



Inflation Clouds on the Horizon

Addressing inflation risks in a broad asset allocation.

April 2021

KEY INSIGHTS

- Even at relatively low levels, inflation can substantially reduce real portfolio returns over time.
- Unexpected inflation can inflict the most damage on long-term portfolio performance.
- Our research suggests that allocations to real assets equities and inflation-indexed bonds can improve overall portfolio performance by dampening return volatility during inflationary periods.

Inflation—particularly unexpected bouts of consumer price inflation—can be highly detrimental for a portfolio’s real returns and purchasing power over time.¹ Yet, many investors have little protection in their portfolios against the risk of an inflation spike. This creates potential risks at a time when U.S. inflation expectations have strongly rebounded after plunging at the onset of the coronavirus pandemic—indicating that markets are bracing for higher prices as the economic recovery strengthens.

We believe this is a good time for investors to reassess the value of asset classes that potentially can protect the purchasing power of their portfolios. Inflation-linked bonds and real assets—such as natural resource and real estate stocks—historically have performed well in inflationary environments and potentially can reduce volatility in a diversified portfolio.

A Reflationary Environment

Aside from a few temporary bursts, actual inflation and inflation expectations have been rather muted since the 2008–2009 global financial crisis. Warnings from inflation hawks that the large-scale monetary stimulus used to combat the crisis would fuel runaway inflation proved to be unfounded, as numerous factors—including widespread deleveraging following the real estate bubble of the early 2000s, sluggish economic growth, and fiscal austerity—worked to tame consumer prices. The middle of the last decade also saw a deep oil price decline stemming from oversupply, which further sapped inflationary pressures.

The global pandemic initially resulted in a steep slide in the consumer price index (CPI) and in inflation expectations as governments imposed virus-containment measures, causing demand for many goods and services to sink.



Richard Coghlan, Ph.D.
*Co-portfolio Manager,
Real Assets Fund*



Christopher Faulkner-MacDonagh, Ph.D.
*Co-portfolio Manager,
Real Assets Fund*



Michael Sewell, CFA
*Inflation Protected Bond Fund
and Limited Duration Inflation
Focused Bond Fund*

¹ “Real” returns refer to the returns on an investment after deducting inflation.

“Even moderate rates of inflation can substantially reduce a portfolio’s purchasing power over longer periods...”

— Christopher Faulkner-MacDonagh, Ph.D.

Co-portfolio Manager,
Real Assets Fund

After bottoming below 0.2% in late March 2020, the five-year break-even inflation rate—a closely watched measure of the market’s inflation expectations—climbed to 2.6% as of the end of March 2021.²

Headway with vaccine administration, a rebound in oil and other commodity prices, an anticipated release of pent-up consumer demand combined with supply bottlenecks, and massive stimulus efforts by governments and central banks are among the drivers that have raised concerns that inflation could stage a comeback.

Although substantial slack in the labor market and an easing of supply disruptions are factors that could restrain a sustained surge in inflation, conditions appear ripe for an upside surprise, in our view.

- The Federal Reserve has committed to letting the economy run hot for some time, shifting its focus from maintaining price stability to maximizing employment and—relatedly—reducing income inequality.
- Meanwhile, the U.S. federal government has opened the fiscal spigots, including direct cash payments to households, resulting in a savings glut that consumers could draw upon when they feel more confident and are more able to spend.

Although higher inflation readings are widely anticipated in the near term as year-over-year measures reflect the impact of the pandemic-related base effects from 2020, the market currently does not appear to be pricing in a more lasting inflationary impulse. However, we believe that investors should take heed that unexpected inflation—which, by definition, cannot be forecast—is potentially more disruptive and thus can inflict the most damage on a portfolio.

The Challenge of Inflation

Even moderate rates of inflation can substantially reduce a portfolio’s purchasing power over longer periods—even when investors enjoy sizable nominal returns.³ Over the three decades ended December 31, 2020, for example, a hypothetical USD 10,000 portfolio invested 60% in U.S. large-cap stocks (as measured by the S&P 500 Index) and 40% in U.S. core bonds (as measured by the Bloomberg Barclays U.S. Aggregate Index) could have grown to USD 133,917—an annualized return of 9.03%. However, inflation would have reduced that ending portfolio value to just USD 68,820 in 1990 dollars—a real annualized return of only 6.64%.⁴

Headline inflation was relatively low during the hypothetical example period, averaging around 2.3%. An investment window covering a period of high inflation, such as the double-digit rates of the 1970s and early 1980s, would have seen an even larger reduction in real returns.

