Global macro matters

From reflation to inflation: What's the tipping point for portfolios?

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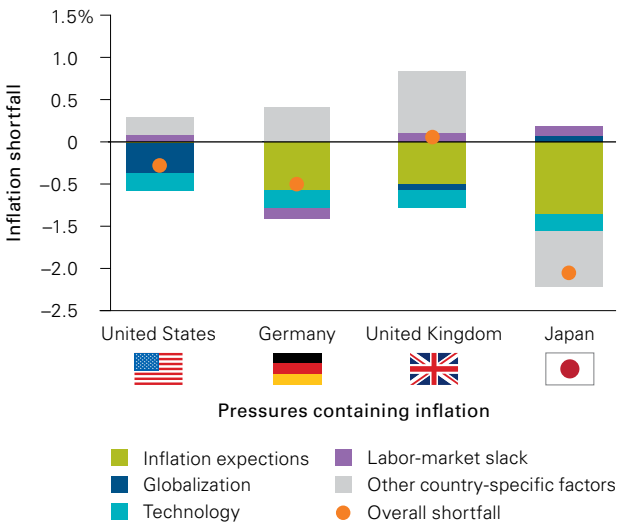
In our 2018 *Vanguard Economic and Market Outlook*, we pointed to 2018 cyclical risks that could disrupt the status quo of modest growth and tepid inflation expectations. With already tight labor markets growing even tighter and an uptick in wages, the possibilities of an economic rebound and inflation were underappreciated risks to the markets. Although we believe secular drags should keep it well-contained in the medium-to-long term, inflation continues to recover and could rise even higher than expected in the short term.

In this note, we ponder various investment strategies for a rising inflation theme. For those investors seeking to hedge inflation risk, we show that important risk-return trade-offs must be considered when adding inflation-sensitive assets to a portfolio. We also look at portfolio strategies for active-minded investors seeking to gain exposure to rising inflation in the near term. We quantify the expected benefits of these strategies as well as the significant risks if a higher-than-expected inflation scenario does not materialize.

The inflation outlook

We believe secular drags including globalization, technological innovation, and well-anchored inflation expectations have been keeping inflation contained in recent years, and we expect this to persist over the medium-and-long term. **Figure 1** illustrates the contributions of these factors to inflation's shortfall compared with central bank targets.

Figure 1. An augmented Phillips curve: much more than unemployment



Notes: This augmented Phillips curve model is based on a panel data-regression specification with inflation expectations, the difference between services and goods price inflation (a proxy for globalization effects on tradeable/nontradeable prices), technology disinflation (the cost of technology-related components of Consumer Price Index prices), and labor slack (the gap between the unemployment rate and the nonaccelerating inflation rate of unemployment [NAIRU]) for four economic regions during the period 1991–2017. For inflation expectations, we use 10-year Consumer Price Index (CPI) expectations from the U.S. Survey of Professional Forecasters and the 12-month moving average of the year-over-year core CPI for Germany, Japan, and the United Kingdom. Labor slack is defined as the difference between the official unemployment rate and the NAIRU. We used Bureau of Labor Statistics (BLS) CPI detailed data to identify technology-related components as follows: information and information processing, information technology, hardware and services, and video and audio equipment. We used this series across all regions as a proxy.

Source: Vanguard calculations based on Thomson Reuters Datastream, the Bureau of Labor Statistics, the OECD *Economic Outlook*, the Bank of Japan, the Federal Statistical Office of Germany, the Office for National Statistics (United Kingdom), and the Federal Reserve Bank of Philadelphia *Survey of Professional Forecasters*.

However, the recent synchronized acceleration in global growth and employment is finally translating into nascent upward pressure on wages and core inflation metrics, which will continue pushing inflation higher. Particularly in the United States, it has been picking up steam. The trend is similar in Europe, albeit from a much lower starting point. Falling unemployment rates and incipient normalization of inflation expectations may raise global inflation this year.

