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Vanguard economic and market outlook for 2022: Striking a better balance

- Although the Covid-19 pandemic will remain a critical factor in 2022, the outlook for macroeconomic policy will likely be more crucial. Our outlook for the global economy will be shaped by how the support and stimulus enacted to combat the pandemic are withdrawn. The removal of policy support poses a new challenge for policymakers and a source of risk for financial markets.
- While the economic recovery is expected to continue through 2022, the easy gains in growth from rebounding activity are behind us. We expect growth in both the US and the euro area to slow down to 4% in 2022. In China, we expect growth to fall to about 5%, and in the UK we expect growth to be about 5.5%.
- Inflation has remained high across most economies, driven both by higher demand as pandemic restrictions were lifted and by lower supply resulting from global labour and input shortages. Although a return to 1970s-style stagflation is not on the cards, we expect inflation to remain elevated across developed markets as the forces of demand and supply take some time to stabilise.
- Central banks will have to maintain the delicate balance between keeping inflation expectations anchored and allowing for a supportive environment for economic growth. As negative supply shocks push inflation higher, they threaten to set off a self-fulfilling cycle of ever higher inflation, which could begin to chip away at demand. Ultimately, we anticipate that the Federal Reserve will raise rates to at least 2.5% by the end of this cycle to keep wage pressures under control and to keep inflation expectations stable.
- As we look toward 2022 and beyond, our long-term outlook for assets is guarded, particularly for equities amid a backdrop of low bond yields, reduced support and stretched valuations. Within fixed income, low interest rates guide our outlook for low returns; however, with rates moving higher since 2020, we see the potential for correspondingly higher returns.

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Editorial note: This publication is an update of Vanguard's annual economic and market outlook 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.

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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 10 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 at 30 September 2021. 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."

Global summary

Navigating an exit from exceptionally accommodative policy will be critical to the global economy in 2022.

The global economy in 2022: Striking a better balance

Our outlook for 2021 focused on the impact of Covid-19 health outcomes on economic and financial conditions. Our view was that economic growth would prove unusually strong, with the prospect of an "inflation scare" as growth picked up. As we come to the end of 2021, parts of the economy and markets are out of balance. Labour demand exceeds supply, financial conditions are exceptionally strong even when compared to improved fundamentals and policy accommodation remains extraordinary.

Although health outcomes will remain important in 2022, the outlook for macroeconomic policy will be more crucial as support and stimulus packages enacted to combat the pandemic-driven downturn are gradually removed into 2022. The removal of policy support poses a new challenge for policymakers and a new risk to financial markets.

The global economic recovery is likely to continue in 2022, although we expect the low-hanging fruit of rebounding activity to give way to slower growth, whether supply-chain challenges ease or not. In both the United States and the euro area, we expect growth to normalise lower to 4%. In the UK, we expect growth of about 5.5% and in China we expect growth to fall to about 5% given the real estate slowdown.

More importantly, labour markets will continue to tighten in 2022 given robust labour demand, even as growth decelerates. We anticipate several major economies, led by the US, will quickly approach full employment even with a modest pick-up in labour force participation. Wage growth should remain robust and wage inflation is likely to become more influential than headline inflation for the direction of interest rates in 2022.

Global inflation: Lower but stickier

Inflation has continued to trend higher across most economies, driven by a combination of higher demand as pandemic restrictions were lifted and lower supply from global labour and input shortages. Although a return to 1970s-style inflation is not on the cards, we anticipate that supply/demand frictions will persist well into 2022 and keep inflation elevated across developed and emerging markets. That said, it is highly likely that inflation rates at the end of 2022 will be lower than at the beginning of the year given the unusual run-up in certain goods prices.

Although inflation should cool in 2022, its composition should be stickier. More persistent wage-based inflation should remain elevated, given our employment outlook, and will be the critical determinant in central banks' adjustment of policy.

Policy takes centre stage: The risk of a misstep increases

The global policy response to Covid-19 was impressive and effective. Moving into 2022, how will policymakers navigate an exit from exceptionally accommodative policy? The bounds of appropriate policy expanded during the pandemic, but it's possible that not all these policies will be unwound as conditions normalise. On the fiscal side, government officials may need to trade off between higher spending—due to pandemic-driven policies—and more balanced budgets to ensure debt sustainability.

Central bankers will have to strike a delicate balance between keeping a lid on inflation expectations, given negative supply-side shocks, and supporting a return to pre-Covid employment levels. In the United States, that balance should involve the Federal Reserve (Fed) raising interest rates in 2022 to ensure that elevated wage inflation does not translate into more permanent core inflation. At present, we see the negative risks of too-easy policy accommodation outweighing the risks of raising short-term rates. Given conditions in the labour and financial markets, some are likely underestimating how high the Fed may ultimately need to raise rates this cycle.

The bond market: Rising rates won't upend markets

Despite modest increases during 2021, government bond yields remain below pre-Covid levels. The prospect of rising inflation and policy normalisation means that the short-term policy rates targeted by the Fed, the European Central Bank (ECB) and other developed-market policymakers are likely to rise over the coming years. Credit spreads remain generally very tight. In our outlook, rising rates are unlikely to produce negative total returns, given our inflation outlook and given the secular forces that should keep long-term rates low.

Global equities: A decade unlike the last

A backdrop of low bond yields, reduced policy support and stretched valuations in some markets offers a challenging environment despite solid fundamentals. Projections from our Vanguard Capital Markets Model®, which explicitly incorporates such variables, continues to reveal a global equity market that is drifting close to overvalued territory, primarily because of US equity prices. Our outlook calls not for a lost decade for US stocks, as some fear, but for a lower-return one.

The outlook for the global equity risk premium is still positive but lower than last year's, with total returns expected in the range of 2 to 4 percentage points over bond returns. Recent outperformance has only strengthened our conviction in non-US equities, which have more attractive valuations than US equities.

For British pound investors, our 10-year annualised nominal return projections[1] for UK equities are 4.6%-6.6%, while for global ex-UK equities (unhedged) they are 2.8%-4.8%. For UK aggregate bonds, expected returns are 0.8%-1.8%, while for global ex-UK bonds (hedged), they are 0.7%-1.7%.

For euro investors, our 10-year annualised nominal return projections[1] for euro area equities are 2.7%-4.7%, while for global ex-euro area equities (unhedged), they are 1.4%-3.4%. For euro area and global ex-euro area aggregate bonds, expected returns are -0.5%-0.5%.

1 Our 10-year annualised nominal return projections are based on a 1-point range around the 50th percentile of the distribution of return outcomes for equities and a 0.5-point range around the 50th percentile for fixed income.

I. Global economic perspectives

Global economic outlook: Striking a better balance

Our outlook for 2021 focused on the impact of health outcomes on economic and financial market conditions (Davis et al., 2020). Although the evolution of health outcomes will continue to play a significant role in defining the environment, our outlook for 2022 and beyond begins to shift focus to macroeconomic policy or, more specifically, the gradual removal of support and stimulus packages used to combat the impacts of Covid-19.

In both the United States and the euro area, we expect growth to slow down to 4%. In the United Kingdom, we expect growth of about 5.5%, while in China we expect growth to fall to about 5%. Across emerging markets, growth could prove uneven, aggregating to 5.5%.

Inflation has continued to rise across most economies, driven by a combination of higher demand as pandemic restrictions are lifted and lower supply due to labour and input shortages globally. Although a return to 1970s-style inflation is not in the cards, we expect inflation to peak and moderate thereafter over the first half of 2022 but remain elevated through to year-end 2022 across developed and emerging markets. Along with historically high valuations in equity and bond markets, these factors are likely to lead to a more volatile and lower-return period for financial markets in coming years.

Our outlook presents the case for such an environment in the near to medium term by outlining the array of historically large and diverse policies enacted, estimating their impact and analysing how the expected unwinding of these policies will affect the economy and markets.

Policy matters: It was different this time

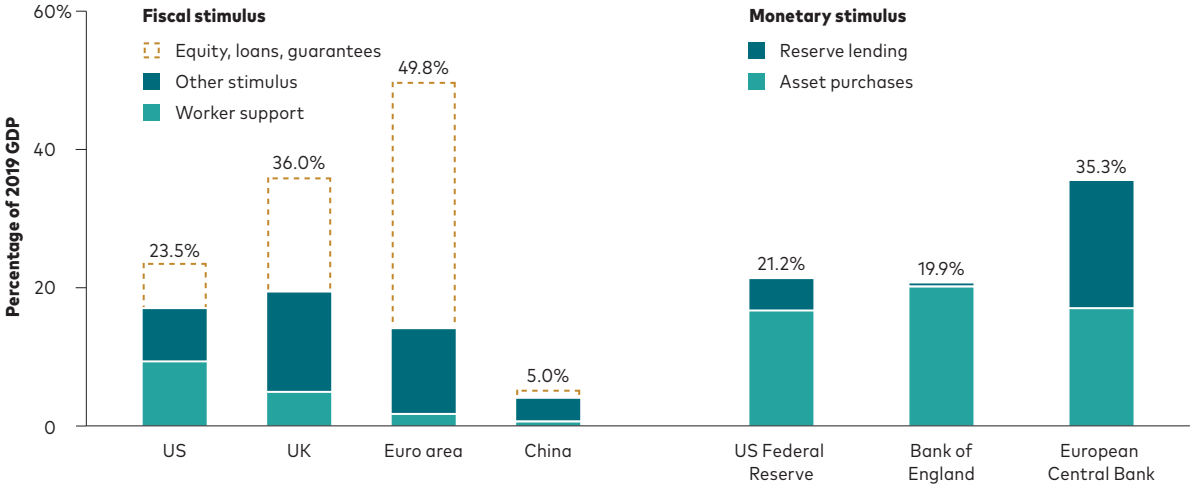
In the years surrounding the global financial crisis (GFC), macroeconomic policy drew a level of attention not seen since the so-called Great Moderation that began in the mid-1980s. Before the financial crisis, it was believed that the business cycle had been tamed, with less need for significant policy support, either monetary or fiscal.

With the onset of the GFC, debates about the magnitude, duration and structure of policy support needed to steer economies through the tumult were heated, with both sides presenting theoretical and mathematical support for their views. Although the degree of monetary and fiscal support during the GFC was unprecedented, the scale, breadth and duration of monetary support surpassed that of fiscal support as concerns over fiscal policy's adverse effects (inflation and debt loads, for example) led to more austere conditions sooner than some thought warranted, particularly in the euro zone.

Such considerations were put aside when the need to address the Covid-19 pandemic's health and economic fallout became apparent. This perhaps was not surprising given the scale of the shock to the global economy, but it was noteworthy nonetheless. **Figure I-1** shows that monetary support was implemented in markets to magnitudes unthinkable before the pandemic. Fiscal support, too, was historic in its magnitude and duration.

FIGURE I-1

A macroeconomic policy experiment in real time



Notes: All stimulus percentages are based on 2019 Nominal GDP. Fiscal stimulus: For worker support for the euro area, an average of spending for Germany, Italy and Spain is used to estimate aggregate European Union support. For equity, loans and guarantees, an average across Germany, Italy, Spain and France is used for an EU aggregate estimate. For the UK, total spending on unemployment benefits and furlough (for both employed and self-employed individuals) is used. For the US, we obtained the data from the Committee for a Responsible Federal Budget. For China, we obtained the data from the Ministry of Finance and State Taxation Administration. Across all regions, worker support includes income support and direct payments. Other stimulus includes tax policy, state and local funding, health care spending and other spending. Equity, loans and guarantees include the loans and grant spending. Monetary stimulus: For the euro area, asset purchases during the pandemic were conducted under the Pandemic Emergency Purchase Programme (PEPP) and the pre-pandemic Asset Purchase Programme (APP). Reserves were made available through targeted longer-term refinancing operations (TLTROs). For the UK, assets were purchased by the Asset Purchase Facility and reserves made available through the Term Funding Scheme with extra incentives. For the US, we include asset purchases under quantitative easing and the peak amount disbursed under various emergency lending facilities.

Sources: Bloomberg, dw.com, Office for National Statistics, International Monetary Fund and Committee for a Responsible Federal Budget (see covidmoneytracker.org/explore-data/interactive-table) and Clarida, Burcu, and Scotti, 2021).

Monetary policy: Change amid uncertainty

Although much work remains to be done to combat Covid-19, particularly in emerging markets, most developed-market central banks (as of this writing) have announced plans to start gradually removing monetary stimulus (**Figure I-2**)[1]. As that accommodation is removed, monetary conditions in the world will remain highly accommodative overall but become less so over time.

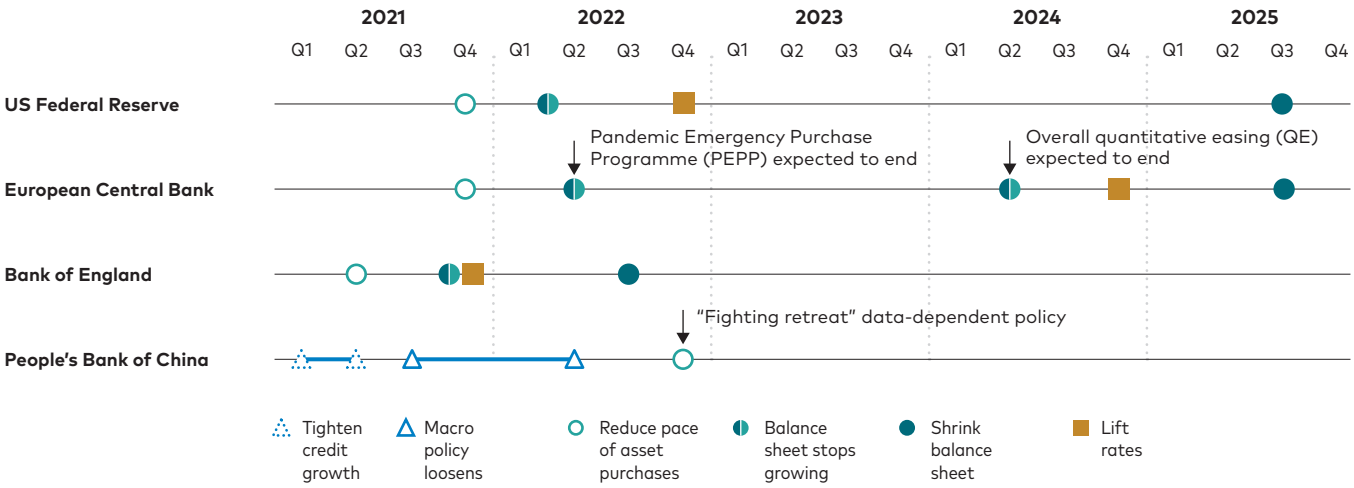
Inflationary pressures have sharpened the focus on monetary policymakers and may drive changes in policy actions and how they are communicated. However, as long as evidence points to these pressures being transient, central banks will not overreact and will remain vigilant to the risk of higher expectations of inflation feeding through into more persistent shifts in wage and price increases[2].

Amid the pandemic uncertainty, some developed-market central banks shifted their approach to policymaking to try to more consistently achieve their inflation targets. Rather than aim for an explicit target of 2% or close to it, the US Federal Reserve would now seek to achieve average inflation of 2% over time or more explicitly allow for above-target inflation after periods of weaker price growth. The European Central Bank announced a shift to a symmetric 2% target. These shifts, in general, signal a desire by policymakers to tolerate inflation that runs above their pre-pandemic target range.

FIGURE I-2

The long and winding road to normality

The removal of monetary accommodation will be gradual



Notes: Vanguard assessments are as of at 1 November 2021, and are of actions taken or likely to be taken by the US Federal Reserve, the Bank of England, the European Central Bank and the People's Bank of China. Under a "fighting retreat" mode, China's government would accept that growth will need to slow down, but at a gradual pace. If the deceleration is gradual, the government will not intervene and instead will focus on reforms and financial stability. But if the pace is rapid and creates market panic, the government will fight against the trend to stabilise growth. This will allow the government to engineer a smooth deleveraging process and soft landing.

Source: Vanguard, as at 1 November 2021.

1 Emerging-market and some developed-market central banks have already either started removing accommodation (for example, by tapering or ceasing asset purchases) or are expected to start raising rates earlier than previously anticipated, primarily as a result of higher-than-expected spot inflation and the resulting rise in medium- to long-term inflation expectations.

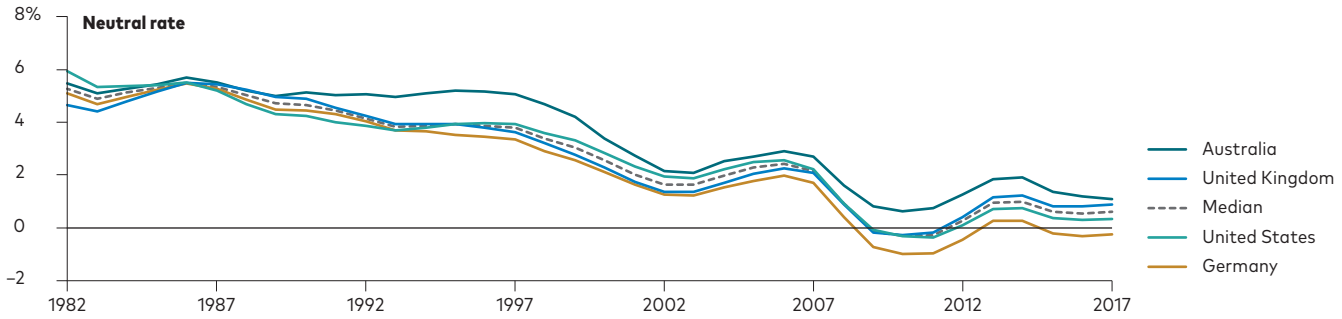
2 Overall, the main factors pushing up inflation in 2021 are (1) higher demand as economies reopen, (2) labour and materials shortages, (3) higher energy prices, especially in Europe, (4) expansionary fiscal and monetary policies through the pandemic, and (5) other factors related to pandemic-induced distortions. These pressures are expected to ease over 2022. A major risk to this view is if these pressures more permanently affect wage negotiations, which could fuel more persistent price increases.

Future policy decisions must also consider the drop in developed-market neutral rates[3]. Since well before even the GFC, global neutral rates have been falling (**Figure I-3a**). This presents challenges for policymakers, as the monetary policy stance is calibrated in tandem with the estimate of neutral rates. If neutral rates are low, they act as an anchor for policy rates, which in turn would remain closer to the theoretical floor of the zero lower bound[4]. The factors that drove the drop in neutral rates (**Figure I-3b**) are unlikely to abate materially over the coming years. However, we can see some of these trends reversing, thereby pushing up neutral rates moderately in the future (**Figure I-3b**).

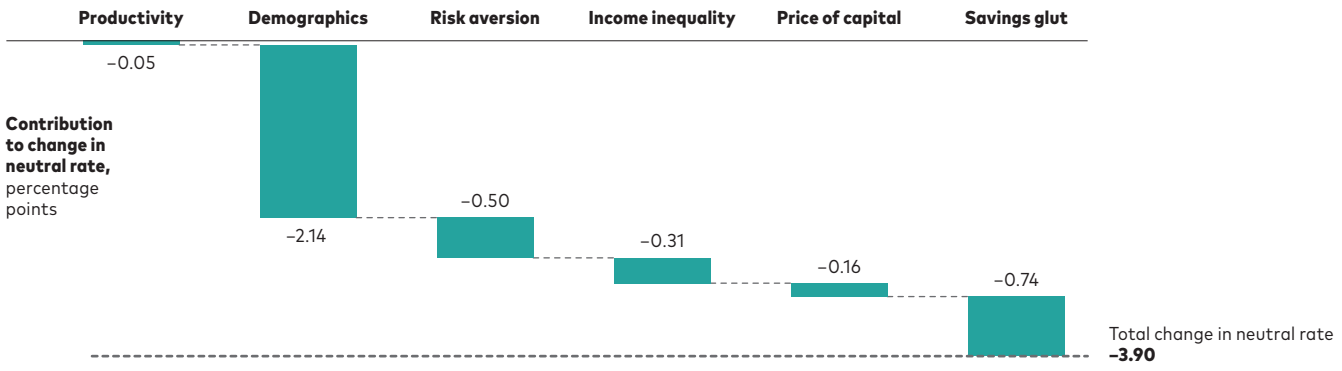
FIGURE I-3

A secular decline in neutral rates

a. Low neutral rates have been decades in the making



b. Multiple factors have driven this decline



Notes: Figure I-3b shows the drivers of the change in the median neutral rate for 24 developed markets included in Figure I-3a. We work with data from 1982 to 2021. We estimate the long-run cointegrating relationship via fully modified OLS (ordinary least squares) of the real short-term interest rates as well as six factors that we believe have driven the neutral rate: productivity (as measured by total factor productivity, or TFP, growth); demographics (as measured by the share of the working-age population aged 15 to 24); risk aversion (as measured by the spread in 10-year yields for BAA-rated bonds and Treasuries); income inequality (as measured by top 10% to bottom 50%); the relative price of capital (as measured by the price of equipment and machinery to consumption); and the savings glut (as measured by the current account percentage GDP in China). The long-run cointegrating relationship is the source of our neutral rate estimate for each country.

