

TIPS: Strategic Allocation

WHITE PAPER

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In this paper, we provide an overview of Treasury Inflation Protected Securities (TIPS). TIPS, particularly those with shorter duration and thus low sensitivity to interest rates, are expected to provide a reliable inflation hedge to investors for which inflation is a substantial risk (e.g., pensions for which benefits are indexed to inflation, as well as endowments and foundations). For such investors, short duration TIPS, combined with real assets, would serve as the backbone of an inflation-protection program in their portfolios. That said, a market-duration TIPS portfolio will be at least as sensitive to changes in interest rates as it is to changes in inflation expectations. Being issued by the US Treasury, TIPS can also play the role of high quality bonds, serving as a unique kind of ballast. As with other Treasury bonds, TIPS' modest level of returns means that substituting them for other investments in a portfolio comes with an opportunity cost.

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Inflation-linked bonds

Unlike nominal bonds, inflation-linked bonds guarantee an inflation-adjusted return if held to maturity. The expected nominal yield for a government bond consists of three components: the expected rate of inflation, the inflation risk premium, and the real interest rate. Because an inflation-linked bond eliminates the risk associated with uncertainty over inflation, its yield does not include the inflation risk premium. Consequently, the expected nominal yield provided by an inflation-linked bond consists of only the expected rate of inflation and the real interest rate.¹

¹ Inflation-linked bonds are generally less liquid than their nominal counterparts. While the average liquidity premium is estimated to be reasonably large, (0.38%), it is also volatile, with a relatively large standard deviation (0.34%) that varies in line with liquidity risk proxies such as the implied volatility of VIX options (ACR 2018).

History of inflation-linked bonds

Price-linked debt instruments have a relatively long history, dating back at least as far as the mid-18th century when the Massachusetts Bay Colony issued securities linked to silver prices on the London stock exchange. In modern financial markets, although there was relatively small issuance by some governments in the mid-20th century (e.g., Finland in 1945, Israel in 1955), the first large developed market to issue inflation-indexed securities was the United Kingdom in 1981, while Australia and Canada followed suit in 1985 and 1991, respectively. The US government first issued Treasury Inflation-Protected Securities (TIPS) in 1997. At present, more than twenty

countries now offer some form of inflation-linked bonds. Although the mechanics of each country's inflation indexing differs, the concept is the same: investors are ultimately promised an inflation-adjusted return. Notably, as of the end of 2019, roughly 8% of the outstanding value of OECD government debt was inflation-linked, up from 3% in 2008.²

² OECD Borrowing outlook 2019, <https://doi.org/10.1787/aa7aad38-en>

US TIPS

With one important difference, TIPS are structurally identical to traditional US Treasury securities. Traditional US Treasuries pay a specified rate of income (via a coupon payment) and return the owner's principal at the stated maturity date. Likewise, TIPS pay a specified rate of income and return the owner's principal at the stated maturity date. And, as with traditional Treasuries, the full faith and credit of the US government backs TIPS. However, unlike that of a nominal Treasury, the principal value—and by extension the coupon payment—of TIPS is adjusted to reflect inflation of the consumer price level, as measured by the Consumer Price Index (CPI-U).³

³ For more information regarding the computation of the inflation adjustment, see Gürkaynak, Sack, and Wright (2007). For more information regarding the CPI-U, see the Bureau of Labor Statistics (www.bls.gov).

Characteristics of TIPS

Expected nominal returns

A simple way to closely approximate the expected nominal return for an inflation-protected security is to add its present yield to the expected rate of inflation over its maturity. For example, on January 2, 2020 the real yield for the 10-year TIPS was approximately 0.08%. At that time, the Survey of Professional Forecasters predicted that the CPI-U would average 2.20% over the next ten years.⁴ Therefore, a buyer of a 10-year TIPS could expect a nominal return of $(0.08 + 2.20 =) 2.28\%$ over the subsequent ten years.

⁴ Survey of Professional Forecasters, 1st Quarter 2020. Federal Reserve Bank of Philadelphia, <https://www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/2020/survq120>.

