Insights
Fixed Income

Treasury Inflation-Protected Securities (TIPS) 101

Treasury Inflation-Protected Securities (TIPS) are an often misunderstood fixed income asset class. Some investors hear "inflation-protected" and assume that TIPS returns are perfectly correlated to changes in inflation. In reality, however, they are not. Learning more about the nuances, mechanics, and potential benefits of TIPS can help you integrate this asset class into portfolios.

TIPS Market Overview & Mechanics

A relatively novel class of bonds, Treasury Inflation-Protected Securities were introduced in the United States in 1997. The basic notion behind their construction is to index the principal and income on a US Treasury security to inflation.[1]

The US TIPS market is the world's largest inflation-indexed securities market with a market value of over $1.77 trillion.[2] The Federal Reserve (Fed) is a major buyer of TIPS, currently holding $377 billion in its System Open Market Account Holdings of Domestic Securities (SOMA) account.[3]

Because the overall market size of TIPS is smaller than that of traditional Treasuries ($10.03 trillion),[4] supply and demand factors can have a greater impact on the price of TIPS than regular Treasuries. For example, as a result of the Fed asset purchase program in 2020, the net supply of publicly held TIPS declined by $184 billion,[5] contributing to TIPS prices appreciating on the year. Alternatively, the price of TIPS may depreciate when the Fed sells securities, like in 2022.

Beyond the market size, TIPS differ from regular Treasuries in several ways.

Principal of Bond Adjusted for Inflation Unlike a standard nominal US Treasury, the principal amount of TIPS is adjusted up or down based on changes in inflation. To measure inflation, the Treasury Department uses changes in the CPI, or Consumer Price Index for All Urban Consumers (not seasonally adjusted). While the principal amount on individual TIPS is adjusted daily and used to calculate interest payments, it is not received by the investors until maturity (a phenomenon referred to as phantom income). At maturity, an investor will receive the inflation-adjusted principal value.

Principal is Floored At the maturity date of a TIPS, the US government guarantees that the owner of the security receives the greater of the original principal or the inflation-adjusted principal. This contractual feature is similar to an embedded put option, since a TIPS investor can force the US Treasury to redeem the TIPS at par in the unlikely event that the cumulative inflation over the life of the TIPS is negative (i.e., deflation). In other words, if there has been deflation over the life of the security, the US government returns no less than the bond's original face value to the investor.

Coupon Rate Based on Real Interest Rates TIPS will pay out a fixed percentage of the principal as its coupon semiannually until maturity. The initial coupon of a TIPS is based on the "real interest rate." This differs from regular US Treasuries which are based on a "nominal interest rate", a summation of the "real interest rate" and the market's assumption of future inflation. As TIPS have a principal inflation adjustment feature, the real rate is almost always lower than the nominal rate.

Periodic Coupon Payment Changes The coupon rate for TIPS is fixed at the point of issue. However, the semiannual coupon payment *amount* (the bond's stated coupon rate multiplied by the inflation-adjusted principal) can change. If inflation has been positive and the principal amount has increased, the bond's coupon payment will also increase proportionally.

TIPS ETFs vs. Individual Securities

When deciding *how* to add exposure to TIPS as an asset class, consider how TIPS exchange traded funds (ETFs) compare to individual TIPS. Figure 1 summarizes these differences.

Figure 1
TIPS vs. TIPS ETFs

Key Differences Between TIPS and TIPS ETFs	TIPS ETFs	Individual TIPS Bonds
Diversified	Yes	No
Inflation adjustment	Paid monthly	Paid at maturity
Frequency of payments	Monthly	Semi-annually
Set Maturity Date	No	Yes
Phantom Income	No	Yes
Exchange traded	Yes	No, OTC

Source: State Street Global Advisors, December 31, 2022.

TIPS ETFs offer three potential benefits:

1 **TIPS ETFs are Both Liquid and Diversified** Average daily trading volume of TIPS ETFs is $1.1 billion[6] and the ETF will hold several TIPS securities across different maturities. Additionally, through an ETF, as a result of professional money management, you may also receive better trade execution pricing on the underlying holdings than you might otherwise receive when investing in individual TIPS on your own.