Source: Vanguard, as at 1 November 2021.

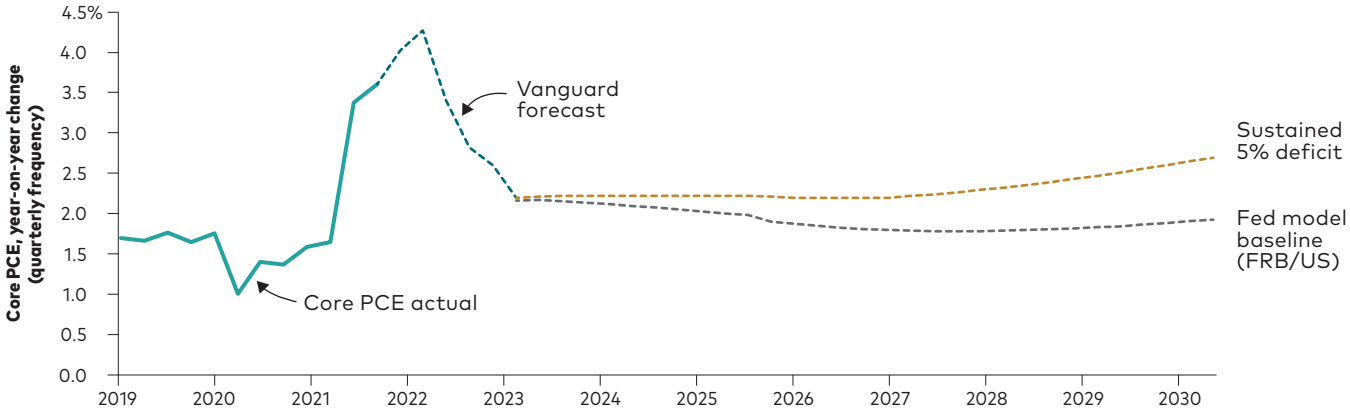
3 The neutral (or natural) rate of interest is the real interest rate that would prevail when the economy is at full employment and stable inflation; it is the rate at which monetary policy is neither expansionary nor contractionary.

4 As short-term interest rates reach the zero lower bound, further monetary easing becomes difficult, leading to the need for unconventional monetary policy, such as large-scale asset purchases (quantitative easing).

Although low neutral rates may mean that bond investors need not fear interest rates, it may also mean that addressing the next downturn could present additional challenges to monetary policymakers. Another issue central bankers would need to grapple with is the increasing deficit spending implemented to counter the pandemic's impact on household and business balance sheets. As shown in **Figure I-4**, sustained fiscal spending could push inflation higher, adding to the concerns of central bank policymakers. The upside is that central banks appeared willing to deploy creative solutions to a litany of issues during the most recent downturn and would likely stand ready to do so again.

FIGURE I-4

Deficit spending over an extended period puts additional pressure on policymakers



Notes: The figure uses US core Personal Consumption Expenditures (PCE), which exclude volatile food and energy costs. The FRB/US baseline assumes a normalising budget deficit in the 2%–3% range over the forecast horizon (out to 2030). The sustained 5% deficit scenario assumes a persistent 5% budget deficit throughout the forecast horizon (out to 2030).

Sources: Federal Reserve Bank of New York FRB/US macroeconomic model, Refinitiv and Vanguard, as at 31 October 2021.

Fiscal policy: Bridging a gap

Figure I-1 outlined the myriad approaches to fiscal support enacted in response to the pandemic. Given the need to shut down major portions of their economies, developed-market governments with the means to do so focused their support on labour markets and businesses in affected industries.

Unlike stimulus packages enacted in response to prior recessions that targeted an increase in output via the business sector, this time programmes were designed to inject funds directly into household and business balance sheets. If industries were shuttered and workers told to stay home, as they were during the pandemic, the response needed to be—and was—much different.

One of the most notable changes came in Europe when, after years of discussion and debate, European Union officials issued supranational debt aimed at supporting specific needs of individual countries while being backed by the collective group. As with monetary policy, there are likely to be legacy effects of fiscal policy measures enacted during the pandemic. More broadly, the most lasting impact of the pandemic-driven fiscal packages will be higher levels of debt to gross domestic product (GDP) ratios.

High debt levels, particularly for countries that issue it in their own currencies, are not in themselves an issue. Indeed, government debt can represent an efficient mechanism for financing capital expenditure that delivers economic and social benefits over an extended period. But high debt caused by excessive current spending represents an inappropriate build-up of macroeconomic and financial burdens on future generations. So it is clear that governments cannot continue to borrow and spend in perpetuity and debt levels can become excessive. In that context, there is no specific debt level at which growth or other macroeconomic fundamentals are suddenly impaired. The discussion should focus on debt sustainability, which differs by country based on several factors, some of which are outlined in **Figure I-5**.

FIGURE I-5

Broadening the debt discussion: Debt sustainability metrics in advanced economies

		US	UK	France	Japan	Italy	Canada	Germany
Net debt to GDP ratio	Lower value is more sustainable	109.0	97.2	106.1	172.3	144.2	37.0	52.5
Interest payments as a percentage of GDP	Lower value is more sustainable	1.6	1.1	0.8	0.3	2.7	0.2	0.3
Interest rate growth differential	Lower value is more sustainable	–2.3	–2.8	–2.3	–1.0	–0.5	–3.6	–2.8
Projected primary surplus/deficit	Higher value is more sustainable	–3.1	–2.4	–2.8	–2.0	0.3	–0.1	0.8
Tax to GDP ratio	Lower value is more sustainable	30.0	35.7	52.5	33.6	47.9	40.1	46.1
Interest payment as a share of tax revenue	Lower value is more sustainable	5.8	3.5	2.2	0.9	4.8	5.3	1.8

Unsustainable debt ← → Sustainable debt

Notes: For calculations, net debt to GDP ratio = debt/GDP; interest payments as a percentage of GDP = i/GDP; interest rate growth differential = i-g (both are in real terms); tax to GDP ratio = tax/GDP; interest payment as a share of tax revenue = i/tax. All are 2021 forecasts. Projected primary surplus/deficits are taken as International Monetary Fund forecast averages from 2023 to 2026.

Sources: International Monetary Fund and Vanguard, as at September 2021.

The experiences of 2011 and the European debt crisis made policymakers wary of enacting austerity measures to reduce high debt levels too quickly or sharply[5]. However, high debt burdens and the deficit spending that drives them need to be addressed if the cost of government financing is not to increase because of increased difficulty to fund it in sovereign debt markets. But the timing and scope of such austerity measures (for example, tax increases or spending cuts or both) must be considered along with the factors outlined in **Figure I-5** and the impact on potential social unrest. That is where the concept of fiscal space comes in (Ostry et al., 2010, and Zandi, Cheng, and Packard, 2011).

Fiscal space is a concept that estimates how much more debt a country can issue before reaching a tipping point. Absent unprecedented changes in fiscal policy, it is estimated that crossing that level would trigger a debt crisis. Rather than identifying one absolute level of debt, this measure accounts for factors such as interest rates, reserve currency status and a country's history of tax and spending policies in identifying a level of unsustainable debt/GDP. Beyond these maximum debt levels, faith in that country's willingness and ability to service its debt burden erodes, with detrimental implications for economic fundamentals and financial markets.

As **Figure I-6** shows, debt limits differ for each country. Countries should not seek to approach these limits, as they mark a level at which default becomes highly likely—such that even before the limit is reached, one would expect financial and economic unease. This could extend into social unrest if implemented austerity measures are sufficiently harsh, as happened in Greece during the European debt crisis (Ponticelli and Voth, 2020).

FIGURE I-6

Pushing the limit(s): Stylised debt limits under alternative assumptions

		Increasing interest burden → Interest rate growth (r–g) differential			
	Current debt/GDP	1.0%	1.5%	2.0%	2.5%
US	103%	508%	338%	x	x
UK	104	831	554	415%	332%
Australia	62	693	462	346	272
Germany	69	1,080	720	540	432
Japan	256	x	x	x	x

Unsustainable debt ← → Sustainable debt

Notes: The results are obtained from a stylised Primary Balance Reaction Function for the US, UK, Australia, Germany and Japan, specified using a logistic form and altered according to the maximum attainable primary surplus, combined with differing values for r-g. The red x's indicate debt that is on an unsustainable path at the given r-g level. This applies particularly for Japan (which has a very high debt/GDP ratio). For r-g even as low as 1%, the debt/GDP ratio must be lower than current levels for debt to be sustainable. As interest rate burdens increase from left to right, the level of sustainable debt/GDP ratio for various regions is estimated to decline.

Sources: International Monetary Fund and Vanguard, as at 21 September 2021.

5 In 2011, a deepening sovereign debt crisis prompted the deployment of bailouts with stringent fiscal conditions. The fallout made European policymakers wary of enacting austerity measures.

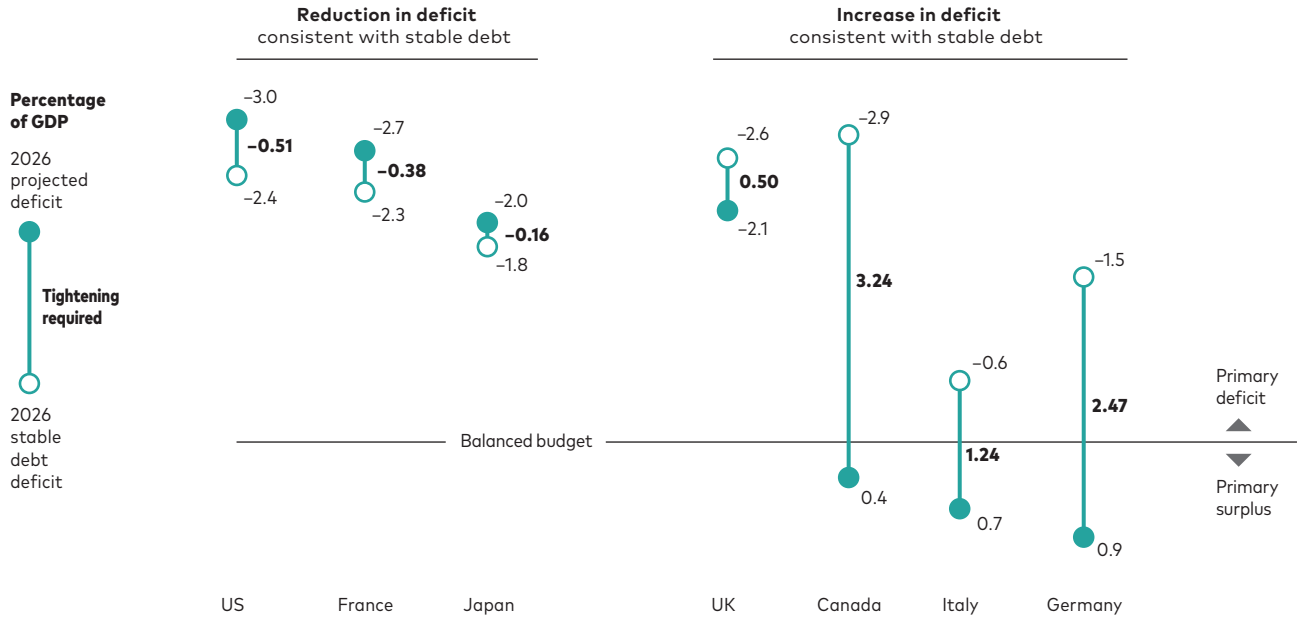
Addressing high debt levels is possible without inducing social unrest. Such policies would typically involve a combination of factors, including macroeconomic policy to affect inflation and growth as well as changes to tax and spending policies (Boz and Tesar, 2021). Policymakers have the most control over this latter set of changes, which determine a country's primary fiscal balance. **Figure I-7** shows that such changes, provided they are enacted in a timely manner, could help achieve sustainability. The shaded circles in the figure show the current projected primary balance for a selection of developed-market economies, and the empty circles show the estimated primary balance, based on the fiscal space framework, that a country will need to achieve sustainability.

Some countries already enjoy a primary balance that would allow their debt to remain sustainable under current assumptions. A modest reduction should be sufficient for now, for those that must make policy changes, including the US. But as time goes on and interest rates rise and deficits persist, the need for change becomes more pertinent and difficult. As the pandemic fades, countries should begin addressing these dislocations or they will face greater pain in the future, and their ability to address crises or recessions with fiscal policy will continue to deteriorate.

FIGURE I-7

Low rates provide some breathing space, but debt sustainability is a looming concern

Reduction or increase in deficit consistent with stable debt



Notes: Units are presented as a percentage of GDP. A negative interest rate growth differential (r-g) allows some countries, such as the US, France and Japan, to run a deficit while sustainably servicing interest burdens. Countries with a positive interest rate growth differential must maintain a debt surplus in order to maintain stable debt dynamics. Stable debt refers to debt levels (surplus or deficit) that keep debt on a controlled path.

Sources: International Monetary Fund and Vanguard, as at 21 September 2021.

Counterfactuals: What could have been?

We've outlined some of the extraordinary measures that monetary and fiscal policymakers have taken to try to offset the impact of the pandemic-driven economic shutdown. Some of these measures will be rolled back and, hopefully, will not be necessary again. But their effects, such as higher debt levels, will persist, at least in the medium term. Others, such as average inflation targeting, are likely to remain as policy features going forward. But what if these policies had not been enacted?

During a typical downturn, incomes fall because of job losses, resulting in a drop in demand, which then leads to overcapacity and then to supply cuts, resulting in more job losses and so on until some form of monetary or fiscal intervention interrupts the cycle. This time, the downturn was far from typical, with large enforced falls in productive potential as sectors of the economy were shut down, as well as associated falls in demand as consumer confidence fell. As a result, it was clear that output and labour markets would feel severe adverse effects from interventions to stop the spread of Covid-19, as governments intervened swiftly and forcefully with untested policies. The ensuing months revealed the benefits and costs of such measures.

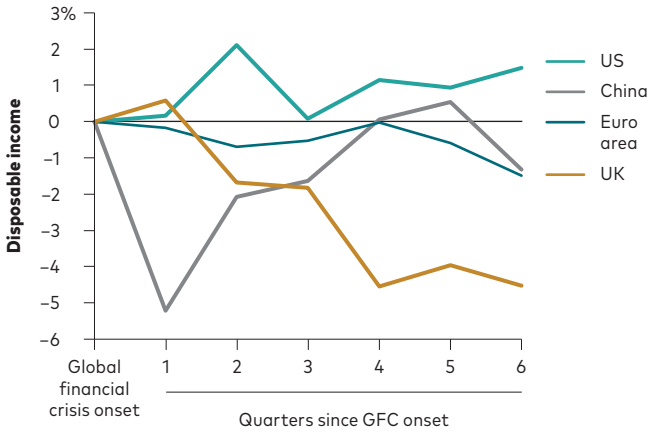
In the US, for instance, fiscal policymakers agreed to combat the possible deterioration of household balance sheets as a result of job losses with levels of support previously unheard of, including stimulus checks and additional unemployment insurance payments. **Figure I-8** shows that, counterintuitively, certain measures of income in the US, instead of falling, rose during the downturn—a pattern similar, though not in terms of magnitude, to that following the financial crisis.

FIGURE I-8

Incomes *rose* substantially in the US during the downturn

a. Change in disposable income from pre-Covid-19 trend

b. Change in disposable income during the global financial crisis



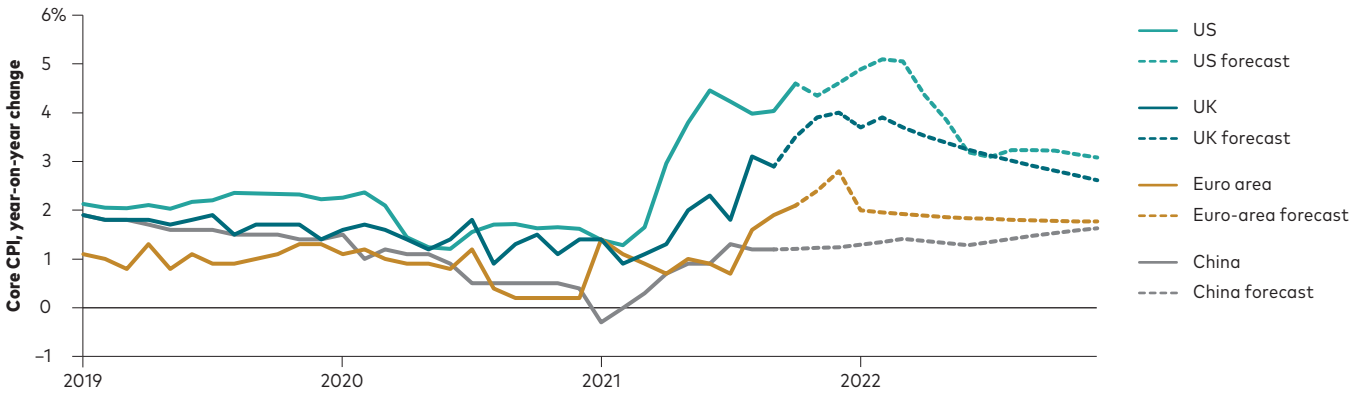
Notes: In Figure I-8a, data are from Q4 2019 to Q3 2021 for all regions. In Figure I-8b, data are from Q1 2008 to Q3 2009 for the US, euro area, and UK and from Q2 2007 to Q4 2008 for China.

Sources: Vanguard calculations, using data from Bloomberg, Macrobond and Refinitiv.

Although households may not have experienced the same degree of economic pain during this downturn as they did during others—particularly considering the high unemployment levels—these policies were not without costs. Global supply constraints and rebounding demand, once business restrictions were lifted, resulted in elevated inflation rates. The injections of stimulus and income support policies further stoked these inflationary pressures, driving inflation to levels not seen in decades, particularly in the US (**Figure I-9**). Some would argue that a reasonable degree of upward pressure on inflation is long overdue, but few would consider current US inflation rates sustainable[6]. Our projections indicate inflationary pressures subsiding, though staying above central bank targets as we move toward year-end 2022.

FIGURE I-9

How long will high inflation last?



Note: Data and Vanguard forecasts are for year-on-year percentage changes in the core Consumer Price Index, which excludes volatile food and energy prices. Actual inflation is to September 2021 for the US, UK and China and to October 2021 for the euro area. Vanguard forecasts are presented thereafter.

Sources: Vanguard calculations, using data from Bloomberg and Refinitiv.

6 This is particularly so considering the reasoning behind central banks' shift to average inflation targeting.

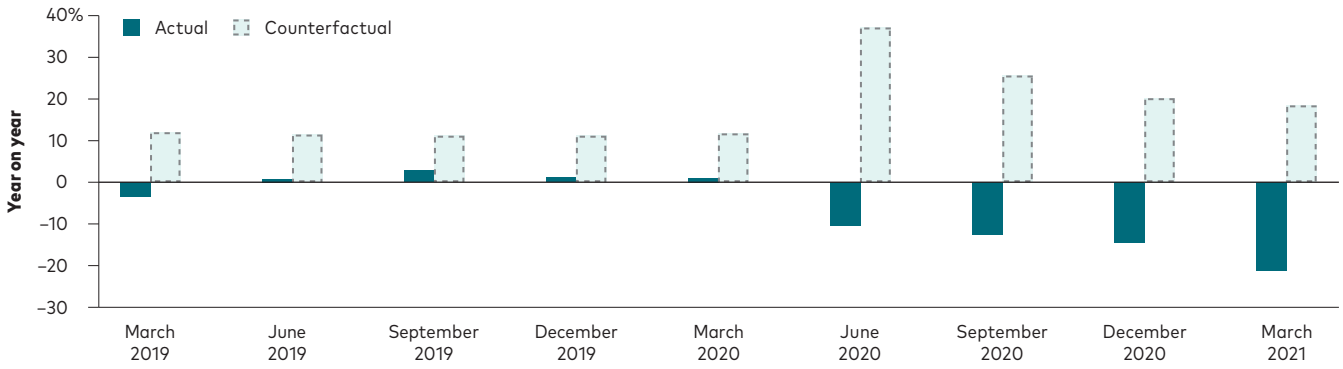
Absent the fiscal policies outlined in **Figure I-1**, our financial and business environment would be much different and more akin to what we faced coming out of the GFC. During that crisis, as in most downturns, business insolvencies and closures spiked as financing became difficult while revenues fell amid a lack of demand.

Figure I-10a shows that during this most recent downturn, the rate of business insolvencies actually declined as the pandemic wore on, thanks to the measures taken by fiscal and monetary authorities. Business investment did suffer (**Figure I-10b**), but not nearly as much as expected given economic conditions.