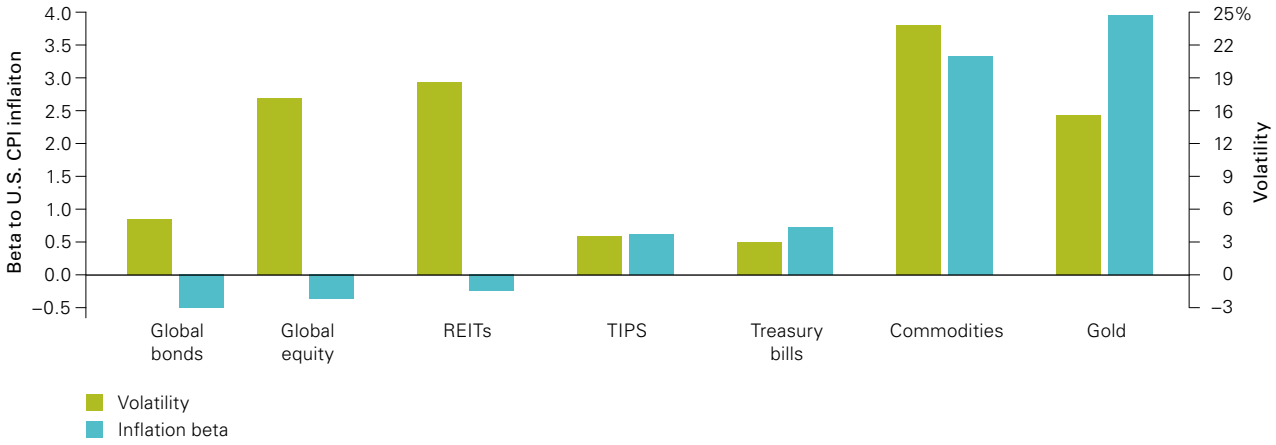
The cyclical reflation taking place in developed markets could mean a one-time permanent loss in the inflation-adjusted (real) value of an investor's portfolio. Some investors may desire to hedge this inflation risk, whereas others may actually want to gain exposure to the inflation shock. Either option has trade-offs, which we examine below.

Inflation-hedging assets, from correlation to beta

Asset classes with strong positive correlations to inflation are commonly mistaken to be good inflation hedges. However, a high correlation with inflation doesn't necessarily translate to a high *beta* to inflation. Inflation beta is defined as how much an asset's return increases when inflation goes up by 1 percentage point, and it represents the true inflation-hedging property of the asset. Whereas correlation captures the direction of co-movement between the asset's returns and inflation, inflation beta captures both the direction and the magnitude of the co-movement. For instance, Treasury bills and Treasury inflation-protected securities (TIPS) both exhibit a high correlation to inflation, but as shown in **Figure 2**, each has an inflation beta of less than 1 (0.8 for Treasuries and 0.7 for TIPS). If inflation increased by 1 percentage point, neither of them would be able to keep up (they would have inflation-adjusted losses of 20 and 30 basis points, respectively). The correlations of gold and commodities with inflation are not that different from those of TIPS or Treasuries, but they have much higher inflation betas (around 3.5–4). The distinction between correlation and beta is important, because low-beta assets can still lose ground in real terms during inflation surprises even if they have a high correlation to inflation.[1]

Another important point illustrated in Figure 2 is that exposure to high-inflation-beta assets is not free of risk: It comes bundled with high return volatility. Traditional long-only portfolio construction techniques can't separate the inflation-hedging properties from the volatility of an asset class. Therefore, the trade-off between the inflation beta and the riskiness of an asset is similar to the traditional risk-return trade-off. You can only get more return or more inflation beta at the expense of more risk.

Figure 2. How assets stack up as hedges for short-term inflation



Notes: Correlations of CPI with asset classes are based on rolling one-year annualized returns. Volatility is calculated as a standard deviation of rolling one-year annualized returns. Data are from January 1970 to December 2017.

Source: Vanguard calculations based on Thomson Reuters Datastream, Moody's Analytics Data Buffet, the S&P GSCI commodity index, the Bloomberg Barclays U.S. Treasury Inflation Protected Securities Index, the S&P GSCI Gold Index, and FTSE Nareit All Equity REITs Index data.

1 Equities are often positioned as good inflation hedges. This is true over long periods and makes sense from a strategic asset allocation perspective. However, investors hoping to hedge shorter-term inflation volatility may want to consider assets with stronger relationships to short-term price fluctuations.

More trade-offs to consider

Inflation-hedging seems to be a straightforward process of simply adding a good inflation hedge to a portfolio. However, a number of additional factors and trade-offs must be considered.

The concept of inflation beta can be applied both to individual assets and to the portfolio as a whole. A well-hedged portfolio would have an inflation beta equal to 1, meaning its returns would move one-for-one with inflation. But unless it consisted solely of assets that each had an inflation beta of 1, maintaining this position would require balancing assets with lower inflation beta (such as stocks or bonds) with others with much higher beta. Thus, the hedging strategy consists of adding small amounts of an asset with high inflation beta to a core allocation of low- or even negative-beta assets so that beta averages 1 at the portfolio level.

