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Fixed income perspective: Treasury Inflation Protected Securities

Treasury Inflation Protected Securities (TIPS) are an often misunderstood fixed income asset class. While some investors believe the name implies that TIPS returns are perfectly correlated to changes in inflation, that is not the case. Investors should examine the subtleties and complexities of TIPS before seeking to take advantage of their long-term diversification benefits. Within the overall TIPS market, securities with shorter durations (1-10 years) can be more strongly correlated to inflation while offering similar return potential and lower volatility.

UNDERSTANDING INTEREST RATES, INFLATION AND TIPS

Investors sometimes forget that TIPS are bonds and therefore are subject to interest-rate risk. They also may not understand that inflation itself will not propel TIPS returns. Only inflation that is higher than the rate already expected by the market creates extra return. Other market factors may also influence the returns of these securities.

TIPS are an asset class driven by subtleties. They're much more complicated than many investors think because their returns are driven by two factors: changes in interest rates and changes in inflation expectations. These two variables, interest rates and inflation, are some of the most difficult to accurately forecast.

To better understand the impact of changing interest rates on TIPS, let's look at how TIPS work as individual bonds and within a mutual fund structure, and the performance factors that affect their total return. The performance of TIPS depends on the interplay of interest rate changes and unexpected inflation. Therefore, the actual performance of TIPS will vary depending on how the rate cycle and inflation environment play out. Regardless of the rate environment,

TIPS can be a valuable portfolio diversifier for long-term investors given that the primary drivers of return are likely to be different than most exposures already in a portfolio.

HOW TIPS WORK

Treasury Inflation Protected Securities were introduced in the United States in 1997. The basic principle behind their development was to index the principal and income on a U.S. Treasury security for inflation. Three main differences distinguish a TIPS from a regular U.S. Treasury security:

- Principal of the bond is adjusted for inflation
- Coupon rate is fixed based on the "real interest rate" (if real rates are negative, a minimum coupon of 0.125% will be used)
- Interest payments include an inflation adjustment

Let's more closely examine each of these aspects of TIPS.

Principal amount

The principal amount of a TIPS is adjusted up or down for changes in inflation. To measure inflation, the Treasury Department uses changes in the CPI-U, or Consumer Price Index for All Urban Consumers (not seasonally adjusted). This measure was selected by the Treasury because it is the best known and most widely accepted measure of inflation. While the principal amount is adjusted daily and used to calculate interest payments, it is not received by investors until maturity. In addition, the U.S. government guarantees that the inflation-adjusted principal amount of the bond at maturity will not be less than the bond's original amount. If the United States experiences an extended period of deflation, the U.S. Treasury would make up the difference at maturity by returning the full par amount of the bond.

Coupon payment

The initial coupon of a TIPS is based on the real interest rate. (It is based on the higher of the real interest rate, determined when the security was first auctioned into the market, or 0.125%.) To understand what a real rate is, we must examine the two components of nominal interest rates:

Nominal Rate = Real Rate + Inflation Expectations

Because the structure of a TIPS includes an inflation adjustment feature, the bond's initial coupon is based on the market real interest rate at issuance. This rate is almost always lower than the nominal rate. For example:

- The yield on the 10-year Treasury note was 4.24% as of 30 June 2025.[1]
- The market expects inflation to be 2.28% over the next 10 years.
- This means the real 10-year rate was 1.96%.
- The coupon on the bond would be set at the higher of 1.96% or 0.125%, rounded to the nearest 0.125% increment (so 2.00%).

The inflation adjustment feature of the TIPS coupon payment is tied to the inflation adjustment of the bond's principal amount.

The coupon rate is fixed at the point of issue. However, at each semiannual coupon payment, the bond's stated coupon rate is multiplied by the inflation-adjusted principal amount. If inflation has been positive, and the principal amount has increased, the bond's coupon payment will also increase.