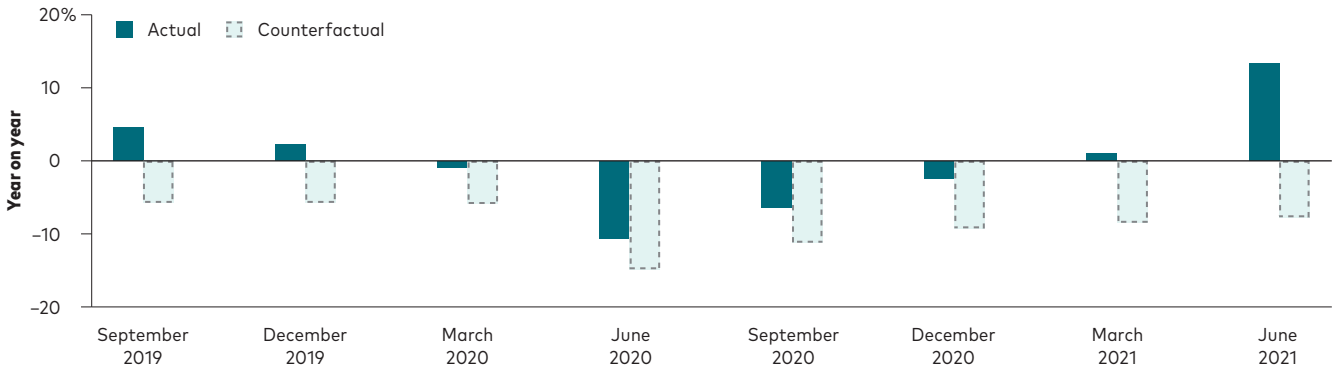
FIGURE I-10

An unorthodox recessionary business environment

a. Insolvencies fell during the downturn



b. Businesses held back on investment, but not as much as expected



Notes: The bars in I-10a represent the growth in business insolvencies globally. We take the GDP-weighted average of bankruptcy growth across the US, the UK, France, Germany, Japan and Australia to get the actual global aggregate (solid bars). The counterfactual scenario (dotted bars), representing what might have happened if policymakers had not taken the steps they did, is constructed based on the relationship between unemployment and business failures during the global financial crisis. The bars in I-10b represent the growth in global business investment . We take the GDP weighted average of business growth across the US, the UK, France, Germany, Japan and Australia to get actual business investment across regions (solid bars). The counterfactual scenario (dotted bars) is constructed based on the relationship between unemployment and business investment during the global financial crisis.

Sources: Vanguard calculations, based on data from Reuters and Moody's, as at 30 September 2021.

Clearly, this most recent downturn and rebound have been unlike any other in ways that go far beyond the economic and market environment. For this reason we hesitate to go so far as to say that such policy support will be necessary or should be implemented during the next recession. That said, global economies and financial markets would look much different had policymakers not taken the steps they did.

Global macroeconomic policy shifts will thus guide the course of the world economy through the next year. However, we see a common thread of risk across regions tied to the fate of the global supply recovery. Even as policy shifts gears, some uncertainty remains about supply normalisation. **Figure I-11** describes three possible states of the global economy. Our central case is one in which global demand stays robust while supply gradually recovers, still keeping moderate upward pressure on price inflation.

FIGURE I-11

Global scenarios

	Baseline	Downside risk	Upside surprise
Immunity gap	Continued progress on herd immunity in major economies by end of 2021.	Stalled progress on herd immunity by end of 2021.	Continued progress on herd immunity in major economies by end of 2021, emerging markets through 2022.
Consumer/ business reluctance gap	Social and business activity normalise by early 2022.	Social and business activity hampered through 2022.	Social and business activity surpass pre-pandemic levels by early 2022.
Covid-19	New mutations and vaccine distribution issues subside, closing the immunity gap by early 2022.	New mutations and vaccine distribution issues persist, prolonging immunity gap well into 2022.	New mutations subside and distribution efficiencies emerge.
Labour market	Unemployment rate falling throughout 2022.	High and sustained unemployment results in permanent labour market scarring.	Unemployment rate falling just above NAIRU rates by end of 2022.
Inflation	Inflation moves back toward target from above.	Inflation overshoots and maintains upward trajectory through 2022.	Inflation falls below target toward year-end 2022.
Policy	Central bank policies meet mandates despite unease. Additional fiscal support not necessary.	Central banks are behind the curve, and additional fiscal support would prove inflationary.	Central bank policies meet mandates as supply expands to meet rising demand. Additional fiscal support not necessary.
Growth	Global growth averages 4.6% for 2022.	Global growth averages close to 3.4% for 2022.	Global growth averages close to 5.5% for 2022.
Demand versus supply	Demand **>** Supply Demand and supply **both increase**	Demand **>** Supply Demand and supply **both decrease**	Demand **=** Supply Demand and supply **both increase**
Probability	**60%**	**30%**	**10%**

Notes: Historical global GDP data is taken from Bloomberg Economics estimates. Global growth estimates are derived from Vanguard forecasts, where growth numbers for the regions we forecast (the US, UK, euro area, China, Australia, Japan and Canada) are combined with IMF forecasts for Sub-Saharan Africa, Latin America and the Middle East and Central Asia. Pre-virus trend is the average quarterly growth rate from 2013 to 2019. NAIRU refers to the non-accelerating inflation rate of unemployment.

Sources: Vanguard model estimates, based on data from Reuters, Bloomberg, Bloomberg Economics, Macrobond and the International Monetary Fund.

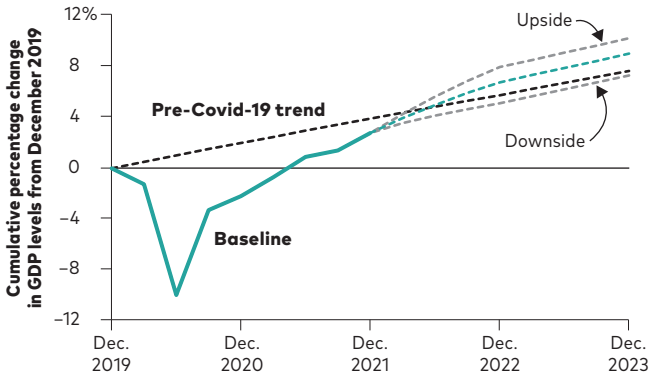
United States: Constraints pose threat as pandemic loosens grip on the economy

Although health outcomes continue to influence our near-term views for the US, the focus has shifted toward policy normalisation. In 2021, growth has slowed after the initial rebound, inflation has remained elevated and employment growth has progressed more moderately than anticipated.

Economic activity has breached its pre-pandemic level and, by our assessment, is on track to overshoot its pre-pandemic trend by early 2022—a significant achievement given the depth of the shock experienced. Overall, we expect GDP growth of 4% over the course of 2022. **Figure I-12** illustrates our assessment that conditions for growth continue to appear favourable. Broadly, consumer balance sheets in aggregate are healthy, as households have benefited from ample fiscal policy support, deleveraged during the pandemic, built up savings and seen favourable wealth effects in housing and asset prices[7]. Further fiscal policy support will also likely boost growth in 2022 and beyond.

FIGURE I-12

US growth: Slowing but still robust



Notes: The y-axis represents the level impact from the baseline, which is December 2019. The pre-Covid-19 trend assumes a 1.9% growth rate. The baseline scenario assumes gradual normalisation in supply-side constraints with unemployment rates reaching close to 3.5% by year-end 2022. The downside scenario is characterised by a lengthier persistence of current supply-side constraints, which would continue to act as a significant drag on growth. In this scenario, inflation will stay elevated as we view supply constraints dominating the demand impact on inflation currently. The upside scenario is characterised by a speedy normalisation of supply-side constraints, which will allow demand to be more fully realised and allow earlier easing of inflation pressures.

Sources: Vanguard and Refinitiv, as at 30 November 2021.

7 Leverage, as measured by the the Federal Reserve Bank financial obligations ratio, dropped from 15% of disposable income in the fourth quarter of 2019 to 13.8% in the second quarter of 2021. The household savings rate has averaged 15.7% during the pandemic (March 2020–September 2021) relative to a 7.5% trend pre-Covid. Household net worth has increased 21% relative to the fourth quarter of 2019, and real estate wealth has risen 12%, as measured by Fed Flow of Funds data as at 30 June 2021.

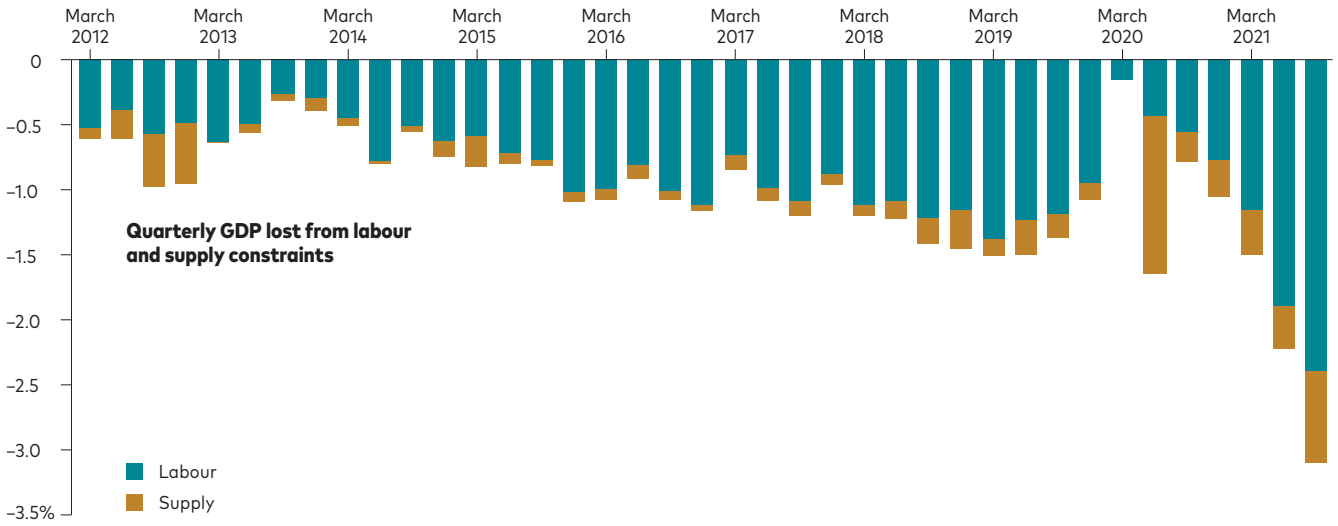
It has become clear, however, that unlike the economy's abrupt shutdown in early 2020 and sharp initial rebound in early 2021, a full reopening will likely be a drawn-out and uneven process. Critically, supply-and-demand imbalances have become more pronounced of late and threaten to weigh on output and exacerbate inflation pressures in 2022, increasing the risk that policymakers are late in withdrawing accommodation.

Shortages of labour and materials combined with logistical bottlenecks resulting in elevated prices have emerged as key risks, and how and when these will normalise remains highly uncertain. **Figure I-13** shows the current severity of those constraints, well beyond the drag imposed during a typical late-cycle economy, bringing focus to the circumstances needed for them to improve.

Job growth has accelerated toward the end of 2021, but as we progress into 2022, we expect the pace to moderate as the supply of unemployed people seeking work is depleted and competition among businesses intensifies to attract talent from other firms.

FIGURE I-13

Labour shortages are acute at this point in the business cycle



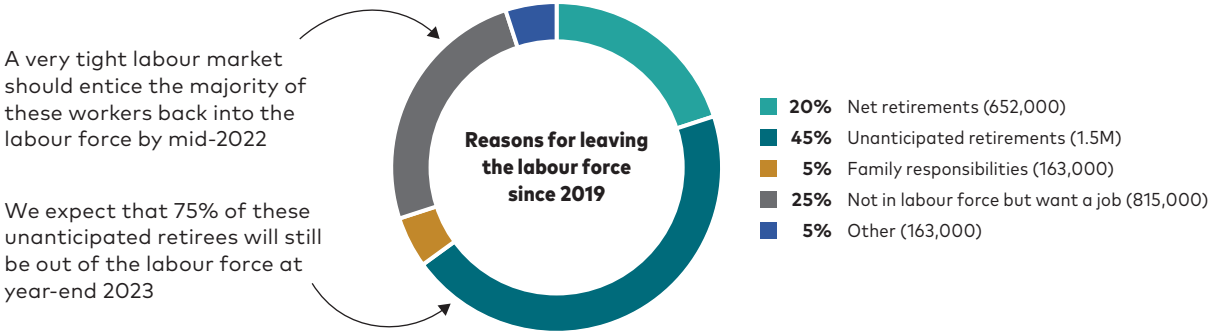
Notes: Output lost is measured as the percentage of quarterly gross domestic product that is forgone because of labour and supply constraints. Labour and supply shortages are estimated using industry employment levels, net job openings (openings minus separations), and labour productivity. Industries with positive net job openings are assumed to be experiencing labour constraints, and industries with positive net job openings but below-average labour productivity are assumed to be facing both labour and supply constraints.

Sources: Vanguard calculations, based on data from the Bureau of Economic Analysis and the Bureau of Labor Statistics, as at 30 June 2021.

Although some expect labour force re-entrants to completely fill the labour-supply gap shown in **Figure I-13**, the demographic landscape suggests this is unlikely. Retirements have contributed most to the decline in labour force participation since the pandemic started, with net retirements and unanticipated retirements totalling about 2 million as at June 2021 (**Figure I-14**). Although some of these retirements were planned even before the pandemic, more than half were unanticipated[8]. The unanticipated retirements have generally been those of older and wealthier workers previously employed in higher-wage industries and workers who originally expected to retire in coming years. Thus, we expect that only a fraction of these unanticipated retirees will return to the labour force.

FIGURE I-14

The labour force is unlikely to recover to pre-Covid-19 levels



Notes: Percentages represent the contribution to the overall decline in labour force participation. Net retirements refers to expected retirements minus new labour market entrants. This is a normal labour market rotation that occurs as older workers retire and younger workers enter the labour force. This rotation will have a net negative effect on the labour force from 2020 to 2025 because retirements will exceed new labour market entrants. Unanticipated retirements are retirements in excess of what our demographic models predicted—workers who likely retired as a result of pandemic implications. Family responsibilities refers to those who are not working because they are caring for family. Other includes those who have left the labour force to continue their education or because of a disability. All figures represent the change from the fourth quarter of 2019 through the second quarter of 2021.

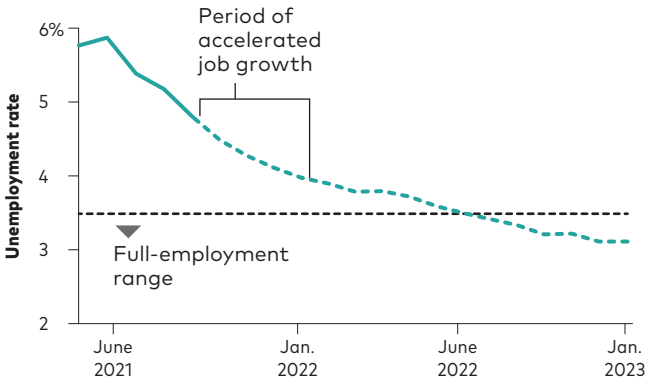
Sources: Vanguard calculations, based on data from the Federal Reserve Bank of Atlanta, as at 30 June 2021.

8 The unanticipated decline in retirements is calculated by comparing the current data with our estimates from the proprietary labour force participation model described in Patterson et al. (2019).

This paradox of elevated labour demand and weak labour force growth suggests that the official unemployment rate will reach the pre-pandemic low of 3.5% in mid-2022 but that the labour force participation rate may peak nearly a percentage point lower than its 63.3% level of February 2020. Such a scenario as shown in **Figure I-15**, in which the labour market proves tighter than previously anticipated, would present significant challenges for the Fed in assessing the appropriate time to begin raising its policy rate, further exacerbated by still-elevated inflation. These conditions form the core of the 2022 risks we outlined earlier.

FIGURE I-15

US to reach full-employment range by mid-2022



Note: The dotted line depicts the Vanguard headline (U-3) unemployment rate forecast.

Sources: Vanguard forecast and calculations, based on Refinitiv data, as at 30 September 2021.

Recently, elevated inflation has raised questions about its persistence, which could dampen the recovery and risk Fed action earlier than expected. We estimate that the effects from supply constraints will persist well into early 2022 before we see inflation normalising gradually toward the pre-pandemic trend. These factors contribute to our expectations that inflation will stay elevated for some time before slowing in the second half of next year, bringing the Core Personal Consumption Expenditures Price Index for year-end 2022 in the range of 2.3%–2.6% year over year.

Based on our understanding of the Fed's liftoff criteria, we expect them to focus on two key aspects of the economy: (1) labour market conditions improving to the point of full employment and (2) inflation to be sustainably at or moderately above 2%[9]. Given our labour market estimates, we expect to be within range of full employment by the second half of 2022; at that point, it will be difficult for the Fed to justify holding off on rate hikes through the end of the year. We say "within range" of full employment given the ambiguous nature of such a threshold, particularly as the Fed has communicated a desire to factor in a wide array of variables in making its assessment.

9 See *The Federal Reserve's New Framework: Context and Consequences*, remarks delivered 16 November 2020, by Fed Vice Chair Richard H. Clarida; available at federalreserve.gov/newsevents/speech/clarida20201116a.htm.

Euro area: Accommodative monetary policy set to continue despite inflationary pressures

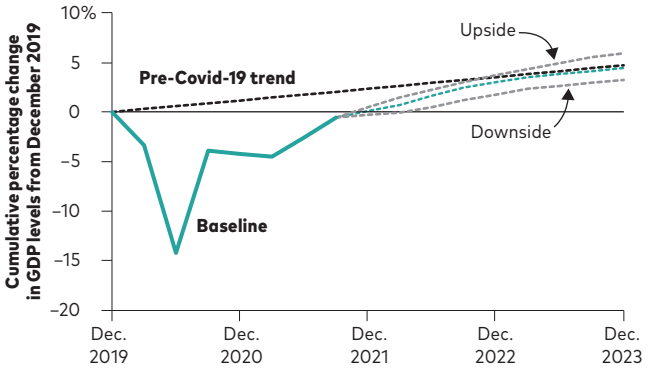
In the first quarter of 2021, the euro-area economy slipped into recession for the second time since the pandemic began. Strict lockdowns across the region constrained supply and consumer demand remained weak. In addition, initial vaccine production and distribution disruptions as well as relatively high vaccine hesitancy delayed the start of the vaccination rollout compared with other developed markets.

The vaccination pace accelerated substantially in the second quarter, leading to a broad-based easing of restrictions and supporting a strong bounce-back in activity over subsequent months. In the third quarter, output was only about 0.5% below the level attained at the end of 2019 (**Figure I-16**). Economic momentum, however, has since slowed as the reopening boost continues to moderate, amplified by slowing global growth, intensifying supply-chain disruptions and more recently a tightening of restrictions due to the emergence of the Omicron variant. Overall, the euro-area economy is anticipated to have grown by 5% in 2021, in line with our prediction in our 2021 outlook.

Looking ahead to 2022, we expect infection- and vaccine-acquired immunity to remain relatively successful in mitigating the pressure on hospital systems[10], which will allow for a continued economic recovery. In our central scenario, we expect that the euro-area economy will grow by 4% in 2022, and that by the end of 2022, GDP will be only about 0.5% below the trajectory we expected pre-Covid-19.

FIGURE I-16

Euro-area growth set to limit long-run scarring



Notes: The y-axis represents the level impact from the baseline, which is December 2019. The pre-virus trend assumes an annual growth rate of 1.1%.
Sources: Bloomberg, Eurostat, and Vanguard, as at 2 November 2021.

The risks to this view are skewed to the downside. They include new virus mutations that are resistant to the latest vaccines, raising consumers' reluctance to engage in social activities. In particular, the Omicron variant could have more substantial negative effects on economic activity than currently expected. Higher-than-anticipated energy prices and taxes that squeeze household disposable incomes pose further downside risks, as do larger or more persistent global supply-chain disruptions. Upside risks include a faster-than-expected drawdown in household savings that would fuel greater consumption spending. A more rapid unwinding of industrial bottlenecks is also possible, and that would benefit the euro area disproportionately, as manufacturing makes up almost 17% of the bloc's GDP, in contrast to just 11% for the US.