Changes in the amount investors are willing to pay for inflation protection will directly affect the relative pricing of TIPS and Treasuries.

By contrast, a buyer of a 10-year traditional Treasury bond would receive a nominal return of 1.88% over ten years. The 1.8% difference in yield can be attributed to the net effect of both an inflation risk premium for Treasuries and an illiquidity premium for TIPS (see footnote 1).

Inflation risk premium

Leaving aside the illiquidity premium, which could potentially decline to de minimis levels at times, the only difference in nominal yields between Treasuries and TIPS should be the inflation risk premium. Changes in the amount investors are willing to pay for inflation protection will directly affect the relative pricing of TIPS and Treasuries: when the inflation risk premium goes up (down), then Treasuries should lose (gain) value relative to TIPS, all else equal.

Despite its importance in nominal Treasury valuation, determining the value of the inflation risk premium as well as the primary factors influencing it is difficult due to a lack of direct observability. Approaches to measuring have varied, incorporating related market prices (e.g., term structure models), survey data, and macroeconomic models (e.g., consumption-based asset pricing models). While there is general consensus that the inflation risk premium has declined since the 1970s, recent estimates have varied between being largely positive with high variability to being minimal or negative.⁵

⁵ Bekaert & Wang, 2010; Chen, Engstrom, and Grischenko, 2016.

These various approaches reflect different explanations for changes in the inflation risk premium. Using a market-based framework, investors simply demand a higher inflation risk premium when they believe that the likelihood of having inflation exceed their expectations is high. A behavioral finance framework suggests that periods of rising inflation will cause investors to overestimate the likelihood of further increases, with a commensurate increase in the inflation risk premium (and conversely, falling inflation leads to overestimates of further decreases which leads to decreased inflation risk premiums). Consumption-based models estimate the inflation risk premium by examining the relationship between forward consumption and inflation growth over time to determine whether inflation protection will offset a decline in consumption (i.e., during negatively correlated periods) or be superfluous/detrimental to consumption (i.e., during positively correlated periods). While all three types of model indicate a long-term downward trend in inflation-risk premium, their conclusions can vary significantly in different market environments.

Volatility

At first blush, one would expect TIPS to be less volatile than Treasuries, whose prices must reflect investors' expectations about inflation and their willingness to assume inflation risk. However, actual returns have indicated otherwise: the annualized standard deviation of monthly returns is 5.4% for TIPS versus 4.3% for Treasuries during the period from March 1997 through December 2019.⁶ What's more, sub-samples of the time period reveal the same counterintuitive relationship.

⁶ Source: Barclays US TIPS Index; Barclays US Treasury Index

The conundrum may be resolved by noting that expectations regarding the future real interest rate and inflation rate are probably negatively correlated. That is, a high expected real interest rate may serve as a brake on economic growth, thereby discouraging inflation; conversely, low real rates likely spur growth and lead to inflation. To the extent that the inflation risk premium does not vary drastically, this negative correlation serves as a dampening mechanism that may cause Treasuries to be less volatile than TIPS.

Correlations

The correlation of monthly returns between TIPS and various other asset classes are shown in the following table.

	TIPS	Bonds	Stocks	Inflation
TIPS	1.00			
Bonds	0.76	1.00		
Stocks	0.02	-0.06	1.00	
Inflation	0.07	-0.17	0.05	1.00

TABLE 1
Correlation Matrix
(March 1997 - December 2019)⁷

⁷ Source: Barclays TIPS Index; Barclays Aggregate Index; Russell 3000 Index; CPI-U.

⁸ This result holds true even when lagging CPI-U for 3 and 6 months.

From 1997 through 2019, TIPS exhibited a positive correlation with nominal bonds. This makes intuitive sense because both are similarly affected by changes in expectations about future real interest rates despite the differential impact of inflation expectations on each. Next, TIPS exhibited approximately zero correlation with stocks (which also had *de minimis* correlation with either nominal bonds or with inflation). Finally, TIPS exhibited only a slight positive correlation with inflation.⁸ Although it is too slight to draw firm conclusions, this positive correlation may make intuitive sense.