2 **TIPS ETFs Pay the Rate of Inflation as Realized** TIPS ETFs pay out all earned income in the portfolio, including an inflation adjustment that is applied to the fund's underlying securities, based on three months' prior CPI. With individual TIPS, the inflation adjustment is received only at maturity. The lag associated with the payment is because the reference CPI for TIPS for the first day of any calendar month is actually the CPI published for the third prior calendar month.

3 **TIPS ETFs Avoid Phantom Income** One of the complicating issues of using individual TIPS is that investors must pay taxes each year on the inflation adjustment to the principal even though the inflation adjustment isn't received until the bond matures. ETFs avoid issuing this "phantom income" by distributing all inflation adjustments (classified as Treasury income) as they are accrued. This turns phantom income into realized cash flows.

It is important to note that if there is deflation, a TIPS ETF might omit or not pay a monthly distribution. For example, in late 2022 and early 2023, inflation started to fall which caused the principal of TIPS to be adjusted down. As a result, many TIPS ETFs did not pay monthly distributions during this period.

SEC Yield Differences in TIPS ETFs

Fund managers of TIPS ETFs have the option of marketing "SEC yields" on their website, or the annualization of dividends and interest earned per share during the prior 30 days, less expenses, as prescribed by Securities and Exchange Commission (SEC) rules. Given the payment of the inflation principal and the potential elimination of a payment if there is deflation, an ETF's yield metric may be distorted.

Though the TIPS principal rises with higher inflation, the SEC doesn't specify whether the SEC yield should include the inflation adjustment to income. Therefore, if inflation is exceptionally high, a fund's SEC yield that adjusts for inflation will be higher than fund peers that do not include the inflationary adjustment to the principal. However, it may be misleading to include the inflationary adjustment in the SEC yield calculation, as it assumes that on a go-forward basis, the inflation reading in the prior months will be persistent which makes comparisons difficult.

How the Breakeven Inflation Rate Impacts Performance

Evaluating the breakeven inflation rate — the annualized rate of CPI inflation over the life of the bond that makes the total return of a TIPS equal to that of a similar-tenor Treasury — is also important when comparing TIPS to nominal Treasuries.

Calculated as the yield difference between Treasury bonds and TIPS of the same maturity, breakeven rates are, ultimately, a proxy for the market's inflation expectations. The lower the rate, the lower the expectation for inflation.

Positive inflation typically benefits the performance of TIPS, while falling inflation (deflation/disinflation) may cause lower performance. It is important to note that market inflation expectations are often already priced into TIPS. Therefore, for inflation trends to be beneficial for the relative return of TIPS, it must develop at a rate that is higher than the market's anticipated breakeven inflation rates.

The following example illustrates how the inflation adjustment feature of TIPS works during a period of inflation and what it means for returns. If the US 10-year yield is 3.87% and the yield on a 10-year TIPS bond is 1.58%, this means that the breakeven rate is 2.29%. If inflation over the next 10 years is actually 2.5%, this would lead to stronger relative performance, all else equal, for TIPS versus nominals, as realized inflation was higher than what was estimated (as represented by the breakeven) at the time of purchase.

A change in market expectations or uncertainty about inflation can change TIPS prices before maturity, however. For example, beginning in April 2021 nominal and real yields both fell. Yet, real yields fell faster as a result of widening breakeven rates and investors' desire to mitigate the effects of inflation on their Treasury exposure. At the time, therefore, investors felt breakeven rates (i.e., market-based inflation expectations) were understated and not reflective of the loose policy environment. As expectations increased, TIPS outperformed nominal Treasuries by more than 8% through 2021.[7]

TIPS' Role in a Portfolio

One of the primary advantages of TIPS is that they are backed by the full faith and credit of the US government. Because TIPS offer the government's assurance that investors will never receive less than the original face value of the bond at maturity, even in the event of deflation during the life of the bond, TIPS have very low credit risk. And among asset classes used as inflation hedges, TIPS have historically been the least volatile. As shown in Figure 2, compared to equities, commodities, or real estate, TIPS have historically exhibited a lower standard deviation of returns.