Example of TIPS inflation adjustment feature

The following hypothetical example illustrates how the inflation adjustment feature of a TIPS bond works during a period of inflation:

- TIPS issued at a face value of $1,000
- Coupon rate is 3%
- Annual inflation rate is 2%

Principal value increases — Over the course of the year, the principal value of the TIPS increases to $1,020 ($1,000 x 102%).

Coupon payment increases — The investor's coupon payment increases from $30.00 ($1,000 x 3%) to $30.60 ($1,020 x 3%) annually. Note that actual coupon payments are made semiannually.

[1] Source: www.treasury.gov

BENEFITS OF TIPS

Low credit risk

One of the primary advantages of TIPS is that they are backed by the full faith and credit of the U.S. government. This means they have very low credit risk.

Lower volatility inflation hedge

Among asset classes commonly used as inflation hedges, TIPS are the least volatile. As shown in **Exhibit 1,** compared to equities, commodities, high yield bonds or real estate, TIPS have historically exhibited a low standard deviation of returns. Notably, shorter-duration (1-10 year) TIPS have offered an even more attractive risk/reward tradeoff than full-duration TIPS.

Exhibit 1: Historically, TIPS have exhibited a low standard deviation of returns

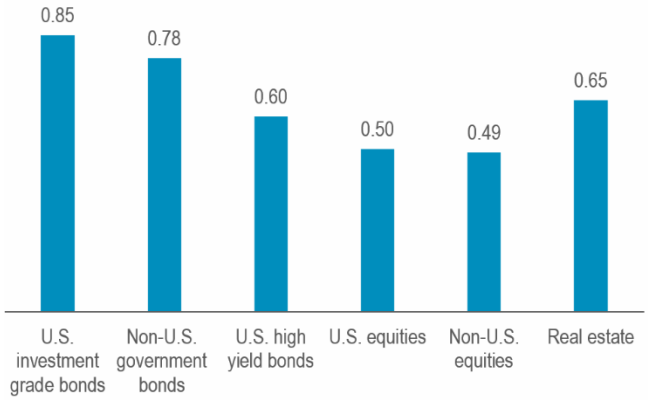
Asset class	Annualized return (%)	Standard deviation (%)	Sharpe ratio (%)
TIPS (1-10 year)	2.93	3.84	0.23
TIPS (full duration)	2.67	5.00	0.14
U.S. investment grade bonds	1.76	5.03	-0.04
Non-U.S. gov't bonds	0.56	6.89	-0.19
U.S. high yield bonds	5.37	7.54	0.46
U.S. equities	13.65	15.50	0.77
Non-U.S. equities	7.03	15.24	0.39
Real estate	6.61	17.49	0.34
Commodities	1.45	21.33	0.08

Source: Morningstar Direct for the 10 years ended 30 Jun 2025. **Past performance does not predict or guarantee future results. Representative indexes: TIPS (1-10 Year):** Bloomberg U.S. Treasury TIPS 1-10 Year Index; **TIPS (full duration):** Bloomberg U.S. Treasury TIPS Index; **U.S. investment grade bonds:** Bloomberg U.S. Aggregate Bond Index; **non-U.S. government bonds:** FTSE World Government Bond Index; **U.S. high yield bonds:** Bloomberg U.S. High Yield 2% Issuer Cap Index; **U.S. equities:** S&P 500 Index; **non-U.S. equities:** MSCI EAFE Index; **Real estate:** FTSE NAREIT All Equity REIT Index; **commodities:** S&P GSCI Index. Standard deviation is a measurement of an investment's volatility. It is not possible to invest directly in an index.

Diversification

Because it is a distinct asset class, TIPS tend to behave differently from other commonly used types of investments. **Exhibit 2** shows the correlation benefits of TIPS relative to several fixed income and equity categories for the 10 years ended 30 June 2025. These can make TIPS a valuable portfolio diversifier.

