A midyear update to the *Vanguard Economic and Market Outlook for 2023*

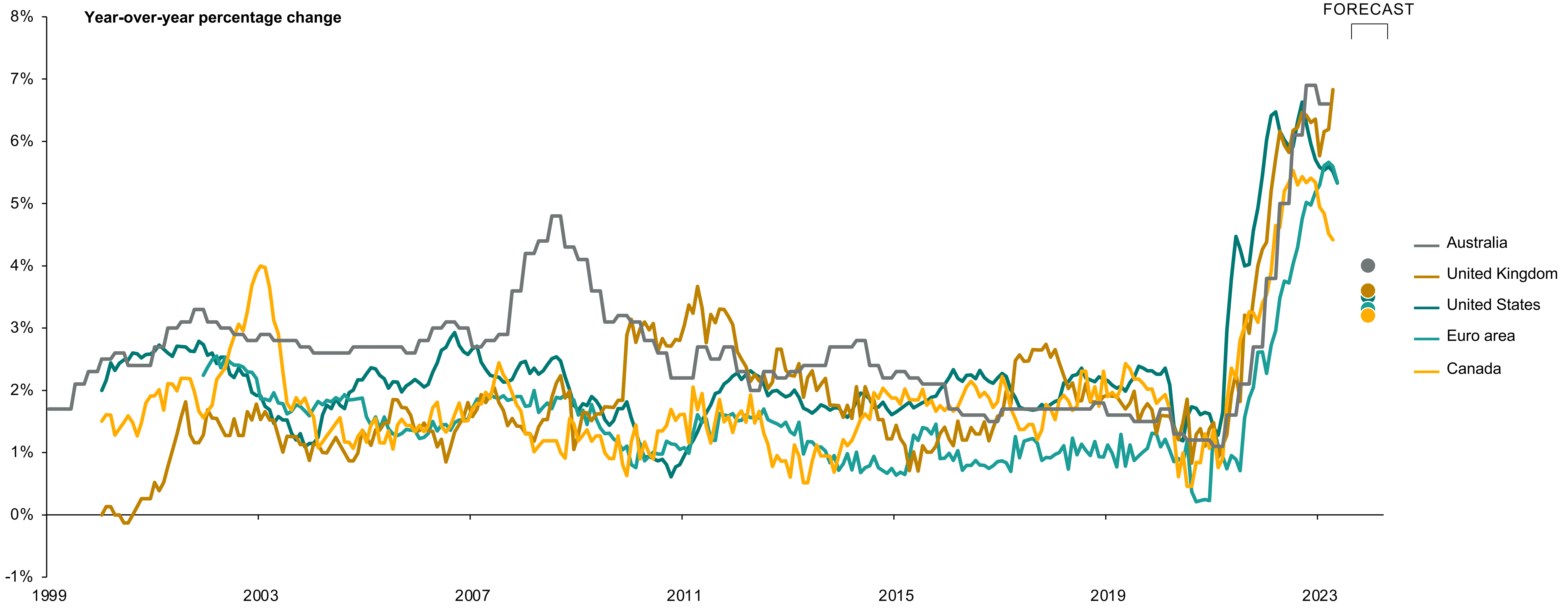
Still beating back inflation

Vanguard’s forecasts for year-end 2023

	2023 economic growth	2023 inflation*	2023 monetary policy**	2023 unemployment rate
United States	0.75%	3.3%	5.25%–5.5%	4.5%
Canada	0.8%	3.2%	5%	5.5%
Mexico	1.8%–1.9%	5.6%	11.25%	3.5%
United Kingdom	0%	4.9%	5.5%–5.75%	4%–4.5%
Euro area	0.5%	3.3%	3.75%–4%	7%–7.5%
China	5.5%–6%	1%	2.45%–2.55%	4.7%
Australia	1%–1.5%	4.5%	4.6%	4%

*Inflation forecasts are for core inflation, which excludes volatile energy and food prices, except for Australia, where we measure headline inflation, which includes food and energy.
**Our forecast for the United States year-end monetary policy rate reflects our expected Federal Reserve federal funds target range.
Notes: Figures related to economic growth, inflation, monetary policy, and unemployment rate are Vanguard forecasts for the end of 2023.
Growth and inflation are comparisons with the end of the preceding year; monetary policy and unemployment rate are absolute levels.
Source: Vanguard, as of June 26, 2023.

Slow but sure progress on inflation



Notes: We use the core consumer price index (CPI) for all locations except Australia, where we use trimmed mean CPI. Year-end 2023 figures are Vanguard forecasts.
Sources: Vanguard calculations, based on data from the U.S. Bureau of Labor Statistics, Statistics Canada, Eurostat, the U.K. Office for National Statistics, and the Australian Bureau of Statistics accessed through Macrobond on June 15, 2023.

United States

ECONOMIC GROWTH

0.75%

Recovery from the brief 2020 recession has endured an aggressive Federal Reserve interest rate-hiking cycle. Recent growth has been stable at about 2%, annualized. We still assign a high probability to a recession, though the odds have risen that it could be delayed from 2023 to 2024.

CORE INFLATION

3.3%

Our base case is for the pace of consumer price increases to continue easing. Shelter inflation should slow in the second half of 2023 and return to its pre-pandemic pace by 2024. Slowing momentum in labor markets should also lower ex-shelter services inflation later this year.

MONETARY POLICY

5.25%–5.5%

Given the lags between monetary policy shifts and discernible changes in the economy, Fed policymakers could decide that their 5 percentage points of interest rate hikes are enough to knock inflation down to their 2% target. But we view at least one more rate increase as probable.

UNEMPLOYMENT RATE

4.5%

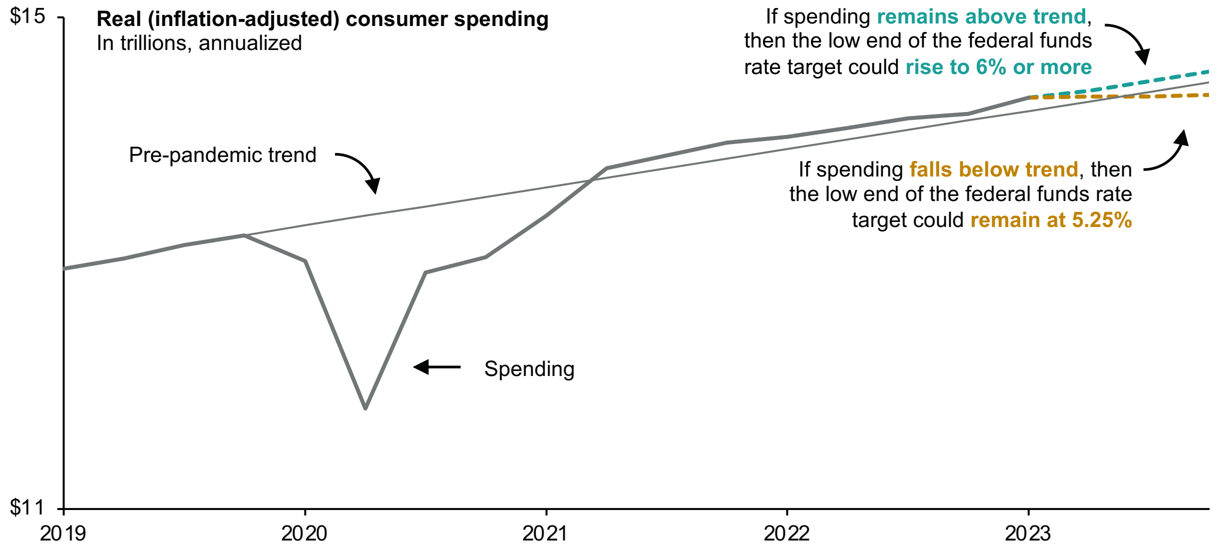
In our 2023 outlook, we described a weakening labor market as a condition for falling inflation. The labor market has remained resilient even as disinflation has continued. Unemployment remains below 4%, where it stood at the start of the Fed's rate-hiking cycle. We expect softening as a condition for progress on inflation.

