it inverts.[3] Inversion typically occurs when the market believes the Fed has gone too far and drives the yield of the 10-year Treasury below the federal funds rate and that of the 3-month Treasury yield. Recession typically ensues 12 to 18 months later. Since the onset of policy rate increases in 2015, the slope of the Treasury curve has flattened from 300 basis points to around 80 basis points today. As the Fed continues to normalize policy in 2019, the risks of inversion will build (**Figure I-10a**). Some subscribe to the view that a new policy environment means that a flatter yield curve does not hold the same predictive power it once did. Our research leads us to believe that while this power has diminished over time, it still presents a fairly significant risk to our 2019 U.S. base case.[4]

FIGURE I-10

The yield curve remains a relevant leading indicator of economic growth

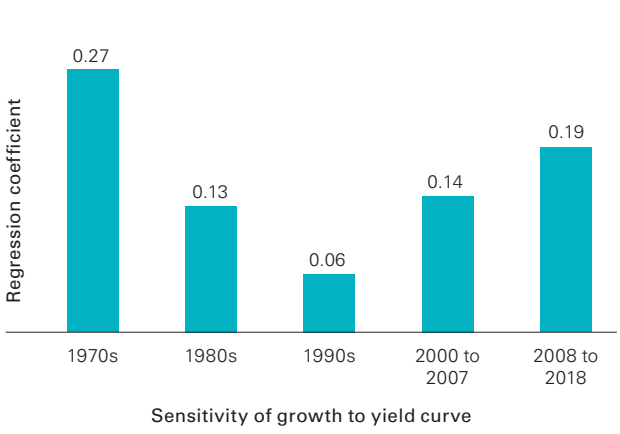
a. Further flattening expected; inversion risk increases in 2019



Notes: FFR refers to federal funds rate. The U.S.10-year Treasury path range uses the 35th to 65th percentile of projected VCMM path observations. Distribution of return outcomes is derived from 10,000 simulations for each modeled asset class. Simulations are as of June 30, 2018. Results from the model may vary with each use and over time.

Sources: Vanguard calculations, based on data from Thomson Reuters Datastream and Moody's Analytics Data Buffet; Federal Reserve Bank of New York.

b. Relationship of growth to yield curve has not deteriorated in the quantitative-easing era



Notes: Data are through June 30, 2018. Sensitivity is represented by coefficients from an ordinary least squares (OLS) regression model of yield curve slope (10-year U.S. Treasury yield minus 3-month T-bill yield) and the Vanguard Leading Economic Indicators series (used as a proxy for growth with monthly observations) 12 months forward. Coefficients are statistically significant at the 1 percent significance level.

Source: Vanguard calculations, based on data from Moody's Analytics Data Buffet and Thomson Reuters Datastream.

3 As measured by the difference between 3-month and 10-year constant-maturity Treasury yields.

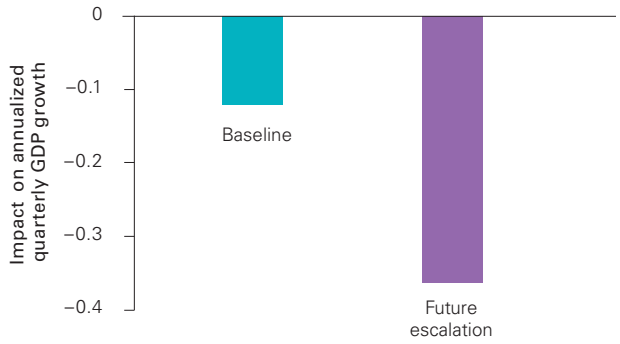
4 See the 2018 Vanguard Global Macro Matters paper *Rising Rates, Flatter Curve: This Time Isn't Different, It Just May Take Longer.*

Outside of monetary policy, the largest domestic risk to our U.S. outlook stems from trade policy. Trade represents a relatively small proportion of the U.S. economy (20% of GDP vs. a developed-market average of 35%). However, if trade tensions reverberate through financial markets (as shown in increases in the BBB spread in **Figure I-11**), the implications for economic conditions, including growth, become more significant. While we believe the U.S. will avoid recession in 2019, if the impacts of monetary and trade policies spread to financial markets, the likelihood of a downturn will become more substantial.

FIGURE I-11

Trade war impacts

GDP impact of higher costs of traded goods and financial market uncertainty



Baseline: A 25% tariff on $350 billion in imported goods (approximate amount of the U.S. trade deficit with China) and a retaliatory 25% tariff on $350 billion in exported goods along with a 25-basis-point widening of the credit spread.

Further escalation: A 25% tariff on a further $200 billion in imported goods (approximate amount of automobile, steel, and aluminum imports exposed to announced tariffs) and retaliatory 25% tariff on a further $200 billion in exported goods along with a 100-basis-point widening of the credit spread.

Notes: Tariff impacts are based on increasing prices of imports and exports by percentage indicated in the Federal Reserve's FRB/US model. The credit spread is the BBB spread. BBB spread impacts are based on shocking the yield spread of long-term BBB corporate bonds versus the 10-year Treasury bond yield by the indicated percentage.

Source: Vanguard calculations, based on the Federal Reserve's FRB/US Model.

Euro area: Stable growth as policy normalizes

After a sharp slowdown in 2018, euro-area growth is likely to stabilize around 1.5% in 2019, which is slightly above trend (see Figure I-6f on page 14). The slowdown was exacerbated by weak global demand for euro-area exports and delays to German car production as carmakers adjust to new European Union (EU) emissions standards.

In early 2019, we expect growth to modestly rebound as car production gets back on track. In addition, domestic demand in the euro area is likely to remain resilient, supported by healthy levels of business and consumer confidence and very low interest rates, which should continue to stimulate demand for credit. A stronger rebound remains unlikely in our view, given China's ongoing slowdown and U.S.-China trade tensions, which will weigh on demand for euro-area exports.

In 2019, risks to the euro area are tilted slightly to the downside, given a number of important global risks we outlined in the global growth outlook section. Domestically, the biggest risk is a further escalation in tensions between Italy's government and European policymakers. In 2019, Italy may break the 3% fiscal-deficit ceiling imposed on all EU members, and given the recent downgrade of Italian sovereign debt by key ratings agencies and the associated rise in Italian bond yields, Italy's debt levels are likely to remain elevated for the foreseeable future. Nervousness about Italy's fiscal position may spill over to other Italian assets and to periphery bond markets, which on its own could dampen growth. The larger risk, however, is that the European Commission imposes penalties on Italy, further stoking Italian resentment toward the EU and provoking Italy to exit from the euro. We think the chance of an Italian exit is only 5% over the next five years, but the situation warrants close attention.

In 2019, we expect the labor market to continue tightening, given that growth is likely to remain above trend for most of the year. The unemployment rate, now close to 8%, is likely to approach 7.5% by year-end, leading to a further lift in wage growth and core inflation (**Figure I-12a**).

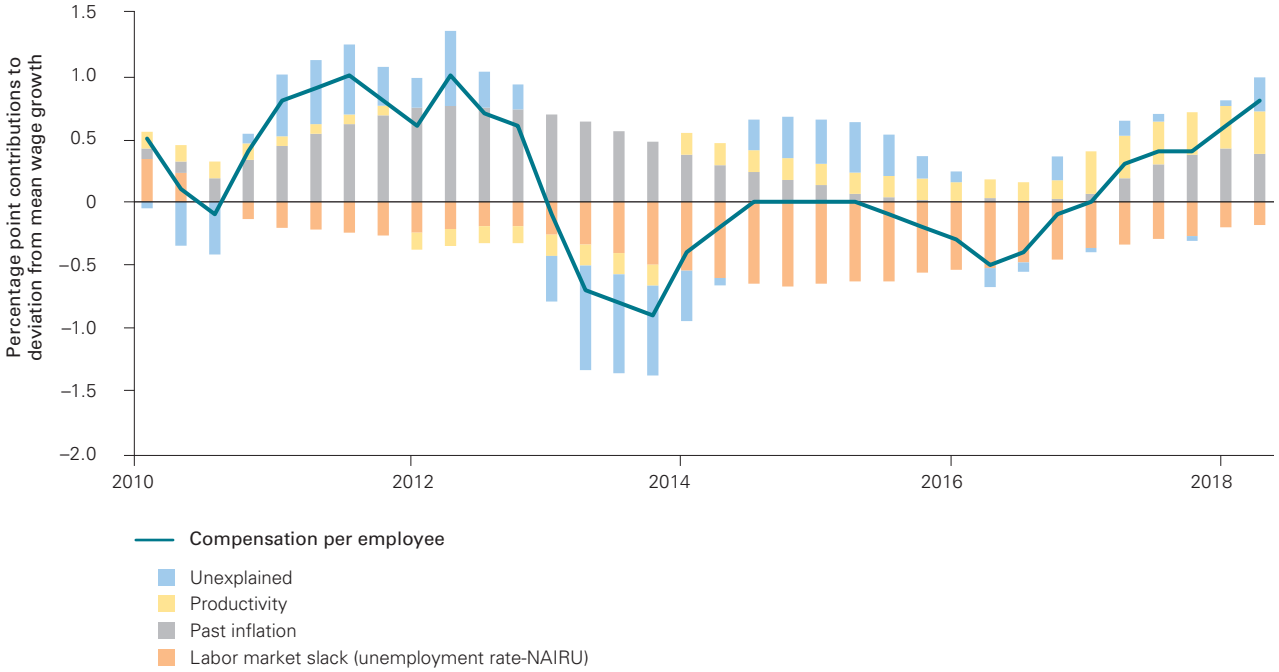
At this stage, we see a low probability of a surprise surge in core inflation, for two key reasons. First, Germany's economy is becoming deeply integrated with low-wage countries in Central and Eastern Europe, so German firms will be unwilling to offer higher wages at home. Second, periphery countries such as Italy, Spain, and Portugal need to contain their labor costs to restore competitiveness with the more efficient German economy.

Given this environment of tightening labor markets and rising inflation pressures, we expect the European Central Bank (ECB) to lift interest rates for the first time in late 2019 (**Figure I-12b**). By that stage, we estimate that the output gap will be slightly positive, with core inflation on track to reach target over the short to medium term. This will be followed by a very gradual hiking path thereafter (25 basis points every six months), given that we do not anticipate strong price pressures, as outlined above. Our analysis suggests that core inflation is unlikely to reach the ECB's target until wage growth increases.