Figure 3 illustrates an example of adding commodities to traditional stock/bond portfolios. Figure 3a plots two sets of portfolios against their inflation betas: inflation-hedged stock/bond/commodity portfolios optimized to strike an inflation beta of 1 and traditional stock/bond portfolios with inflation betas ranging from 0.1 to –0.1. Since the individual stock and bond inflation betas are low or negative, their combined average cannot be any different. Adding a moderate allocation of commodities (with an inflation beta of 3.5) is enough to hit the target of 1.

Figure 3b shows the trade-off involved in inflation hedging. Adding commodities to a portfolio not only increases the inflation beta but also raises overall volatility. The entire frontier of inflation-hedged portfolios sits down and to the right of the traditional stock/bond efficient frontier, indicating higher levels of portfolio volatility at every level of expected return.

An inflation-hedged portfolio is more efficient than a traditional stock/bond portfolio in terms of real inflation-adjusted volatility (it has an inflation beta closer to 1), but the traditional portfolio is more efficient in terms of nominal return volatility. Investors may be better insulated against inflation shocks with an inflation-hedged portfolio, but they will have to stomach higher volatility.

Figure 3a. Higher inflation betas . . .

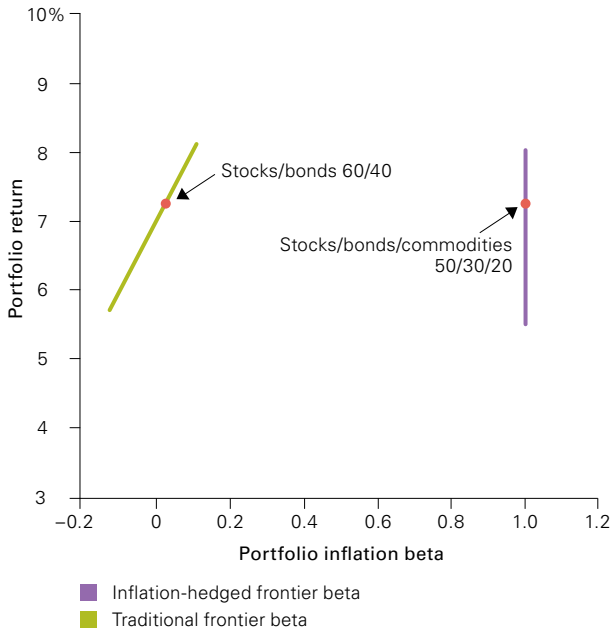
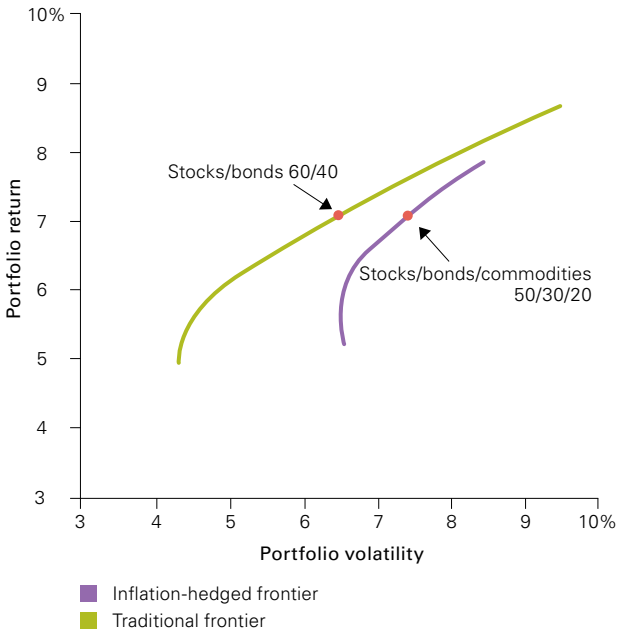


Figure 3b. . . . come with higher volatility



Notes: We performed a mean-variance optimization analysis using two portfolios, a traditional portfolio of global bonds and global stocks and another made up of global bonds, global stocks, and commodities. The latter was optimized to have a beta of close or equal to 1 while minimizing risk.

Source: Vanguard calculations based on Thomson Reuters Datastream, Moody's Analytics Data Buffet, and the S&P GSCI commodity index.

Figure 4 shows how different inflation-hedging strategies would fare relative to a traditional 60/40 stock/bond portfolio. Assets commonly believed to be inflation hedges, such as REITs, don't add much in terms of overall portfolio inflation beta. TIPS and Treasury bills offer a better solution but still do not fully hedge the portfolio's exposure to inflation. Among high-risk, high-beta assets, commodities beat gold, with a higher beta and lower volatility.