Josh Hirt
Vanguard Senior Economist

WHAT I'M WATCHING

Consumer spending and the Fed's hiking cycle

Consumer spending has remained remarkably consistent over the past year despite persistent inflation. If spending remains on this path, the Federal Reserve will have more work to do. Increasing the policy rate another three-quarters of a percentage point is not out of the question under such conditions.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.

Notes: The Federal Reserve sets the federal funds rate target—typically a range—as a goal for the level of short-term interest rates. The pre-pandemic trend shows the average pace of growth in real consumer spending between 2017 and 2019.

Sources: Vanguard calculations, based on U.S. Bureau of Economic Analysis data as of June 12, 2023.

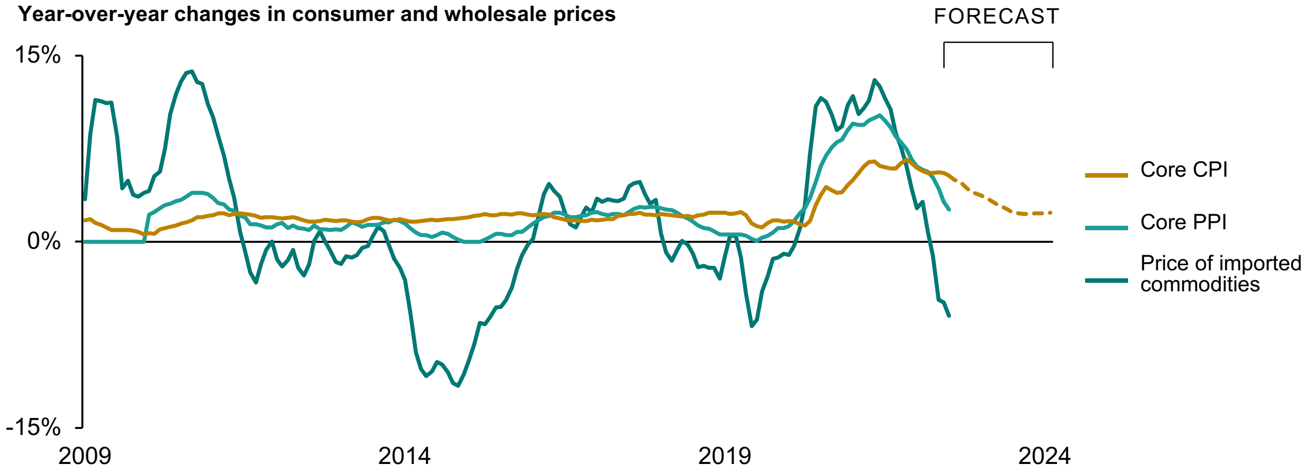
United States (continued)

Asawari Sathe
Vanguard Senior Economist

WHAT I'M WATCHING

Declining import and wholesale prices

Import prices have been easing rapidly since March 2022—and outright declining since February 2023—thanks in part to the rebuilding of supply chains disrupted by the COVID-19 pandemic. Producer or wholesale prices have been falling almost as quickly, helping to curb actual and expected consumer inflation toward the 2% target set by Federal Reserve policymakers. We think they will get there in 2025.



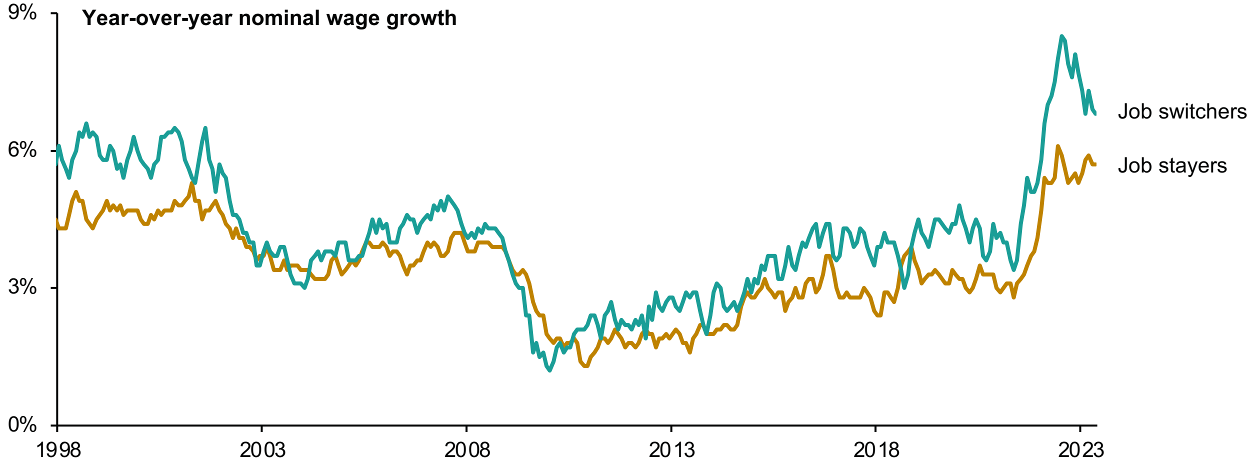
Notes: Changes in commodity prices use non-seasonally adjusted data for all commodities based on 2021 trade values. All other data include seasonal adjustments. Core prices exclude food and energy. The Producer Price Index (PPI) measures wholesale prices. The Consumer Price Index (CPI) measures retail prices.
Sources: Vanguard calculations, based on data from Refinitiv and Moody's through May 31, 2023.

Adam Schickling
Vanguard Economist

WHAT I'M WATCHING

Job switchers' fading wage premium

The wage increases typically commanded by workers who change employers over and above the gains made by workers who stick with their employers is a window into labor market conditions. When the labor market tightens, employers first raise wages to attract new talent and then to retain current workers, factors that can boost both economic growth and inflation. The wage-gain advantage for job switchers has been waning since the middle of 2022—an encouraging sign that inflationary pressures stemming from the labor market are abating.



Notes: The chart is based on the Federal Reserve Bank of Atlanta's Wage Growth Tracker, which uses data from U.S. Census Bureau surveys of nonfarm workers to estimate the median level of year-over-year changes in hourly wages. Each data point is an average of that month's median wage growth rate and the median rates of the two preceding months.
Source: Federal Reserve Bank of Atlanta data as of April 30, 2023.

Euro area

ECONOMIC GROWTH

0.5%

We believe the energy crisis drove the shallow 2022–2023 contraction. A muted recovery is likely before the lagged effects of monetary policy tightening trigger a new downturn. The peak impact of European Central Bank (ECB) interest rate hikes will occur in the second half of 2023, lowering output.

CORE INFLATION

3.3%

By any measure, inflation has declined meaningfully. Falling energy prices should help headline inflation ease further. Food prices are past their peak, too. Service-price inflation, linked to wage growth, is stickier and central to our expectation that core inflation will end 2023 at 3.3%, still well above the ECB's 2% target.

MONETARY POLICY

3.75%–4%

The ECB has hiked interest rates by 4 percentage points in 12 months. A deposit rate of 3.75%–4% would represent restrictive policy. It would exceed our inflation forecast and be more than twice our 1.5%–2% estimate of the region's neutral rate of interest, a theoretical rate that neither stimulates nor inhibits growth.