FIGURE 1-12

European wage pressures are building, which will prompt the ECB to initiate a gradual hiking cycle

a. Drivers of euro-area wage growth

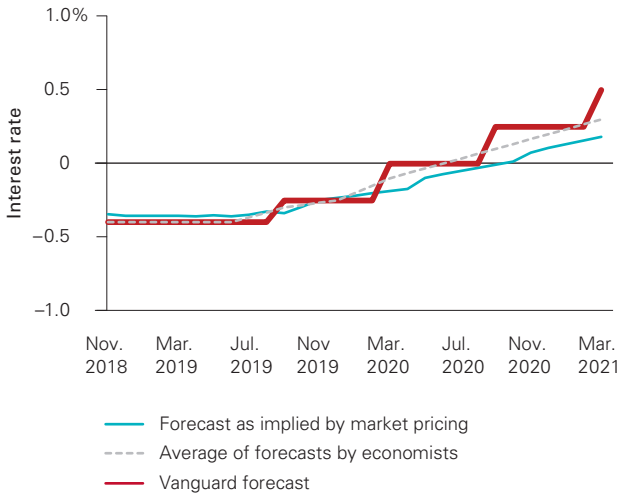


Notes: This decomposition has been derived from an OLS regression of compensation per employee on productivity growth, past inflation, and labor market slack. The nonaccelerating inflation rate of unemployment (NAIRU) is derived from the estimate by the Organisation for Economic Co-operation and Development (OECD).

Source: Vanguard calculations, based on data from Eurostat and the OECD.

FIGURE I-12 (continued)

b. ECB rate view (versus forward curve and economists' forecast)



Notes: Economists' forecast reflects the median expectation from a survey conducted by Bloomberg. The forecast implied by market pricing is derived from the forward overnight interest rate swap curve.

Sources: Vanguard, Bloomberg.

United Kingdom: Brexit is still the wild card

The United Kingdom is set to leave the EU on March 29, 2019. What happens beyond then depends on what, if any, deal it strikes with the EU. Under our base case, we assume that an agreement is reached that has the United Kingdom leave in March, with some kind of free-trade deal that starts after a transition period.

In the long run, according to government estimates, U.K. GDP would fall by as much as 5%. In 2019, however, the transition period would help limit disruption to the economy, so growth would be likely to remain around trend at 1.6%.

In contrast to previous years, our conviction in our base case is relatively low, given that several Brexit options are still on the table that could materially affect growth. One of the two most prominent risks is a "Crash Brexit," in which the United Kingdom fails to reach a deal and effectively falls out of the EU with no backstop. Such a scenario could be chaotic in the short run, depending on what sort of safety net the government puts in place, leading to sharply lower growth and possibly a recession.

The second risk is a "No Deal Brexit" scenario, in which the U.K. Parliament fails to ratify the deal, which could potentially lead to a second referendum and a vote to remain in the EU. Under this scenario, there would be several months of uncertainty as the referendum takes place, but a decision to remain in the EU could boost growth.

Headline and core inflation are likely to slow and ultimately settle close to 2% in 2019, after being pushed well above target by the sharp drop in the pound sterling after the EU referendum (**Figure I-13a** on page 22). There will still be further upward pressure on inflation, mostly from low unemployment and rising wages. However, we expect the Bank of England to preemptively respond to this potential inflation pickup to keep consumer price growth in line with its 2% target.

U.K. inflation is currently above the Bank of England's 2% target, and in normal times, this would already warrant policy tightening. We are not in normal times, however, given that the country is about to leave the EU.

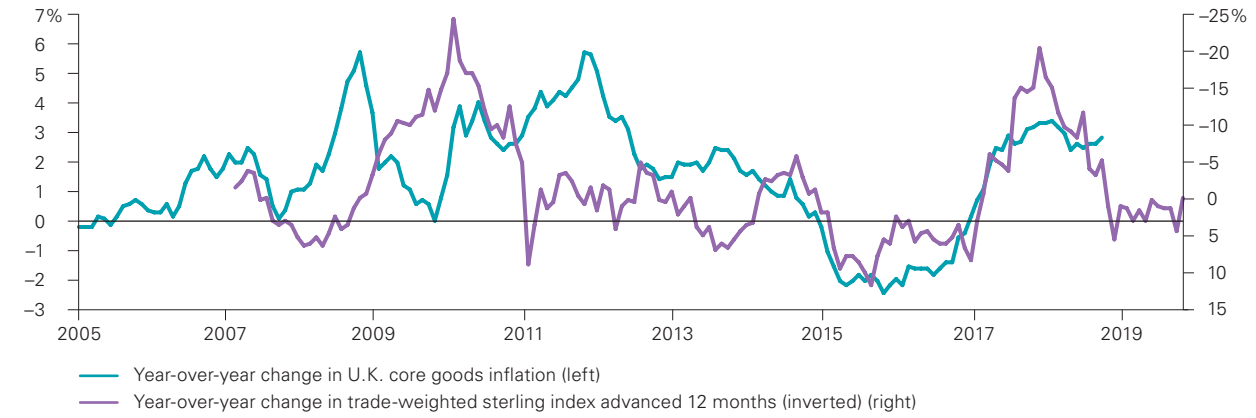
The Bank of England understands that sentiment is fragile and that the possibility of a "No Deal Brexit" is still on the table, so a rate hike could damage sentiment and push the United Kingdom into an unintended slowdown. We therefore believe that the central bank is likely to keep rates on hold until there is further clarity around Brexit.

If our base case plays out, and a "Compromise Brexit" deal is struck before March 2019, we would expect the Bank of England to increase rates twice in 2019, in May and in November, to bring inflation back in line with target (**Figure I-13b** on page 22). If no Brexit deal is reached, however, it will need to reassess its inflation outlook. If the hit to aggregate demand is judged to be greater and more persistent than the hit to aggregate supply, interest rates may be cut. But there is a chance that rates may need to rise even in a "No Deal Brexit" scenario, as the negative supply shock could lead to inflation accelerating above target for a sustained period.

FIGURE I-13

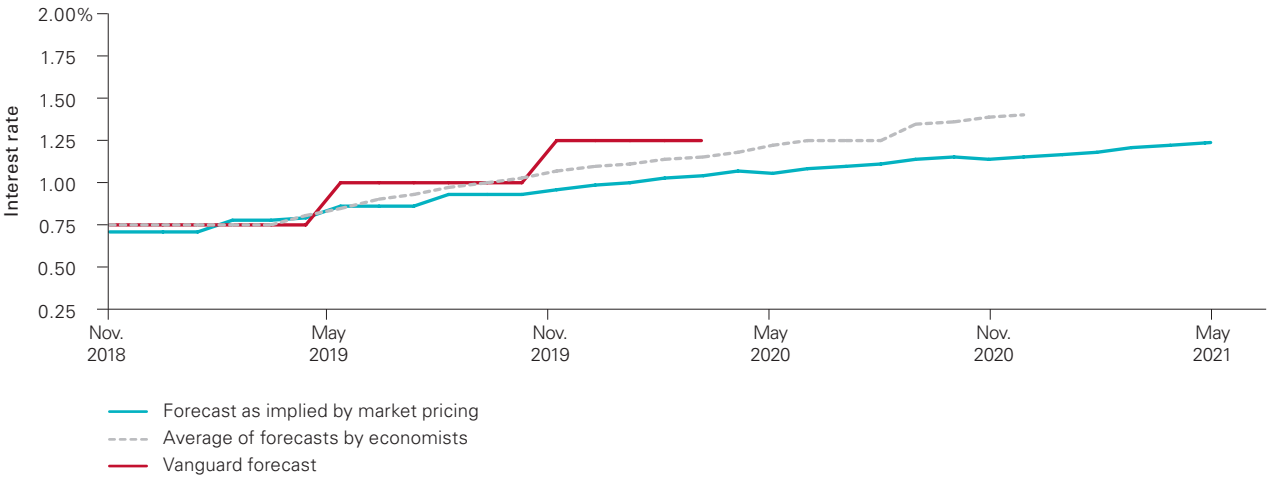
Bank of England to hike rates twice per year to stem inflation pressures

a. U.K. goods inflation is expected to fall because of a stronger pound



Sources: Bloomberg and the Office of National Statistics.

b. Bank of England rate view (versus forward curve and economists' forecast)



Notes: Economists' forecast reflects the median expectation from a survey conducted by Bloomberg. The forecast implied by market pricing is derived from the forward overnight interest rate swap curve.

Sources: Vanguard and Bloomberg.

China: Reprioritizing policy goals amid rising risks

The confluence of China's financial deleveraging campaign and rising geopolitical tensions with the United States has predictably shaken private sector confidence and slowed Chinese economic growth in 2018. These factors, along with the expectation of continued friction in China-U.S. relations, have compelled policymakers to reprioritize near-term growth stability over long-term economic restructuring and medium-term financial stability (see **Figure I-14**). As the government ramps up efforts to boost domestic demand in 2019 amid rising external and domestic challenges, we view the chance of a hard landing as low and expect China's economy to settle into a lower growth range of 6%–6.3% in 2019.

External headwinds have been rising as the United States and China approach a full-blown trade war. The stimulus from export front-loading is waning, and the true economic implications of U.S. tariffs will become apparent. We estimate the direct impact of current tariffs on China's GDP at a modest –0.15%, but this could accelerate to –0.60% with a 25% tariff on all imports from China.

FIGURE I-14

China's current easing is more moderate than in prior cycles

Priority		2014–2016	2017–2018	2018–2019 (projected)
Domestic objectives	Growth stability	HIGH	MEDIUM	HIGH
	Financial stability	LOW	HIGH	MEDIUM
	Structural reform	HIGH	MEDIUM	HIGH
Policy bias	← TIGHTENING EASING →			
Monetary/ exchange rate policy	Interest rates			
	Quantity tools (reserve requirement ratio, liquidity tools)			
	Currency depreciation			
Fiscal policy	Infrastructure spending			
	Tax policy			
Regulatory	Bank credit			
	Shadow credit			
	Property regulations			

Source: Vanguard.