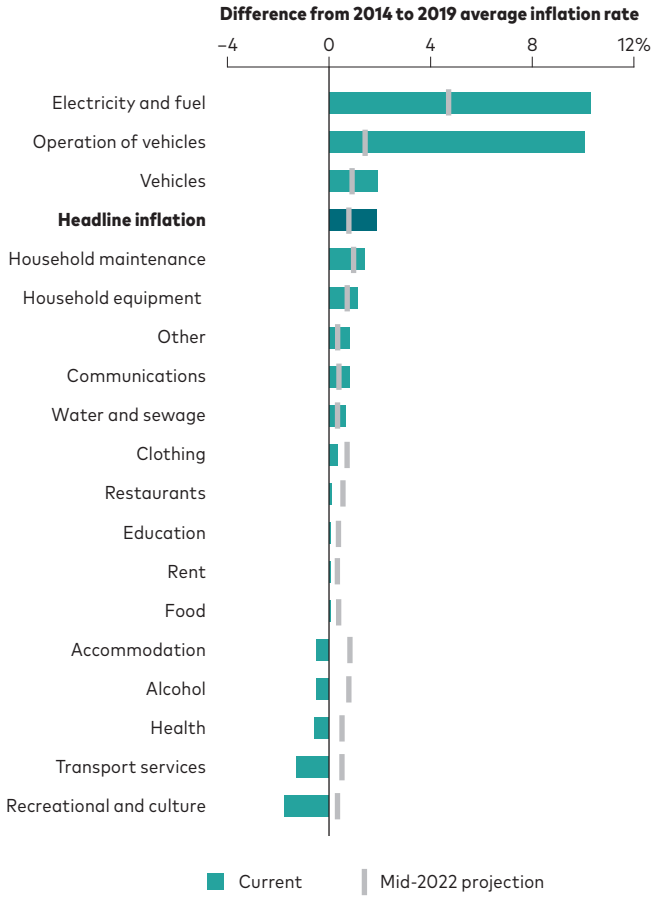
10 Based on information available on the Omicron variant as at 30 November 2021.

In 2021, inflation reached levels not seen since the GFC, with headline inflation reaching 4.1% in October compared with a year earlier. In recent months, a surge in energy prices due to natural gas shortages put substantial upward pressure on inflation. As has been the case across most developed economies, inflation pressure has been concentrated in the goods sector, while services inflation has remained subdued. Importantly, we see the factors driving up inflation as largely transitory. We anticipate that inflation will fall below its current level by mid-2022, while staying slightly elevated above its 2014–2019 average (**Figure I-17**). A major risk to this view is if price pressures feed into expectations and wage negotiations, which could fuel a more persistent increase in inflation and put pressure on central bank policy.

The ECB in 2021 concluded its strategy review, the first in almost two decades. Key changes included a shift to a symmetric 2% target—compared with the previous "below but close to 2%" wording (for more details, see the earlier section "Monetary policy: Change amid uncertainty")—and an ambitious climate-related action plan.

FIGURE I-17

Euro-area inflation pressures are concentrated in the goods sector



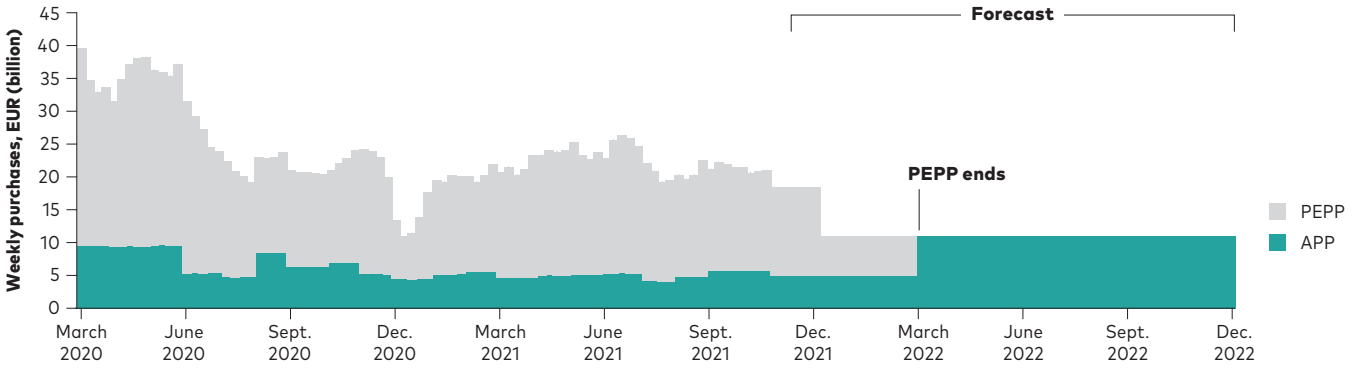
Notes: The figure shows the three-month average of the year-over-year rate of inflation for various sectors as at September 2021 in terms of its deviation from the 2014–2019 average. The vertical bars represent projections of this deviation for mid-2022.

Sources: Bloomberg, Eurostat, and Vanguard, as at 2 November 2021.

The ECB is expected to reduce its pace of asset purchases under the Pandemic Emergency Purchase Programme starting in the fourth quarter of 2021, and PEPP purchases are likely to stop in the first half of 2022. Asset purchases will nonetheless continue far beyond that. Similarly, we don't currently expect rate hikes over at least the next 24 months—a timeline that differs markedly from current market pricing. This highly accommodative monetary policy stance is justified by the ECB's relatively sanguine medium-term inflation outlook, but higher-than-anticipated inflation mixed with supply constraints may pressure policymakers. Despite recent shocks, inflation is expected to fall below the ECB's newly explicit 2% target by the end of its forecasting horizon. We expect an expansion of the pre-pandemic Asset Purchase Programme to smooth the transition after the PEPP ends (**Figure I-18**)[11].

FIGURE I-18

ECB to continue quantitative easing even after PEPP has come to an end



Notes: The Asset Purchase Programme (APP) is the pre-pandemic QE programme run by the ECB. The Pandemic Emergency Purchase Programme (PEPP) is the emergency QE programme introduced in 2020.

Sources: Bloomberg and Vanguard, as at 2 November 2021.

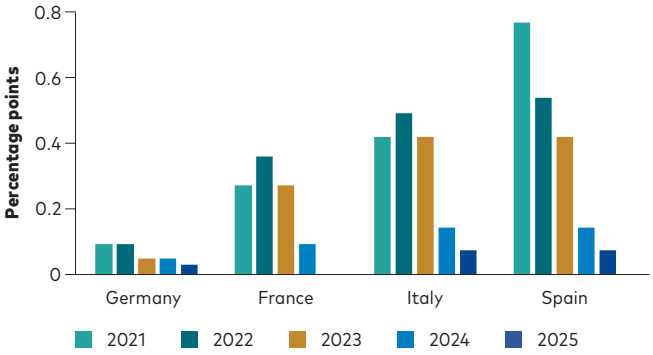
11 Potential newer programmes that can selectively buy certain sovereign assets could complement the existing APP, which must purchase in proportion to a sovereign's economic size.

The ECB partly facilitated highly expansionary fiscal stances by national governments throughout the pandemic. Budget deficits remained high in 2021; they ranged from 8.6% to 10.2% in France, Italy and Spain and were about 7% in Germany[12].

One benefit of the pandemic has been approval of the NextGenerationEU package. Its centerpiece is a 750-billion-euro recovery fund, designed to help repair the pandemic-driven immediate damage and to invest in a greener and more digital Europe[13]. The European Commission will finance it, borrowing on the markets at more favourable rates than many member states. The funds will be distributed over the coming years and are expected to moderately boost GDP by about 20 to 40 basis points a year, with a larger effect in Southern European economies (**Figure I-19**). (A basis point is one-hundredth of a percentage point.)

FIGURE I-19

Expected recovery fund contribution to GDP growth per country



Notes: The graph shows the contribution of the recovery fund to GDP growth per country. It is calculated as the difference in the fiscal impulse with and without the recovery fund. The fiscal impulse is defined as the fiscal stance (the change in the structural budget deficit) multiplied by a fiscal multiplier, which is assumed to be 0.7.

Sources: Vanguard, the International Monetary Fund Fiscal Monitor and Bloomberg, as at 2 November 2021.

12 Deficit figures reflect the General Government Overall Balance, according to the International Monetary Fund's Fiscal Monitor, October 2021.

13 This amount is commonly expressed in 2018 prices (and is about 800 billion euros in current prices, as at the third quarter of 2021).

United Kingdom: Bank is committed to firm but cautious tightening path

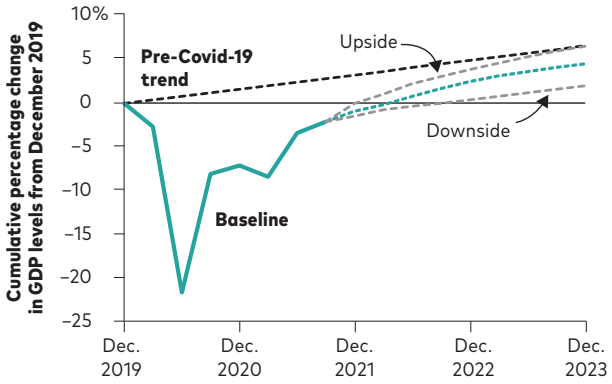
In similar fashion to the euro area, the UK economy experienced another downturn in economic activity in early 2021 as the government enacted a new lockdown to limit the spread of Covid-19. Activity contracted sharply in the first quarter, driven by a 4.4% drop in household consumption from the previous quarter.

However, amid a successful vaccination rollout and significant easing of restrictions, the UK economy recovered strongly during mid-2021. Consumer confidence returned, households drove down part of their excess savings built up during the pandemic and many businesses reopened. In the latter part of the year, momentum slowed as the impulse from reopening faded and activity became increasingly restrained by labour, material and energy shortages both in the UK and globally. Despite this slowdown, we still expect annual growth of about 7% in 2021, broadly in line with our forecast in our 2021 outlook.

As we look ahead to 2022, the UK economy will see growth challenges that will lower real disposable incomes. These include the end of the government-subsidised furlough programme; reduced unemployment benefits and higher taxes on income, consumption and corporate profits, as well as higher energy prices. However, these drags on consumption will be at least somewhat counteracted by robust wage growth and households' large stock of excess savings. We therefore expect economic growth of 5.5% in 2022. This would leave GDP about 2% below its pre-pandemic trend (**Figure I-20**)—a greater shortfall than that projected for the euro area, mainly because the UK faces additional Brexit-related headwinds.

FIGURE I-20

Recovery to decelerate but remain firm throughout 2022



Notes: The y-axis represents the level impact from the baseline, which is December 2019. The pre-virus trend assumes an annual growth rate of 1.7%. Downside risks include new virus mutations that are resistant to the latest vaccines and a renewed Covid-19 wave in winter that raises consumers' reluctance to engage in social activities. Higher-than-anticipated energy prices and taxes that squeeze household disposable incomes pose further downside risks, as do larger or more persistent global supply-chain disruptions. Upside risks include a faster-than-expected drawdown in household savings that would fuel greater consumption spending.

Sources: Bloomberg, the Office for National Statistics and Vanguard, as at 2 November 2021.

The annual inflation rate accelerated significantly in 2021, from about 0.5% at the start of the year to over 3% by September. This was driven by increased demand as the economy reopened and by a sharp rise in energy prices, among other factors. As we enter 2022, inflation is set to rise further amid higher food and gas prices, rising pressures from non-energy industrial sectors such as steel and chemicals, a quicker pass-through from higher food prices and a large April increase in the energy price cap[14]. We expect headline CPI to peak between 4.5% and 5% in the first half of 2022 and approach 2.5% year over year by the end of 2022.

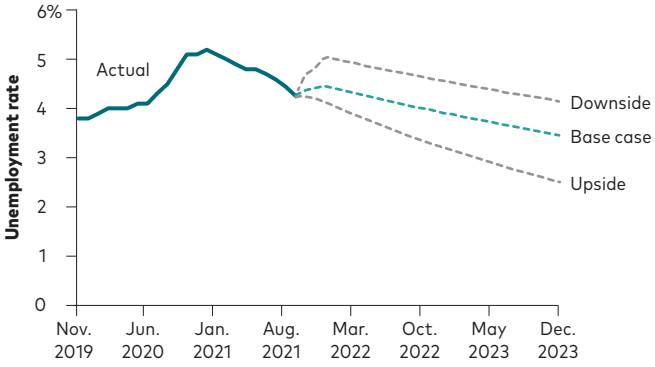
14 The cap sets the maximum price an energy supplier can charge for electricity and gas.

The larger and more persistent inflation shock has raised concern among Monetary Policy Committee (MPC) members at the Bank of England, some of whom worry that without any central bank action, these dynamics will meaningfully spill over into medium-term inflation expectations. Policymakers, though, must balance the risk of inflation expectations de-anchoring with a potential labour market softening as the furlough programme unwinds. In our base case, as **Figure I-21** illustrates, we expect only a modest rise in unemployment to about 4.5% as most of the 1.3 million furloughed workers are absorbed by the labour market by the end of 2021. The employment outlook is expected to remain strong, particularly as labour demand appears ample, as evidenced by record job vacancies.

We expect the MPC to begin raising interest rates in December 2021, provided that October labour market data are in line with our expectations. This will serve to signal to investors that the MPC is serious about fighting inflation and to maintain credibility. If progress in the labour market disappoints materially, or if there are signs of a considerable slowdown in economic activity because of the Omicron variant, then we expect the first rate hike to be delayed until February 2022. It will likely be followed by another 25-basis-point rate hike at the committee's subsequent meeting. This would take the Bank Rate to 0.5%, allowing the central bank to commence balance-sheet runoff starting in the second quarter of 2022. The quantitative easing programme will end in December 2021, as the bank has communicated (see the earlier section "Monetary policy: Change amid uncertainty").

FIGURE I-21

Labour market to remain strong despite furlough's end



Notes: The upside labour market scenario assumes that only 10% of currently furloughed workers lose their jobs once the scheme ends and only 30% of these newly unemployed workers stay in the labour force. The downside scenario assumes that 50% lose their jobs and 50% of the newly unemployed remain in the labour force. The base case assumes a modest rise in unemployment to 4.8% as most of the 1.3 million furloughed workers are absorbed by the labour market.

Sources: Bloomberg, the Office for National Statistics, Her Majesty's Revenue and Customs, and Vanguard, as at 2 November 2021.

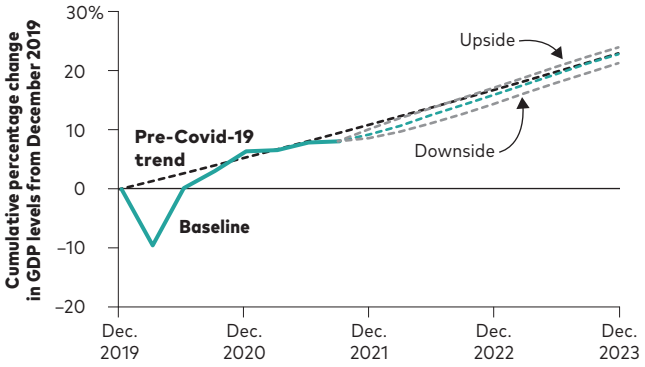
China: Growth headwinds to intensify amid transition toward a new policy paradigm

Policy was a defining theme for China in 2021, with regulatory tightening ramping up across all sectors of the economy, especially in property and energy, amid the government's desire to promote "common prosperity" and carbon neutrality. Along with sporadic lockdowns stemming from the Covid-19 Delta variant outbreak, the ongoing regulatory crackdown pushed China's growth below trend for most of the year, even though it was the first country to normalise from the pandemic in 2020.

In 2022, we expect China's growth to remain under pressure, as uncertainty related to the government's "zero-Covid" lockdown strategy will only be magnified by deepening regulatory measures and the lack of a strong macro policy-easing response[15]. These headwinds are likely to cap the growth rebound around 5%, leaving an output gap of –1.1% by the end of the year (**Figure I-22**). With the government likely to set the growth target around 5%–6%, compared with above 6% in 2021, this suggests that policymakers will likely either tolerate a more tepid recovery or unveil further stimulus measures to support the economy.

FIGURE I-22

No hard landing, but growth concerns to resurface



Notes: The y-axis represents the level impact from the baseline, which is December 2019. In the baseline scenario, we assume that current regulatory tightening continues, albeit at a more prudent pace, while macro easing in the form of fiscal and monetary stimulus picks up speed more notably starting in the second quarter of 2022 after the National People's Congress. The downside scenario is characterised by a policy mistake in the form of overly aggressive regulatory tightening and inadequate macro easing. A potential Covid-19 resurgence leading to additional containment measures under the "zero Covid" strategy also poses a downside risk. The upside scenario would entail an acceleration of macro easing and a pause in regulatory tightening alongside surging global demand for Chinese exports.

Sources: Vanguard, using data from Refinitiv, as at 2 November 2021.

15 The objective of this strategy is to keep transmission of the virus as close to zero as possible and, ultimately, to eliminate it entirely through strict lockdowns.

Unlike most developed economies, which have gradually eased lockdowns as vaccination rates increase, China has maintained a strict zero-Covid lockdown strategy even though over 70% of its population has been fully vaccinated, making the economic reopening unsustainable and stifling the consumption and services sector. As a case in point, household consumption has remained significantly below its trend, dropping from –3% to –5.4% in the third quarter of 2021, in contrast with the US, which was 5% above trend. The latest data suggest that a consumption recovery is underway and could extend into next year. However, China's decision to stick with a zero-Covid strategy could pose a risk to a full recovery in consumer activity and growth, especially against a more complicated backdrop of heightened regulatory uncertainty[16].

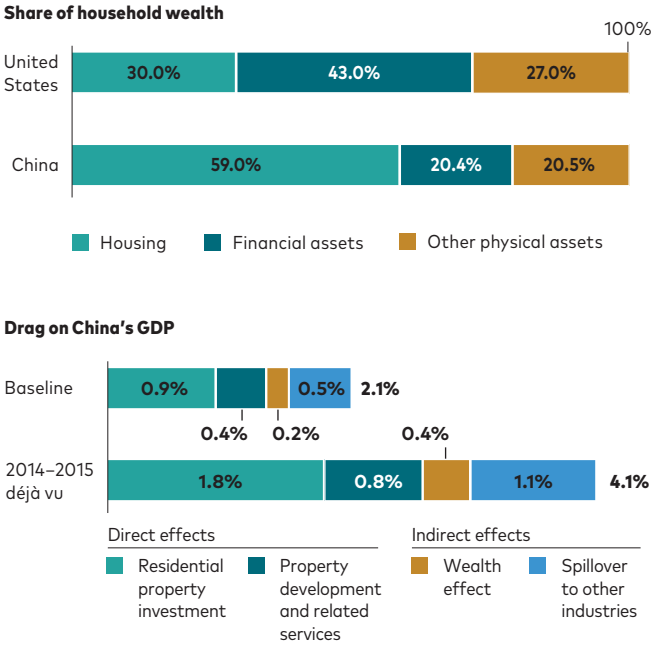
Though implementing regulations to control risks is not new in China, the recent crackdown is distinct in its scope. While previous regulatory crackdowns primarily targeted old-economy sectors, such as industrials and the property market, the 2021 action was widespread across both old and new economies, affecting close to 50% of GDP. We believe that this reflects a fundamental shift in the government's policy goals, with the policy priority increasingly shifting from efficiency to equity and from corporate profitability to labour income. This regulatory campaign is unlikely to stop or reverse, even if the pace and magnitude may slow slightly in 2022. Consequently, we expect a deepening of the property and energy market downturn in the near term, as the government seeks to achieve its common prosperity and decarbonisation goals by making housing more affordable and the power supply more well-rationed.

We estimate both direct and indirect impacts on GDP from a property downturn. Direct effects include real-estate investment and property-related services and consumption, while indirect effects pertain to spillovers into upstream industries, such as materials and metal products, that are highly sensitive to the property activity.

Additionally, we accounted for potential wealth effects coming from a decline in property prices, as property accounts for nearly 60% of Chinese households' wealth, compared with 30% in the US (**Figure I-23**). Our model suggests that the total drag on growth could be around 2% in 2022, with effects potentially magnified should a déjà vu scenario of the 2014–2015 property downturn play out.

FIGURE I-23

Property market downturn to deepen in 2022



Notes: We consider both real and financial impacts of the property crackdown on GDP. In the baseline scenario, we assume growth in property investment declines by 10 percentage points from high single digits in 2021 to a modest contraction in 2022 and growth in property prices moderates by around 5 percentage points. We use China's input-output table to consider indirect effects such as the spillover impact on upstream industries such as materials and metal products, as well as impacts via the wealth effect channel. Under the downside scenario, where we see a replay of the 2014–2015 property slowdown, we assume growth in property investment declines by close to 20 percentage points and property prices drop by 10 percentage points.

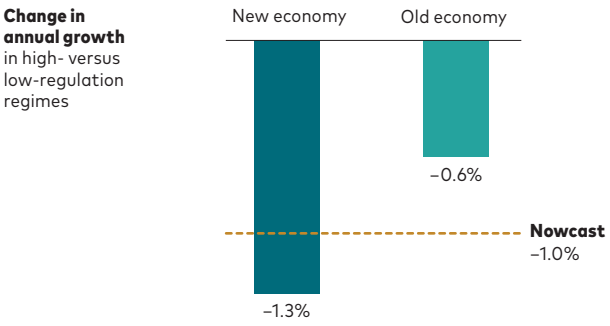
Sources: Vanguard, using data from Refinitiv, the People's Bank of China and the US Federal Reserve, as at 30 September 2021.