UNEMPLOYMENT RATE

7%–7.5%

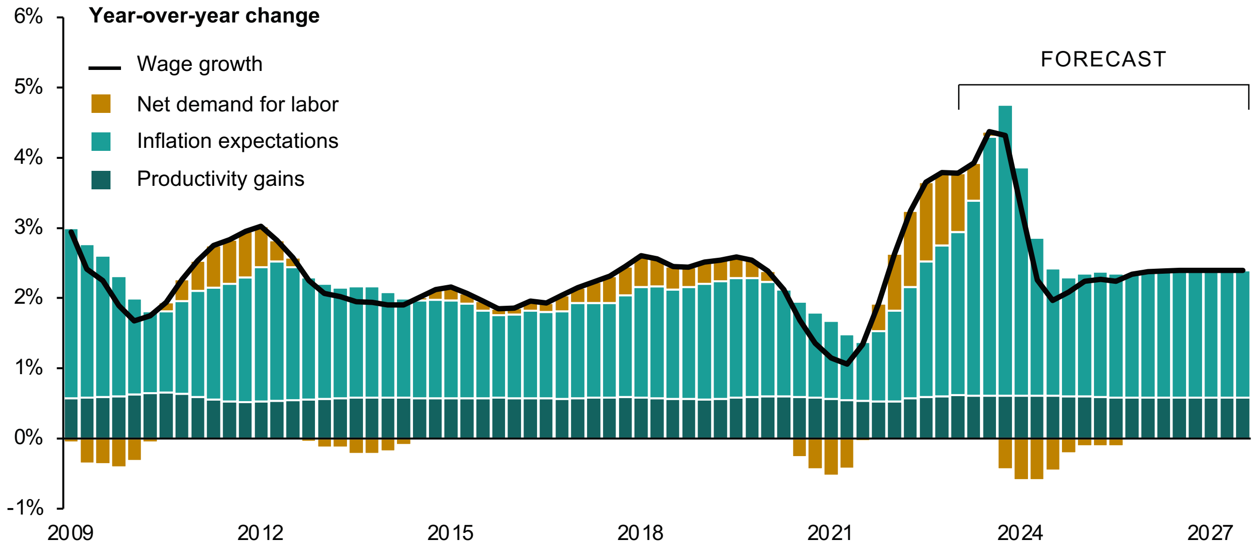
After peaking in 2020 at 8.6% amid the COVID-19 pandemic, the unemployment rate eased to 6.5% in April 2023. We foresee a partial retracement in the second half of 2023 as the ECB's inflation-fighting campaign passes the one-year mark and the lagged effects of changes in monetary policy are fully revealed.

Shaan Raithatha
Vanguard Senior Economist

WHAT I'M WATCHING

Euro area wage growth

More than half the rise in euro area inflation in 2021 and 2022 owed to corporate profit growth. We expect workers' pay to play a bigger role in setting the rate of inflation in the coming months. Even so, year-over-year wage growth is likely to decline sharply in 2024 amid declining inflation expectations and weakness in the labor market.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.

Notes: Proprietary Vanguard forecasts of euro area wage growth from the beginning of 2023 to the end of 2027 are based on quarterly government-reported data from the second quarter of 2009 through the fourth quarter of 2022. Data reflect year-over-year changes. Net demand for labor reflects gross demand for labor minus supply of labor. Positive net demand boosts wages and vice versa.

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

United Kingdom

ECONOMIC GROWTH

0%

As in other markets, we've been surprised by the resilience of the U.K. economy. Our initial forecast of a 2023 contraction in the production of goods and services has given way to an estimate of no change in output. As elsewhere, we believe a recession remains more likely than a soft landing.

CORE INFLATION

4.9%

Strengthening services inflation has driven core inflation to more than 30-year highs, whereas core inflation is retreating in many other developed markets. We expect core services inflation to drive broader headline inflation in the year ahead as prices for food, energy, and other goods wane.

MONETARY POLICY

5.5%–5.75%

We've recently raised our forecast for the Bank of England's terminal rate by three-quarters of a percentage point given stronger-than-expected inflation data, the continued tight labor market and accelerating wage growth. We maintain our view of no rate cuts until mid-2024 at the earliest.

UNEMPLOYMENT RATE

4%–4.5%

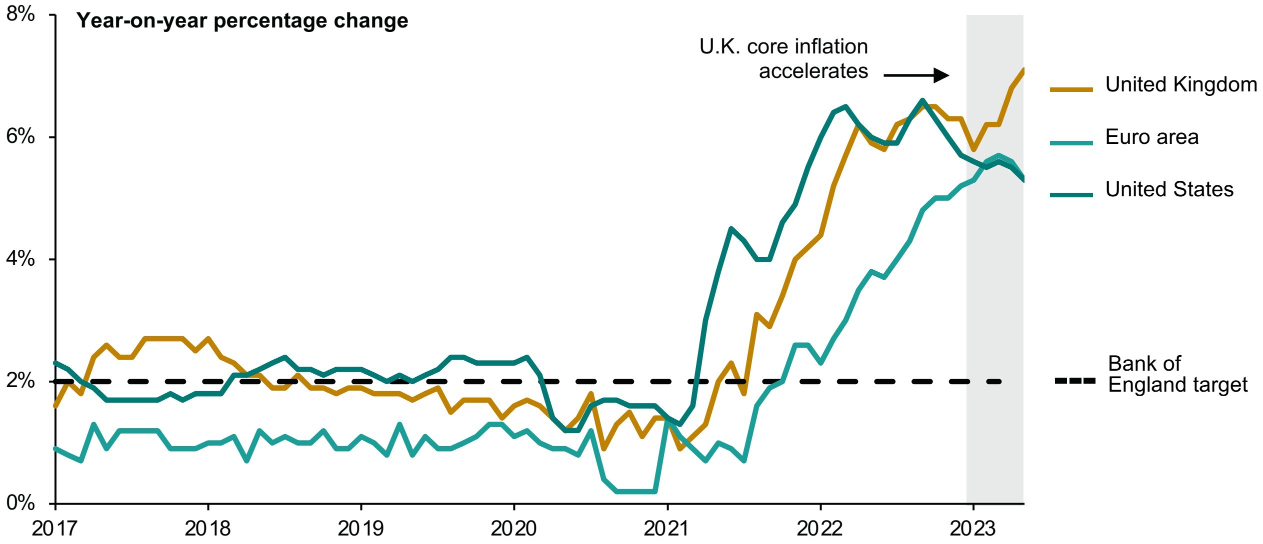
By a variety of measures, notably rates of employment and wage growth, the labor market displayed strength in the opening months of 2023. Yet consumers have not been confident about future employment. We expect a modest rise in unemployment in the second half of the year.

Shaan Raithatha
Vanguard Senior Economist

WHAT I'M WATCHING

Stubborn core inflation

Over the last two months, core inflation has accelerated, in stark contrast to the euro area and the United States, where rates appear to have peaked. Particularly concerning is that core pressures seem to be driven by strengthening services inflation. With the labor market still tight, the Bank of England likely has some hard work still to do to guide inflation back toward its 2% target.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.

Note: The chart shows changes in the core consumer price index for all locations.

Sources: Vanguard calculations, using data as of June 21, 2023, from the U.S. Bureau of Labor Statistics, Eurostat, and the U.K. Office for National Statistics.

China

ECONOMIC GROWTH

5.5%–6%

The bulk of gains in growth likely occurred in the first quarter when the end of COVID-19 restrictions unleashed pent-up demand. That scenario has yielded to a broad-based weakening. Full-year growth above a conservative government target is likely, but three years of policy uncertainty will weigh on confidence.

CORE INFLATION

1%

Lower energy and pork prices have contributed to a series of weak inflation prints. Alongside slowing growth, that has led us to nearly halve our inflation forecast from the start of the year. A rebound later this year is likely as credit demand strengthens and food and energy prices stabilize.

MONETARY POLICY

2.45%–2.55%

A recent People's Bank of China cut to 2.65% for the key 1-year medium-term lending facility should have little tangible economic effect. We believe an additional 10 to 20 basis points of cuts are likely. But China's challenge is a lack of demand for money, not a lack of supply. The likelihood of aggressive fiscal stimulus is low.