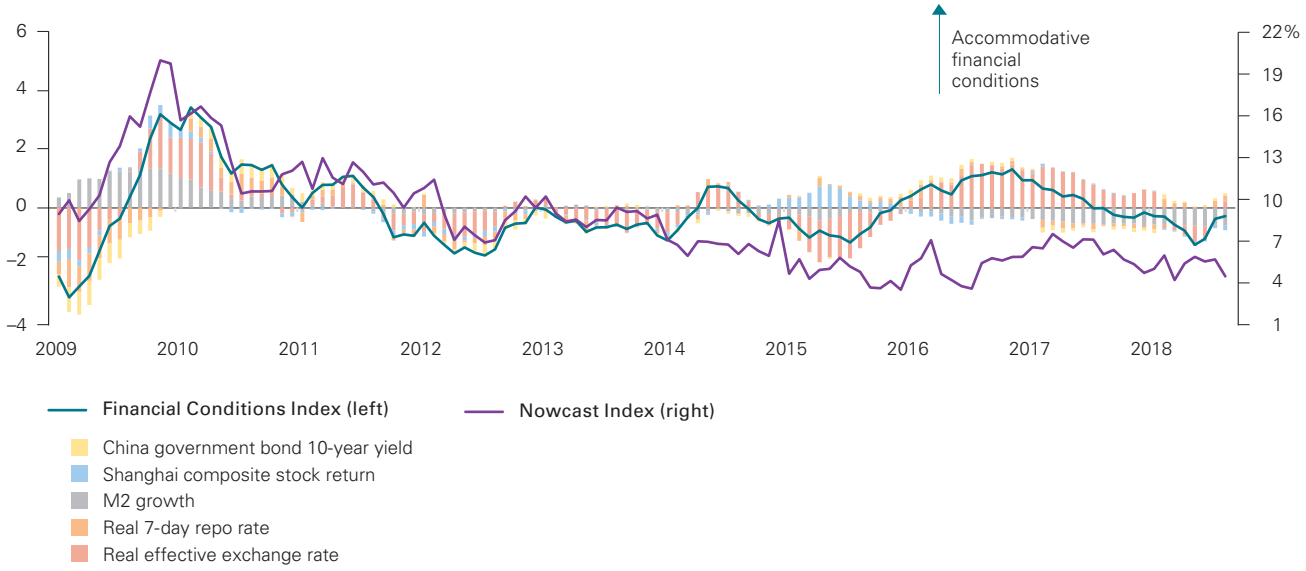
In addition, the potential downside is greater when considering the indirect impact on the labor market, consumption, business confidence, and financial markets. Although there are hopes that a trade deal is imminent, the U.S.-China conflict extends beyond trade to areas such as investment, technology, intellectual property rights, market access, and industry policy. Hence, the path to an eventual truce between the two economic superpowers is likely to be bumpy and prolonged.

China's 2016–2017 financial sector deleveraging campaign and regulatory crackdown on shadow banking had the adverse side effect of curbing credit to small and medium-sized private enterprises, a key component of China's new economy. As policymakers recognize the downside risk to growth, they are ready to pause or even modestly backtrack these deleveraging efforts to boost corporate sentiment; further monetary easing, such as required reserve ratio cuts, is in the pipeline (see **Figure I-15**). We expect regulatory reform aimed at encouraging entrepreneurship and private enterprise,

FIGURE I-15

Proactive policy stimulus should limit growth downside

Vanguard Financial Conditions Index versus Nowcast Index



Notes: Vanguard Financial Conditions Index is a VAR-weighted index of financial indicators. Positive values imply accommodative financial conditions; negative values imply tight conditions. Vanguard's Nowcast Index is designed to track China's economic growth in real time using a dynamic factor approach to weight economic and financial market indicators, accounting for co-movement between the factors.

Source: Vanguard calculations, based on data from Bloomberg, CEIC, and Thomson Reuters Datastream.

alongside fiscal expansionary measures including infrastructure investment and tax cuts, to combat the effects of a trade war.

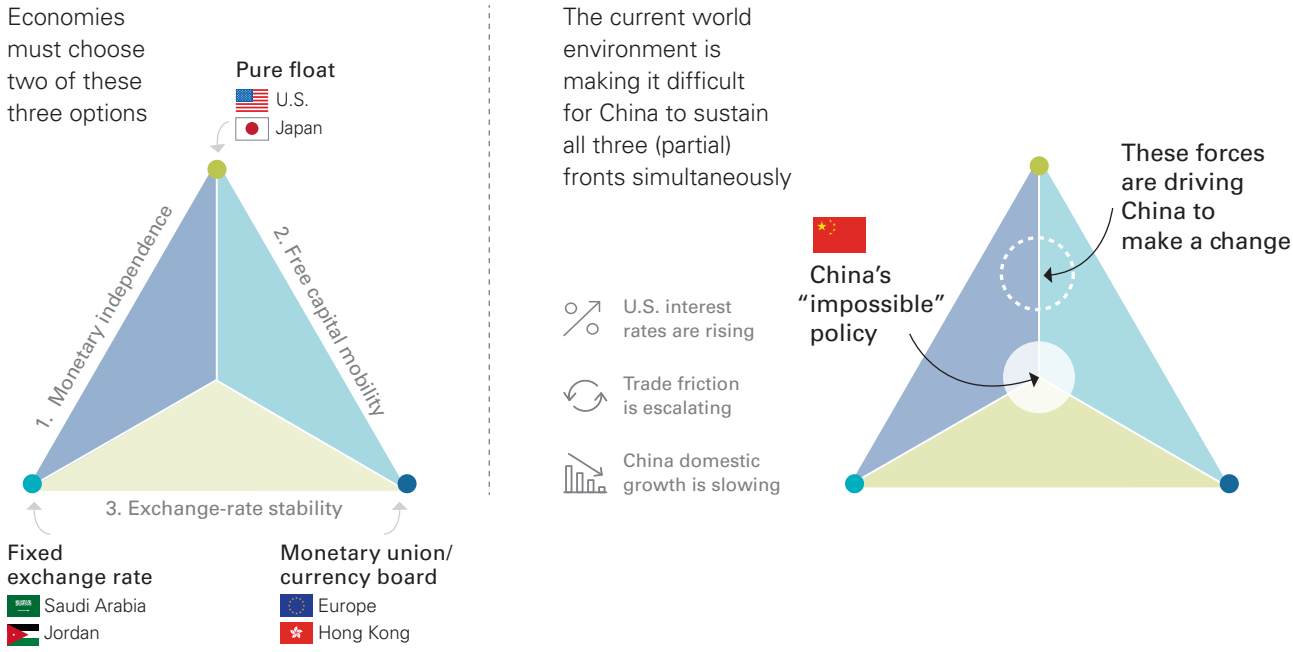
Responding to the slowdown through monetary policy easing revives the "impossible trinity" as the United States continues to raise interest rates.[5] However, we believe a repeat of 2015–2016, when China foreign exchange reserves declined by more than $1 trillion in 18 months amid a surge in capital outflows, is unlikely. With near-term growth stability becoming the top priority, monetary policy independence will prove critical in keeping domestic rates low in a global rising rate environment. As such, an "asymmetric capital control" is likely to be maintained, with tight control on outflows and inflows welcomed. A more flexible exchange rate regime should be allowed, especially when modest depreciation will be needed to offset the negative impact stemming from tariffs (see **Figure I-16**).

Although navigating the trilemma is a challenge in its own right, an ideal "Goldilocks" policy response would neutralize economic headwinds while pushing forward market reforms and safeguarding medium-term financial stability. The government will strive to avoid both under- and over-easing the economy in 2019, but achieving

FIGURE I-16

From an impossible tri-brid approach to a standard corner solution

China is moving toward less capital-account openness and more exchange-rate flexibility



Source: Vanguard.

5 The impossible trinity is a trilemma in international economics that states that it is impossible to have a fixed foreign exchange rate, free capital movement (absence of capital controls), and independent monetary policy at the same time.

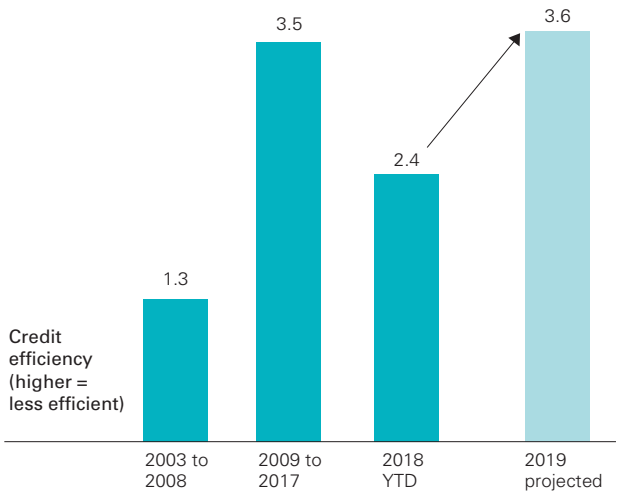
this balance amid multiple goals will be difficult. While we are not as concerned about the near-term growth outlook as many in the market and view the chance of a hard landing as rather low, there are rising concerns that the government is delaying the reforms necessary to alleviate medium-term financial risk and ultimately address distortions in resource allocation (see **Figure I-17**).[6]

Even though the path is likely to be bumpy, we remain cautiously optimistic that China will resume its economic liberalization and reform as a necessary response to enduring international and domestic pressures. The era of "growth at all costs" is coming to an end, and previous inefficiencies and excesses that were masked by China's size and population can no longer go unaddressed. Reform efforts in recent years have demonstrated China's commitment to emphasizing high-quality growth and progressing to a technology-intensive consumption- and service-oriented economy. We believe that continued reforms to improve corporate governance of state-owned enterprises; strengthening intellectual property protection; and providing a level playing field for all firms, including foreign, private, and state-owned enterprises, are critical for China's long-term development through more efficient capital allocation in domestic and international markets. In our view, this is China's ultimate path to higher productivity and future growth potential.

FIGURE I-17

The risk of "kicking the can down the road" remains

Credit efficiency to deteriorate modestly in 2019



Note: Credit efficiency is defined as debt in the economy divided by nominal GDP. 2018 YTD is through September.

Source: Vanguard calculations, based on data from CEIC.