Macro inflation strategies

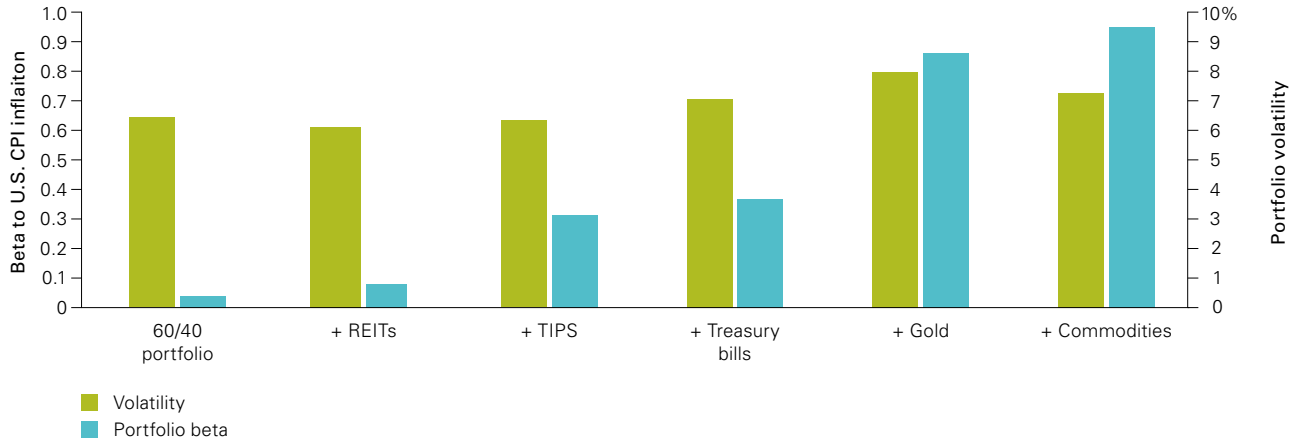
While most people view cyclically rising inflation as a risk to their portfolios, a few more active-minded investors may see it as an opportunity. But active portfolio strategies such as macro strategies or dynamic asset allocation are not for everyone. Investors must not only thoroughly understand the risks involved; they also must execute the strategy within rigorous and systematic guardrails (usually supported by quantitative techniques) that allow for prudent risk management.

With that background, we examine strategies for four economic scenarios that could occur over the next three years, based on Vanguard Capital Markets Model® (VCMM) simulations. The scenarios are baseline, high inflation-high growth, high inflation-low growth, and low inflation (see Figure 5a). The baseline scenario follows our baseline view of cyclical upward pressures on inflation resulting in reflation of developed markets toward but not beyond a 2% target level. The high growth-high inflation scenario illustrates an upside risk of sustained higher economic growth with tightening labor markets. High inflation-low growth represents mild stagflation (caused, perhaps, by the imposition of tariffs on Chinese imports) in which inflation rises above the 2% target but growth slows. The low inflation scenario would be an economic slowdown with the potential for a mild recession.

Figure 5b shows optimal portfolios for each scenario that vary their exposures to the following four factors or risk premiums: equity risk, term or duration, credit, and inflation risk. In a high growth-high inflation scenario, expected returns on equity would be high, causing the efficient frontier to be steep. Long and short rates would also rise faster than expected, resulting in an optimal portfolio with higher allocations to equity and commodities relative to the baseline. In the low inflation scenario, REITs are reduced and the global equity allocation increases relative to the baseline. The high inflation-low growth portfolio has a lower allocation to equities than the baseline and more commodities, and it shifts some of the TIPS allocation to short-duration holdings to counterbalance the increased duration from a higher allocation to bonds.

Remember that these strategies face the considerable risk that the macro scenario they were built for might not occur. The baseline portfolio, being the most diversified while also having decent exposure to assets that are correlated with inflation, performs quite well even in scenarios that deviate from our baseline view on inflation. All other portfolios tend to underperform significantly in those situations.