UNEMPLOYMENT RATE

4.7%

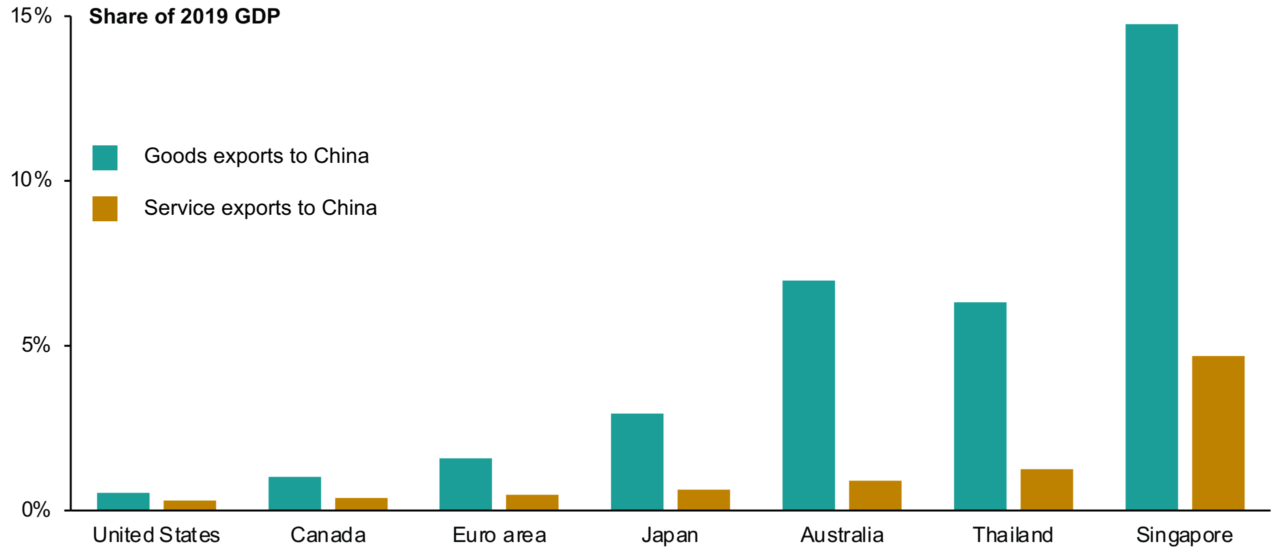
The labor market has improved steadily since China's post-pandemic reopening, with the headline unemployment rate declining to 5.2%. However, youth unemployment has climbed to a record high, posing a downside risk to growth.

Grant Feng
Vanguard Senior Economist

WHAT I'M WATCHING

China's global spillover effects

In past economic recoveries, China's appetite for commodities and other goods benefited its trade partners. Now, as its economy bounces back from COVID-19-related downturns, China is less likely to support global growth. That's because China's current recovery is being led by the services sector, and services exports account for much less of trading partners' gross domestic product than goods exports.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.

Note: The chart is based on 2019 gross domestic product because data from more recent years are skewed by the COVID-19 pandemic.

Sources: Vanguard calculations, using China General Administration of Customs data via CEIC.

Australia

ECONOMIC GROWTH

1%–1.5%

Our growth forecast is little changed from the start of the year. But tepid first-quarter growth and our expectation for subdued consumption skew risks to the downside. Our proprietary leading indicators model suggests growth will fall below trend. We place a 40% probability on recession in the next 12 months.

HEADLINE INFLATION

4.5%

Despite mixed signals, we believe inflation has peaked; our forecast remains where it was at the start of the year. Still, recent higher-than-expected readings suggest higher interest rates will be required to dampen demand. We foresee inflation falling to the central bank's target range only in late 2024 or 2025.

MONETARY POLICY

4.6%

A historically aggressive effort to quell inflation almost certainly will continue. The Reserve Bank of Australia (RBA) has raised its cash rate target a dozen times. We foresee two more rate hikes, taking the rate target to 4.6% by year-end, higher by 25 basis points than our view at the start of the year amid signs of sticky inflation.

UNEMPLOYMENT RATE

4%

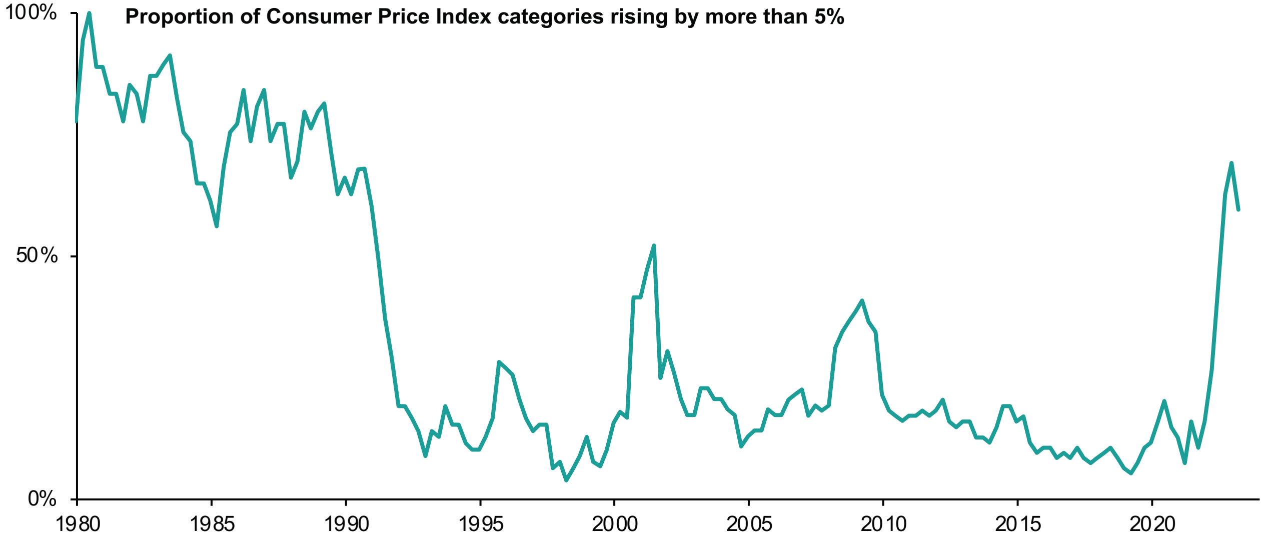
An unemployment rate that has flirted with near-50-year lows is likely to rise as financial conditions tighten. The RBA will be attuned to unit labor costs, which have risen as productivity growth has been subdued. An increase in productivity will be required for wage growth to remain consistent with the RBA's inflation target.

Alexis Gray
Vanguard Senior Economist

WHAT I'M WATCHING

A measure of inflation's stickiness

Inflation that is broad-based, affecting a wide range of goods and services, is likely to remain stickier than inflation confined to a small proportion of items. The proportion of goods and services whose prices have risen by more than 5% has started to drop back after reaching more than 30-year highs at the end of 2022. We'll want to see that proportion continue to fall.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.
Note: Data points are quarterly.
Source: Vanguard calculations, using Australian Bureau of Statistics data through the first quarter of 2023.

Canada

ECONOMIC GROWTH

0.8%

Although growth has recently surprised to the upside, our proprietary leading indicators index remains in negative territory. We expect a mild recession as the effects of higher interest rates spread. If full-year growth differs from our forecast, we believe it's likely to disappoint.

CORE INFLATION

3.2%

We expect inflation to continue moderating this year. But upside risks remain, in part because shelter costs account for a relatively large share of household spending and the home loan market is dominated by variable-rate and short-term fixed-rate loans.

MONETARY POLICY

5%

A surprise June hike brought the Bank of Canada's key rate target to 4.75%. We expect at least one more rate hike in 2023. Because of high levels of household debt and the sensitivity of housing costs to rates, monetary policy is restrictive and becoming more so as inflation recedes.