Japan: No exit, but more flexibility

The Japanese economy has managed to weather multiple natural disasters and softening external demand in 2018, thanks to strong domestic demand. In 2019, impediments to growth will likely intensify, given the scheduled consumption tax hike and potential escalation of U.S. protectionism, notably auto tariffs. Nonetheless, we see the downside as being contained because the negative impact should be offset by continued labor market strength, strong corporate profitability, and various mitigating fiscal measures. Households' net burden from the 2019 tax hike is estimated to be only a quarter of the 2014 tax hike as a larger portion of the tax revenue (roughly half, versus one-fifth in 2014) will be rechanneled back to the real economy through social security enhancements, cash subsidies, and infrastructure projects. Overall, we expect growth to revert to its trend of approximately 0.8% in 2019, with the risk skewed modestly to the downside.

Although a positive output gap and tight labor market would warrant monetary policy normalization in most economies, the decades-long struggle with suppressed inflation expectations precludes the Bank of Japan from tightening.We expect core inflation to gradually rise toward 1% throughout 2019, but it is likely several years away from the BoJ target of 2% as a result of these muted expectations (**Figure I-18**).

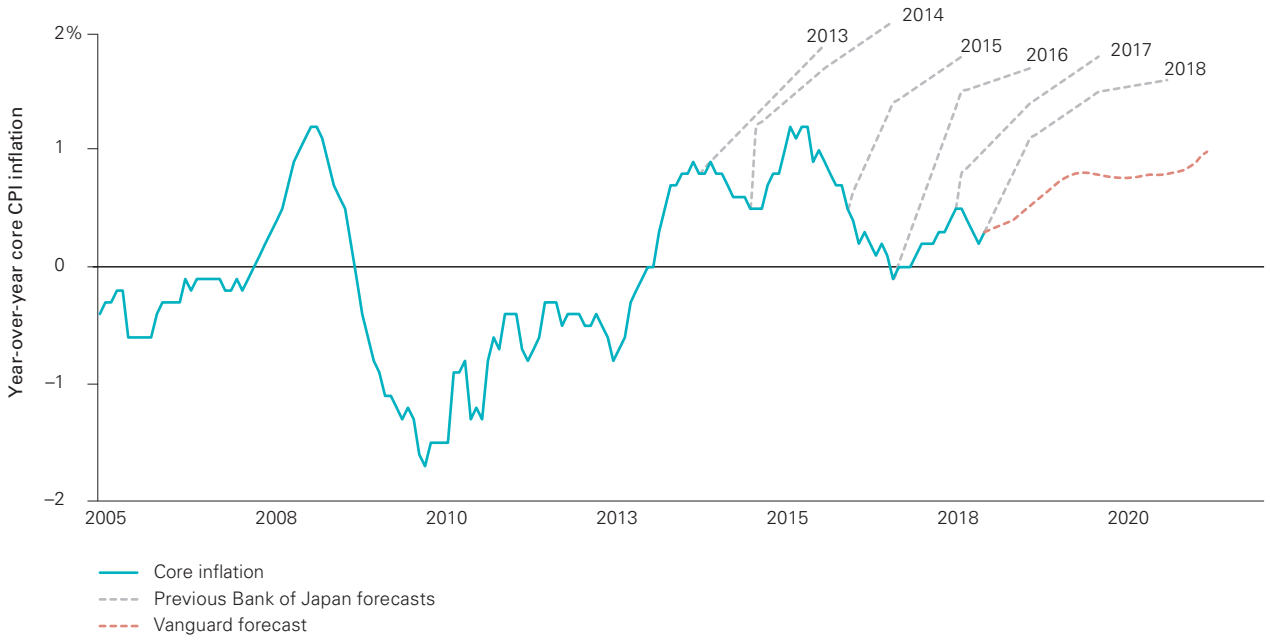
A standard Taylor rule would imply that the bank's current policy stance is accommodative enough, even under our more conservative forecast for inflation and the output gap (see **Figure I-19**). Nonetheless, the Taylor rule estimate based on market inflation expectations demonstrates that the current policy rate is still not low enough to achieve the BoJ's 2% inflation target. This dichotomy is a result of a number of structural factors—

6 See the 2017 Vanguard Global Macro Matters paper *SOE Reforms—China's Path to Higher Productivity.*

FIGURE I-18

The Bank of Japan's inflation woes

Core inflation forecasts (Bank of Japan and Vanguard)



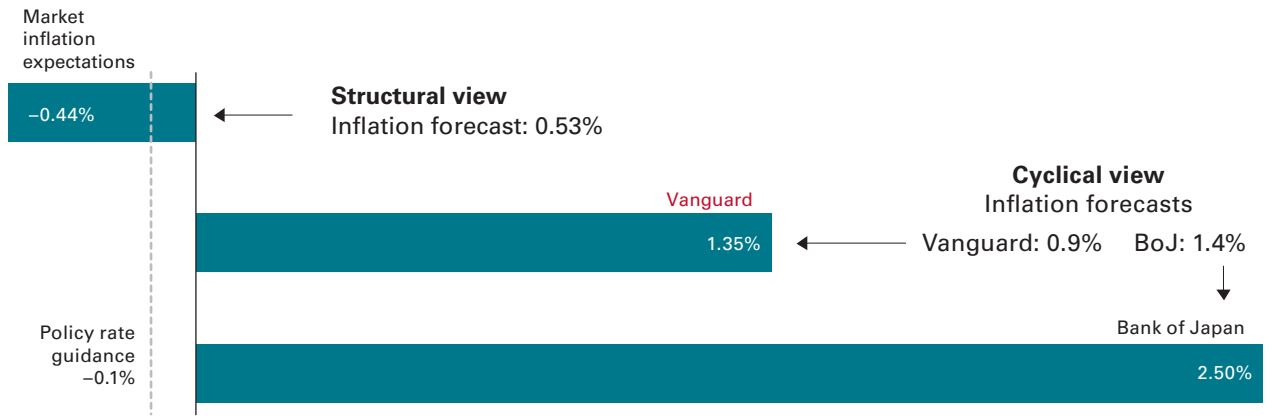
Notes: Core CPI includes all items except fresh food and energy. This measure is also referred to as BoJ Core.

Source: Vanguard calculations, based on data from Thomson Reuters and the Bank of Japan.

FIGURE I-19

A cyclical view of slack suggests current easing is sufficient, but a structural view suggests otherwise

Stylized Taylor rule estimates using inflation forecasts



Notes: The Taylor rule estimate using market inflation expectations takes a structural view of policy setting, taking into account only inflation expectations. It tends to be structurally low because of its highly adaptive nature, with no consideration given to what a cyclical upswing and tight labor market could do to boost prices. Vanguard's and the BoJ's forecasts take a cyclical view of slack by also factoring in the pass-through effects (which are limited in Vanguard's assessment) of a positive output gap and tight labor markets on prices.

Source: Vanguard calculations, based on data from the BoJ, IMF, Bloomberg, and Moody's Analytics Data Buffet.

including labor market duality, the more adaptive nature of Japan's inflation expectations, and global technology advancement—that are preventing labor market and economic pressure from being translated into wage and price increases. As a result, the BoJ is unlikely to raise rates in 2019 and should maintain its forward guidance that interest rates remain low for an extended period.

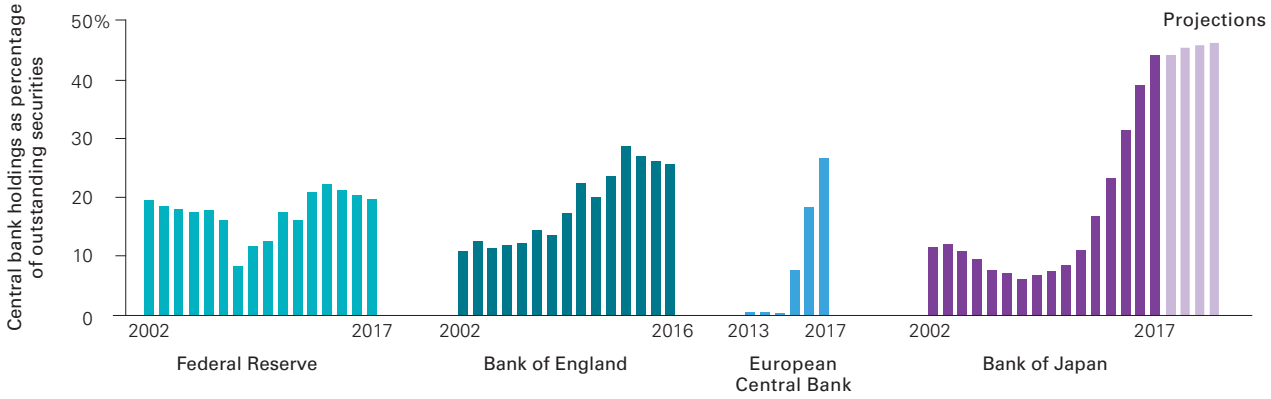
However, additional tweaks and policy fine-tuning measures will likely occur over the next few years. The BoJ is mindful that the side effects accompanying prolonged monetary easing, such as the decrease in Japanese government bond (JGB) market liquidity and deteriorating profitability of financial institutions, are becoming more prominent. The bank's quantitative and qualitative easing program continues to absorb most of the JGBs issued (see **Figure I-20**) and a prevailing low-yield environment continues to dampen profit margins for banks.

Hence, the BoJ will continue to seek more flexibility to enhance the sustainability and credibility of its policy framework without hampering the benefits of easy money. For safe-haven assets such as JGBs, this could mean giving a wider trading band than the current +/- 20 basis points for the 10-year yield. Although this could indirectly result in higher yields, it is by no means an exit from monetary stimulus. The yield curve control target will likely be anchored at approximately 0%, and a negative interest rate policy will still be in place. For risky assets such as the bank's annual 6 trillion yen ETF purchase program, fine-tuning could imply a "soft taper" as in the case of current JGB purchases, with the bank

FIGURE I-20

The side effects of monetary easing are growing

Elevated ownership of outstanding government bond securities poses liquidity risks



Source: Vanguard calculations, based on data from Moody's Analytics Data Buffet, Bloomberg, and the IMF.

intervening only when the equity market falls below a certain threshold instead of treating the 6 trillion yen as a fixed, hard target.