Figure 2
Asset Class Return and Volatility (2013–2022)

	Annualized Return (%)	Annualized Standard Deviation (%)	Sharpe Ratio
TIPS (1–10 Year)	1.29	3.91	0.14
TIPS (Full Curve)	1.12	5.14	0.07
Agg.	1.06	4.10	0.08
Non-US Govt. Bonds	-1.22	6.03	-0.33
US High Yield Bonds	4.03	7.37	0.45
US Equities	12.56	14.71	0.80
Non-US Equities	4.67	14.78	0.27
Real Estate	6.86	16.53	0.37
Commodities	-3.30	22.15	-0.18

Source: FactSet. Period: December 31, 2012–December 31, 2022. TIPS (1–10 Year) = Bloomberg US Treasury Inflation Notes 1–10 Year Index. TIPS (Full Curve) = Bloomberg US Treasury Inflation-Linked Bond Index. Agg = Bloomberg US Aggregate Bond Index. Non US Govt Bonds = FTSE WGBI. US High Yield Bonds = Bloomberg US High Yield Corporate Bond Index. US Equities = S&P 500 Index. Non-US Equities = MSCI EAFE Index. Real Estate = FTSE NAREIT All Equity REIT Index. Commodities = S&P GSCI Index. **Past performance is not a reliable indicator of future performance.** Index returns are unmanaged and do not reflect the deduction of any fees or expenses. Index returns reflect all items of income, gain and loss and the reinvestment of dividends and other income as applicable.

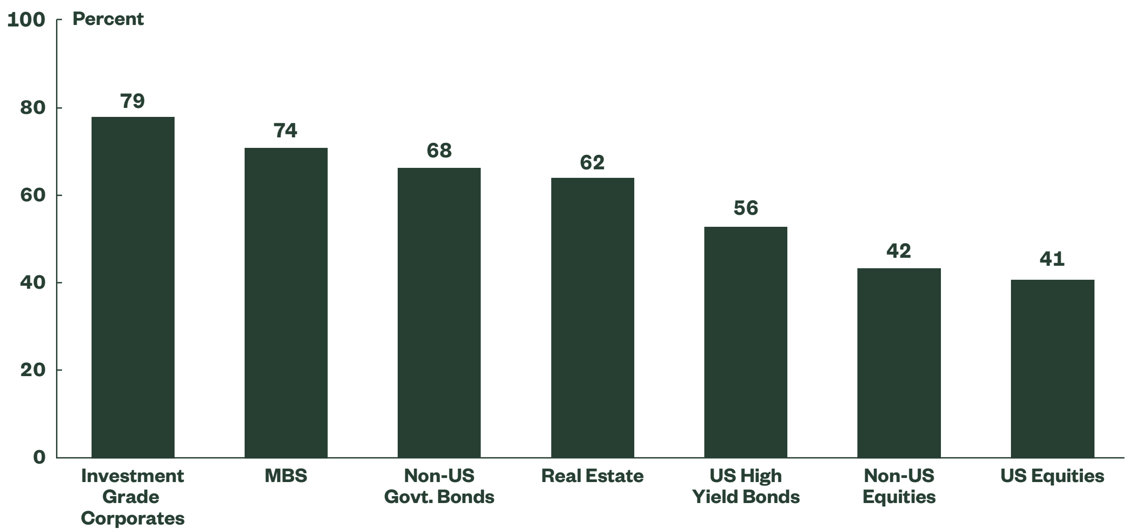
While TIPS are directly indexed to changes in inflation, many investors are surprised to see the low correlation between TIPS and inflation. Over the past 10 years, TIPS have registered slightly negative correlation to inflation (-10%).[8]

The slightly negative correlation stems from the fact that TIPS, like all bonds, have a duration, and changes in interest rates can sometimes have a much larger impact on returns (see next section for details). However, on a relative basis to nominal Treasuries, the excess return on TIPS have a 60% correlation[9] — underscoring how performance of TIPS should be viewed both on an absolute and relative basis.