UNEMPLOYMENT RATE

5.5%

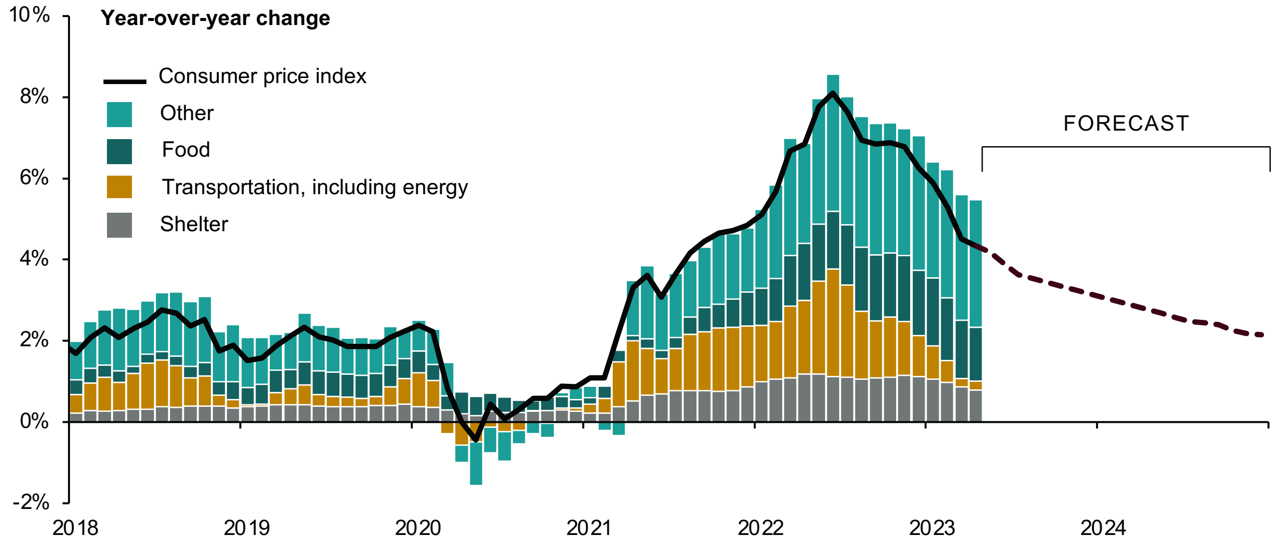
Since spiking to a pandemic-induced peak of 14% in 2020, unemployment has slid to multidecade lows near 5%—well below its longer-term average of about 7%. We expect it to rise in the second half of 2023 as monetary policy further tightens and the economy slows.

Bilal Hasanjee
Vanguard Senior Investment Strategist

WHAT I'M WATCHING

Slowing energy and transportation prices

Just as accelerating transportation and energy costs played meaningful roles in Canada's mid-2022 inflationary peak, their deceleration since then has eased the headline pace of price increases for goods and services. We believe inflation will continue to moderate in Canada in the second half of 2023 and 2024, though the moderation may be more gradual.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.

Note: The "Other" component reflects the sum of five categories: household operations and furnishings and equipment, clothing and footwear, health and personal care, recreation and education and reading, and alcoholic beverages and tobacco products.

Source: Vanguard calculations, based on data from Refinitiv, Moody's, and the Bank of Canada as of April 30, 2023.

Mexico

ECONOMIC GROWTH

1.8%–1.9%

The rate of growth in U.S. inventories (excluding autos) has slowed in 2023 and, in turn, so have exports from Mexico to the United States—the destination for 70% of Mexico's exports. We expect economic growth to slow from roughly 4% in recent quarters to less than 2%.

CORE INFLATION

5.6%

The headline level of price increases has been moderating faster than the core rate, which excludes food and energy prices and may provide a clearer portrait of underlying price trends. By either measure, inflation remains well above the central bank's 3% target.

MONETARY POLICY

11.25%

We expect the Bank of Mexico to maintain its current rate target through year-end for a few reasons. Interest rates exceed the rate of inflation, which has been falling, and falling inflation with stable nominal rates means higher real (inflation-adjusted) rates, which may restrict growth.

UNEMPLOYMENT RATE

3.5%

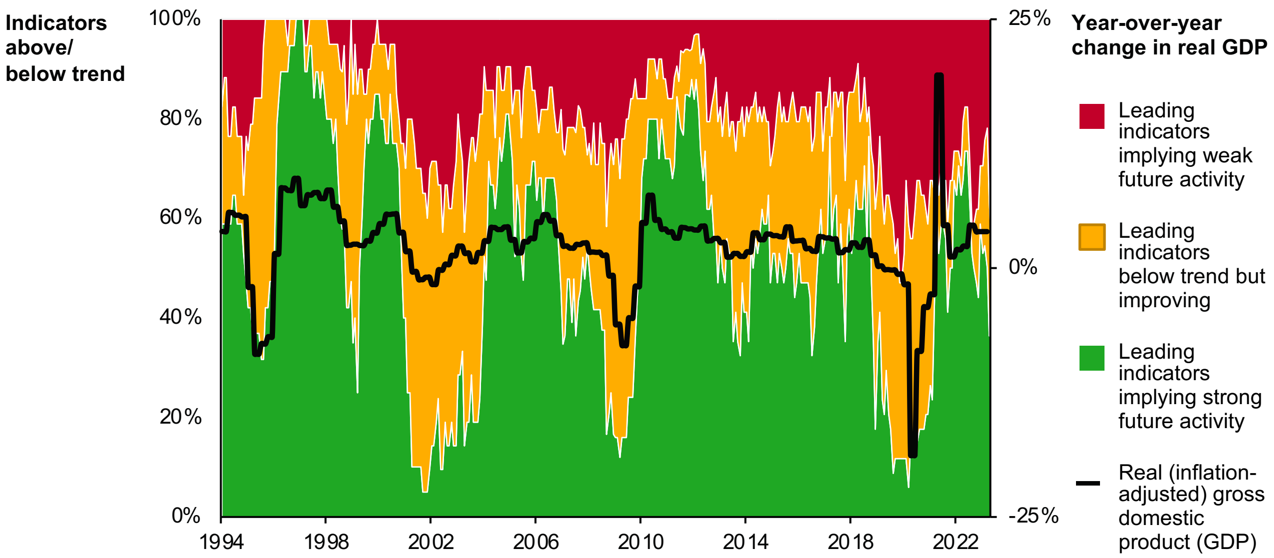
"The labor market remains strong," the Bank of Mexico said in its June policy statement, and we agree. Its strength does not preclude some softening, however, which we expect as the effects of tight monetary policy—in the United States as well as Mexico—continue to build.

Vytas Maciulis
Vanguard Economist

WHAT I'M WATCHING

Leading indicators point to growth

Robust consumer spending and fixed investment have recently supported economic growth. With moderating inflation, real wage growth should continue to accelerate, suggesting that consumption could continue to expand. `Nearshoring' activity—companies moving part of their production to countries close to their markets—is another positive over the medium term. Our Leading Economic Indicators Index summarizes our outlook. Nearly half of the index's underlying indicators recently implied strong future economic activity, and more below-trend signals have been improving.



Growth, inflation, monetary policy, and unemployment figures above are end-2023 Vanguard forecasts. Growth and inflation are comparisons with year-end 2022; monetary policy and unemployment are absolute.