In times of rising inflation, investors should be willing to pay more for inflation insurance. An increase in this premium should be directly manifested in decreased demand for nominal fixed income securities, hence the negative correlation of bonds and inflation. The money slated for nominal bonds must go somewhere, and TIPS may be the logical alternative investment. Thus, TIPS may benefit from the rotation out of nominal fixed-income securities during times of increasing inflation.

Portfolio roles and considerations

Inflation hedge

Over long-term periods, investments in real assets such as equities and real estate will likely protect investors from inflation by appreciating in value in excess of the rate of inflation. This is because as the prices of goods and services increase, the prices of these assets will also increase. However, over the short term, inflation produces major dislocations that can result in very unpredictable investment returns. As a result, TIPS—particularly short-term TIPS, which minimize their exposure to interest rates—can help hedge short-term volatility from changes in inflation while other

real assets hedge longer-term inflation risk. The table below shows how TIPS with different levels of duration would have performed during the highest and lowest annual inflation periods since 1971.

1971-2018 ⁹	US TIPS 1-5 Year	US TIPS 5 Year Constant Maturity	US TIPS 10 Year Constant Maturity	Inflation (CPI)
Top 20% of Inflation Periods ¹⁰	7.8%	6.0%	3.2%	9.5%
Bottom 20% of Inflation Periods	1.9%	2.7%	3.8%	1.3%

TABLE 2
TIPS Performance vs.
Inflation

⁹ One traditional difficulty in analyzing TIPS returns is their relatively short history, as the first TIPS was issued in 1997. To compensate for this drawback the results above use simulated TIPS returns based on an internal Meketa Investment Group model that is built upon industry and academic research.

¹⁰ Represents ranked rolling 12-month inflation. Performance represent average of rolling 12-month returns during these periods.

Furthermore, since TIPS guarantee an inflation-adjusted income, they may be an appropriate asset for investors who have some portion of their liabilities exposed to inflation. There are many such investors. Those defined benefit plans that offer a cost of living adjustment possess liabilities that are explicitly linked to inflation. Similarly, endowments and foundations must adjust to rising salaries and other relevant costs. By owning TIPS, these funds can more closely match their assets to their real liabilities, particularly if their liabilities are directly linked to CPI-U. Conversely, if an investor's liabilities are determined by other measures of inflation, TIPS may provide only a partially effective hedge (i.e., they will have a degree of basis risk).

Duration

Duration is often defined as a bond's sensitivity to a change in (nominal) interest rates. Theoretically, duration can be broken into two primary components: sensitivity to changes in real interest rates and sensitivity to changes in the expected inflation rate. Since TIPS provide an inflation-adjusted return, their sensitivity to the latter is zero. Hence, the duration for inflation-linked bonds measures their sensitivity to a change in real interest rates only. The aggregate TIPS market exhibited a duration of approximately 7.4 years in late 2019.

Duration is not as meaningful a tool for TIPS portfolios as it is for nominal bonds, because an investor cannot discern the root cause of a shift in nominal rates. In other words, it is impossible to accurately predict the sensitivity of a portfolio of TIPS to a change in nominal interest rates (Roll, 2003).

Thus, incorporating the duration of a TIPS portfolio into the calculation of duration for an aggregate bond portfolio can be somewhat misleading because it conflates two different constructs. Therefore, an investor who has a dedicated allocation to TIPS could consider excluding them when calculating the duration of their aggregate bond portfolio. However, we believe they would be better served by using the effective duration that is typically calculated by the asset manager of their TIPS portfolio. While not exact, this will provide a much better sense of the interest rate sensitivity of the aggregate bond portfolio.

Yield

Because TIPS are quoted in terms of a real yield, it is similarly misleading to compare them to the nominal yields of an aggregate bond portfolio. If it is imperative to estimate a nominal yield for TIPS, the investor can do so by adding the most appropriate long-term inflation expectation to the real yield. Note that this involves some estimation error.