As a distinct asset class from Treasuries — and not a component of the widely followed Bloomberg Aggregate Index — TIPS also tend to behave differently from other investments that are commonly found in core bond portfolios. As shown in Figure 3, TIPS are not perfectly correlated to common fixed income investments and have a low correlation to equities, making them a valuable portfolio diversifier. Therefore, including TIPS may improve the risk/return profile of a diversified portfolio irrespective of the market's inflation dynamics.

Figure 3

Asset Class Correlation to TIPS (2013–2022)



Source: Bloomberg Finance L.P., Period: December 31, 2012–December 31, 2022. TIPS = Bloomberg US Treasury Inflation-Linked Bond Index. IG Corporates = Bloomberg US Corporate Investment Grade Index. MBS = Bloomberg Multiverse MBS Index. Non-US Govt Bonds = FTSE WGBI. High Yield = Bloomberg US High Yield Corporate Bond Index. US Equities = S&P 500 Index. Non-US Equities = MSCI EAFE Index. Real Estate = FTSE NAREIT All Equity REIT Index. **Past performance is not a reliable indicator of future performance.**

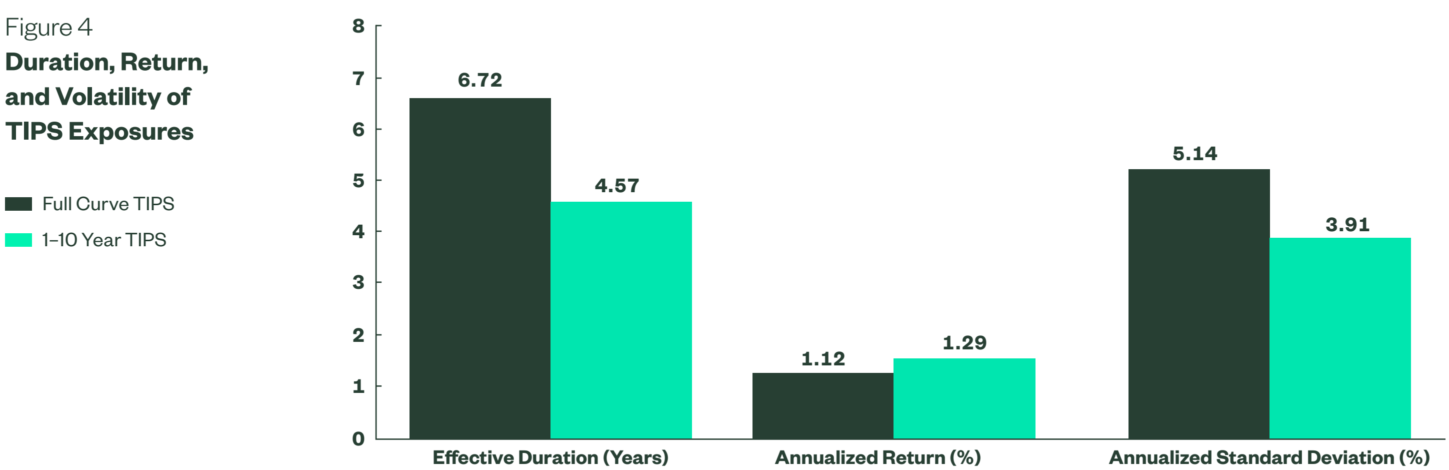
Rate Risks for TIPS

Like all bonds, TIPS are subject to interest-rate risk. And because of this, they are not a perfect hedge against inflation. For example, in March 2022, the Fed began an aggressive rate hike campaign to combat rising inflation. Through year end, the central bank raised rates by a total of 4.25%, which was the fastest rate hike cycle in decades.[10] During the same period, TIPS registered a loss of 10.8%,[11] primarily due to their duration risk amid the unprecedented speed of the rate hike cycle. These bond losses were widespread among many other fixed income asset classes, such as nominal Treasuries, investment grade corporate bonds, high yield bonds, etc.