Exhibit 2: TIPS have had low correlation to other fixed income and equity categories



Source: Morningstar Direct, 10 years ended 30 Jun 2025. **Past performance does not predict or guarantee future results. Representative indexes:** Bloomberg U.S. Treasury TIPS Index; **U.S. investment grade bonds:** Bloomberg U.S. Aggregate Bond Index; **Non-U.S. government bonds:** FTSE World Government Bond Index; **U.S. high yield bonds:** Bloomberg U.S. High Yield 2% Issuer Cap Index; **U.S. equities:** S&P 500 Index; **Non-U.S. equities:** MSCI EAFE Index; **Real estate:** FTSE NAREIT All Equity REIT Index. It is not possible to invest directly in an index.

CHALLENGES IN TIPS INVESTING

An investor must navigate several common challenges when considering adding TIPS to a portfolio.

Phantom income

A complicating issue of individual TIPS is that the investor must pay taxes each year on the inflation adjustment to principal, even though the investor does not receive the amount of that inflation adjustment until the bond matures. This phenomenon is known as "phantom income tax."

Mutual fund investors avoid this problem because TIPS mutual funds distribute all inflation adjustments as they are accrued, turning phantom income into realized cash flows. Although the fund distributions are subject to income tax, the income is actually taxed in the same tax year it is received.

> *Among asset classes commonly used as inflation hedges, TIPS are the least volatile.*

Inflation adjustment lag

The inflation adjustment feature of TIPS can be confusing for investors because there is a lag between the inflation announcement and its impact on the price of the TIPS. The inflation adjustment is based on changes in the CPI-U. Technically, the inflation adjustment to TIPS is based on an index ratio for each individual bond, which is set at 100 at issuance. The particular index value for an individual TIPS is known as its Reference CPI-U. However, there is a three-month lag between the time when the CPI-U value is published and when that value affects the Reference CPI-U for the inflation adjustment of a TIPS bond.

For example, the Reference CPI-U for the first day of any calendar month is the CPI-U published for the third preceding calendar month. Therefore, the Reference CPI-U applicable to April 1 in any calendar year is the CPI-U published for January. This lag between the inflation prints and the impact on the price of a TIPS can be confusing, since larger increases in inflation do not affect the principal amount of the TIPS for three months. In the secondary market, this lag can affect the trading price of TIPS as the market anticipates the future changes in the CPI-U. A mutual fund is priced daily based on the prices available in the secondary market. Therefore, the daily value of a TIPS mutual fund can more rapidly adjust to changes in inflation.

Inconsistent income

Many investors purchase bonds for current income. However, the current income of a TIPS or TIPS fund can be inconsistent. Because the coupon payment received on the bond is based on changes in inflation, it can go up or down quite rapidly.

During a period of disinflation (slowing or declining inflation rates), such as that experienced after the credit crisis of 2008, TIPS mutual funds can actually pay no dividends for extended periods of time. That's because the negative adjustments to the principal of the bonds get booked as negative income under mutual fund accounting rules.

For that reason, a TIPS mutual fund may not be best suited for investors who require current income in the form of consistent, periodic coupon payments.

COMPARISON OF INDIVIDUAL TIPS AND TIPS MUTUAL FUNDS

When deciding how to purchase exposure to the TIPS asset class, investors should consider the similarities and differences between the two products, as shown in **Exhibit 3.**

Exhibit 3: Comparing TIPS investment vehicles

	Individual securities	Mutual funds
Inflation protection	●	●
No phantom income		●
Principal protection at maturity	●	
Diversification		●
Professional management		●

The information shown is for illustrative purposes only and does not predict the future performance of these types of vehicles or any Nuveen product.

TIPS PERFORMANCE FACTORS

Again, TIPS returns are driven primarily by two factors: changes in interest rates and changes in inflation expectations. Understanding how these factors interplay is important to understanding how TIPS can potentially perform.

Interplay of interest rates and inflation

As a fixed income security, a TIPS bond will experience changes in its price as interest rates move up or down. Like all bonds, rising interest rates cause the price of TIPS to decline, while falling rates do the opposite. However, there are two important differences between TIPS and a regular nominal bond.