The challenge for investors in addressing inflation risk is that traditional stock and bond allocations historically have done a suboptimal job of hedging against unexpected inflation. While equities generally performed well during periods of moderately rising prices, they demonstrated relatively weak real returns during periods of high inflation, which tended to depress corporate profit margins. For bond investors, inflation can erode the real value of coupon income and usually is accompanied by rising interest rates. This can weigh on high-quality bond prices.

T. Rowe Price research suggests that allocations to real assets—which include natural resource equities and real estate investment trusts (REITs)—and to inflation-indexed bonds such as Treasury inflation protected securities

² Source: Barclays (see Additional Disclosures).

³ “Nominal” returns are the returns on an investment before deducting inflation.

⁴ **Past performance is not a reliable indicator of future performance.** The performance shown is for illustrative purposes only and is not indicative of an actual investment. Investors cannot invest directly in an index.

“...our research indicates that shorter-term TIPS historically had a high correlation to unexpected inflation...”

— Michael Sewell, CFA
 Portfolio Manager, Inflation Protected Bond Fund and Limited Duration Inflation Focused Bond Fund

(TIPS) can improve overall portfolio performance by potentially dampening the volatility of both nominal and real returns during inflationary periods. However, returns and the correlations of returns between different asset classes both can vary widely over different time horizons and in different economic environments.⁵ In our view, this supports the case for exposure to a diversified basket of assets, including some that have demonstrated the ability to maintain purchasing power in an inflationary environment.

Assets React Differently to Inflation

To analyze the degree of inflation protection that various asset classes have historically provided, we looked at how closely returns on those asset classes have correlated with inflation over rolling one-month and three-year periods. The three-year period was chosen because it is roughly the duration from peak to trough—or, conversely, from trough to peak—in a typical inflation cycle.

Historical relationships between inflation and the nominal returns on various asset classes are illustrated in Figure 1. We found that shorter-term TIPS (less than five years to maturity) exhibited relatively high correlation to inflation, particularly over a three-year time frame, indicating that their returns generally moved in the same direction as inflation. In other words, nominal returns on short-term TIPS tend to be higher when inflation is higher.⁶

Only short-term Treasury bills had a higher positive correlation with inflation than shorter-term TIPS. However, Treasury bills currently offer near-zero yields that could be easily consumed by inflation. Moreover, our research indicates that shorter-term TIPS historically had a high correlation to unexpected inflation and thus could have potentially provided protection against its damage to longer-term investment returns.⁷

Correlation to Consumer Price Inflation

(Fig. 1) September 1, 1976, through December 31, 2020

Asset Class/Sector	1 Month	3 Years
Metals and Mining	0.04	0.37
Energy and Materials	0.06	0.37
U.S. REITs	0.01	0.42
Global REITs	0.00	0.27
U.S. Stocks	-0.04	0.07
Shorter-Term TIPS	0.26	0.62
Longer-Term TIPS	0.11	0.29
U.S. Core Bonds	-0.10	0.02
Treasury Bills	0.44	0.77

Source: Morningstar, Inc. (see Additional Disclosures); analysis by T. Rowe Price.

Note: See appendix for a description of the benchmarks and asset classes used in the study.

⁵ Correlation measures the degree to which two variables, such as the returns of different securities or market indices, move in relation to each other. Correlation is measured on a scale from +1 to -1. Positive results indicate that the variables tended to move in the same direction at the same time, while negative results indicate that they tended to move in the opposite direction from one another. 0 represents no relationship.

⁶ Because TIPS did not exist before 1997 (and shorter-term TIPS data were not available prior to 2002), T. Rowe Price analysts created a proxy return series for earlier years based on the after-inflation yields on conventional Treasuries of comparable maturity during pre-1997 time periods. This return series then served as the basis for measuring TIPS characteristics (such as nominal and real volatility and correlations) in periods prior to the availability of actual TIPS data.

⁷ Based on data from December 2003 through December 2020. Expected inflation is obtained as that part of current CPI inflation that can be explained by trends in past inflation (using a regression framework), and unexpected inflation then emerges as the residual that cannot be explained by recent inflation trends. Analysis by T. Rowe Price.

“...all four real assets sectors outperformed the S&P 500 Index and showed positive real returns versus the CPI during the high-inflation periods.