One way to reduce the interest-rate sensitivity of TIPS is to use a TIPS portfolio with a shortened duration profile. Figure 4 illustrates how the 1–10 year TIPS index has a 68% shorter duration than the full curve index, and has outperformed by 0.17% (annualized) with 24% lower volatility. In the above example from 2022, 1–10-year TIPS outperformed full curve TIPS by 3.7%.[12]

Figure 4

Duration, Return, and Volatility of TIPS Exposures



Source: FactSet, Bloomberg Finance L.P., as of December 31, 2022. Return and standard deviation measured for the 10-year period ending December 31, 2022. Full Curve TIPS = Bloomberg US Treasury Inflation-Linked Bond Index. 1–10 Year TIPS = Bloomberg US Treasury Inflation Notes 1–10 Year Index. **Past performance is not a reliable indicator of future performance.**

Investors may want to consider adding TIPS to their portfolios. SPDR offers a breadth of Inflation Linked ETFs that are designed to protect against inflation in the US as well as in developed and emerging market countries.

Figure 5
Inflation-Linked SPDR ETFs

Ticker	Name	Benchmark	AUM ($M)	Gross Expense Ratio (%)	Net Expense Ratio (%)	Duration (Years)
SPIP	SPDR® Portfolio TIPS ETF	Bloomberg US Government Inflation-Linked Bond Index	2,237	0.12	0.12	6.92
TIPX	SPDR® Bloomberg 1–10 Year TIPS ETF	Bloomberg 1–10 Year US Government Inflation-Linked Bond Index	1,363	0.15	0.15	4.38
WIP	SPDR® FTSE International Government Inflation-Protected Bond ETF	FTSE International Inflation-Linked Securities Select Index	521	0.50	0.50	9.69

Source: State Street Global Advisors, as of December 31, 2022. The gross expense ratio is the fund's total annual operating expenses ratio. It is gross of any fee waivers or expense reimbursements. It can be found in the fund's most recent prospectus.

Endnotes

1 US Treasury.

2 Bloomberg Finance L.P., as of December 31, 2022. Based on the ICE BofA All Maturity US Inflation-Linked Treasury Index.

3 Federal Reserve, as of December 28, 2022.

4 Bloomberg Finance L.P., as of December 31, 2022. US Treasury market is based on the Bloomberg US Treasury Index.

5 Federal Reserve, Period: December 31, 2019–December 31, 2020.

6 Bloomberg Finance L.P., as of December 31, 2022. Based on the average 30 day notional trading volume.

7 Bloomberg Finance L.P., as of December 31, 2021. based on the return of the Bloomberg US Treasury Inflation-Linked Bond Index and the Bloomberg US Treasury Index.

8 Bloomberg Finance L.P., Period: December 31, 2012–December 31, 2022. Inflation = US CPI Urban Consumers NSA Index. TIPS = Bloomberg US Treasury Inflation-Linked Bond Index.

9 Bloomberg Finance L.P., Based on calendar year returns of the Bloomberg US Treasury Inflation-Linked Bond Index and the Bloomberg US Treasury Index from December 31, 2012–December 31, 2022. compared to year-over-year changes in CPI.

10 Bloomberg Finance L.P., Period: February 28, 2022–December 31, 2022. TIPS = Bloomberg US Treasury Inflation-Linked Bond Index.

11 Bloomberg Finance, L.P., Period: February 28, 2022–December 31, 2022. 1–10 Year TIPS = Bloomberg US Treasury Inflation Notes 1–10 Year Index. Full curve TIPS = Bloomberg US Treasury Inflation Notes Index.

12 Bloomberg Finance L.P., Period: February 28, 2022–December 31, 2022. Inflation = US CPI Urban Consumers NSA Index; TIPS = Bloomberg US Treasury Inflation-Linked Bond Index. 1–10 Year TIPS = Bloomberg US Treasury Inflation Notes 1–10 Year Index.