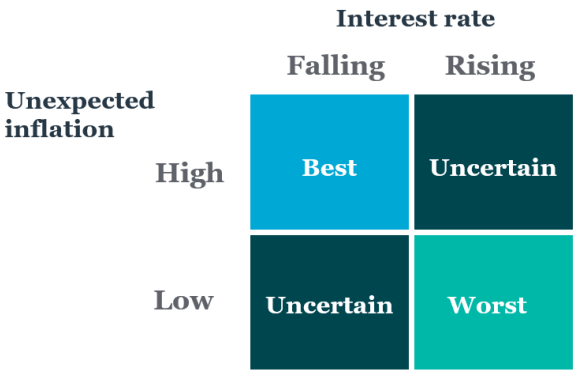
First, the price of a TIPS is based on changes in interest rates. However, because real interest rates do not include the inflation expectation, they tend to be less volatile than nominal rates. It is the inflation component of nominal rates that tends to cause much of their volatility. That said, real rates still move over time, generally in sync with nominal trends.

Second, the overall TIPS market tends to be longer duration than the typical taxable fixed income asset class. Therefore, even though real rates are less volatile, the average TIPS fund can fluctuate more in response to changes in interest rates than the average intermediate term bond fund.

Inflation also affects performance. Positive inflation is good for TIPS while negative inflation is bad. However, purchasers of TIPS in the secondary market or TIPS mutual funds must understand that the current market inflation expectation is already priced into the bond. For inflation to be beneficial, it must be higher than the market anticipates. This complicates the response of TIPS to inflation. Moreover, if inflationary pressures are causing rising rates, the picture becomes less clear.

Exhibit 4 shows how these two forces interact. The best environment for TIPS is one with falling interest rates and rising unexpected inflation — a period of stagflation like the United States experienced in the 1970s. The worst environment is the opposite: rising yields and falling inflation.

Exhibit 4: Factors affecting TIPS returns



However, the impact of the other two environments is less certain. It depends on the relative impact of each factor on the price of bonds. Raging inflation accompanied by sharply rising rates may not be ideal if the negative price impact of the rising rates completely counteracts the positive price impact of unexpected inflation.

Exhibit 5 shows how these two factors can interact to affect the price of a TIPS. For example, even a modest rise in real yields of just 100 basis points can quickly overcome a substantial 3% increase in inflation to create a -3.0% return.

Exhibit 5: Changes in real yield have an impact on 10-year TIPS total returns

Change in:

real yield \ annual inflation	-1%	0%	1%	2%	3%
-100 bps	9.5%	10.6%	11.7%	12.8%	13.9%
-50 bps	5.1%	6.2%	7.3%	8.3%	9.4%
0 bps	1.0%	2.0%	3.0%	4.0%	5.0%
50 bps	-3.0%	-2.0%	-1.0%	-0.1%	0.9%
100 bps	-6.8%	-5.8%	-4.9%	-4.0%	-3.0%

Data source: BofA Merrill Lynch Global Research. One-year horizon, coupon = 2%; initial value = 100. bps = basis points. One basis point = 0.01%, and 100 basis points = 1%. The information shown is for illustrative purposes only and does not predict the future performance of these type of vehicles or any Nuveen product.

MEASURING RATE SENSITIVITY

Because the impact of the inflation adjustment feature of TIPS can mute the bond's price response to changes in interest rates, the duration usually quoted on TIPS indexes and many mutual funds is the "inflation beta-adjusted duration."

The actual duration of the security is reduced by a factor that attempts to capture the mitigating effect of the inflation adjustment feature of the bond. For the technically inclined, this factor is based on the correlation between the price return of TIPS and inflation over the preceding 30 days. That means it accounts only for the most recent period of inflation, and it can vary over time.