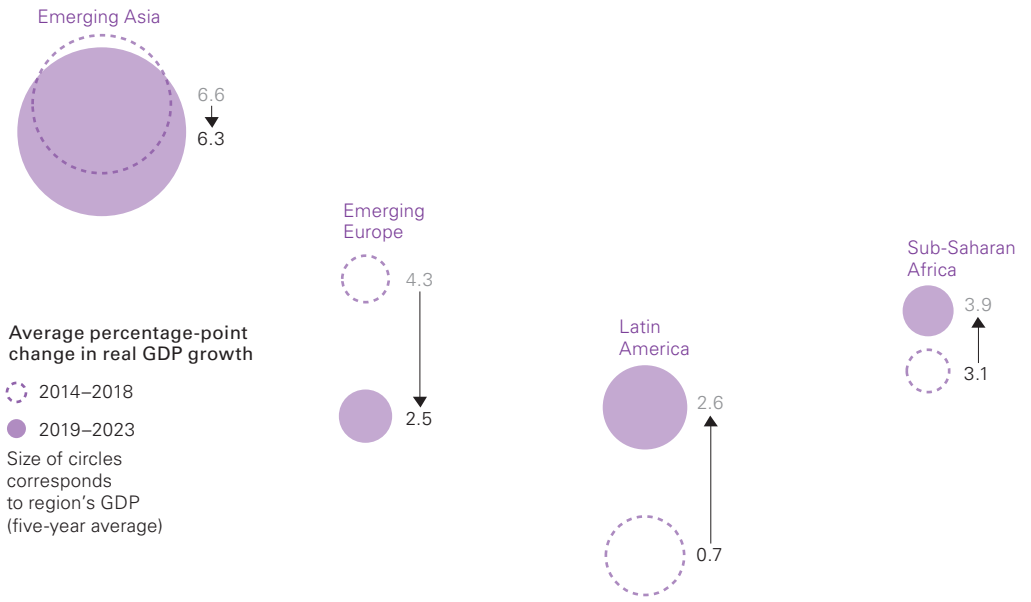
Japan's long-term economic growth prospects remain well below the average of G20 countries. Without the necessary structural reforms, accommodative monetary policy alone is unlikely to lift labor supply, investment, and productivity—and, hence, potential growth. In our view, confidence about economic prospects in the medium term, instead of low interest rates or easy access to credit, is the most important factor driving business investment decisions. The "third arrow" of Prime Minister Shinzo Abe's economic platform has notched notable wins in corporate tax and governance reforms, enhancing labor participation of women and older and foreign workers, reducing pay disparity between regular and nonregular employees, and embracing global trade liberalization. However, progress on immigration reform has been marginal, even as the nation bears a decades-long demographic headwind. Continued deregulation and broader adoption of automation technology, especially in the consumption and service sectors, will be critical to supporting productivity growth in the long term.

Emerging markets: A mixed bag

Growth for emerging markets in aggregate is expected to be 4.6% in 2019; however, there will be vast heterogeneity among and within regions (see **Figure I-21**). The Asia region is expected to register slower growth as China slows down, but it remains the fastest growing of the emerging-market regions. China is projected to register growth lower than 6.5% in 2019. Emerging-market Asian economies are deeply integrated with China-led supply chains and will feel the repercussions of declining export demand from

FIGURE I-21

GDP growth rate



Notes: GDP based on current prices was used to create weighted markers for the regions. Real GDP growth data from the IMF was averaged for the five-year periods 2014–2018 and 2019–2023.

Source: IMF DataMapper.

China. However, the newly ratified Comprehensive and Progressive Agreement for Trans-Pacific Partnership could lessen the blow.

In the Latin American region, the growth projection is 2.8%, an improvement from last year. Central bank policy rates across most emerging-market regions remain low compared with the pre-normalization era (see **Figure I-22**). Across most emerging markets, inflation and currency volatility will determine the pace of central bank hikes in 2019. Apart from some recent volatility, emerging-market currency volatility since normalization (2016–2018) has been lower than during the pre-normalization period (2010–2015).

Most risks for the emerging-market sector are external. The most notable are the U.S.-China trade tensions and a slowdown in China. Monetary policy normalization by the U.S. Federal Reserve has led to tighter financial conditions for emerging markets; this in turn has translated to volatility in emerging-market currencies and declining capital inflows. Populism and geopolitical risks, both at home and abroad, are downside risks for emerging markets. Corporate leverage has increased in emerging markets since the global financial crisis, with high levels of corporate debt issuance in nonlocal currency. A strengthening dollar could severely damage corporate balance sheets within emerging markets.

FIGURE I-22

Idiosyncratic emerging markets

Emerging markets represent a mixed basket; we expect tighter monetary policy to affect growth in countries with unsustainable borrowing

1. Current account (percentage of GDP as of December 2018)
2. Real effective exchange rate (REER) misalignment (as of November 2018)
3. International reserves (percentage of GDP as of Q4 2017)
4. Ease of doing business rank (as of Q4 2017)
5. Household debt (percentage of GDP as of Q1 2018)
6. Per capita GDP (in USD as of Q3 2018)
7. Inflation (percentage change in consumer prices as of September 2018)

	1	2	3	4	5	6	7
Emerging markets Asia	1.0%	3.2%	20%	68	42.6%	$6,104	3.4%
Emerging markets Europe	–0.2%	3.1%	20%	50	24.0%	$11,322	7.2%
Latin America	–2.2%	6.1%	20%	77	23.5%	$9,780	9.8%

Notes: Real exchange rate misalignment is defined as the deviation of the real effective exchange rate (REER) from its past five-year average. This vulnerability indicator is two-sided. Rapid appreciations or depreciations of a country's exchange rate may indicate that flows of foreign funds into or out of the economy may be unsustainable. Depreciations in the exchange rate also reduce purchasing power and increase the risk of economic slowdown. The World Bank Ease of Doing Business score serves as the basis for ranking economies on their business environment and is an indication of an economy's position relative to that of other economies.

Source: Vanguard calculations, based on data from the IMF *World Economic Outlook*, the Bureau of Industry and Security, the World Bank, and Moody's Analytics Data Buffet.

II. Global capital markets outlook

Vanguard's outlook for global stocks and bonds is subdued, yet modestly higher than this time last year. Downside risks are more elevated in the equity market than in the bond market. After factoring in higher short-term interest rates and non-U.S. equity market valuations, the net result is a modestly higher global market outlook for the next decade.

The market's efficient frontier of expected returns for a unit of portfolio risk is still in a lower return orbit. More important, common asset-return-centric portfolio tilts, seeking higher return or yield, are unlikely to escape the strong gravity of low return forces in play.

Global equity markets: High risk, low return

Global equity has rewarded patient investors with a 12.6% annualized return in the 9½ years since the lows of the global financial crisis. As part of this strong performance, valuations are currently much higher. For instance, valuations in the U.S. and emerging markets appear stretched relative to our proprietary fair-value benchmark, thereby making our global equity outlook guarded.

The ten-year outlook for global equities, similar to last year, is centered in the 4.5%–6.5% range based on our Vanguard Capital Markets Model (VCMM) projections.

Expected returns for the U.S. stock market are lower than those for international markets, underscoring the benefits of global equity strategies in this environment.

Equity valuations and Vanguard's "fair-value" CAPE

As discussed in a Vanguard Global Macro Matters piece titled *As U.S. Stock Prices Rise, the Risk-Return Trade-off Gets Tricky,* price/earnings ratios—including Robert Shiller's cyclically adjusted P/E ratio (CAPE)—are at alarming levels. The current CAPE level corresponds to the 95th percentile of its historical range of values, approaching highs seen during the dot-com era. However, a straight comparison of CAPE (or other valuation multiples) with its historical averages can be misleading, failing to account for today's low inflation and interest rates.

Because a secular decline in interest rates and inflation depresses the discount rates used in asset-pricing models, investors are willing to pay a higher price for future earnings, thus inflating P/E ratios. Therefore, a high CAPE may not be indicating overvalued stock prices but rather may be an outcome of low inflation and interest rates.

Vanguard's fair-value CAPE accounts for current interest rates and inflation levels and provides a more useful time-varying benchmark against which the traditional CAPE ratios can be compared, instead of the popular use of historical average benchmarks.

Figure II-1a plots Shiller's CAPE versus our fair-value model. For instance, in the late 1990s, the difference between the CAPE and our fair-value estimate would have suggested a bubble. Today, although the CAPE is approaching historical highs, it's not grossly overvalued, as it would be in a bubble, when compared with its fair value.

We have extended this fair-value concept to other regions. As illustrated in **Figure II-1b**, our equity valuation dashboard indicates that non-U.S. developed markets are fairly valued, even after adjusting valuations for rates and inflation. For emerging markets, it is important to note that their stocks typically trade at lower multiples than those in developed markets because of the higher risk and higher earnings yield required by investors. Even after adjusting for higher risk, emerging markets are overvalued.

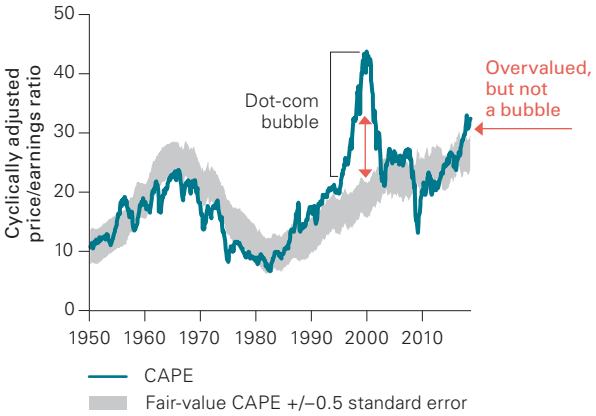
Global equities and the diversification of domestic risks

As shown in **Figure II-2**, our expected return outlook for U.S. equities over the next decade is centered in the 3%–5% range, in stark contrast with the 10.6% annualized return generated over the last 30 years. Although valuation expansion proved to be a tailwind to returns over those 30 years, we expect valuations to contract as interest rates gradually rise over the next decade. The expected equity risk premium (over cash) for the U.S. market appears compressed, primarily because of elevated valuations today.