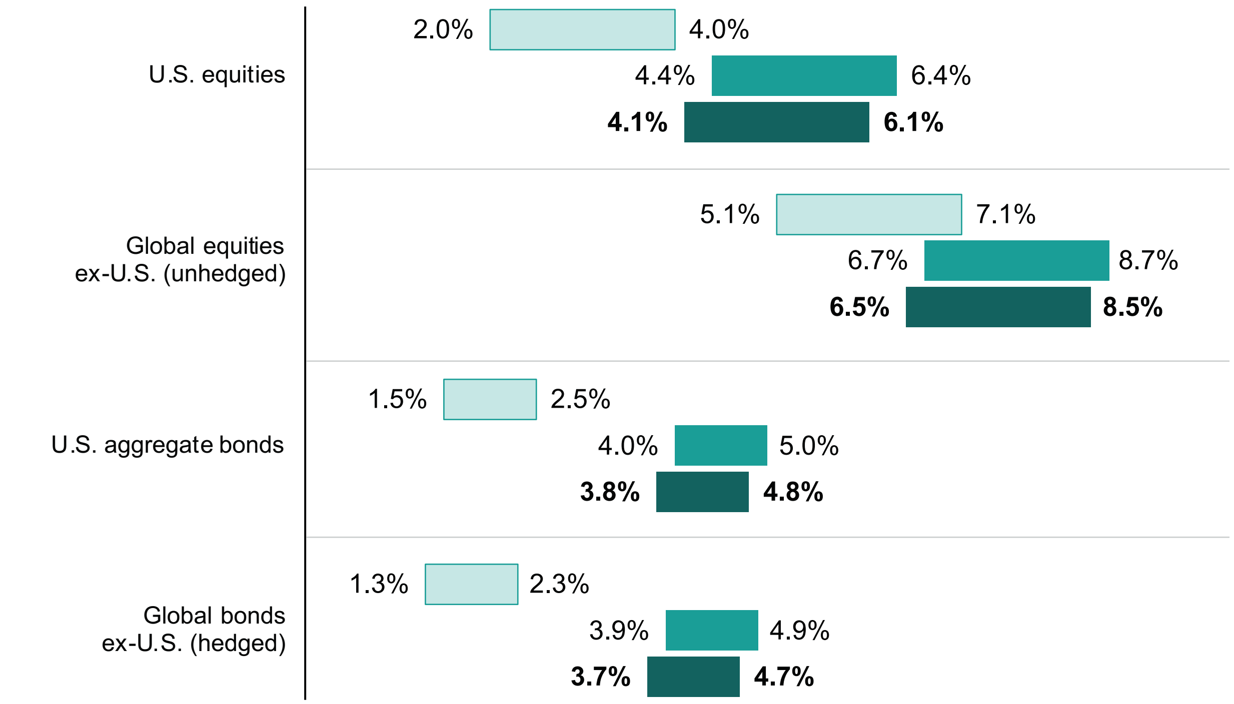
Notes: The Vanguard Leading Economic Indicators Index (VLEI) for Mexico, created to infer developing economic trends, incorporates dozens of variables for the consumer, labor market, manufacturing, exports and imports, and financial markets. Each variable is assigned a weight based on its historical correlation with economic activity and its predictive power.

Source: Vanguard, as of June 15, 2023.

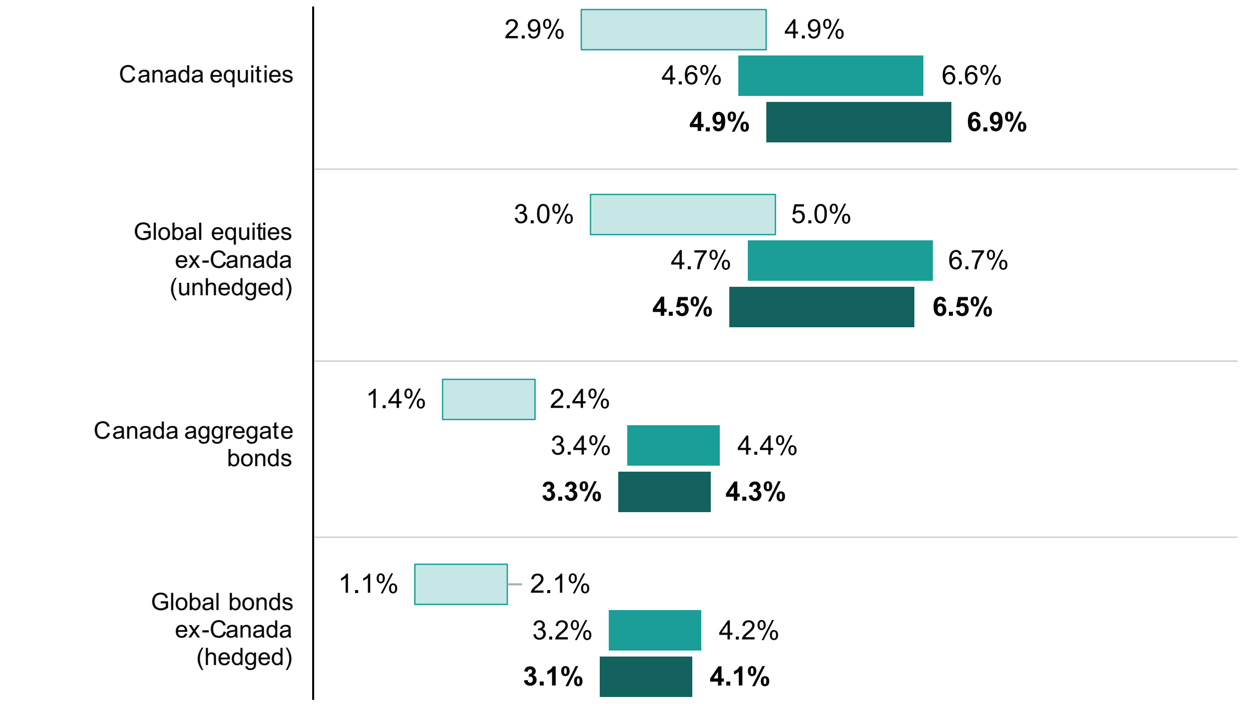
Global equity and fixed income outlook

Our 10-year annualized return forecasts are modestly lower since the start of the year for most developed markets. Equity prices (and valuations) have risen and long-term yields have settled lower as central bank policy rates near their expected highs. Forecasts are from the perspective of local investors in local currencies.

U.S. dollar



Canadian dollar



Forecast 2021 year-end 2022 year-end 2023 midyear

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. Distribution of return outcomes from the VCMM are derived from 10,000 simulations for each modeled asset class. Simulations are as of December 31, 2021; December 31, 2022; and May 31, 2023. Results from the model may vary with each use and over time. For more information, please see the important information slide.

Note: Figures are based on a 2-point range around the 50th percentile of the distribution of return outcomes for equities and a 1-point range around the 50th percentile for fixed income.

Source: Vanguard.