16 In contrast with the zero-Covid strategy, the living-with-Covid approach seeks to balance economic and societal concerns while minimising hospitalisations and deaths, with less focus on the number of infections.

Meanwhile, energy supply shocks as a result of the government's decarbonisation efforts are likely to continue restricting industrial production in 2022 in the lead-up to the Winter Olympics and the National Party Congress. These regulatory actions will not only directly affect activity and employment in the targeted sectors; they could also dampen overall business confidence and investment, particularly in the new economy, which tends to be more sensitive to the regulatory environment (**Figure I-24**). As a result, China may not see a meaningful rebound in growth until the second quarter of 2022.

FIGURE I-24

Confidence in the privately led new economy sector may be significantly affected by high regulation uncertainty



Notes: 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. The Nowcast comprises two distinct economies. The old economy is based on state-owned enterprises; low-end and heavy manufacturing industries such as textile, coal, steel and concrete production; and real estate. The new, consumer-driven economy is led by private enterprises and based on domestic consumption, high-skill manufacturing and service industries.

Sources: Vanguard, using data from Refinitiv and the CEIC, as at 30 September 2021.

The upshot is that macro policy has the potential to shift toward a more accommodative stance during this policy transition period, especially given its lagged and modest response to date. Accelerating the timing, pace and magnitude of fiscal and monetary easing could pose upside risks to our forecasts and would allow growth to come in around trend of 5.5%, thereby helping to close the output gap by the end of 2022. By contrast, delayed and insufficient macro easing could well push China's growth lower than 4%. That said, a hard-landing scenario of the economy appears quite unlikely given the significant progress made toward addressing demand-side imbalances over the last five years (**Figure I-25**) (Wang, Schickling, and Yeo, 2021).

Engineering a smooth rebalancing in an environment of shifting policy regimes will require prudence to undercut risk but not stifle innovation, to promote equity but not at the expense of efficiency and to regulate the private sector but not completely revert to a state-dominant model. A failure to balance these conflicting forces could result in China stagnating like Japan in the longer term, with growth below 2%. However, if successful, we see a bright future where China could escape the middle-income trap and overtake the US as the largest economy in the world after 2050.

FIGURE I-25

Downside risks remain elevated, but we do not expect a hard landing

China's emphasis on growth quality has reduced some demand-side headwinds over the past five years.

		2015	2020–2021
Financial imbalances	Debt-to-GDP ratio (<)	251%	306%
	Five-year change in debt-to-GDP ratio (<)	55%	40%
Overcapacity reduction	Inventory-to-sales ratio (months) (<)	18.3	13.5
	Industry capacity utilisation ratio (>)	74.6	78
Economic rebalancing	Consumption versus investment share of GDP (>)	8%	11%
	Service versus manufacturing share of GDP (>)	10%	17%
Macro policy cushion	Foreign exchange (FX) reserves (USD trillion)* (>)	3.0	3.2
	Total social financing growth trough to peak** (<)	5.1%	3%
	Policy rate cuts** (<)	1.3%	0.3%
Asset price appreciation	Five-year increase in margin trading (RMB billion) (<)	53.1	31.3
	Five-year increase in retail speculation (new trading accounts opened, million) (<)	2.6	0.5
	Property price growth year-over-year (Tier 1 city) (<)	19.9%	4.0%

Lower growth quality ← → Higher growth quality

(>) indicates higher values lead to healthier and more sustainable growth prospects. (<) indicates lower values lead to healthier and more sustainable growth prospects.

* We compared 2016's foreign exchange reserves with 2019, given that most of the 2015–2016 FX drain happened in the latter year.

** We compared the 2015–2016 easing cycle with the 2018–2019 easing cycle.

Notes: "Tier 1 city" refers to Beijing, Shanghai, Guangzhou and Shenzen. Data for 2015 are as at 31 December 2015. Data for 2020–2021 are as at 31 December 2020, with the exception of inventory-to-sales ratio, which is as at 30 September 2021.

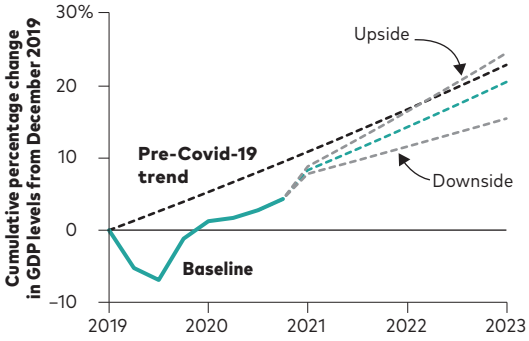
Sources: The CEIC, China's National Bureau of Statistics, Moody's Analytics Data Buffet, the Organization for Economic Co-operation and Development, the U.S. Bureau of Economic Analysis and Vanguard calculations.

Emerging markets: Recovery is underway, but with some hurdles

While developed-market economies rebounded from the Covid-19 crisis via a combination of vaccine rollouts and fiscal and monetary policy support, emerging-market economies face a less certain road to recovery in 2022. Although we expect emerging-market growth to outpace that of its developed-market counterparts, our forecast for 7% growth in 2021 and 5.5% in 2022 is relatively sluggish given the 2020 downturn in emerging markets as well as the pre-Covid-19 trend of growth (**Figure I-26**). Furthermore, risks to our emerging-market growth forecast are skewed to the downside, stemming from the growing potential of earlier-than-expected tightening of central bank policy in developed markets, as well as continued virus vulnerability, especially in emerging-market Asia.

FIGURE I-26

Emerging-market GDP will likely remain below pre-Covid-19 trend



Notes: The y-axis represents the level impact from the baseline, which is December 2019. We assume a pre-Covid-19 trend growth rate of 5.3%. The upside forecast assumes faster than pre-Covid-19 trend growth in 2022 because of a global growth upswing and better-than-expected health progress. The downside forecast assumes growth slightly below the 2019 pace in 2022 because of disruptive inflation and developed-market central bank tightening.

Sources: Vanguard calculations, based on International Monetary Fund data. Data are to the second quarter of 2021. The forecasts are as at 31 October 2021.

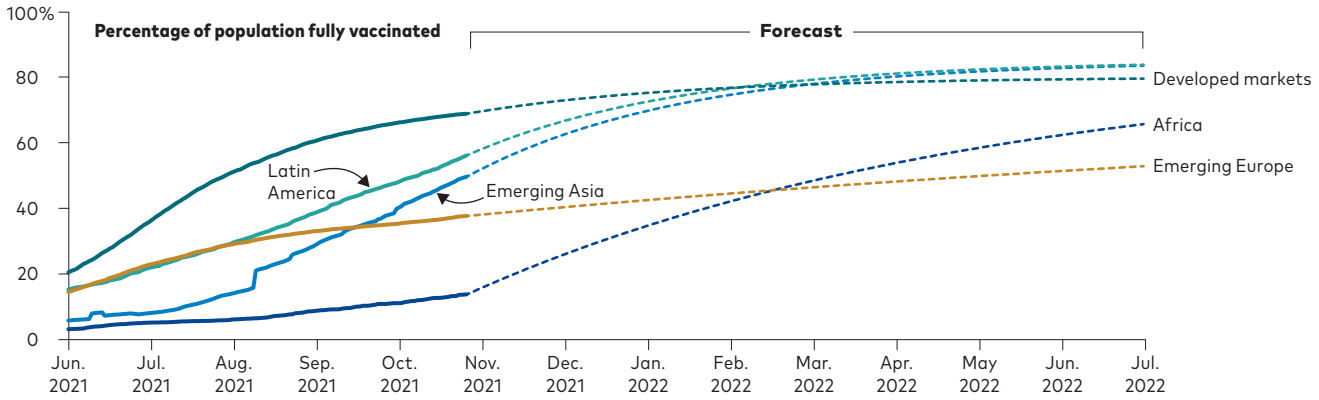
After a slow start, certain emerging-market regions have made great progress on the vaccination front recently (**Figure I-27**). We expect progress to continue to be strong in emerging Asia and Latin America, such that the majority of people who are willing and able to be vaccinated will be by the end of 2021, ahead of consensus expectations. But vaccine-related health risks persist. Logistical and supply factors will limit rollout in emerging Africa until at least the first half of 2022, and vaccine hesitancy will continue to hamper vaccine coverage in emerging Europe through the rest of 2021. With only a small proportion of the population having acquired immunity, emerging Asia remains vaccine-reliant and vulnerable to continued Covid-19 outbreaks.

Moreover, booster shot requirements in developed markets will chip away at the available pool of vaccines, hindering distribution within emerging markets.

However, in good news for emerging-market regions outside of Asia, recent evidence seems to suggest that natural immunity is a potent force in reducing hospitalisation and mortality risk from subsequent Covid-19 infections. But even though natural immunity may suggest a silver lining to the significant outbreaks suffered across much of emerging markets in 2020 and 2021, Asian populations will remain vulnerable until vaccination rollouts are complete—and potentially beyond.

FIGURE I-27

Divergence in global vaccination rates



Notes: The forecast is based on an AR(1) process assuming a terminal coverage rate and decay factor by region. AR(1) refers to an auto-regressive process where a contemporary data point is correlated to its lagged value. Terminal coverage rate is the maximum vaccine coverage rate expected for a region based on Vanguard calculations. Decay factors for regions are a combination of factors such as proximity to terminal coverage rate and existing regional vaccination rates.

Sources: Vanguard calculations, based on data from Our World in Data, Oxford University, as at 31 October 2021.

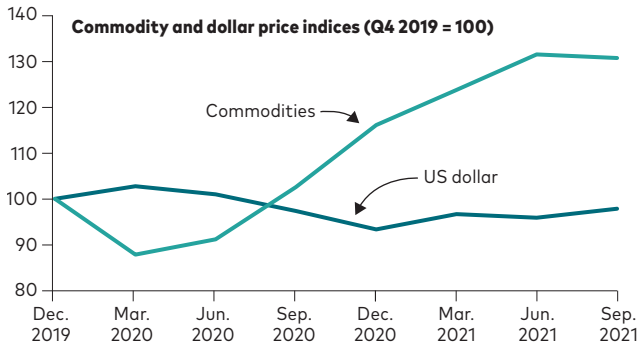
Our proprietary modelling suggests material impacts to emerging-market economies from changes in the second and third drivers of emerging-market growth in 2022—developed-market monetary policy and global growth. We estimate that a one-standard-deviation shock to global commodity prices will boost emerging-market economic growth by 2 percentage points over two years. Similarly, we estimate that a one-standard-deviation appreciation in the dollar (as triggered by an unexpected Fed tightening) will shave off about half a percentage point in emerging-market economic growth over two years (**Figure I-28**).

An uptick in global demand as countries exit lockdown, led by the US, has boosted global commodity prices significantly so far this year. We expect supply shortages to continue through the first quarter of 2022 before cooling off slightly. In combination with structural energy shortages making the extraction of key commodities more expensive, and the structural step-up in global infrastructure spending to retool greener economies, we expect commodity prices to remain elevated in 2022. This is a boost to emerging-market economies broadly. Thus there is upside risk to emerging-market growth stemming from global commodity demand.

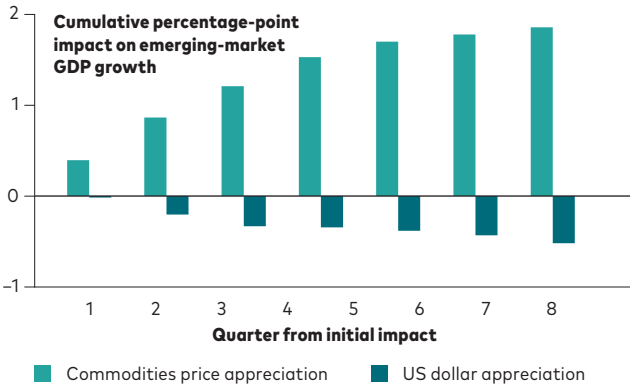
On the flip side, there is downside risk to our emerging-market growth forecast resulting from the increasing potential for earlier-than-expected hikes by developed-market central banks, chiefly the Fed. As inflation remains stubbornly high in the US, market participants are increasingly pricing Fed hikes into 2022. This caused sell-offs in emerging-market assets in the third quarter of 2021, as evidenced by emerging-market foreign exchange markets and by spreads widening. If the market were to continue to price in earlier Fed hikes and possibly even incrementally larger hikes (for example, 50 basis points versus 25 basis points), financial conditions may tighten further in emerging markets, cutting growth prospects.

FIGURE I-28
Commodity and dollar developments

a. Commodities have risen through Covid-19 but the dollar has been flat



b. Commodity and dollar developments should be positive for emerging markets growth



Notes: Commodities data are based on the S&P GSCI Non-Energy Commodity Price Index. US dollar data are based on the Bloomberg Dollar Index. A one-standard-deviation shock to global commodity prices boosts emerging-market economic growth by 2 percentage points over two years. Similarly, a one-standard-deviation appreciation in the dollar (as triggered by an unexpected Fed tightening) will shave off about half a percentage point in emerging-market economic growth over two years.

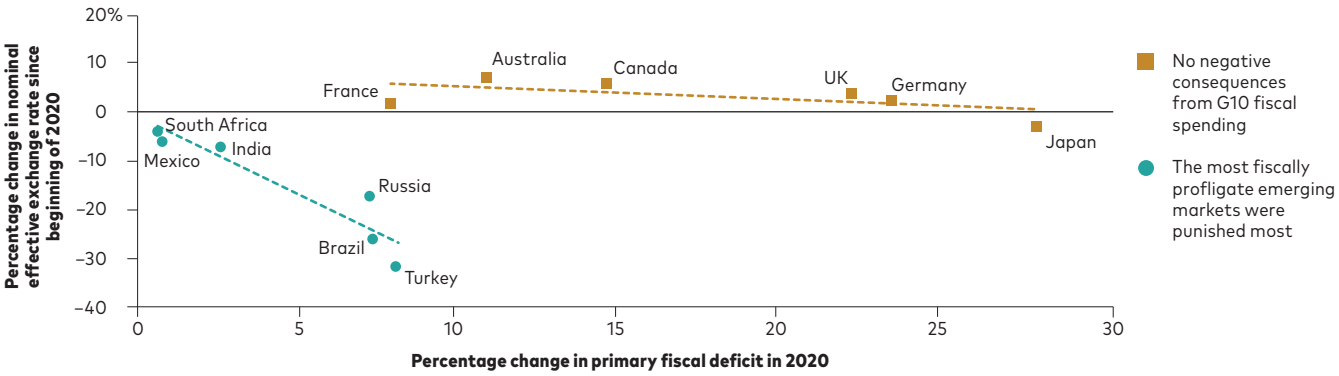
Sources: Vanguard calculations, based on data from Standard & Poor's and Bloomberg, as at 31 October 2021.

Another factor limiting the emerging-market recovery is the more limited fiscal and monetary space afforded to those economies relative to their developed-market counterparts. **Figure I-29** shows that although developed-market economies suffered no consequences in terms of lower foreign exchange rates from fiscal stimulus, there was a strong positive correlation between the size of fiscal stimulus and the size of the subsequent foreign exchange sell-off in emerging markets.

A depreciating currency in emerging markets is negative for two main reasons: It can be inflationary because of the open nature of emerging-market economies, and it can increase the value of external debt, leading to financial stability concerns[17]. As an example, we compare Latin American economies Mexico and Brazil. Brazil stimulated its economy with aggressive fiscal spending (similar to developed markets) and thereby initially suffered a much milder recession than Mexico, which decided not to spend much in the face of the Covid-19 shock. However, Brazil's currency has sold off much more severely than the Mexican peso, which remains relatively stable. This in turn has led to spiralling inflation in Brazil compared with Mexico.

FIGURE I-29

Emerging-market countries were punished by the markets for fiscal stimulus; developed-market countries were not



Notes: Turkey did very little fiscal stimulus, instead advocating a private credit impulse. The net effect of boosting economic performance is the same. We use that private credit impulse as a proxy for fiscal stimulus.

Sources: Vanguard calculations, based on national sources via Refinitiv, as at 31 October 2021.

17 An open economy is one characterised by both a reliance on international trade in goods and services, often denominated in foreign currencies, and a reliance on international capital flows.

In addition to the contrasting issues facing countries such as Brazil and Mexico, broader inflationary dichotomies exist at a regional level. In both Latin America and emerging Europe, inflation is above its pre-Covid-19 rate. However, in emerging Asia, inflation remains below its pre-Covid-19 rate. In 2022, we expect some moderation of both phenomena; however, continued global supply disruptions and strong global demand add upside risk to our outlook. In particular, we see higher-than-trend inflation continuing in Latin America beyond 2022 because of unanchored expectations and policy errors. In contrast, we expect to see some normalisation in emerging Europe and emerging Asia toward the pre-Covid-19 trend.

Part of the disinflationary pressure in emerging Asia stems from its zero-Covid strategies. We expect the pace of the vaccine rollout to confer a level of herd immunity, such that emerging Asian economies can safely depart from such approaches which have also hampered demand in the region. Central banks in regions such as Latin America and emerging Europe have been at the forefront of the emerging-market hiking cycle and are expected to continue raising rates in 2022. Continued monetary policy efforts to counter inflation in these regions, as well as gradually easing global-supply constraints and waning developed-market fiscal impulses, should cool inflationary pressures by late 2022.

II. Global capital markets outlook

Global capital markets barely missed a beat in 2021 as they continued their steady rise from pandemic-related lows in March 2020. The first quarter of 2021 was largely defined by the "reflation trade" as the economic reopening resulted in rising bond yields. The economically sensitive sectors of value and small-capitalisation stocks outperformed. By the second quarter, a more hawkish policy stance from central banks, falling expectations for global growth and the spread of the Covid-19 Delta variant caused the yield curve to flatten, US markets to widen their performance gap over other markets and growth stocks to outperform value. Now, with valuations exceeding their pre-pandemic highs, elevated inflation and continued economic strength are creating a fragile backdrop for markets.

As we look to 2022 and beyond, our long-term outlook for global asset returns is guarded. This is especially true for equities, where high valuations and lower economic growth rates cause us to anticipate lower returns over the next decade. For fixed income, low yields (by historical standards) mean that investors should expect lower returns. However, since yields have risen modestly since 2020, our outlook is commensurately higher than a year ago.

Although our economic outlook forecasts modestly higher inflation and a normalisation in interest rates over the next decade, it will not be enough to raise our returns forecast to historical averages. Achieving such returns will require a shift in the underlying secular forces that have kept rates low across developed economies since the late 2000s. For this reason, we continue to caution investors against extrapolating future results from the past and we encourage them to implement their asset allocation with low-cost funds.

Moreover, with different regions offering different opportunities, it is important that investors follow a globally diversified approach in order to exploit these opportunities and hedge the risk that asset classes do not perform as expected.

Vanguard's distinct approach to forecasting

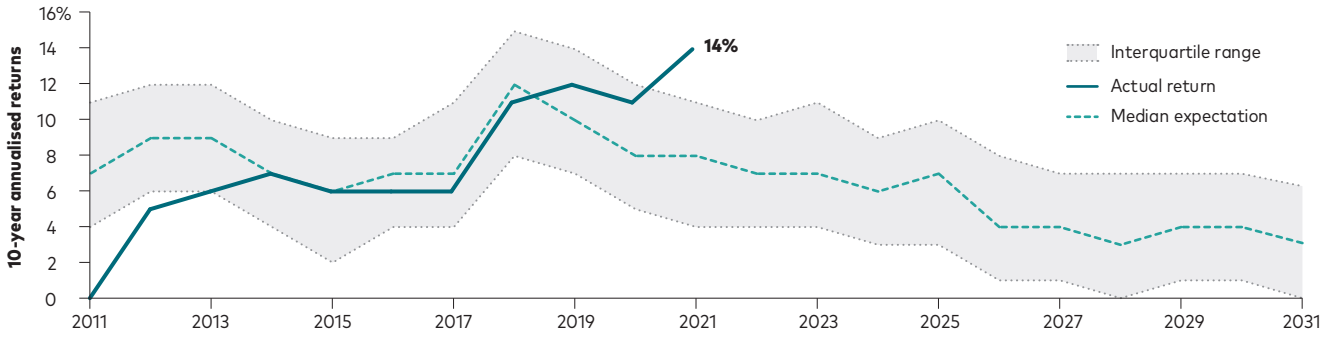
To treat the future with the deference it deserves, Vanguard has long believed that market forecasts are best viewed in a probabilistic framework. This annual publication's primary objectives are to describe the projected long-term return distributions that contribute to strategic asset allocation decisions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

Global equity markets: A widening performance gap

The market recovery from Covid-19 has been broadly positive but has also varied across different regions. The US market registered a gross total return of 26% in GBP terms from 1 January to 26 November 2021, exceeding its pre-pandemic high. The UK market has still not recovered to reach the high it had achieved prior to March 2020, with a total gross return of 14% since the beginning of 2021[1].