Typically, this inflation adjustment reduces the duration of TIPS by approximately 20%-40% relative to nominal bonds of similar maturities.

While the impact of the inflation adjustment offsets some of the price impact of the longer duration, much remains. For example, as of 30 June 2025, the full duration of the Bloomberg TIPS Index was 6.54 years, compared to 6.06 years for the Bloomberg U.S. Aggregate Bond Index.[2] Many investors do not realize the amount of interest-rate sensitivity the TIPS market contains.

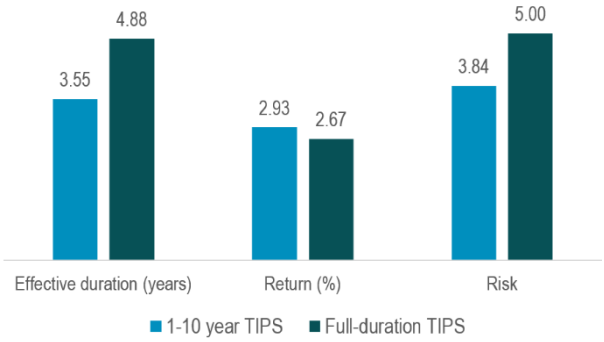
[2] Source: Bloomberg, L.P.

Because TIPS are government issued, they do not have any potential for narrowing credit spreads to mitigate rate increases. This makes them one of the more sensitive fixed income sectors to rate changes.

The negative impact of TIPS longer duration profile was on display in 2022. For the full year, the 10-year Treasury yield rose by +2.36% (+236 bps). During the same period, the Bloomberg U.S. TIPS Index returned -11.95%, even as the CPI-U reached its highest level in decades. This period clearly illustrates how a large spike in interest rates can overwhelm the positive contribution of inflation.

One way to reduce the interest-rate sensitivity of the TIPS asset class is to use a TIPS portfolio with a shorter duration profile. **Exhibit 6** shows that the TIPS 1-10 year index has just 73% of the duration of the full-duration index but with greater return potential and 23% lower volatility.

Exhibit 6: Shorter-duration TIPS reduce interest-rate sensitivity



Data sources: Morningstar Direct; Bloomberg, L.P. Return = 10-year total return for the period ended 30 Jun 2025. Risk = 10-year standard deviation of returns for the period ended 30 Jun 2025. **Past performance does not predict or guarantee future results. Representative indexes: TIPS (full duration):** Bloomberg U.S. Treasury TIPS Index; **TIPS (1-10 year):** Bloomberg U.S. Treasury TIPS 1-10 Year Index. Standard deviation is a measurement of an investment's volatility. It is not possible to invest directly in an index.

MEASURING INFLATION EXPECTATIONS

One of the biggest benefits of the creation of the TIPS market was that it created a visible, easy-to-track measure of investor inflation expectations. The difference between the yield on a TIPS and its same-maturity Treasury bond is known as the "breakeven rate" of inflation. It is the market's expectation of the inflation rate for that period of time.

Theoretically, an investor who believes inflation will be higher than the current breakeven rate over that time period should buy the TIPS because it is underpriced. In contrast, an investor who believes the rate of inflation will be lower than the breakeven rate should sell TIPS.

Exhibit 7 shows that this historical breakeven rate of inflation for the 10-year TIPS has averaged 2.02%, indicating that investors typically expect inflation to be positive. While inflation remains above the Federal Reserve's 2% target as of 30 June 2025, investors expected inflation of only 2.28% over the next 10 years, down markedly from peak expectations of 2.94% as of 30 April 2022.

Exhibit 7: Breakeven inflation rate (%) for 10-year TIPS, 2015-2025

Data sources: Bloomberg, L.P. and Nuveen (30 Jun 2015 – 30 Jun 2025).

Shorter-duration (1-10 year) TIPS have offered investors an even more attractive risk/reward tradeoff than full-duration TIPS.