FIGURE II-1

Divergence in global equity valuations

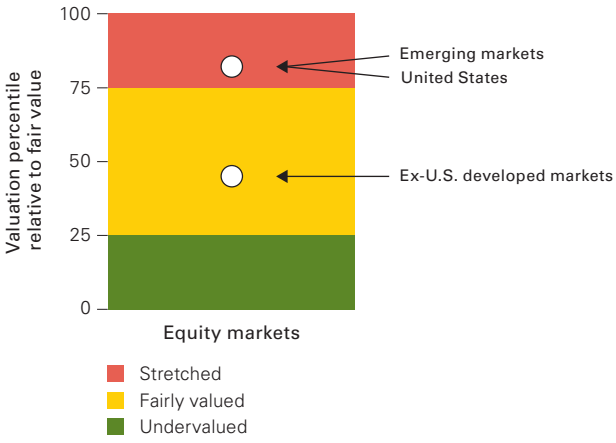
a. CAPE for the U.S. S&P 500 Index is approaching overvalued territory



Notes: Fair-value CAPE is based on a statistical model that corrects CAPE measures for the level of inflation expectations and for lower interest rates. The statistical model specification is a three-variable vector error correction (VEC), including equity earnings yields, ten-year trailing inflation, and ten-year U.S. Treasury yields estimated over the period January 1940–September 2018.

Source: Vanguard calculations, based on data from Robert Shiller's website (aida.wss.yale.edu/~shiller/data.htm), the U.S. Bureau of Labor Statistics, and the Federal Reserve Board.

b. Ex-U.S. developed markets appear to be fairly priced



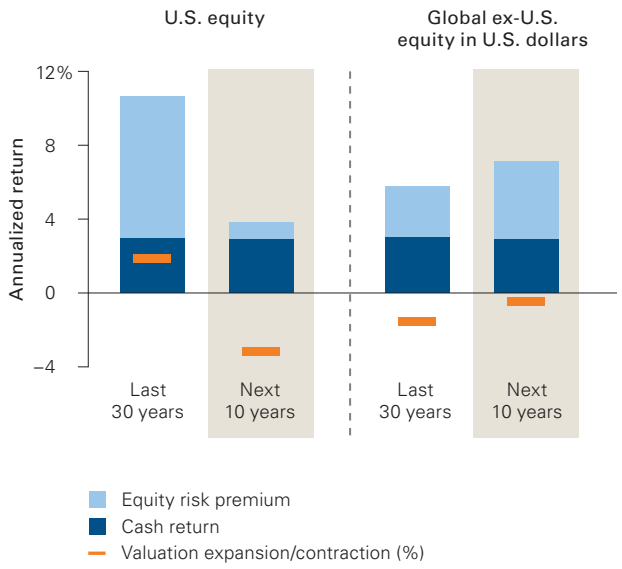
Notes: The U.S. valuation measure is the current CAPE percentile relative to fair-value CAPE for the S&P 500 Index from January 1940–September 2018. The developed markets valuation measure is the weighted average of each region's (Australia, United Kingdom, Germany, Japan, and Canada) current CAPE percentile relative to its own fair-value CAPE. The fair-value CAPE for the regions is a five-variable vector error correction (VEC) with equity earnings yield (MSCI index), ten-year trailing inflation, ten-year government bond yield, equity volatility, and bond volatility estimated over the period January 1970 to September 2018. The emerging markets valuation measure is a composite of emerging markets-to-U.S. relative valuations and current U.S. CAPE percentile relative to fair-value CAPE. The relative valuation is the current ratio of emerging markets-to-U.S. price-to-earnings metrics relative to its historical average, using three-year trailing average earnings from January 1990 to September 2018.

Source: Vanguard calculations, based on data from Robert Shiller's website (aida.wss.yale.edu/~shiller/data.htm), the U.S. Bureau of Labor Statistics, the Federal Reserve Board, and Thomson Reuters Datastream.

FIGURE II-2

The outlook for equity markets is subdued

a. Exposure to non-U.S. equities may be beneficial



Notes: Data for the last 30 years are from January 1988–December 2017, in USD. Next-10-year data are based on the median of 10,000 simulations from VCMM as of September 30, 2018, in USD. Historical returns are computed using indexes defined in "Indexes used in our historical calculations" on page 5. See Appendix for further details on asset classes shown here.

Source: Vanguard calculations, based on data from Dimson-Marsh-Staunton Global Returns Dataset, FactSet, Morningstar Direct, and Thomson Reuters Datastream.

From a U.S. investor's perspective, the expected return outlook for non-U.S. equity markets is in the 6%–8% range, modestly higher than that of U.S. equity (**Figures II-2a** and **II-2b**). The equity risk premium for non-U.S. equity markets, however, may be slightly higher going forward, as the valuation contraction may not be as drastic as that experienced over the last three decades.

This result is a function of the currently moderate level of valuations, as well as long-term expectations of the U.S. dollar decline priced in by the markets, especially with respect to other major currencies such as the euro and yen.

Our ten-year outlook for global equity (in USD) is in the 4.5%–6.5% range, as seen in Figure II-2b. Although the case for global diversification is particularly strong now, for the purposes of asset allocation we caution investors against implementing tactical tilts based on just the median expected return—that is, ignoring the entire distribution of asset returns and their correlations.

b. Equity market ten-year return outlook: Setting reasonable expectations

Notes: Forecast corresponds to distribution of 10,000 VCMM simulations for ten-year annualized nominal returns as of September 30, 2018, in USD, for asset classes shown. Median volatility is the 50th percentile of an asset class's distribution of annual standardized deviation of returns. See Appendix for further details on asset classes shown here.

Source: Vanguard.

Global fixed income markets: An improved outlook

Higher interest rates have improved our outlook for fixed income compared with this time last year. As shown in **Figure II-3**, it is in the 2.5%–4.5% range for the next decade. Expected returns for the riskier fixed income sub-asset classes appear more differentiated compared with previous years, in part because of a recent expansion in credit spreads, thereby giving them the cushion to capture the risk premium.

U.S. interest rates: A slightly higher yield curve

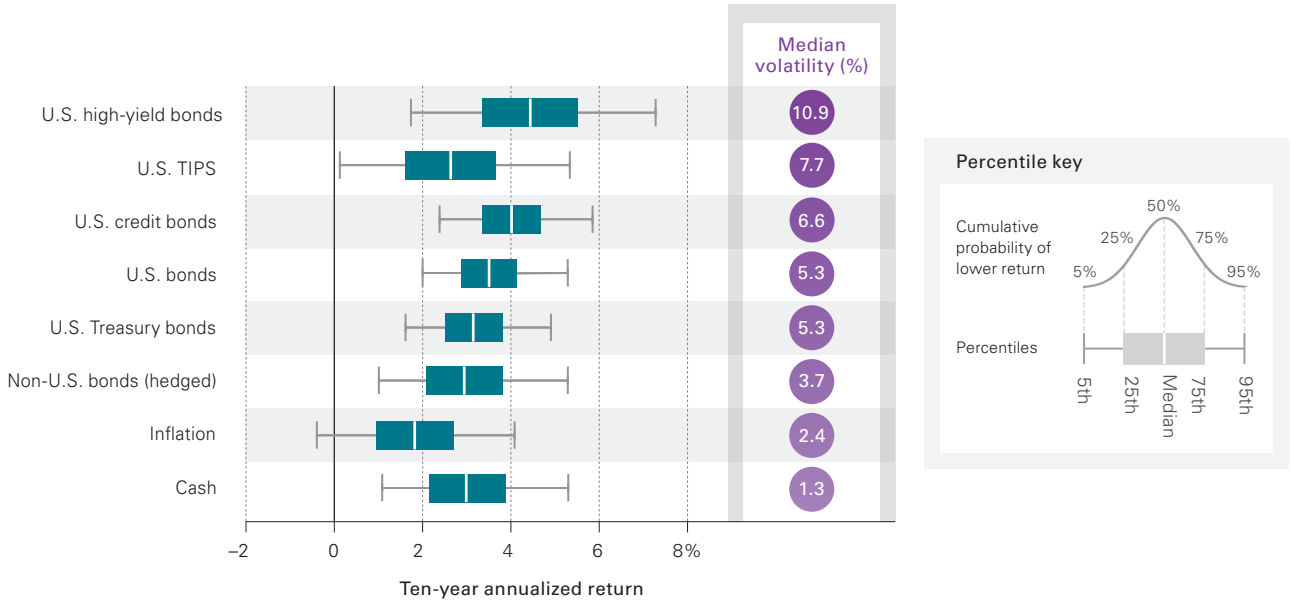
Despite the expected increase in short-term policy rates, the risk of a material rise in long-term interest rates remains modest. As illustrated in **Figure II-4**, duration strategies are fairly valued and less risky than investors may believe in a rising rate environment. This is because we expect the short end of the yield curve to rise more than the long end over the next decade, as the long rates are anchored by inflation expectations.

Corporate bonds: Higher risk, higher return

The central tendency for U.S. credit bonds (specifically, the Bloomberg Barclays U.S. Credit Bond Index) is in the 3.0%–5.0% range, modestly higher than last year because of the rise in the underlying Treasury rates. The central tendency for high-yield corporate bonds (specifically, the Bloomberg Barclays U.S. High Yield Corporate Bond Index) is in the 3.5%–5.5% range, again,

FIGURE II-3

Higher rates have pushed expected fixed income returns higher

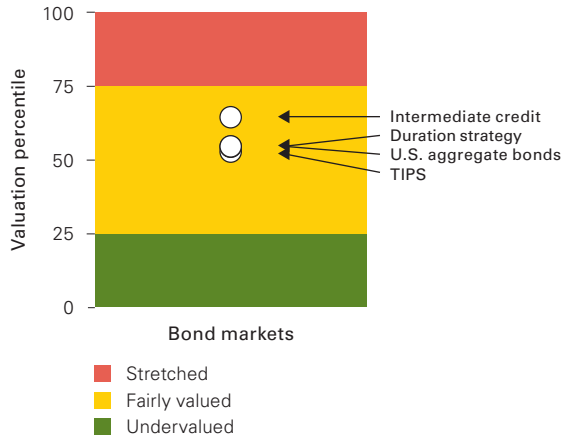


Notes: Forecast corresponds to distribution of 10,000 VCMM simulations for ten-year annualized nominal returns as of September 30, 2018, in USD for asset classes shown. Median volatility is the 50th percentile of an asset class's distribution of annual standardized deviation of returns. See Appendix for further details on asset classes shown here.