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Co-portfolio Manager,
Real Assets Fund

Longer-term TIPS had moderately positive correlations with inflation but provided less inflation protection than shorter-term TIPS. Although the principal value of all TIPS adjusts to reflect monthly changes in the CPI, the longer durations⁸ of longer-term TIPS make their returns more sensitive to the increases in real interest rates that often accompany periods of higher inflation. Notably, longer-term TIPS generally were less correlated with inflation than real asset equities over the three-year periods we examined.

In contrast with TIPS, returns on conventional U.S. core bonds showed negative or low correlation with inflation over both one-month and three-year time periods. Therefore, conventional bonds—which historically tended to perform well during periods of steady or declining inflation—failed to protect purchasing power in inflationary periods.

Our study found relatively weak correlations between monthly returns on real assets and inflation; however, real assets demonstrated greater value as inflation hedges over three-year periods. Notably, real assets also had relatively low correlations with broader equity market returns over three-year periods, suggesting their potential to reduce volatility in diversified portfolios (Figure 2).

This effect was most notable in the metals and mining sector, which had a negative correlation with the broader equity market over three-year periods. Over one-month periods, by contrast, returns on real equities tended to show relatively high positive correlations with the broader equity market—a reflection of their short-term sensitivity to general market risk, or beta.

Inflation Drivers Matter

In addition to looking at how various asset types have held up over different time periods, we examined how investments performed in different inflation environments. The 1970s, for example, saw higher commodity prices and rapid increases in wages and consumer prices. The 1980s, by contrast, saw decelerating consumer price inflation, slower wage growth, and minimal gains or even deflation in commodity prices.

In our study, all four real assets sectors outperformed the S&P 500 Index and showed positive real returns versus the CPI during the high-inflation periods. But these sectors also demonstrated varying relative strength in different inflation environments.

Global REITs, for example, posted their highest returns in periods of high broad-based inflation, while energy and materials equities performed

Correlation to the S&P 500 Index

(Fig. 2) September 1, 1976, through December 31, 2020

Asset Class/Sector	1 Month	3 Years
Metals and Mining	0.60	-0.05
Natural Resources	0.76	0.44
U.S. REITs	0.62	0.34
Global REITs	0.64	0.41

Source: Morningstar, Inc. (see Additional Disclosures); analysis by T. Rowe Price.
Note: See appendix for a description of the benchmarks and asset classes used in the study.

⁸ Duration measures a bond's sensitivity to changes in interest rates.

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somewhat better during periods of high commodity price inflation. TIPS are designed to respond to a specific type of inflation—U.S. consumer inflation as measured by the CPI—and thus could be less effective in environments where rapid commodity price inflation is the primary concern.

Inflation Hedges Can Dampen Volatility

Finally, we looked at the effect that investments in real assets and TIPS potentially could have had on reducing volatility in a portfolio that included a mixture of traditional stock and bond investments. As shown in Figure 3, we modified a traditional 60% U.S. large-cap equity/40% U.S. core fixed income portfolio to include allocations to real assets and TIPS. We then calculated the historical annualized volatility on these hypothetical portfolios over time periods ranging between one month and three years.

Our research showed that adding either TIPS or real assets equities to the equity/fixed income portfolio could have lowered volatility across all holding periods, although the effect was more pronounced over longer time frames. Adding both real assets and TIPS could have reduced portfolio volatility even further.

Balancing Trade-Offs

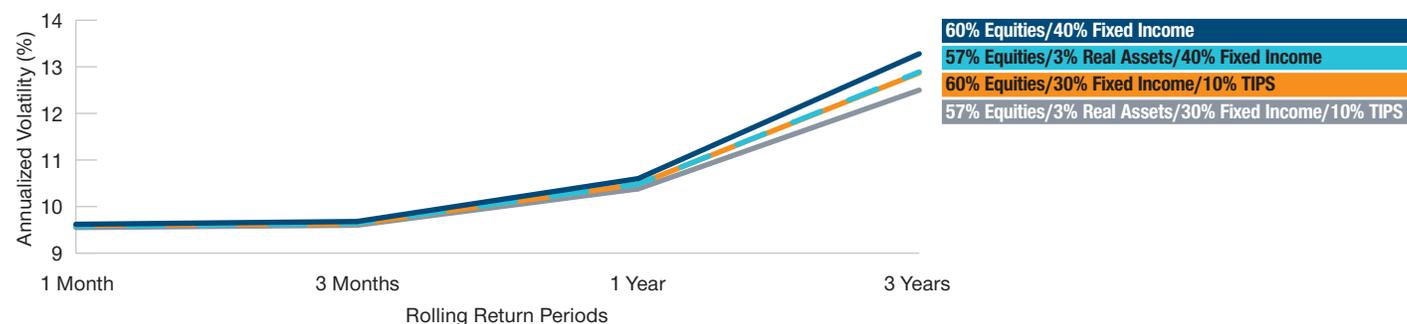
Investors should be aware that there are potential trade-offs involved with investing in assets that protect against inflation. For example, real assets underperformed traditional equities over the past 10 years amid an oversupply of energy and other commodities along with tepid global economic growth.