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Information Classification: General

Glossary

Bloomberg US Treasury Index Measures US dollar-denominated, fixed-rate, nominal debt issued by the US Treasury.

Bloomberg US Govt Inflation-Linked All Maturities Index Measures US dollar-denominated, fixed-rate, inflation linked debt issued by the US Treasury.

Bloomberg US Treasury TIPs 1–10 Year Index Measures the performance of the US TIPs market with less than 10 years to maturity. Federal Reserve holdings of US TIPs are not index eligible and are excluded from the face amount outstanding of each bond in the index.

Bloomberg US Treasury TIPS Index Measures the performance of the US TIPs market. Federal Reserve holdings of US TIPs are not index eligible and are excluded from the face amount outstanding of each bond in the index.

Bloomberg US Aggregate Bond Index A broad-based flagship benchmark that measures the investment grade, US dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate pass-throughs), ABS and CMBS (agency and non-agency).

S&P 500 Index A widely regarded as the best single gauge of large-cap U.S. equities.

FTSE NAREIT All Equity Index A free-float adjusted, market capitalization-weighted index of U.S. equity REITs. Constituents of the index include all tax-qualified REITs with more than 50 percent of total assets in qualifying real estate assets other than mortgages secured by real property.

S&P GSCI Index A widely recognized leading measure of general price movements and inflation in the world economy. Provides investors with a reliable and publicly available benchmark for investment performance for investment performance in the commodity markets.

US CPI Urban Consumers NSA Index Measure of prices paid by consumers for a market basket of consumer goods and services.

Bloomberg US Corporate Investment Grade Index Measures the investment grade, fixed-rate, taxable corporate bond market.

Important Risk Information

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Investing involves risk including the risk of loss of principal.

ETFs trade like stocks, are subject to investment risk, fluctuate in market value and may trade at prices above or below the ETFs' net asset value. Brokerage commissions and ETF expenses will reduce returns.

While the shares of ETFs are tradable on secondary markets, they may not readily trade in all market conditions and may trade at significant discounts in periods of **market stress.**

Increase in real interest rates can cause the price of **inflation-protected debt securities** to decrease. Interest payments on inflation protected debt securities can be unpredictable.

Sovereign debt obligations are issued by governments and government agencies and instrumentalities, which may be unable or unwilling to repay principal or interest on debt obligations in times of economic uncertainty.

U.S. Treasury obligations may differ from other fixed income securities in their interest rates, maturities, times of issuance and other characteristics. Similar to other issuers, changes to the financial condition or credit rating of the U.S. government may cause the value of the Fund's U.S. Treasury obligations to decline.

The value of the **debt securities** may increase or decrease as a result of the following: market fluctuations, increases in interest rates, inability of issuers to repay principal and interest or illiquidity in the debt securities markets; the risk of low rates of return due to reinvestment of securities during periods of falling interest rates or repayment by issuers with higher coupon or interest rates; and/or the risk of low income due to falling interest rates. To the extent that interest rates rise, certain underlying obligations may be paid off substantially slower than originally anticipated and the value of those securities may fall sharply. This may result in a reduction in income from debt securities income.

Bonds generally present less short-term risk and volatility than stocks, but contain interest rate risk (as interest rates rise, bond prices usually fall); issuer default risk; issuer credit risk; liquidity risk; and inflation risk. These effects are usually pronounced for longer-term securities. Any fixed income security sold or redeemed prior to maturity may be subject to a substantial gain or loss.

Passively managed funds invest by sampling the index, holding a range of securities that, in the aggregate, approximates the full Index in terms of key risk factors and other characteristics. This may cause the fund to experience tracking errors relative to performance of the index. This may cause the fund to experience tracking errors relative to performance of the index.

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Past performance is not a reliable indicator of future performance.

Unless otherwise noted, all data and statistical information were obtained from Bloomberg LP and SSGA as of December 31, 2022. Data in tables have been rounded to whole numbers, except for percentages, which have been rounded to the nearest tenth of a percent.

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ID1504402-3748151.5.1.AM.RTL 0423
Exp. Date: 04/30/2024

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