Source: Vanguard.

FIGURE II-4

Fixed income appears to be fairly valued



Notes: Valuation percentiles are relative to Year 30 projections from VCMM. Intermediate credit and U.S. aggregate bond valuations are current spreads relative to Year 30 from VCMM. Duration valuation is the expected return differential over the next decade between the long-term Treasury index and the short-term Treasury index relative to Years 21–30. The TIPS valuation is the ten-year-ahead annualized inflation expectation relative to Years 21–30.

Source: Vanguard.

higher because of higher underlying Treasury rates. We urge investors to be cautious in reaching for yield in segments such as high-yield corporates, not only because of the higher expected volatility that accompanies the higher yield but also because of the segment's correlation to the equity markets.

As shown in **Figure II-5** (on page 37), a 20% overweight or tilt to high-yield corporates increases a portfolio's volatility excessively relative to a marginal increase in return. The sensitivity of spreads to the economic environment is much larger for high-yield corporate bonds than for other higher-quality segments of the U.S. fixed income market, which also contributes to an increased investment risk.

Treasury Inflation-Protected Securities (TIPS): Markets don't see inflation coming

Break-even inflation expectations inferred from the U.S. TIPS market remain close to the Fed's 2% inflation target and the VCMM long-term median levels. Markets are placing low odds for higher inflation outcomes. Although not attractive from a return perspective, TIPS could be a valuable inflation hedge for some institutions and investors sensitive to inflation risk.

Domestic versus international: Benefits of diversification remain

Although the central tendency of expected return for non-U.S. aggregate bonds appears to be marginally lower than that of U.S. aggregate bonds (see Figure II-3 on page 34), we expect the diversification benefits of global fixed income in a balanced portfolio to persist under most scenarios.

Yields in most developed markets are historically low, particularly in Europe and Japan, yet diversification through exposure to hedged non-U.S. bonds should help offset some risk specific to the U.S. fixed income market (Phillips et al., 2014).

Less-than-perfect correlation between two of the main drivers of bond returns—interest rates and inflation—is expected as global central bank policies are likely to diverge in the near term. Diversification with non-U.S. bonds also helps diversify the risk of policy mistakes by central banks.

Portfolio implications: A low return orbit

Investors have experienced spectacular returns over the last few decades because of two of the strongest equity bull markets in U.S. history, in addition to a secular decline in interest rates from 1980s highs. **Figure II-5a** contrasts our 4%–6% outlook for a global 60% equity/40% bond portfolio for the next decade against the extraordinary 9.4% return since 1970 and the 7.3% return since 1990. As highlighted in previous sections, elevated equity valuations and low rates have pulled the market's efficient frontier of expected returns into a lower orbit. The efficient frontier is also flatter (that is, with less return per unit of risk), as seen from the return and volatility expectations of balanced portfolios, as shown in **Figure II-5c**.

To try to increase portfolio returns, a popular strategy is to overweight higher-expected-return assets or higher-yield assets. A common "reach for yield" strategy is to overweight high-yield corporates. Similarly, "reach for return" strategies involve tilting the portfolio toward emerging-market equities to take advantage of higher growth prospects. Home bias causes some to shy away from non-U.S. equities.

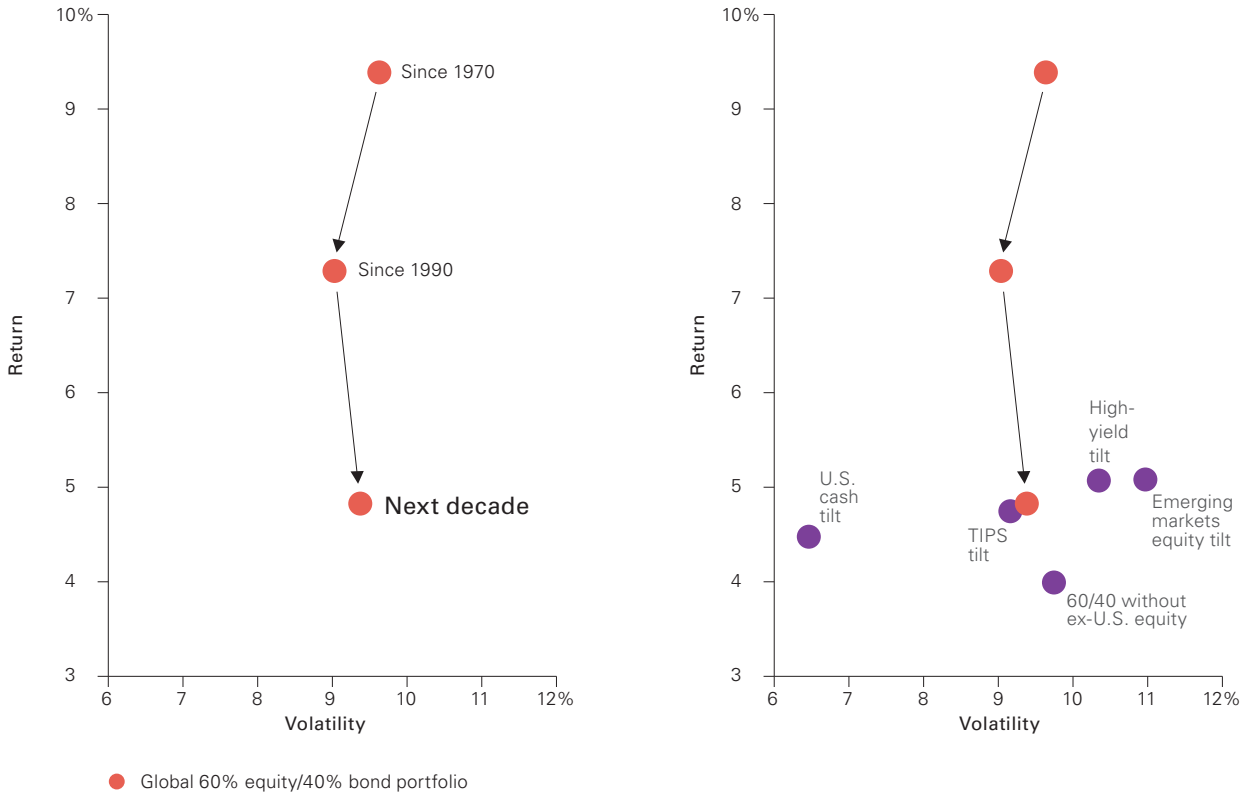
Figure II-5b illustrates that these common return-centric strategies are unlikely, by themselves, to restore portfolios to the higher orbit of historical returns.

FIGURE II-5

Asset allocation for a challenging decade

a. A lower return orbit ...

b. ... that popular "active tilts" will likely fail to escape



c. Projected ten-year annualized nominal returns as of September 2018

	Portfolios	5th percentile	25th percentile	Median	75th percentile	95th percentile	Median volatility
Global balanced portfolios	100% bonds	1.8%	2.7%	3.4%	4.1%	5.1%	4.5%
	20/80 stock/bond	2.3%	3.3%	4.0%	4.7%	5.9%	4.5%
	60/40 stock/bond	1.5%	3.5%	4.9%	6.3%	8.4%	9.4%
	80/20 stock/bond	0.8%	3.4%	5.2%	7.0%	9.7%	12.5%
	100% equity	–0.1%	3.1%	5.3%	7.6%	11.0%	15.8%
Portfolios with common 20% tilts relative to 60/40 stock/bond	**60/40 stock/bond**	**1.5%**	**3.5%**	**4.9%**	**6.3%**	**8.4%**	**9.4%**
	High-yield tilt	1.8%	3.7%	5.1%	6.5%	8.7%	**10.4%**
	Inflation protection tilt	1.4%	3.4%	4.8%	6.2%	8.4%	**9.2%**
	Emerging markets equity tilt	1.4%	3.6%	5.1%	6.6%	8.8%	**11.0%**
	U.S. cash tilt	1.9%	3.4%	4.4%	5.5%	7.1%	**6.4%**
	60/40 without ex-U.S. equity	0.1%	2.5%	4.0%	5.6%	8.1%	**9.8%**

Notes: The figure shows summary statistics of 10,000 VCMM simulations for projected ten-year annualized nominal returns as of September 2018 in USD before costs. Historical returns are computed using indexes defined in "Indexes used in our historical calculations" on page 5. The global equity portfolio is 60% U.S. equity and 40% global ex-U.S. equity. The global bond portfolio is 70% U.S. bonds and 30% global ex-U.S. bonds. Portfolios with tilts include a 20% tilt to the asset specified funded from the fixed income allocation for the fixed income tilts and the equity allocation for the equity tilts.

Source: Vanguard.

Portfolio construction strategies for three potential economic scenarios

Based on our global economic perspective, we examine in **Figure II-6** three possible economic scenarios occurring over the next three years. The high-growth scenario illustrates an upside risk scenario of sustained economic growth with tighter labor markets and a moderate pickup in wages and inflation. The two others are a status quo scenario driven by continued low volatility with positive financial conditions and a recessionary scenario caused by a turn in the business cycle and a correction in the equity markets.

Figure II-6 shows optimal portfolios for each scenario that vary their exposures to the following four factors, or risk premiums: equity risk premium, term premium, credit premium, and inflation-risk premium. In a high-growth scenario, expected global equity returns would be high, causing the efficient frontier to be steep. Long and short rates would also rise faster than expected, resulting in an optimal portfolio loading on equity and short duration.

A recessionary-scenario portfolio would underweight equity and overweight long duration. Surprisingly, the allocation to U.S. equity remains rather large, as the portfolio that is also heavy on long-term Treasuries derives a larger diversification benefit from lower-returning U.S. equity (especially in a recession) than from including higher-returning non-U.S. equity assets. The portfolio strategy in a status quo scenario is well-diversified.