These trade-offs also apply to short- versus longer-term TIPS, in our view. The potential benefit of a higher correlation with inflation that short-term TIPS have provided often came at the cost of accepting lower yields than those offered by longer-term TIPS. Moreover, with their longer-duration profile, returns for longer-term TIPS potentially can benefit more from the decline in real rates that often accompanies a weakening economic outlook.

Because TIPS and real assets equities have different properties, we believe they generally should be used as part of a long-term strategy that also includes assets that will likely outperform in a low-inflation environment and that have higher long-term return potential. Diversification cannot assure a profit or protect against loss in a declining market.

Adding Inflation Protection Has Reduced Volatility

(Fig. 3) Effect was more pronounced over longer time frames



For illustrative purposes only. Not representative of an actual investment or T. Rowe Price portfolio. Investors cannot invest directly in an index. Actual investment results may differ materially.

As of December 31, 2020.

Rolling returns computed using data from 1976 through 2020.

Source: Morningstar, Inc. (see Additional Disclosures); analysis by T. Rowe Price.

Note: See appendix for a description of the benchmarks and asset classes used in the study.

The T. Rowe Price Approach

T. Rowe Price has a long history of addressing the risks that inflation can pose to client portfolios, and this forward-looking approach continues today. The firm offers investment strategies that invest specifically in real assets and in shorter-term TIPS. By incorporating these assets in diversified portfolios, our Multi-Asset Division seeks to provide clients with a buffer against unexpected inflation risk, thus potentially reducing volatility without sacrificing overall expected return.

The inflation focused portion of the fixed income allocation in our multi-asset portfolios is invested in the Limited Duration Inflation Focused Bond Fund. As noted, shorter-term TIPS have been more positively correlated with changes in inflation than longer-term TIPS, primarily because of their shorter duration. Higher interest rates typically have accompanied higher inflation, and a shorter-duration profile—relative to strategies benchmarked to the broader TIPS index—may provide more protection in a rising rate environment.

Within this inflation-hedging component, we also have the flexibility to invest in non-inflation-linked bonds, such as high-quality securitized credit and short-term corporate debt, in periods when U.S. TIPS offer less attractive relative value or if we see opportunities to boost income when inflation is declining. We focus our non-TIPS positions in areas that historically exhibited positive correlation to unexpected inflation and attractive risk-adjusted return profiles.

Our multi-asset team invests the real assets portion of their equity portfolios in the Real Assets Fund. When approaching real assets such as natural resources and real estate, we prefer to invest in a diversified portfolio of equity securities rather than directly in physical commodities or property. In our view, this approach provides better liquidity, as

positions can typically be bought or sold quickly without adverse price reactions.

Our research also suggests that the inflation sensitivity of real assets securities is equal to or better than that of comparable physical assets. In addition, natural resources equities have the potential to benefit from factors other than rising commodity prices—such as increased earnings from productivity gains—while REITs potentially can benefit from rising rents and property values. We use our quantitative research capabilities to target the optimal exposures to various sectors such as natural resources, energy, metals and mining, and real estate.

In addition to the roles they play in T. Rowe Price's multi-asset portfolios, the Real Assets Fund and the Limited Duration Inflation Focused Bond Fund both are also available as standalone investment vehicles for investors seeking to add some potential inflation protection to their own portfolios. Unlike the U.S. Treasury securities in which it invests, an investment in the Limited Duration Inflation Focused Bond Fund is not insured or guaranteed by the U.S. government.

Actively Managing Inflation Protection

Even at relatively low levels, inflation can substantially reduce real portfolio returns over time. Unexpected inflation has the potential to inflict the most damage, suggesting that inflation protection should be an integral component of a long-term investment strategy and not just a tactical position taken in response to the current market environment.

Different inflation-hedging assets have shown varying return and correlation patterns across different inflation environments. This underscores the potential value of constructing diversified inflation-hedging allocations instead of focusing on a single asset class or sector. It also highlights the potential for skilled managers to add value

through active allocation between real, inflation-linked, and conventional assets—such as the broad equity market and non-inflation-linked bonds—and among real asset sectors.