UNEXPECTED INFLATION BENEFITS TIPS PRICES

The price of the bond is based on the real yield and the breakeven rate of inflation. The breakeven rate is the market's expectation of future inflation. For an investor to experience price appreciation in the security due to inflation, actual inflation must be higher than anticipated inflation.

For example, if an investor buys a 10-year TIPS when the breakeven rate is 2.0%, actual inflation must be higher than 2.0% for the inflation to increase the bond's price. On a cash flow basis, the investor still receives a coupon payment adjusted for inflation. That payment is expected to increase by the positive inflation adjustment. However, these increases have already been accounted for in the current price.

Therefore, positive inflation alone will not cause the price of TIPS to increase, only unexpected positive inflation. However, unexpected inflation is usually a major risk in holding a high-quality bond fund since the nominal yield includes an embedded inflation expectation.

UNEXPECTED NATURE OF INFLATION

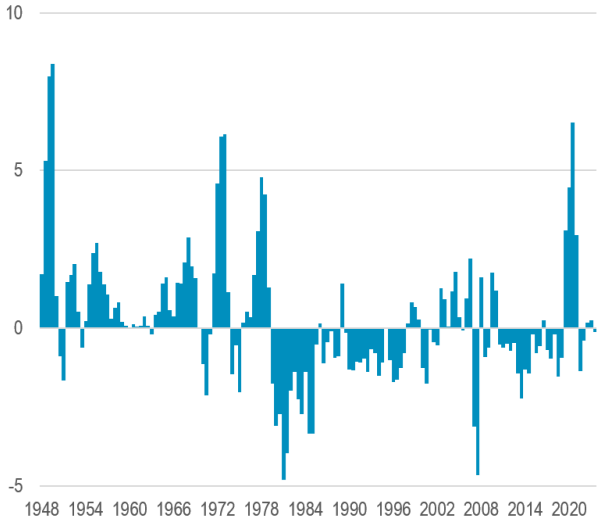
While many investors believe they have a handle on inflation, it can actually be very difficult to forecast. Both professional economists and the market itself (through the breakeven rate) have historically been very poor predictors of inflation.

One problem with forecasts is that they are based on historical data and tend to project the current environment. Another issue can be that rising inflation brings rising wages, salaries and profits.

This can be interpreted as a positive factor by market participants, until the inflation noticeably eats into purchasing power. For this reason, incorporating some inflation protected asset classes into portfolios in advance of inflationary bouts can be helpful to many investors.

Predicting inflation on a tactical, short-term basis is very difficult, even for experts. **Exhibit 8** compares experts' inflation predictions to actual inflation. A line above zero indicates actual inflation was more than forecast, and a line below zero indicates inflation was less than forecast. Over the past 75 years, the United States has experienced large and persistent errors in inflation estimates versus actual inflation data, as measured by the CPI.

Exhibit 8: Actual inflation relative to prior-year consensus forecast
Forecast error (%)



Data source: Federal Reserve Bank of Philadelphia, Bloomberg, L.P. and U.S. Bureau of Labor Statistics (31 Dec 1948 – 30 Jun 2024).

TECHNICAL FACTORS

At just $2.1 trillion, the TIPS market is a fraction of the U.S. Treasury market ($28.7 trillion) and the investment grade credit market ($8.6 trillion).[3] Due to its smaller size, supply and demand factors can have a bigger impact on the price of TIPS bonds. This adds a third dimension to the puzzle of TIPS prices. Some of the factors that may affect demand for TIPS include:

- Inflation expectations
- Risk appetites
- Absolute real yield levels
- Flows into TIPS mutual funds
- Supply
- Expectation of strong CPI prints

[3] Sources: Bloomberg, L.P. and treasurydirect.gov. Data as of 30 Jun 2025.