Figure 4. Options for hedging inflation in a 60/40 portfolio

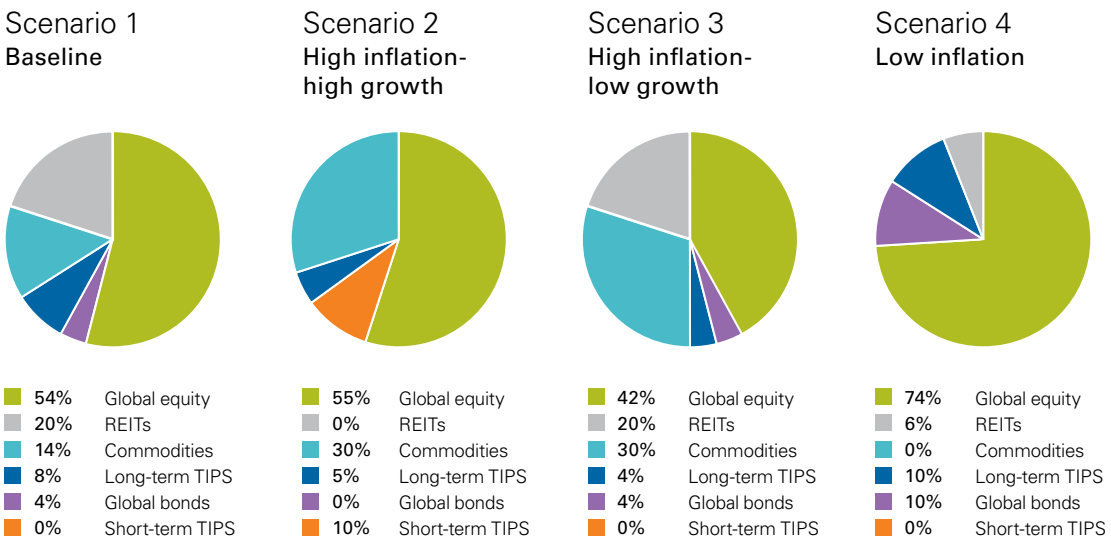


Notes: We performed a mean-variance-optimization analysis using a traditional portfolio of global bonds and global stocks and one in which another asset class was added. The latter portfolio was optimized to have a beta close or equal to 1 while minimizing risk.

Source: Vanguard calculations based on Thomson Reuters Datastream, Moody's Analytics Data Buffet, the S&P GSCI commodity index, the Bloomberg Barclays U.S. TIPS Index, the S&P GSCI Gold Spot index, and FTSE Nareit All Equity REITs data.

Figure 5. Strategies for four economic scenarios

a. Four scenarios for U.S. inflation



b. Optimal portfolios for each scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Best	Diversified	Overweight commodities	Overweight global equity and commodities	Overweight global equity
Second-best	Overweight global equity and commodities	Overweight global equity and commodities	Overweight commodities	Diversified
Third-best	Overweight global equity	Diversified	Diversified	Overweight global equity and commodities
Fourth-best	Overweight commodities	Overweight global equity	Overweight global equity	Overweight commodities

IMPORTANT: The projections and other information generated by the Vanguard Capital Markets Model (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 VCMM, derived from 10,000 simulations for each asset class and macroeconomic variable modeled. Simulations are as of December 31, 2017. Results from the model may vary with each use and over time.

Notes: Performance is relative to the efficient frontier. Portfolios are selected from the frontier based on a fixed risk-aversion level. The forecast displays a simulation of three-year annualized returns of the asset classes shown as of December 31, 2017. The scenarios are based on a subset of 10,000 VCMM simulations sorted by rate, growth, volatility, and equity return.

Source: Vanguard, from Vanguard Capital Markets Model (VCMM) forecasts.

Conclusion

In this note, we examine potential investment strategies for a reflationary environment for investors concerned with such a scenario. For those seeking to hedge inflation risk, we explain that it's important to focus on an asset's inflation beta, not just its correlation. We also demonstrate that there are important risk-return trade-offs involved, since high-inflation-beta assets also have higher volatility. Finally, for those investors seeking to develop a macro strategy for inflation exposure, we show that it's critical to operate within a mean-variance framework to maintain diversification and risk control. We believe that keeping a diversified portfolio amid heightened uncertainties is always prudent. A well-constructed portfolio focused on a strategic asset allocation that accounts for an investor's specific circumstances, goals, and risk tolerance is best-positioned to navigate short-term volatilities, including inflation, and achieve long-term investment success.

Reference

Vanguard Group, The, 2017. *Vanguard Economic and Market Outlook for 2018: Rising Risks to the Status Quo*. Valley Forge, Pa.: The Vanguard Group.

Notes on risk

All investments are subject to risk, including the possible loss of the money you invest. Investments in bond funds are subject to interest rate, credit, and inflation risk. Funds that concentrate on a relatively narrow market sector face the risk of higher share-price volatility. Foreign investing involves additional risks including currency fluctuations and political uncertainty. These risks are especially high in emerging markets. Diversification does not ensure a profit or protect against a loss. 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. Past performance is no guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

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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 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 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.

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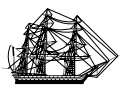

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