WHAT WE'RE WATCHING NEXT

A near-term jump in inflation is widely expected, driven by tailwinds from fiscal stimulus, pent-up consumer demand, and low inflation readings in the year-ago period. As strategic investors, we will be closely watching leading inflation indicators—including the U.S. dollar, oil prices, consumer inflation expectations, and equity valuations—to gauge whether this inflationary momentum will be sustained and position portfolios accordingly.

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Appendix: Description of Benchmarks Used in Inflation Studies

Asset	Time Period	Index Used
Metals and Mining ^{1,2}	Sep. 1976 to Sep. 1989	41% S&P Metals & Mining Index 5% S&P Aluminum Index 21% S&P Iron & Steel Index 33% S&P Gold & Precious Metals Index
	Oct. 1989 to Dec. 1994	83.33% Metals & Mining Index 16.67% S&P Gold & Precious Metals Index
	Jan. 1995 to Feb. 2001	83.33% MSCI World Metals & Mining Index 16.67% MSCI World gold and precious metals subindustry group ³
	Mar. 2001 to Dec. 2020	83.33% MSCI All Country World (ACW) Metals & Mining Index 16.67% MSCI World gold and precious metals subindustry group ³
Energy and Materials	Sep. 1976 to Sep. 1989	65% S&P Oil Composite Index 17.5% S&P Chemicals Index 12.25% S&P Paper & Forest Products Index 0.29% S&P Aluminum Index 1.31% S&P Iron & Steel Index 1.05% S&P Gold & Precious Metals Index 2.6% S&P Metals & Mining Index
	Oct. 1989 to Dec. 1994	65% S&P Energy Sector Index 35% S&P Materials Sector Index
	Jan. 1995 to Feb. 2001	65% MSCI World Energy Sector Index 35% MSCI World Materials Sector Index
	Mar. 2001 to Dec. 2019	65% MSCI ACW Energy Sector Index 35% MSCI ACW Materials Sector Index
	Jan. 2020 to Dec. 2020	MSCI World Select Natural Resources Index (net)
U.S. REITs	Sep. 1976 to Dec. 1977	NAREIT U.S. Real Estate—Equity REIT Index
	Jan. 1978 to Dec. 2020	Wilshire U.S. Real Estate Securities Index
Global REITs	Sep. 1976 to Dec. 1977	66.7% U.S. (NAREIT U.S. Real Estate—Equity REIT Index) 33.3% Japan (JSRI—TSE Real Estate Index)
	Jan. 1978 to Dec. 1979	66.7% U.S. (Wilshire U.S. Real Estate Securities Index) 33.3% Japan (JSRI—TSE Real Estate Index)
	Jan. 1980 to Dec. 1985	40% U.S. (Wilshire U.S. Real Estate Securities Index) 30% Japan (JSRI—TSE Real Estate Index) 30% Australia (S&P/ASX 300 A—REIT Index)
	Jan. 1986 to Jun. 1989	25% U.S. (Wilshire U.S. Real Estate Securities Index) 25% Japan (JSRI—TSE Real Estate Index) 25% Australia (S&P/ASX 300 A—REIT Index) 25% UK (FTSE 350 Real Estate Index)
	Jul. 1989 to Dec. 1999	S&P 500 Global REIT Index
	Jan. 2000 to Dec. 2020	FTSE EPRA/NAREIT Developed Index
U.S. Stocks	Sep. 1976 to Dec. 2020	S&P 500 Index
U.S. Core Bonds	Sep. 1976 to Dec. 2020	Bloomberg Barclays U.S. Aggregate Bond Index
Consumer Inflation	Sep. 1976 to Dec. 2020	Consumer Price Index for All Urban Consumers (CPI-U) ⁴
Commodity Inflation	Sep. 1976 to Dec. 2020	Producer Price Index (PPI), Crude Materials for Further Processing ⁴
Wages	Sep. 1976 to Dec. 2020	Average Hourly Earnings ⁴

¹ Metals and mining contains a structural 1/6 (16.67%) overweight to precious metals over the entire study period.

² Some overlap exists between the energy and materials sector and the metals and mining sector during certain periods.

³ The gold and precious metals subindustry groups are subsets of the metals and mining indexes provided by MSCI. Return series for these subindustry groups were created by T. Rowe Price based on the MSCI data.

⁴ Source: Bureau of Labor Statistics.

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