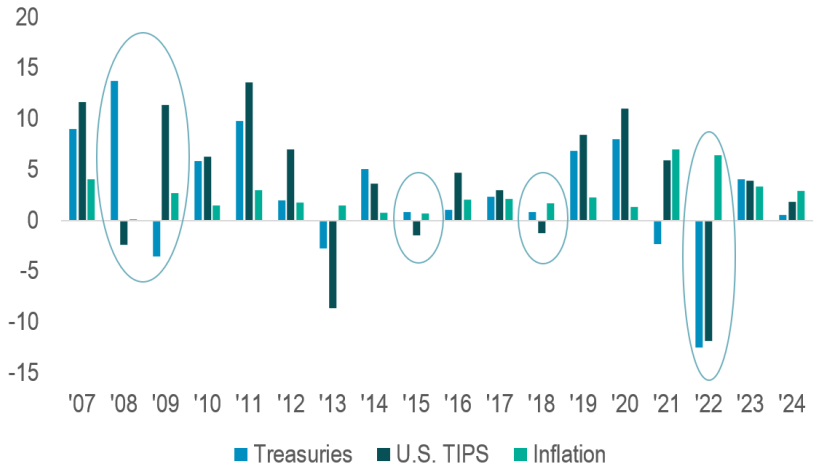
The large impact technical factors can have on the TIPS market became visible in the wake of the credit crisis, as shown in **Exhibit 9**. In 2008, the dramatic flight to quality led investors to favor nominal Treasury securities. However, even though TIPS are technically Treasuries, they behaved as if they were a risk asset. Investors shunning the TIPS market led to a significantly different return than that of U.S. Treasuries. In 2009, this trend reversed and TIPS sharply outperformed Treasuries.

In 2015, the returns of TIPS and Treasuries again diverged due to fundamental factors, including declining commodity prices and rising rates, which more negatively impacted the longer-duration TIPS index.

This same effect occurred in the fourth quarter of 2018, when TIPS sold off in tandem with risk assets as the markets wrongly anticipated Federal Reserve rate hikes. In 2022, TIPS performed in line with Treasuries even as inflation spiked. The negative impact of rising rates simply overwhelmed the positive returns from inflation.

> *Incorporating some inflation protected asset classes into portfolios in advance of inflationary bouts can be helpful to many investors.*

Exhibit 9: Comparing returns (%) of TIPS and Treasuries versus inflation



Data source: Morningstar Direct, 01 Jan 2007 – 31 Dec 2024. **Past performance does not predict or guarantee future results. Representative indexes: Treasuries:** Bloomberg U.S. Treasury Index; **TIPS:** Bloomberg U.S. Treasury TIPS Index; **Inflation:** Consumer Price Index for All Urban Consumers, not seasonally adjusted. The information shown is for illustrative purposes only and does not predict the future performance of these types of vehicles or any Nuveen product and should not be relied on for investment advice. Note: In 2011, commodity price spikes and hopes of more quantitative easing drove unexpected inflation higher early in the year, propelling TIPS returns. In 2012, inflation expectations due to quantitative easing again drove TIPS returns higher than Treasuries. In 2013, TIPS underperformed Treasuries as inflation was lower than expected, among other factors. In 2016, TIPS outperformed due to high expected inflation following the election of President Trump. In 2020 and 2021, TIPS outperformed as inflation fears rose. It is not possible to invest directly in an index.

CONCLUSION

Clearly understanding the relationship of TIPS to inflation, interest rates and market expectations is key to using these securities correctly in a portfolio.

- TIPS may offer a lower-volatility inflation-hedging alternative.
- Shorter-duration (1-10 year) TIPS reduce interest-rate sensitivity while maintaining their correlation to inflation.
- Many investors may find the features of TIPS mutual funds a more convenient way to invest in the asset class versus individual securities.
- The performance of TIPS depends on the interplay of changes in real interest rates and unexpected inflation.

Bottom line: For long-term investors, an allocation to TIPS is likely to improve portfolio diversification. Also, since TIPS are one of the less volatile hedges against inflation, they may be attractive to conservative investors.

For more information, please visit nuveen.com.

Endnotes

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