FIGURE II-1

Global equities have been, on average, close to our estimates and recently outperformed our expectations



Past performance is not a reliable indicator of future results. Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: Figure II-1 shows the actual 10-year annualised return of global equities in GBP compared with the VCMM forecast made 10 years earlier. For example, the 2011 data point at the beginning of the chart shows the actual return for the 10-year period between 2001-2011 (solid line) compared with the 10-year return forecast made in 2001 (dashed line). After 2021, the dashed line is extended to show how our forecasts made between 2012 and 2021 (ending between 2022 and 2031) are evolving. The interquartile range represents the area between the 25th and 75th percentile of the return distribution. See the Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

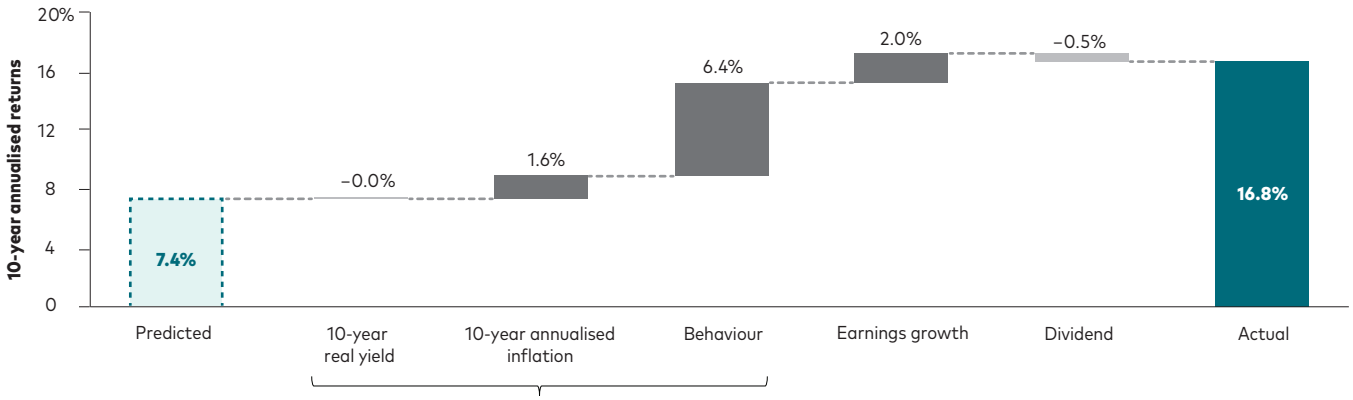
Source: Vanguard calculations, as at 30 September 2021.

IMPORTANT: The projections and 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.

1 **Source:** MSCI USA and MSCI UK indices (gross total returns in GBP downloaded from FactSet).

FIGURE II-2

Investor psychology and higher earnings explain most of the error in our US equity forecast



	Valuation (P/E) change	Earnings growth	Dividend	Total return
2011 forecast	–0.1%	5.0%	2.5%	7.4%
Actual 2011–2021	7.9%	7.0%	2.0%	16.8%

Past performance is not a reliable indicator of future results.

Notes: The chart decomposes the difference between our 2011 forecast for US equities as at 30 September 2021 and actual returns over the 10-year period. Returns are based on the MSCI US Broad Market Index. Changes in valuations are broken down into the real 10-year yield and 10-year annualised inflation based on our proprietary fair-value cyclically adjusted price/earnings (CAPE) model. "Behaviour" is the estimated level of overvaluation, which is described as the difference between actual CAPE and our median estimate of fair value as at 30 September 2021. We classify this deviation as "behavioural" because it is unexplained by the long-term, fundamental drivers of valuations based on our research. The numbers in the table may not add up exactly to 100% because of rounding.

Source: Vanguard calculations in USD, as at 30 September 2021.

IMPORTANT: The projections and 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.

Recent outperformance of the US equity market with respect to other regions is just the latest manifestation of a trend that has defined the last decade. More recently, this has caused actual global equity returns to outperform our forecasts, as shown in **Figure II-1**. Zooming in on the US market, actual returns have been above our estimates primarily due to a higher-than-expected valuation expansion and, to a lesser extent, earnings growth (**Figure II-2**).

For this trend to persist into the next decade, one would have to believe that economic growth will be concentrated in a few sectors of the market, that monetary policy will remain ultra-accommodative, that inflation pressures will completely subside and that risk-seeking behaviour will continue to push US equity valuations away from fair value. These assumptions are not the baseline of our economic analysis and the market-based expectations that serve as inputs to our VCMM.

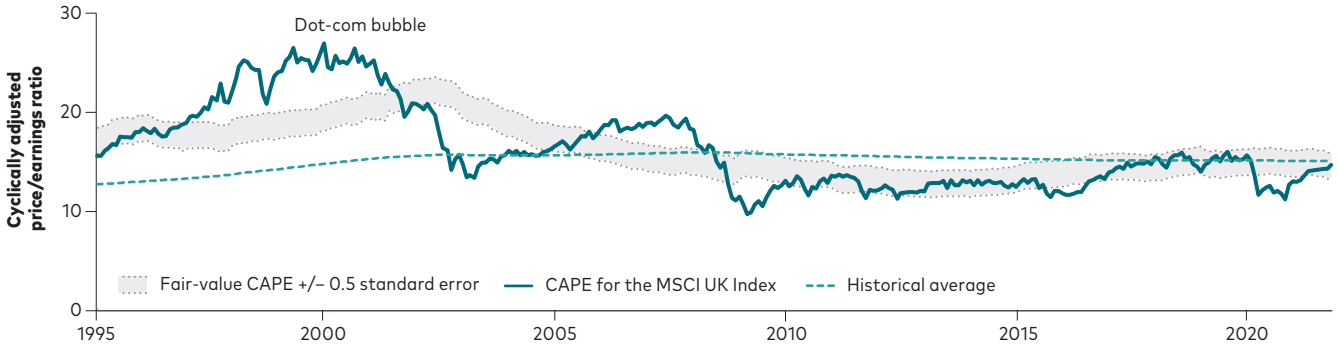
Equity valuations are stretched in some regions and more attractive in others

At Vanguard, we developed a proprietary fair-value model that allows us to assess equity valuations through structural variables such as the levels of real interest rates and expected inflation. Looking at the UK market, the cyclically adjusted price/earnings ratio (CAPE) has been below our fair-value range for some time since the 2020 market crisis. More recently, thanks to more positive market performance, valuations have approached the centre of the range, signalling that valuations are more in line with the economic fundamentals (**Figure II-3a**).

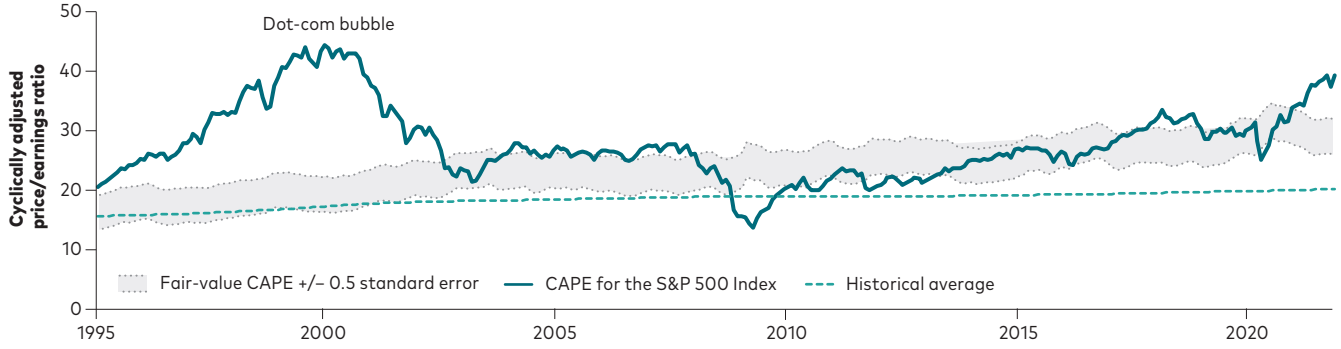
In the US market, on the other hand, the continued surge in broad equity markets following their robust recovery in 2020 has pushed the CAPE for the Standard & Poor's 500 Index further above our estimate of fair value. **Figure II-3b** shows the US CAPE along with our fair-value model estimate and suggests that even when we account for the level of real interest rates and inflation, US equities have not been this overvalued since the dot-com bubble. It is important to note though, that, according to our model, the US market does not look as overvalued as would be implied by simply comparing valuations with their historical averages.

FIGURE II-3

a. UK equities remain fairly valued



b. US equities have not been this overvalued since the dot-com bubble



Past performance is not a reliable indicator of future results.

Notes: The fair-value CAPE is based on a statistical model that corrects CAPE measures for the level of inflation expectations and interest rates. The statistical model specification for the UK fair-value CAPE is a five-variable vector error correction, including MSCI UK earnings yields, 10-year trailing inflation, 10-year UK government bond yields, equity volatility and UK government bond volatility estimated over the period 31 January 1970 to 31 October 2021. The statistical model specification for the US fair-value CAPE is a three-variable vector error correction, including S&P 500 earnings yields, 10-year trailing inflation and 10-year US Treasury yields estimated over the period 31 January 1940 to 31 October 2021. Details were published in the 2017 Vanguard research paper, Global Macro Matters: As US stock prices rise, the risk-return trade-off gets tricky. A declining fair-value CAPE suggests that a higher equity risk premium (ERP) compensation is required, while a rising fair-value CAPE suggests that the ERP is compressing.

Source: Vanguard calculations, as at 31 October 2021, based on data from Robert Shiller's website, at aida.wss.yale.edu/~shiller/data.htm, the U.S. Bureau of Labor Statistics, the Federal Reserve Board, Refinitiv and Global Financial Data.

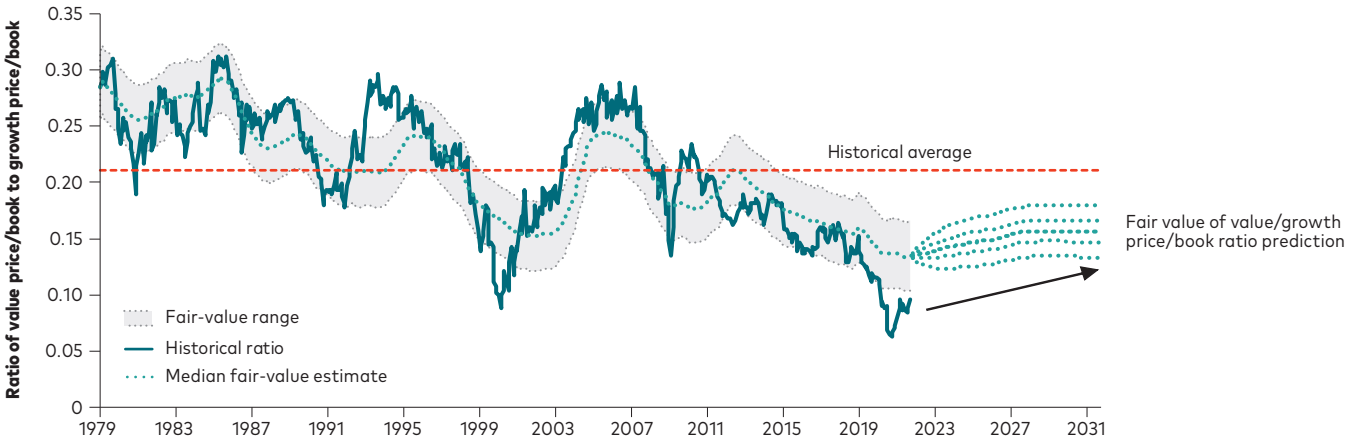
In the equity factor space, we continue to have a constructive view on value stocks despite their strong performance relative to growth in 2021 (DiCiurcio et al., 2021). Focusing on the largest equity region, the US, value has recovered only about a quarter of its nearly unprecedented deficit, as **Figure II-4a** illustrates. We expect value to outperform by as much as the historical equity-risk premium over the next decade, mostly because of a decay in the overvaluation of growth stocks, not because the "fair value of value" has returned to historical norms.

We find that similar drivers—interest rates, inflation, volatility and corporate profits—explain 72% of the variations in US small-cap versus large-cap price/book ratios (**Figure II-4b**). However, the resurgence in economically sensitive parts of the market, such as small-caps, has been sufficient to return that ratio to our estimate of fair value. But as inflation pressures continue to mount, the risk for small-caps is that higher growth might not continue to accompany price increases, as it has over the past year.

FIGURE II-4

US value and small-caps outperformed the broad market this year

a. Despite 2021 rally, there is still upside in US value

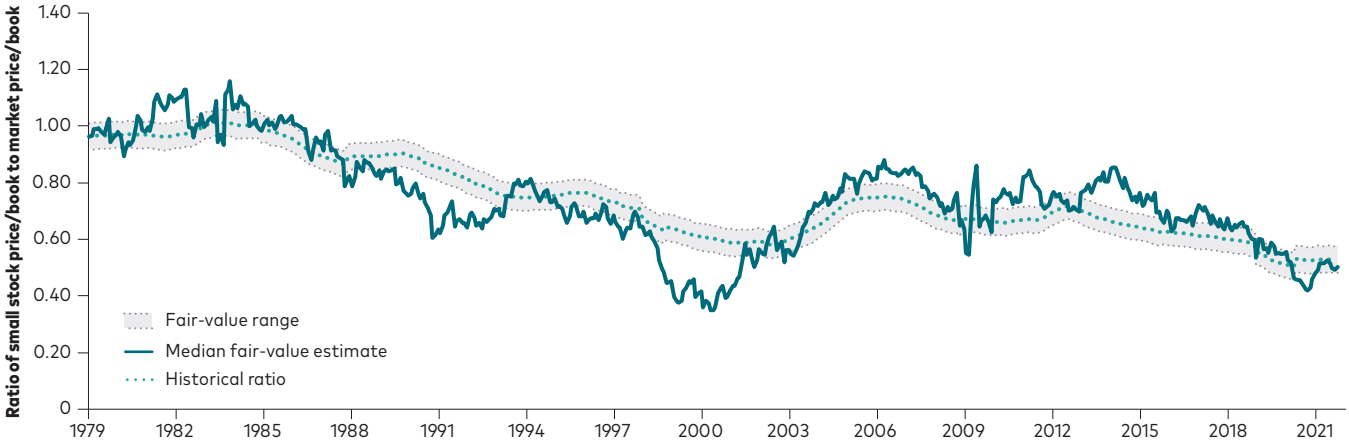


Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results. Past performance is not a reliable indicator of future results.

Notes: The valuation ratio is projected based on a vector error correction model, using a five-lag vector autoregression model to project the systematic drivers.

Source: Vanguard calculations in USD, based on data from FactSet, the U.S. Bureau of Labor Statistics, the Federal Reserve Board, Refinitiv and Global Financial Data, as at 30 September 2021.

b. US small-caps have returned to our estimate of fair value



Past performance is not a reliable indicator of future results.

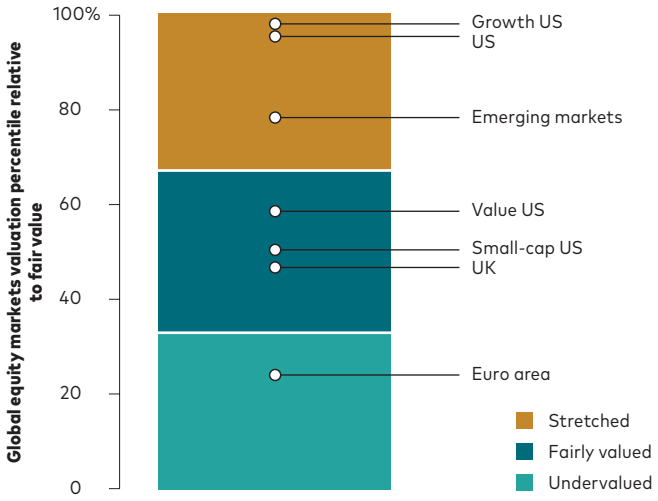
Notes: The statistical model specification is a five-variable vector error correction, including a respective ratio of price to book, 10-year trailing inflation, 10-year real US Treasury yield, equity volatility and growth of corporate profits estimated over the period 31 January 1979 to 30 September 2021.

Sources: Vanguard calculations in USD, based on data from FactSet, the U.S. Bureau of Labor Statistics, the Federal Reserve Board, Refinitiv and Global Financial Data, as at 30 September 2021.

Among the more attractive segments of the market, European equities are some of the most undervalued on a relative basis, as shown in **Figure II-5**. Using our fair-value model, the European equity market has been close to the lower end of the fair-value range since 2010, signalling a moderately undervalued market, with the CAPE ratio that has not yet reached pre-global financial crisis levels.

FIGURE II-5

Equity valuations are drifting higher, but opportunities remain



Past performance is not a reliable indicator of future results.

Notes: Euro area and UK equity valuation measures are the current CAPE percentile relative to the fair-value CAPE for the local MSCI index from 31 January 1970 to 30 September 2021. The US valuation measure is the current CAPE percentile relative to fair-value CAPE for the S&P 500 Index from 31 January 1940 to 30 September 2021. The emerging markets, US value, and US small-cap relative valuations are based on the relative percentile rank to fair value estimated in Figures II-7 and II-4. The US growth valuations are composite valuation measures of the style factor to US relative valuations and the current US CAPE percentile relative to its fair-value CAPE. The relative valuation is the current ratio of the style factor to US price/book metrics relative to its historical average from 31 January 1979 through 30 September 2021. For corresponding indexes for the four style factor valuation measures, see the Appendix section "Indices for VCMM simulations".

Sources: Vanguard calculations in USD, based on Robert Shiller's website, at aida.wss.yale.edu/~shiller/data.htm, the U.S. Bureau of Labor Statistics, the Federal Reserve Board and Refinitiv, as at 30 September 2021.

IMPORTANT: The projections and 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.

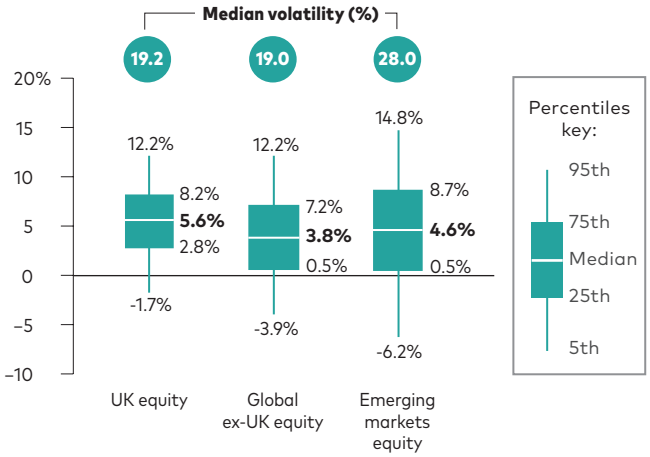
Outlook for global equities and the importance of diversification

Given our views on current market valuations, our forecasts confirm that a globally diversified portfolio with a strategic tilt towards UK equities should reward investors over the long term (**Figure II-6**). In particular, we expect UK equities to return between 4.6% and 6.6% over the next 10 years on an annualised basis. The outlook for global ex-UK equities is more muted, with an expected return between 2.8% and 4.8%[2].

It is important to stress that our valuations and forecasting frameworks are based on the structural drivers of market performance and are intended to set long-term risk and return expectations. Therefore, overvaluation or undervaluation should not, in themselves, suggest a short-term action on the part of investors. Time-varying portfolio construction, which uses long-term forward-looking asset-return expectations as the basis for potential strategic allocation changes, should balance risk and return in a utility-based framework and requires acceptance of model and active risk (Wallick et al., 2020).

FIGURE II-6

Equity market 10-year outlook: Setting reasonable expectations



Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: The forecast corresponds to the distribution of 10,000 VCMM simulations for 10-year annualised nominal returns in GBP for the asset classes highlighted here. Median volatility is the 50th percentile of an asset class's distribution of annualised standard deviation of returns. Asset-class returns do not take into account management fees and expenses, nor do they reflect the effect of taxes. Returns do reflect reinvestment of dividends and capital gains. Indices are unmanaged; therefore, direct investment is not possible. See the Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

Source: Vanguard calculations, as at 30 September 2021.

2 We express equity return projection ranges as 1 percentage point in both directions around the 50th percentile of VCMM simulations.