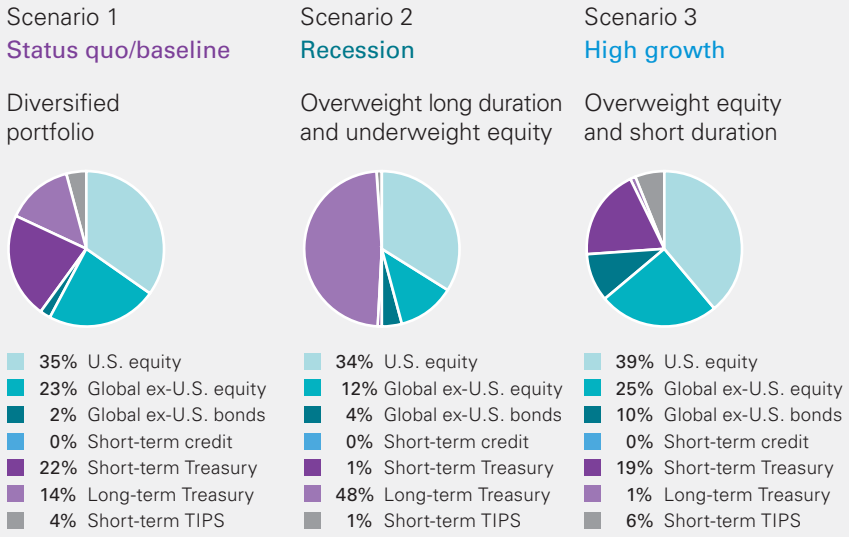
Using our VCMM simulations, we are able not only to illustrate the effectiveness of various portfolio strategies designed for each scenario but also to show the risks of such strategies. The following conclusions can be drawn from our analysis:

1. **Portfolios designed for specific macroeconomic scenarios entail important trade-offs:** If the scenario for which the portfolio was designed does not take place, then the portfolio performance is the worst of all the options.
2. **A balanced portfolio works well for investors who are agnostic about the future state of the economy:** The 60/40 balanced portfolio is an "all-weather" strategy, with either top or middle-of-the-road performance in each scenario.
3. **Portfolio tilts should be done within an optimization framework:** Ad hoc tilts ignore correlations among assets and lead to inefficient portfolios. For instance, in a recession-scenario strategy, U.S. equities can be relatively overweighted (as opposed to underweighted) because of the added diversification benefits of long-term bonds.

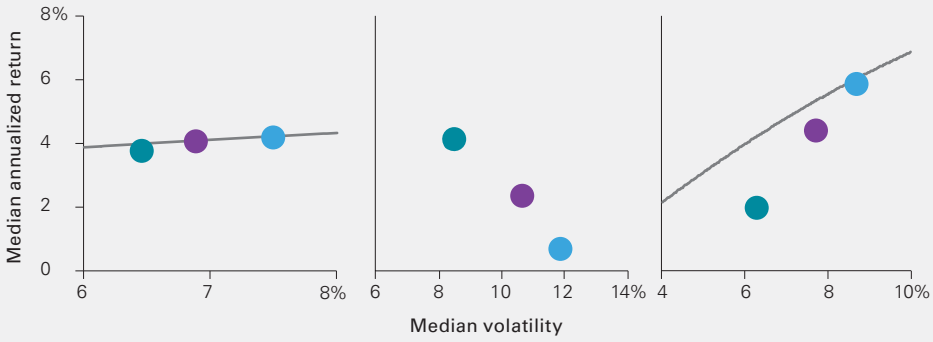
FIGURE II-6

Cyclical surprises and asset allocation trade-offs

a. Optimal portfolios vary for different economic environments



b. A diversified portfolio is not always the best, but it's never the worst



	Scenario 1 Status quo/baseline	Scenario 2 Recession	Scenario 3 High growth
Best	Diversified portfolio	Overweight long duration and underweight equity	Overweight equity and short duration
Second-best	Overweight equity and short duration	Diversified portfolio	Diversified portfolio
Worst	Overweight long duration and underweight equity	Overweight equity and short duration	Overweight long duration and underweight equity

c. Portfolios designed for a single scenario are tempting but can be risky

Strategy **upside** relative to balanced portfolio	**1.4% higher annualized return** with 2.1% lower volatility in a recessionary scenario	**1.1% higher annualized return** with 1.1% higher volatility in a high-growth scenario
Strategy **downside** relative to balanced portfolio	**1.8% lower annualized return** with 1.4% lower volatility in a high-growth scenario	**1.2% lower annualized return** with 1.2% lower volatility in a a recessionary scenario

Notes: Performance is relative to the efficient frontier. Portfolios are selected from the frontier based on a fixed risk-aversion level using a utility function-based optimization model. The forecast displays a simulation of three-year annualized returns of asset classes shown as of September 2018. Scenarios are derived from sorting the VCMM simulations based on rates, growth, volatility, and equity return. The three scenarios are a subset of the 10,000 VCMM simulations. See Appendix for further details on asset classes shown here.

Source: Vanguard.

Portfolio construction strategies: Time-tested principles apply

Contrary to suggestions that an environment of low rates and compressed equity risk premiums warrants some radically new investment strategy, Figure II-5 (on page 37) reveals that the diversification benefits of global fixed income and global equity are particularly compelling, given the simulated ranges of portfolio returns and volatility.

The market's efficient frontier of expected returns for a unit of portfolio risk is in a lower orbit. More important, common asset-return-centric portfolio tilts, seeking higher return or yield, are unlikely to escape the strong gravity of low-return forces in play, as they ignore the benefits of diversification. Modestly outperforming asset-return-centric tilts requires a portfolio-centric approach that leverages the benefits of diversification by weighing risk, return, and correlation simultaneously.

Our prior research shows that investment success is within the control of long-term investors (Aliaga-Díaz, et al., 2016). Factors within a long-term investor's control—such as saving more, working longer, spending less, and controlling investment costs—far outweigh the less reliable benefits of ad hoc asset-return-seeking tilts. Thus, decisions around saving more, spending less, and controlling costs will be much more important than portfolio tilts.

Investment objectives based either on fixed spending requirements or on fixed portfolio return targets may require investors to consciously weigh their options in conjunction with their risk-tolerance levels. Ultimately, our global market outlook suggests a somewhat more challenging environment ahead, yet one in which investors with an appropriate level of discipline, diversification, and patience are likely to be rewarded over the long term. Adhering to investment principles such as long-term focus, disciplined asset allocation, and periodic portfolio rebalancing will be more crucial than ever before.

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III. Appendix

About the Vanguard Capital Markets Model

IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results will vary with each use and over time.

The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

The VCMM is a proprietary financial simulation tool developed and maintained by Vanguard's Investment Strategy Group. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities, and certain alternative investment strategies. The theoretical and empirical foundation for the Vanguard Capital Markets Model is that the returns of various asset classes reflect the compensation investors require for bearing different types of systematic risk (beta). At the core of the model are estimates of the dynamic statistical relationship between risk factors and asset returns, obtained from statistical analysis based on available monthly financial and economic data. Using a system of estimated equations, the model then applies a Monte Carlo simulation method to project the estimated interrelationships among risk factors and asset classes as well as uncertainty and randomness over time. The model generates a large set of simulated outcomes for each asset class over several time horizons. Forecasts are obtained by computing measures of central tendency in these simulations. Results produced by the tool will vary with each use and over time.

The primary value of the VCMM is in its application to analyzing potential client portfolios. VCMM asset-class forecasts—comprising distributions of expected returns, volatilities, and correlations—are key to the evaluation of potential downside risks, various risk–return trade-offs, and the diversification benefits of various asset classes. Although central tendencies are generated in any return distribution, Vanguard stresses that focusing on the full range of potential outcomes for the assets considered, such as the data presented in this paper, is the most effective way to use VCMM output. We encourage readers interested in more details of the VCMM to read Vanguard's white paper (Davis et al., 2014).

The VCMM seeks to represent the uncertainty in the forecast by generating a wide range of potential outcomes. It is important to recognize that the VCMM does not impose "normality" on the return distributions, but rather is influenced by the so-called fat tails and skewness in the empirical distribution of modeled asset-class returns. Within the range of outcomes, individual experiences can be quite different, underscoring the varied nature of potential future paths. Indeed, this is a key reason why we approach asset-return outlooks in a distributional framework.

Index simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes through September 2018. We chose these benchmarks to provide the most complete history possible, and we apportioned the global allocations to align with Vanguard's guidance in constructing diversified portfolios. Asset classes and their representative forecast indexes are as follows:

- U.S. equities: MSCI US Broad Market Index.
- Global ex-U.S. equities: MSCI All Country World ex USA Index.
- U.S. REITs: FTSE/NAREIT US Real Estate Index.
- U.S. cash: U.S. 3-Month Treasury–constant maturity.
- U.S. Treasury bonds: Bloomberg Barclays U.S. Treasury Index.
- U.S. short-term Treasury bonds: Bloomberg Barclays U.S. 1–5 Year Treasury Bond Index.
- U.S. long-term Treasury bonds: Bloomberg Barclays U.S. Long Treasury Bond Index.
- U.S. credit bonds: Bloomberg Barclays U.S. Credit Bond Index.
- U.S. short-term credit bonds: Bloomberg Barclays U.S. 1–3 Year Credit Bond Index.
- U.S. high-yield corporate bonds: Bloomberg Barclays U.S. High Yield Corporate Bond Index.
- U.S. bonds: Bloomberg Barclays U.S. Aggregate Bond Index.
- Global ex-U.S. bonds: Bloomberg Barclays Global Aggregate ex-USD Index.
- U.S. TIPS: Bloomberg Barclays U.S. Treasury Inflation Protected Securities Index.
- U.S. short-term TIPS: Bloomberg Barclays U.S. 1–5 Year Treasury Inflation Protected Securities Index.

Notes on risk

All investing is subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. Investments in bond funds are subject to interest rate, credit, and inflation risk. Foreign investing involves additional risks, including currency fluctuations and political uncertainty. Diversification does not ensure a profit or protect against a loss in a declining market. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

Stocks of companies in emerging markets are generally more risky than stocks of companies in developed countries. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent price fluctuations. Investments that concentrate on a relatively narrow market sector face the risk of higher price volatility. Investments in stocks issued by non-U.S. companies are subject to risks including country/regional risk and currency risk.

Bond funds are subject to the risk that an issuer will fail to make payments on time, and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments. High-yield bonds generally have medium- and lower-range credit-quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit-quality ratings. Although the income from U.S. Treasury obligations held in the fund is subject to federal income tax, some or all of that income may be exempt from state and local taxes.

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