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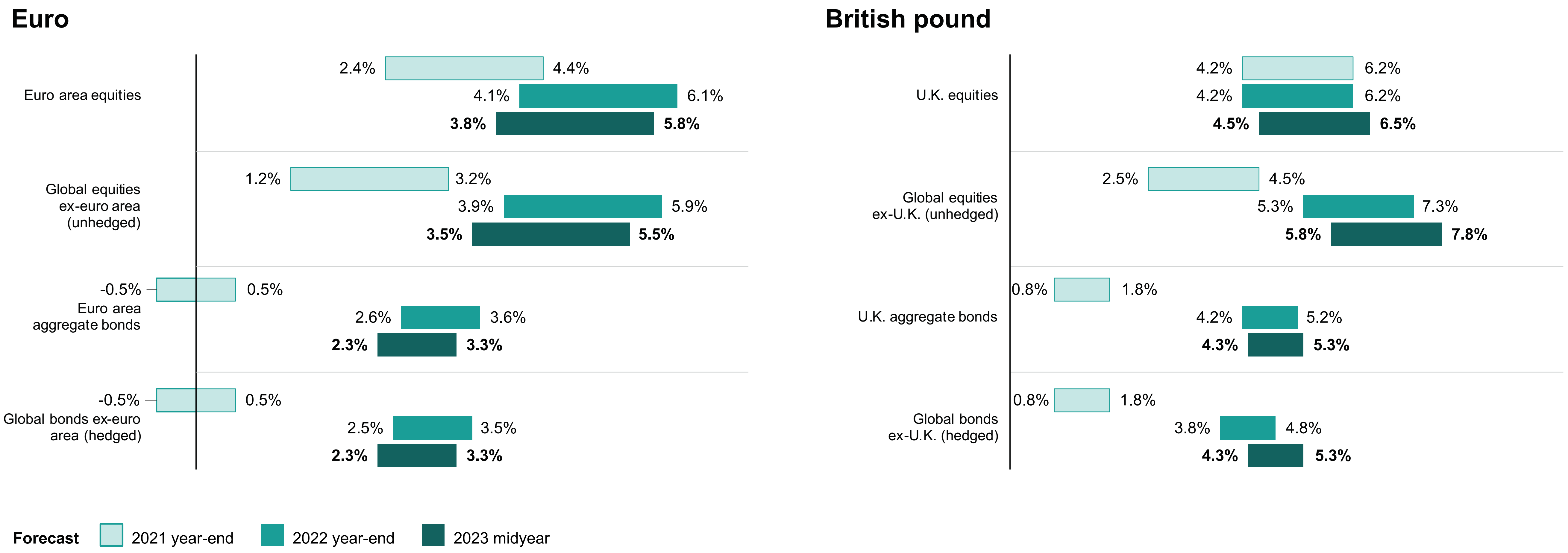

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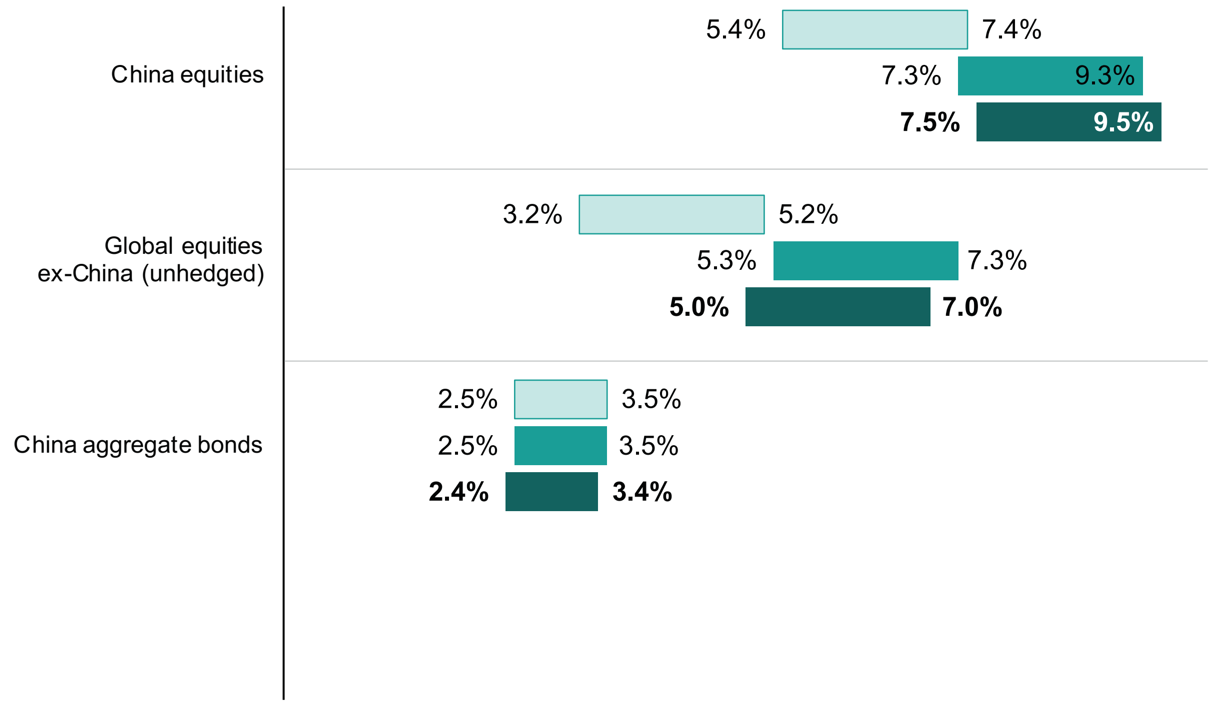
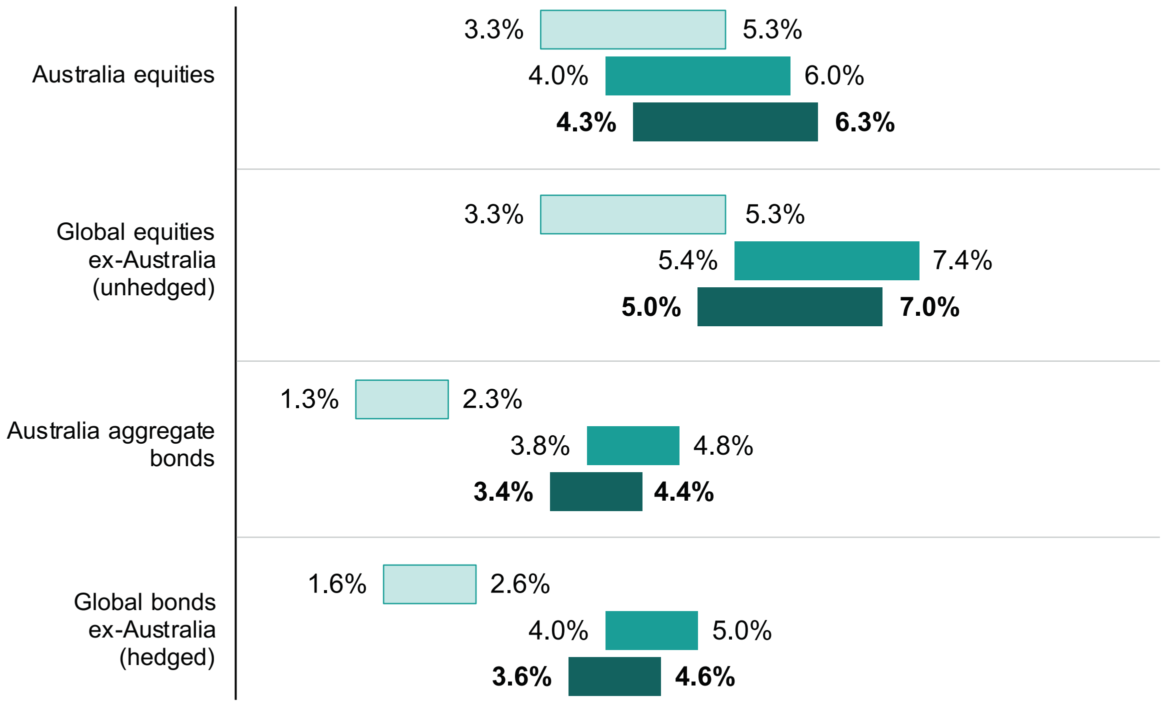
Chinese yuan



Australian dollar



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Source: Vanguard.