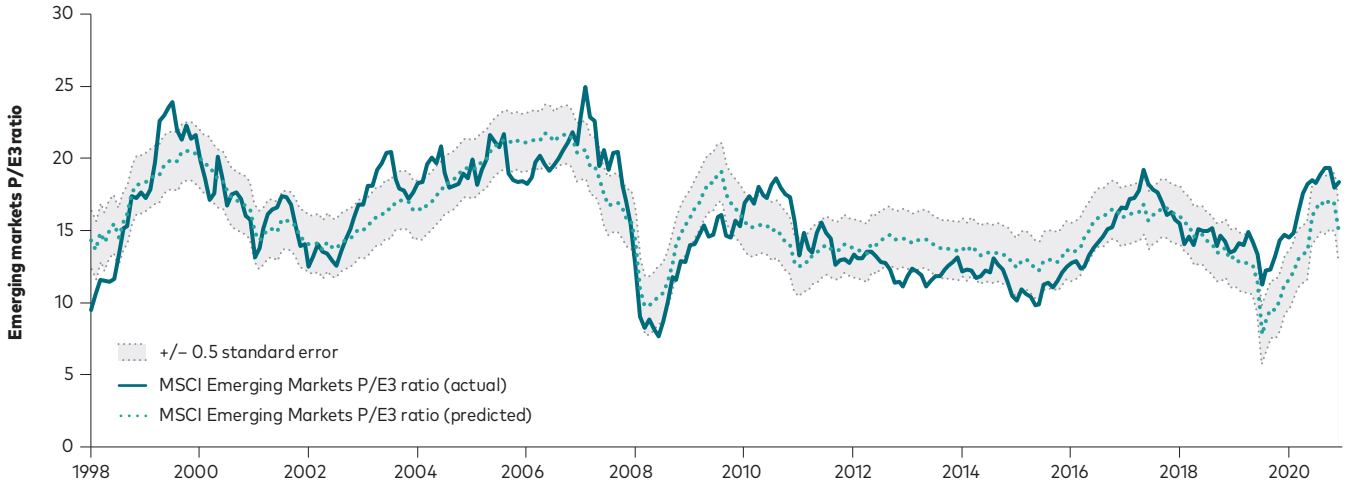
Emerging market valuations appear stretched, but diversification benefits remain

The combined pressures of Covid-19 and the reduced ability to provide policy support have hurt emerging markets on a relative basis. However, lower relative valuations and the anticipation of increased global demand have made emerging market equities more attractive to some investors.

Our research indicates that the broad emerging market valuation is stretched based on its relationships with aggregate inflation, real US short-term yields, the spread between emerging market and US central bank policy rates, economic conditions and equity market volatility[3]. Together, these drivers explain about two-thirds of emerging market valuations, which in turn explain future emerging market equity returns[4]. **Figure II-7** shows our estimate of fair value and actual results. It also highlights that emerging markets valuations are highly sensitive to the economic environment.

FIGURE II-7

Emerging markets present opportunities when economic fundamentals are pointing up



Notes: The statistical model specification is a five-variable regression that uses the following variables: inflation for six major emerging market countries (Brazil, China, India, Korea, Mexico and Taiwan) weighted by MSCI monthly index weights; monthly average of daily real 10-year US Treasury yield; emerging markets central bank policy rates weighted by GDP in US dollars; Vanguard's leading economic indicators (VLEI) for China, Brazil and Mexico (weighted average based on country GDP in US dollars); and the monthly average of daily US equity market volatility (VIX). P/E3 is the price divided by trailing 3-year average earnings.

Sources: Vanguard calculations in USD, based on data from the US Federal Reserve Bank of St. Louis FRED database and Bloomberg, as at 30 September 2021.

Although we view valuations as stretched in emerging markets, it does not necessarily mean that we believe that investors should avoid these markets. In fact, current valuations and a correction to fair value suggest that emerging market returns should be between 3.6% and 5.6% in GBP terms on an annualised basis over the next decade.

Emerging markets also have a historically moderate correlation with developed market equities[5], although they tend to have a higher risk. For these reasons, we believe that emerging market equities still merit inclusion in a globally diversified portfolio.

3 Our methodology uses a five-factor multiple linear regression model to explain changes in the price to three-year rolling average earnings for the MSCI Emerging Markets Index.

4 Similar to the US, there is a statistically significant negative relationship between starting valuations and future returns over five- and 10-year periods.

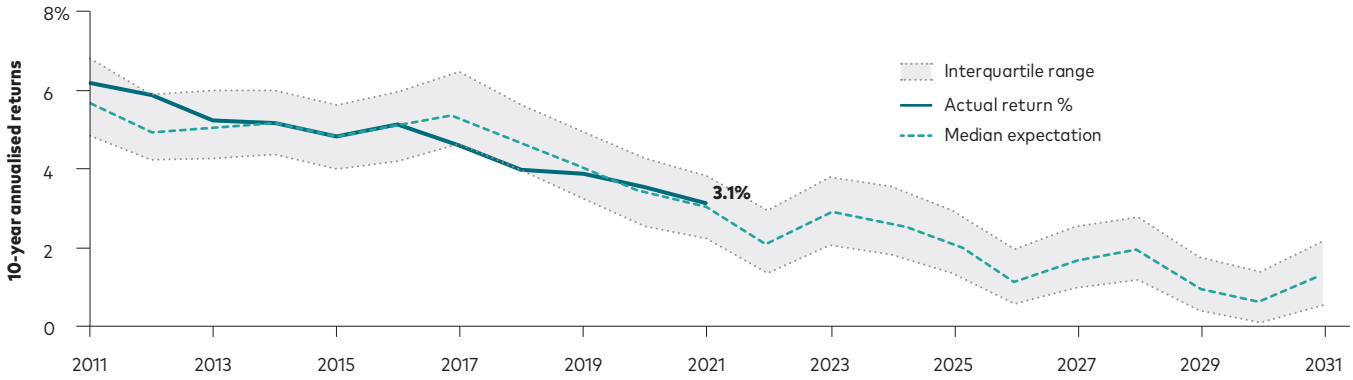
5 Since 1990, the correlation between emerging market and US, Australia, Canada, UK, Japan and euro-area equities were 0.46, 0.64, 0.61, 0.53, 0.50 and 0.56 respectively.

Global fixed income: Rising rates won't upend markets

Given the strong relationship between initial yields and future returns, it is not surprising that actual fixed income returns have largely been in line with our forecasts. As shown in **Figure II-8**, these forecasts have been pushed down by falling interest rates over the last two decades. Although the modestly higher inflation and policy normalisation reflected in our economic outlook is expected to represent a small reversal in the trend, an increase in the equilibrium (natural) rate of interest is needed to generate sustainably higher fixed income returns.

FIGURE II-8

Falling interest rates pushed bond returns (and our forecast) lower



Past performance is not a reliable indicator of future results. Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: The figure shows the actual 10-year annualised return of GBP-hedged global bonds compared with the VCMM forecast made 10 years earlier. For example, the 2011 data point at the beginning of the chart shows the actual return for the 10-year period between 2001-2011 (solid line) compared with the 10-year return forecast made in 2001 (dashed line). After 2021, the dashed line is extended to show how our forecasts made between 2012 and 2021 (ending between 2022 and 2031) are evolving. The interquartile range represents the area between the 25th and 75th percentile of the return distribution. See the Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

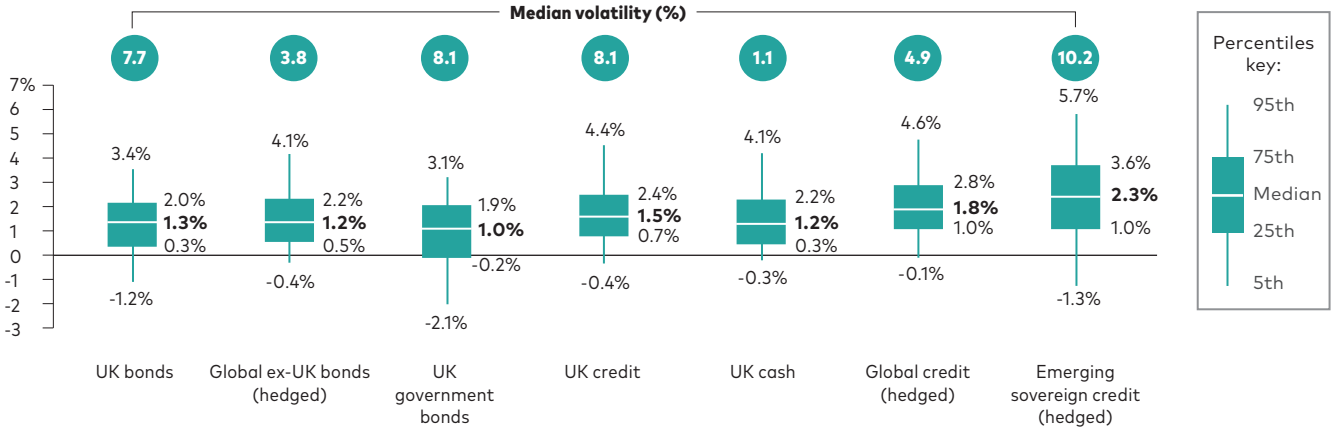
Source: Vanguard calculations, as at 30 September 2021.

IMPORTANT: The projections and 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.

Against a backdrop of gradually rising yields, the UK bond return outlook in the next decade has been ticking up from last year's projections to 0.8%–1.8%[6], as shown in **Figure II-9**. Expected returns for non-UK bonds are in line with local bonds; however, diversification through exposure to hedged non-UK bonds should help offset some risk specific to the UK fixed income markets (Philips et al., 2014).

FIGURE II-9

a. Higher rates have pushed expected fixed income returns higher

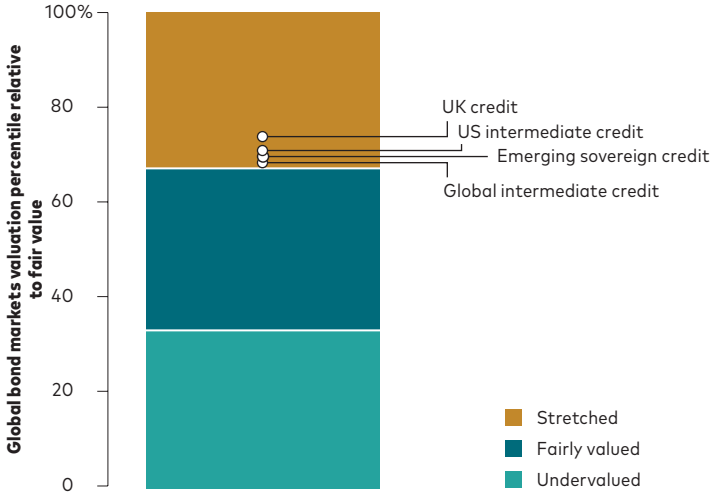


Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: The forecast corresponds to the distribution of 10,000 VCMM simulations for 10-year annualised nominal returns in GBP for the asset classes highlighted here. Median volatility is the 50th percentile of an asset class's distribution of annualised standard deviation of returns. Asset-class returns do not take into account management fees and expenses, nor do they reflect the effect of taxes. Returns do reflect the reinvestment of dividends and capital gains. Indices are unmanaged; therefore, direct investment is not possible. See the Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

Source: Vanguard calculations, as at 30 September 2021.

b. Global credit segments appear to be moderately overvalued



Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: Valuation percentiles are relative to 30-year projections from the VCMM. Credit valuations are based on current spreads relative to year 30. Aggregate bonds are the weighted average between intermediate-term credit and Treasury valuation percentiles. See the Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

Source: Vanguard calculations, as at 30 September 2021.

IMPORTANT: The projections and 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.

6 We express fixed income ranges as a half percentage point in both directions around the 50th percentile.

Corporate bonds: Higher risk, higher return

Although return expectations are not that different across various regions and market segments, our model suggests that the credit sector should outperform other fixed income sectors in the medium and long term, although with potentially higher dispersion.

Mirroring the decrease in the required risk premia on the equity side, the global credit market has been characterised by a rally since March 2020, fuelled by accommodative fiscal and monetary policies that have bolstered market liquidity and supported economic recovery. This has led to a contraction in credit spreads close to historical lows, helping to make credit bonds moderately overvalued in most regions, according to our model (**Figure II-9b**). However, over the medium and long term, investors are still expected to be compensated for assuming credit risk over government bonds, albeit by a lower magnitude than we suggested in 2020.

Overall, our expectations over the next 10 years are for an annualised return between 1% and 2% for UK credit, between 1.3% and 2.3% for global credit (hedged) and between 1.8% and 2.8% for broad emerging market sovereign bonds (hedged) (**Figure II-9a**).

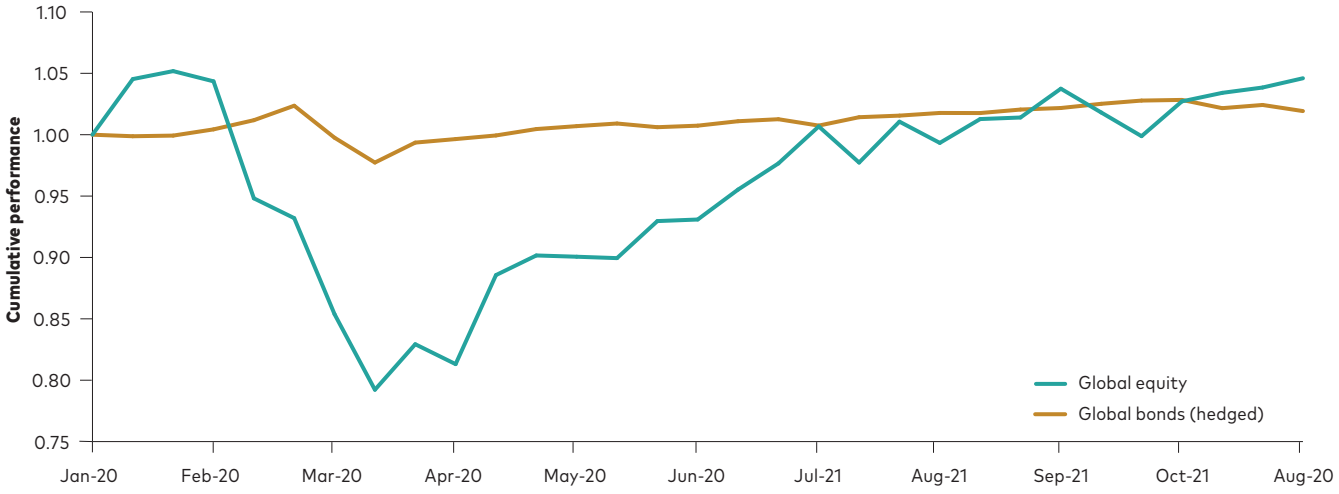
It is important to stress that any potential tilt to the credit asset class should be assessed through the lens of a forward-looking portfolio construction framework that can balance risk and return opportunities, in line with an investor's risk profile.

Bonds and their diversification benefits

Although future returns for the fixed income asset class remain at historic lows, the Covid-19 crisis reaffirmed the role that high-quality diversified bonds play in a portfolio (Davis et al., 2020). As shown in **Figure II-10**, despite the low-yield environment, bonds provided the protection needed to offset equity losses, thanks in part to the favourable measures implemented by central banks at the height of the crisis to ensure market liquidity.

FIGURE II-10

Globally diversified bonds provided protection during the 2020 market crisis



Past performance is not a reliable indicator of future results.

Note: Global equity is represented by the MSCI ACWI Index, global bonds (hedged) is represented by the Bloomberg Global Aggregate Bond Index Hedged. All returns are in GBP.

Sources: Vanguard calculations, based on data from FactSet, as at 30 September 2021.

Looking forward, we expect the negative correlation between equities and bonds to persist, as shown in our forward-looking correlation matrix over the next 10 years (**Figure II-11**), with UK government bonds and globally diversified bonds (hedged) expected to have among the lowest correlation with equities.

FIGURE II-11

Correlation between equities and high-quality bonds is expected to remain negative, on average, over the next 10 years

	UK equity	Global ex-UK equity	Emerging market equity	UK bonds	Global ex-UK bonds (hedged)	UK government bonds	UK credit	UK cash	Global credit (hedged)	Emerging sovereign credit (hedged)
UK equity	1.00									
Global ex-UK equity	0.69	1.00								
Emerging market equity	0.64	0.84	1.00							
UK bonds	0.00	-0.09	-0.12	1.00						
Global ex-UK bonds (hedged)	-0.17	-0.21	-0.20	0.61	1.00					
UK government bonds	-0.15	-0.16	-0.20	0.98	0.60	1.00				
UK credit	0.27	0.06	0.04	0.91	0.54	0.79	1.00			
UK cash	0.02	-0.02	0.02	0.18	0.39	0.13	0.26	1.00		
Global credit (hedged)	0.17	0.12	0.13	0.56	0.77	0.46	0.66	0.33	1.00	
Emerging sovereign credit (hedged)	0.39	0.44	0.60	0.23	0.39	0.14	0.34	0.18	0.57	1.00

Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: Forecast corresponds to median estimate out of 10,000 VCMM simulations of 10-year nominal total returns in GBP for the asset classes highlighted here. See Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

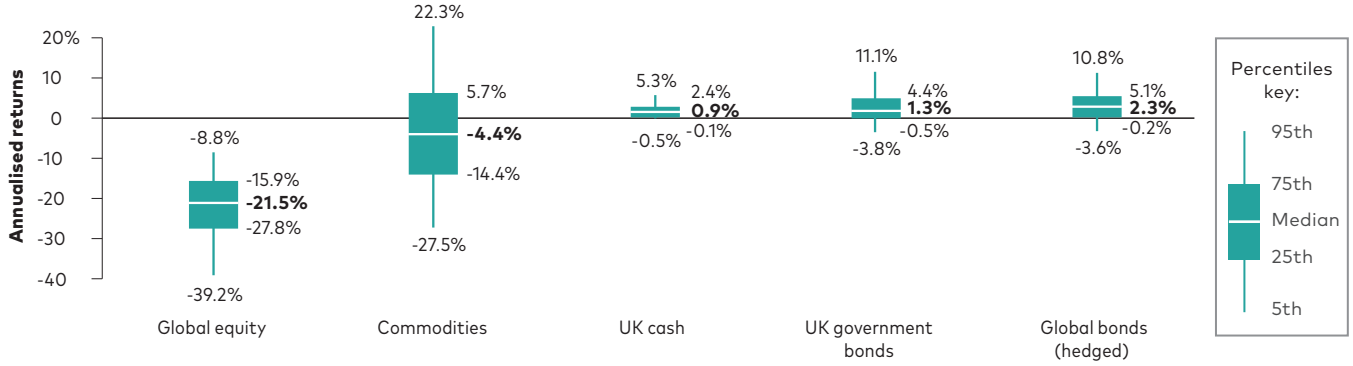
Sources: Vanguard calculations, as at 30 September 2021.

IMPORTANT: The projections and 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.

The previous correlation matrix is based on the overall correlation over the next 10 years. However, multi-asset investors investing in bonds might be primarily concerned with the diversification benefits in those periods where equities would perform the worst. Isolating the VCMM scenarios with the most negative equity returns (the worst quartile of global equity returns), we still find that high-quality bonds are expected to diversify equity risk with the highest median returns and lowest dispersion, as shown in **Figure II-12**.

FIGURE II-12

High-quality bonds are expected to diversify equity risk in the most volatile scenarios



Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Notes: Each box-whisker is the distribution of median nominal returns of various asset classes in the worst decile of global equity returns. VCMM forecasts as at 30 September 2021 in GBP for the asset classes highlighted here. See the Appendix section titled "Indices for VCMM simulations" for further details on asset classes.

Sources: Vanguard calculations, as at 30 September 2021.

IMPORTANT: The projections and 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.

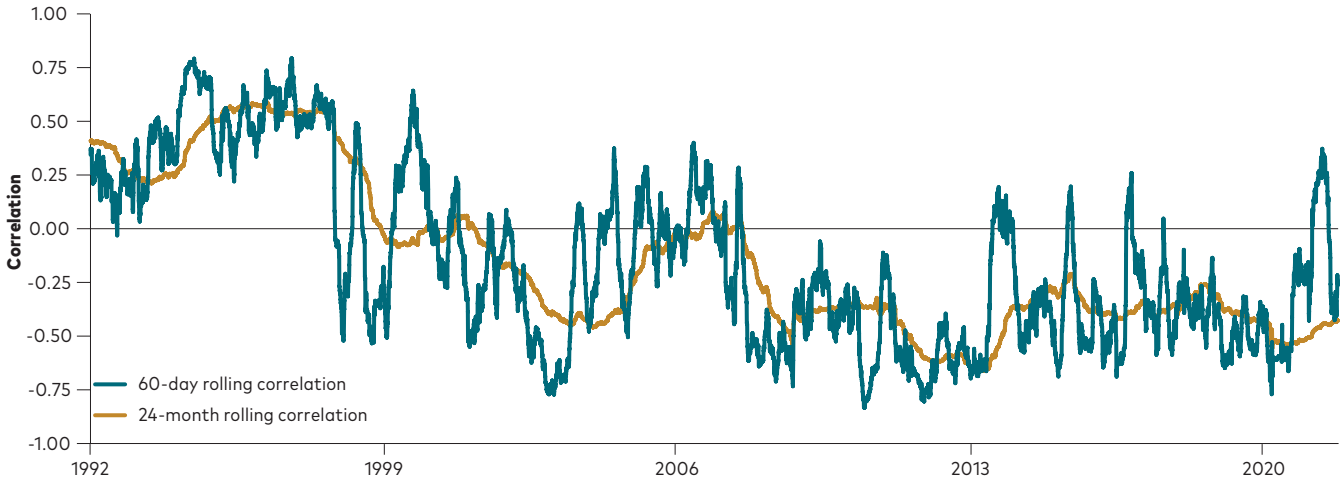
Inflation risk and the importance of the investment horizon

Inflation is one of the structural core variables of our VCMM framework that, in our view, helps to explain market performance and the economic environment in the medium and long term. Moreover, unexpected shocks to inflation might be important drivers of short-term returns and volatility, as we have recently experienced. Although our base case is that recent increases in inflation are driven by temporary factors that should fade away as economies adjust to recent supply and demand shocks, some investors have questioned whether this might affect the performance of equities and bonds and their correlation.

In the previous section, we have shown that our expectation is that, given current conditions, the correlation between equities and bonds should remain negative over the next 10 years. Our research finds that although short-term correlations can vary significantly, longer-term measures have remained negative since the 2000s (**Figure II-13**) and that inflation was a key driver of correlation. However, our analysis also shows that we would need significantly higher inflation (5.7%) than our base case (2%) over the next five years to see correlations become meaningfully positive (Wu et al., 2021).

FIGURE II-13

Short-term correlations are time-varying, though regimes tend to stick for years



Past performance is not a reliable indicator of future results.

Notes: Rolling correlations are calculated on total returns of the S&P 500 Index and the S&P U.S. Treasury Bond Current 10-Year Index, using daily return data for the period between 1 January 1990 and 30 September 2021.

Sources: Vanguard calculations in USD, using data from Refinitiv, as at 30 September 2021.

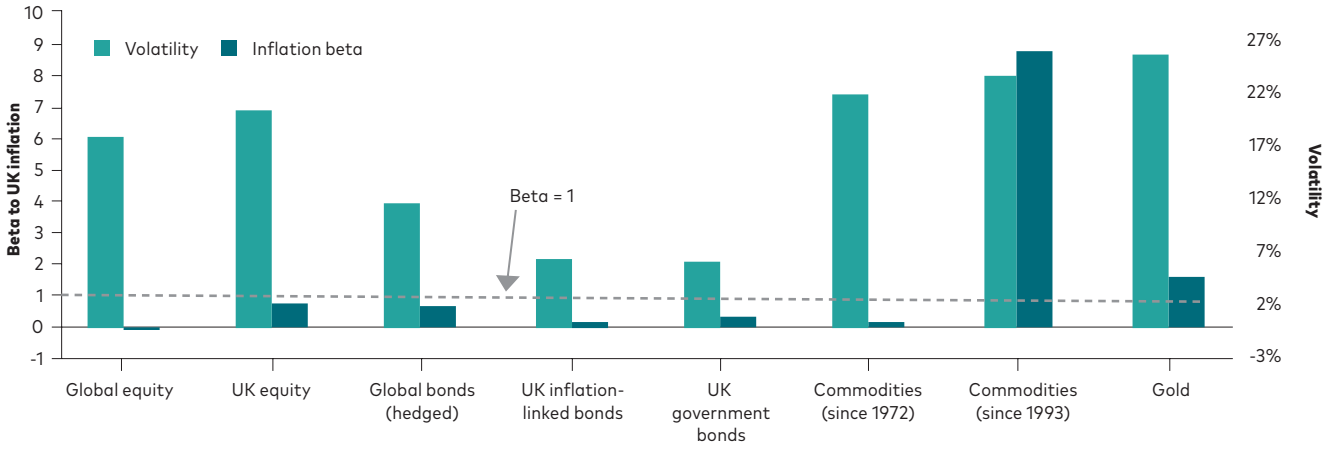
Some investors might be concerned about inflation and the resulting potential for lower real returns and might be keen to hedge this risk. What our analysis shows is that the role of asset classes during inflationary scenarios mostly depends on the investment horizon and the overall macroeconomic environment.

As we mentioned in our 2020 outlook, investors with a shorter investment horizon need to focus on the sensitivity (or beta) of the hedging asset to inflation, not the correlation. Moreover, volatility is another important variable to consider. In **Figure II-14**, we report the beta of each asset to UK (realised) inflation and the asset class's volatility using historical data.

Among all the asset classes, gold is the one that showed the highest beta across different environments, although it also had the highest volatility. Moreover, the relationship between aggregate commodities and UK inflation seems to be time-dependent: commodities tended to show a beta higher than 1 after the early 1990s but did not help to hedge inflation in the 1970s. It is important to remember that, from a UK investor's perspective, commodities are exposed to foreign exchange risk (unless properly hedged) and their performance appears to be conditional on the overall macroeconomic environment, of which inflation is only one of the determinants, being more pro-cyclical in nature. For example, a high-inflation scenario with stagnant or negative economic growth might not be favourable for commodities.

FIGURE II-14

Short-term inflation-hedging properties of different asset classes



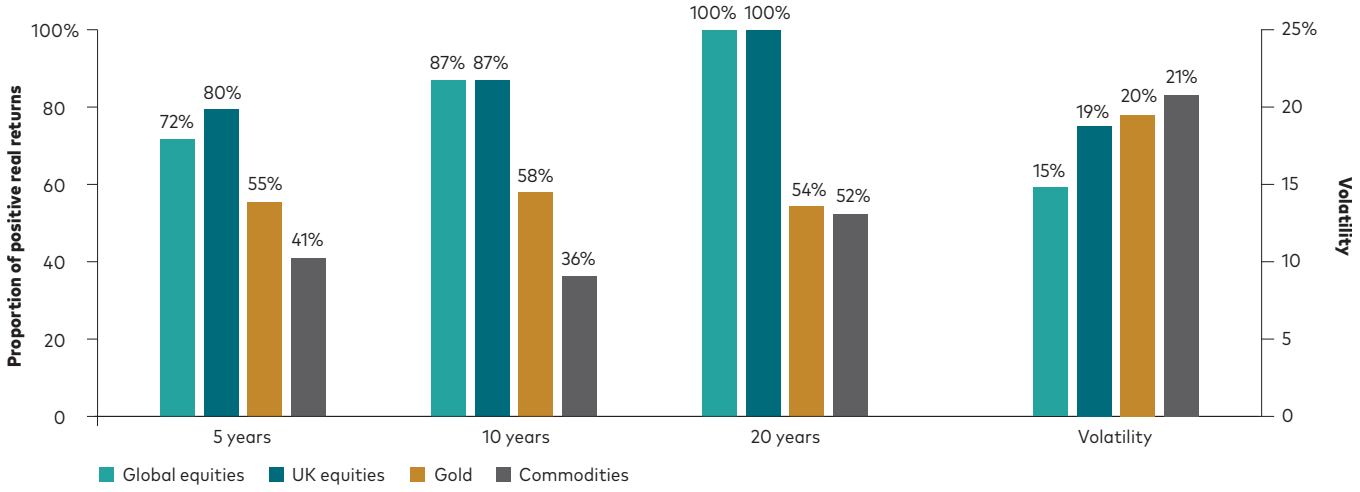
Notes: Volatility is calculated as the standard deviation of rolling one-year annualised returns, at monthly frequency. Inflation beta is defined as how much an asset's return increases when inflation goes up by 1 percentage point. The sample period is 31 January 1972 to 31 October 2021. Due to data availability, the sample for global aggregate bonds and government bonds starts on 31 January 1993 and for inflation-linked bonds on 31 December 1998. We show the analysis of commodities for both the sample starting on 31 January 1972 and on 31 January 1993 (excluding the stagflation of the 1970s and the short participation of the UK in the European Exchange Rate Mechanism and the related pressure on sterling) to highlight the regime-dependence of the inflation-hedging properties of commodities. Indices used: global equity - MSCI World Net Total Return Index; UK equity - MSCI UK Net Total Return Index; global bonds (hedged) - Bloomberg Global Aggregate Total Return Index (Hedged GBP); inflation-linked bonds - Bloomberg Global Inflation-Linked: United Kingdom Total Return Index; UK government bonds - ICE BofA UK Gilt Index; commodities - S&P GSCI Index Spot; gold - Gold Spot.

Sources: Vanguard calculations, based on data from Bloomberg and the OECD.

Over short-term horizons, equities are normally not an effective inflation hedge, although in our analysis UK equities tend to show a higher beta with respect to other asset classes normally used to hedge inflation (although with higher volatility). However, looking at longer horizons, investing in equities is one of the most effective strategies to ensure capital growth beyond the inflation rate (**Figure II-14**). In **Figure II-15a**, the table shows the probability of real returns to be higher than 0% (that is, a positive return after inflation) for five-, 10- and 20-year horizons. Historically, as the results show, investing in globally diversified equities provided the highest chance of achieving a positive real return with the lowest level of risk (relative to gold and aggregate commodities).

FIGURE II-15

a. Global equities have been most likely to beat inflation in the long term

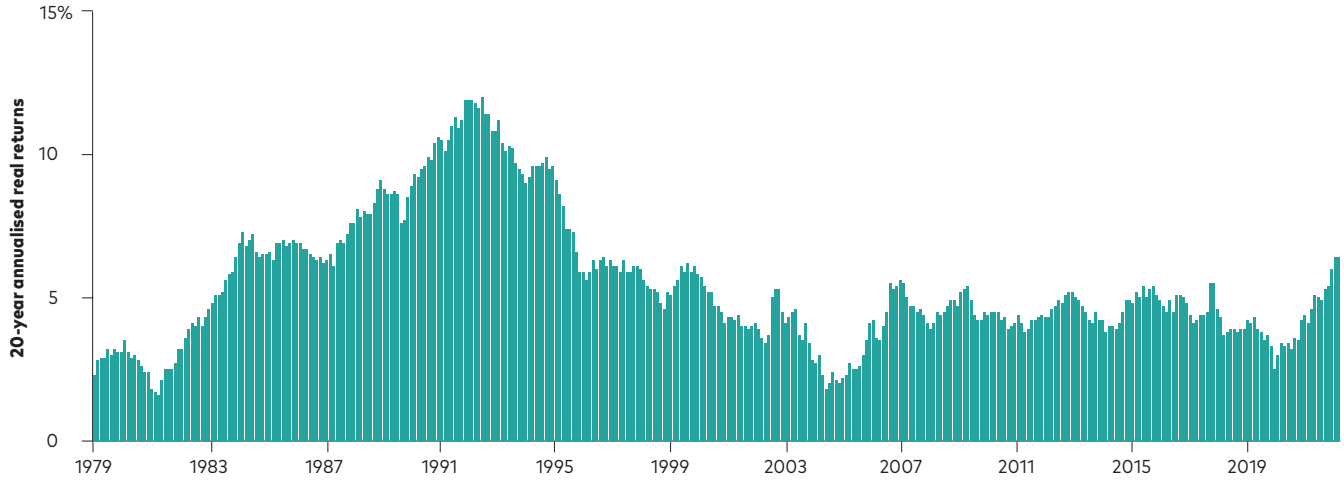


Past performance is not a reliable indicator of future results.

Notes: The chart shows the proportion of real five-, 10- and 20-year returns that have been above 0%. The sample period for the monthly data is 31 January 1975 to 31 October 2021. Volatility is calculated over monthly returns of the entire sample period.

Sources: Vanguard calculations in GBP, based on data from Bloomberg and the OECD.

b. Long-term real global equity returns have always been positive since 1990



Past performance is not a reliable indicator of future results.

Notes: The chart shows the real, annualised 20-year returns of the MSCI World Index for UK-based investors, at monthly frequency. The sample period is 31 January 1975 to 31 October 2021.

Sources: Vanguard calculations in GBP, based on data from Bloomberg and the OECD.

A balanced portfolio for a more balanced environment

As policymakers look to strike a better balance in the years ahead, investors would be well-served to remember the same principles when constructing their portfolios. **Figure II-16a** examines three possible economic scenarios occurring over the next five years. The downside scenario depicts an economic environment of below-trend economic growth, with inflation staying above trend. The baseline scenario is defined by above-trend growth and inflation. The upside scenario is characterised by higher-than-expected growth, with inflation falling below trend.

Figure II-16b shows optimal portfolios based on our five-year return projections for each scenario that vary their exposures to the following four factors, or risk premia: equity risk premium, credit risk premium, inflation risk premium and term premium. In the upside scenario, expected global equity returns would be high. This risk-on environment would also be beneficial for credit fixed income, while lower diversification benefits coming from commodities and inflation-linked bonds would be expected, as inflation risk is contained.

In the downside scenario, the optimised portfolio would underweight equities (about 10% less equity exposure than a 60/40 policy portfolio) and it would increase exposure to international (hedged) bonds for additional diversification. Allocation to commodities also would be higher, to hedge short-term inflation risk.

The portfolio strategy in our baseline scenario is well diversified, with a small overweight to risky assets compared with a 60/40 portfolio. As asset return expectations materially change through time, the asset allocation in our baseline scenario also changes accordingly. These changing asset expectations drive time-varying portfolios. Our research suggests that investors who have the willingness and ability to accept forecast model risk may be able to improve risk-adjusted returns over the long term relative to a static portfolio (Wallick et al., 2020).

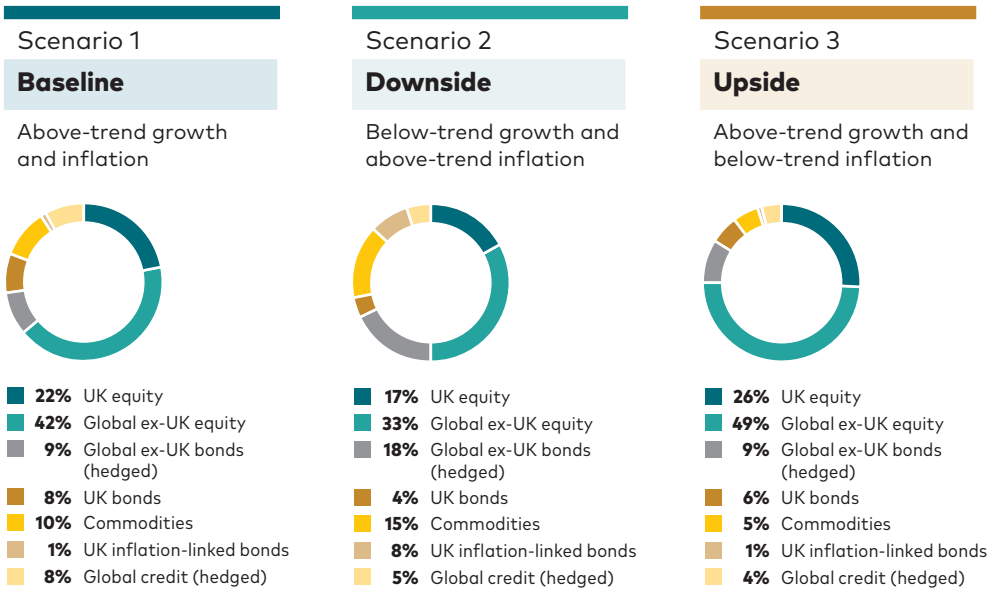
Using our VCMM simulations, we are able not only to illustrate the effectiveness of various portfolio strategies designed for each scenario but also to show the risks of such strategies. The following conclusions can be drawn from our analysis:

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 typically 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 baseline balanced portfolio is an "all-weather" strategy, with either top or middle-of-the-road performance in each scenario.
3. **Portfolio tilts should be implemented within an optimisation framework.** In fact, ad hoc tilts ignore correlations among asset classes and an investor's risk profile and are, therefore, likely to lead to inefficient portfolios (Aliaga-Diaz et al., 2019).

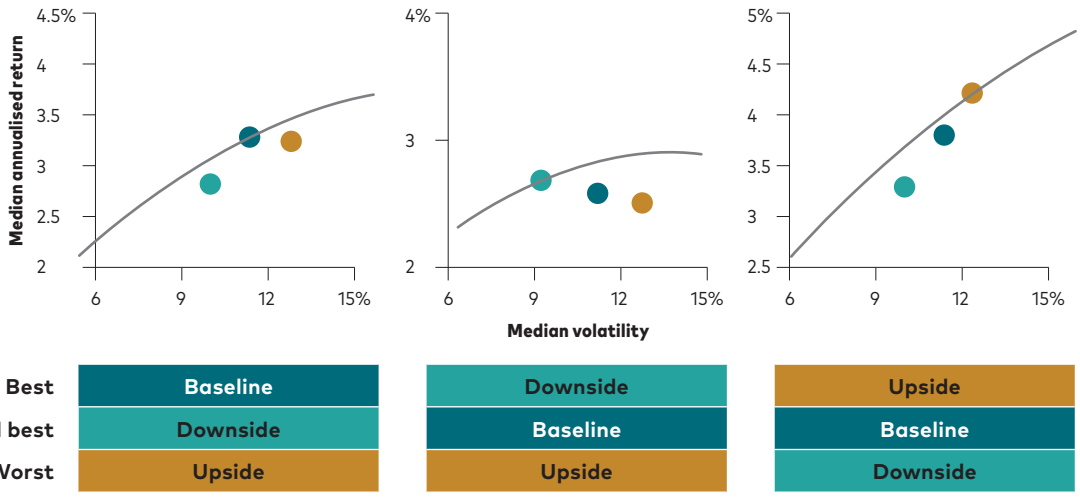
FIGURE II-16

Cyclical surprises and asset allocation trade-offs

a.
Optimal portfolios vary for different economic environments



b.
The baseline portfolio is not always the best, but it's never the worst.



Notes: Portfolios are selected from an efficient frontier based on a fixed risk aversion level using a utility function-based optimisation model. The forecast displays a simulation of five-year annualised returns of asset classes shown as at 30 September 2021. Scenarios are based on sorting the VCMM simulations based on the rates of growth, volatility and inflation. The three scenarios are a subset of the 10,000 VCMM simulations. Ranking of the portfolios is based on the certainty fee equivalent (CFE). CFE is the return differential applied to a portfolio such that its resulting utility score is the same as a benchmark portfolio. For more information see Aliaga-Diaz et al. (2019). See Appendix section titled "Index simulations" for further details on the asset classes shown here.

Sources: Vanguard calculations, as at 30 September 2021.

IMPORTANT: The projections and 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.

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III. Appendix

About the Vanguard Capital Markets Model

IMPORTANT: The projections and 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 US and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, US 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 recognise 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.

Indices for VCMM simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes through 30 September 2021. 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:

- **UK credit:** Bloomberg Sterling Corporate Bond Index.
- **Global ex-UK bonds:** Standard & Poor's High Grade Corporate Index from 1926 to 1968, Citigroup High Grade Index from 1969 to 1972, Lehman Brothers US Long Credit AA Index from 1973 to 1975, Bloomberg US Aggregate Bond Index from 1976 to 1990, Bloomberg Barclays Global Aggregate Index from 1990 to 2001; Bloomberg Barclays Global Aggregate ex GBP Index from 2001 onwards.
- **UK cash:** Bloomberg Sterling 3-Month Gilt Index.
- **Global ex-UK equity:** S&P 90 Index from January 1926 to 3 March 1957; S&P 500 Index from 4 March 1957 to 1969; MSCI World ex UK from 1970 to 1987; MSCI AC World ex UK from 1988 onwards.
- **UK equity:** Bloomberg Equity Gilt Study from 1900 to 1964, Thomson Reuters Datastream UK Market Index 1965 to 1969; MSCI UK thereafter.
- **UK gilts:** Bloomberg Sterling Gilt Index.
- **UK short-term gilts:** Bloomberg Sterling 1-5 Year Gilt Index.
- **UK long-term gilts:** Bloomberg Sterling 15+ Year Gilt Index.
- **UK non-gilts:** Bloomberg Barclays Sterling Non-Gilt Index.
- **UK aggregate bonds:** Bloomberg Sterling Aggregate Bond Index.
- **UK inflation:** Consumer Price indexes – RPI all items long-run series: 1900 to 2014: Jan 1974=100. Code: CDKO. Source: Office for National Statistics.
- **Commodity futures:** Bloomberg Commodity Index in GBP.
- **US intermediate credit:** Bloomberg US intermediate credit index.
- **Emerging sovereign credit:** Bloomberg Barclays EM USD Aggregate Sovereign index.
- **Global credit:** Bloomberg Global aggregate corporates.

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 Vanguard Capital Markets Model® is a proprietary financial simulation tool developed and maintained by Vanguard's primary investment research and advice teams. The model forecasts distributions of future returns for a wide array of broad asset classes. Those asset classes include US and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, US 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 from as early as 1960. 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.

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. 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. US 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-US 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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Investment risk information

The value of investments, and the income from them, may fall or rise and investors may get back less than they invested.

Past performance is not a reliable indicator of future results.

Simulated past performance is not a reliable indicator of future results.

Any projections should be regarded as hypothetical in nature and do not reflect or guarantee future results.

Important information

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