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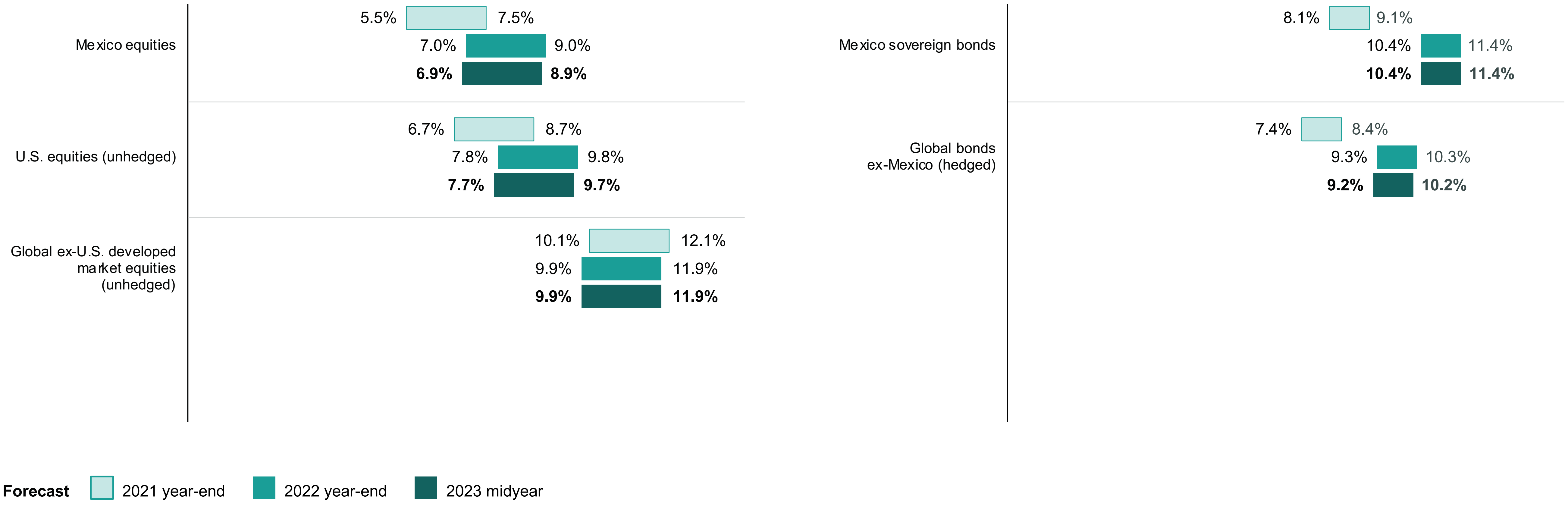
Mexican peso



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Source: Vanguard.

Bonds remain foremost in our time-varying portfolio allocation

Steady state

May 2021

May 2022

May 2023

Asset class	Steady state	May 2021	May 2022	May 2023
U.S. equities	**36%**	**22%**	**19%**	**18%**
International equities	**24%**	**33%**	**28%**	**27%**
U.S. bonds	**28%**	**28%**	**32%**	**33%**
International bonds	**12%**	**18%**	**21%**	**22%**

Projected portfolio statistics

Statistic	Steady state	May 2021	May 2022	May 2023
Annualized returns	**5.8%**	**6.1%**	**5.8%**	**5.8%**
Annualized volatility	**9.7%**	**9.0%**	**7.7%**	**7.4%**
Annualized Sharpe ratio	**0.26**	**0.30**	**0.31**	**0.31**

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Notes: The charts show the optimal allocation to U.S. and international stocks and bonds for a hypothetical investor looking to maximize risk-adjusted returns. Allocations are based on the VCMM forecast at the end of that month, which takes into consideration initial market and economic conditions at that point in time and produces a forecast for the subsequent 10 years. Optimization is done using the Vanguard Asset Allocation Model (VAAM), which aims to capture the traditional risk/return trade-offs for beta, factors, and alpha with investors' attitudes toward those risks. The Sharpe ratio is a measure of return above the risk-free rate that adjusts for volatility. A higher Sharpe ratio indicates a higher expected risk-adjusted return. The "benchmark" portfolio is a standard 60/40 stock/bond portfolio with equity home country bias of 60% and bond home country bias of 70%. Home country bias is the percentage of assets in the portfolio that are from a given investor's region (in this case, U.S. securities for a U.S. investor). U.S. equities are represented by the Dow Jones U.S. Total Stock Market Index (formerly known as the Dow Jones Wilshire 5000) through April 22, 2005; the MSCI US Broad Market Index through June 2, 2013; and the CRSP US Total Market Index thereafter. International equities are represented by the Total International Composite Index through August 31, 2006; the MSCI EAFE + Emerging Markets Index through December 15, 2010; the MSCI ACWI ex USA IMI Index through June 2, 2013; and the FTSE Global All Cap ex US Index thereafter. International bonds are represented by the Bloomberg Global Aggregate Index ex USD, and U.S. bonds are represented by the Bloomberg U.S. Aggregate Bond Index. Portfolio weights may not total 100% because of rounding.

Source: Vanguard calculations, based on data as of May 31, 2021; May 31, 2022; and May 31, 2023.

Vanguard Investment Strategy Group

Global

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Important information

Indexes used in Vanguard Capital Markets Model simulations

The long-term returns of our hypothetical portfolios are based on data for the appropriate market indexes as of December 31, 2021, December 31, 2022, and May 31, 2023. We chose these benchmarks to provide the most complete history possible, and we apportioned the global allocations to align with Vanguard's guidance in constructing diversified portfolios. Asset classes and their representative forecast indexes are as follows:

U.S. equities: MSCI US Broad Market Index.
Global ex-U.S. equities: MSCI All Country World ex USA Index.
U.S. aggregate bonds: Bloomberg U.S. Aggregate Bond Index.
Global ex-U.S. bonds: Bloomberg Global Aggregate ex-USD Index.

Canadian equities: MSCI Canada Total Return Index.
Global ex-Canada equities: MSCI All Country World Index ex-Canada in CAD.
Canadian aggregate bonds: Bloomberg Canadian Issues 300MM Index.
Global ex-Canada bonds: Bloomberg Global Aggregate ex-Canada Index (CAD Hedged).

UK equities: Bloomberg Equity Gilt Study from 1900 through 1964; Thomson Reuters Datastream UK Market Index from 1965 through 1969; MSCI UK thereafter.
Global ex-UK equities: Standard & Poor's 90 Index from January 1926 through March 3, 1957; S&P 500 Index from March 4, 1957, through 1969; MSCI World ex UK Index from 1970 through 1987; MSCI AC World ex UK thereafter.
UK aggregate bonds: Bloomberg Sterling Aggregate Bond Index.
Global ex-UK bonds: Standard & Poor's High Grade Corporate Index from 1926 through 1968; Citigroup High Grade Index from 1969 through 1972; Lehman Brothers US Long Credit AA Index from 1973 through 1975; Bloomberg US Aggregate Bond Index from 1976 through 1990; Bloomberg Global Aggregate Index from 1990 through 2001; Bloomberg Global Aggregate ex GBP Index thereafter.

Euro area equities: MSCI European Economic and Monetary Union (EMU) Index.
Global ex-euro area equities: MSCI AC World ex EMU Index.
Euro area aggregate bonds: Bloomberg Euro-Aggregate Bond Index.
Global ex-euro area bonds: Bloomberg Global Aggregate ex Euro Index.

Australian equities: MSCI Australia Index.
Global ex-Australia equities: MSCI All Country World ex-Australia Index.
Australian bonds: Bloomberg Australian Aggregate Bond Index.
Global ex-Australia bonds: Bloomberg Global Aggregate ex-AUS Bond Index.

China equities: MSCI China A Onshore Index.
Global equities ex-China: MSCI All Country World ex China Index.
China aggregate bonds: ChinaBond Aggregate Index.

Mexico equities: MSCI Mexico Index.
Global ex-U.S. developed market equities: MSCI World ex US Index.
Mexico sovereign bonds: S&P/BMV Sovereign MBONOS Bond Index.
Global bonds ex-Mexico: Bloomberg Global Aggregate Index.

Important information (continued)

All investing is subject to risk, including the possible loss of the money you invest. Diversification does not ensure a profit or protect against a loss in a declining market. Be aware that fluctuations in the financial markets and other factors may cause declines in the value of your account. 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.

Investments in stocks and bonds issued by non-U.S. companies are subject to risks including country/regional risk and currency risk. These risks are especially high in emerging markets.

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.

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

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

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