TIPS are at the pure but costly end of the spectrum. However, they also offer the benefit of safety as they are US Government-issued securities and thus act as an anchor to windward.

TIPS should generally offer a lower nominal yield than mortgage-backed securities, corporate debt, or other fixed income securities that possess credit risk. Hence, an increased allocation to TIPS will reduce the nominal yield of a diversified bond portfolio.

Quality

Because TIPS are issued and backed by the US government, they are considered to possess no credit risk and to be of the same quality as nominal Treasuries. Hence, an increased allocation to TIPS will increase the quality of a diversified bond portfolio.

Sizing

When including TIPS as a portfolio construction component, their returns, volatilities, and cross-correlation with other assets show neither a clear benefit nor a penalty to the diversified portfolio's efficiency. Whether to utilize this asset class thus hinges on their perceived role in the portfolio.

For those investors whose liabilities are measured in real (i.e., purchasing-power) terms, inflation matters. Unexpected inflation—which by its very term cannot be predicted—damage stock-bond portfolios' real value. Some assets offer the ability to hedge inflation to varying degrees, albeit at some opportunity cost, which also varies. Typically, the better (or "purer") the hedge, the greater the opportunity cost.¹¹ TIPS—again, short-term TIPS in particular, with their minimal exposure to interest rate moves—are at the pure but costly end of the spectrum. However, they also offer the benefit of safety as they are US Government-issued securities and thus act as an anchor to windward.

¹¹ While an in-depth discussion is beyond the scope of this paper, for example, assets such as public natural resource equities have returns comparable to other equities, so their opportunity cost is not high, but their inflation-hedging benefit (from price increases in the underlying commodity) is often offset by their equity beta, which pulls them down during unexpected inflation.

Sizing is therefore a tradeoff. Each investor wishing to protect against inflation must weigh how much (e.g., how many years of future payouts) they wish to hedge, and how much opportunity cost they are willing to incur to their overall return as the price of this “insurance.” Backward-looking historical stress tests unfortunately do not shed much light on this puzzle because the last periods of damaging unexpected inflation predate when TIPS existed.

Implementation issues

Market liquidity

As of December 2019, the market value of the forty outstanding TIPS issues was roughly \$1.5 trillion, representing about 9% of the total outstanding issuance of the US Treasury. TIPS are currently auctioned four times per year.¹² The TIPS market is not as liquid as that for nominal Treasury bonds. This is due to several causes: the smaller size of the TIPS market, the fact that TIPS constitute a non benchmark investment for many bond managers, and TIPS’ attractiveness as a buy and-hold investment. Consequently, it is slightly more expensive to trade TIPS than it is to trade Treasuries. On the other hand, the TIPS market is more liquid than that for most investment grade corporate bonds.

Historically, the trading spread has been approximately 0.077% of principal value for TIPS, versus approximately 0.028% for Treasuries¹³. Therefore, for every trade, Treasuries have a one-time 0.047% advantage. On the other hand, TIPS have a significant trading advantage over high quality corporate bonds, which usually trade with a bid-ask spread of at least 0.25% (1/4th)¹⁴. Of course, it is possible that during periods of high volatility, the spreads for TIPS could widen; this happened during the Global Financial Crisis where TIPS spreads grew to as large as 14/32nds¹⁵.

Passive and active management

Passive investors in TIPS resign themselves to the income due to them by the Treasury. They may either buy an individual issue at auction, or invest in a TIPS index. In the latter case, the passive investor accepts the term structure of the TIPS index. Alternatively, a passive investor may design a term structure better suited to the term structure of their liabilities.

Active investors in TIPS seek to augment a passive return through several approaches, described below. These active managers are almost always measured against the TIPS benchmark indexes, discussed below.

An active TIPS manager may try to outperform a TIPS benchmark by managing the term structure of the portfolio. Hence, a manager may employ a bullet or barbell strategy or may make modest real interest rate bets through changes to the portfolio’s real duration.

¹² For more information on recent and future auctions, see <https://www.treasurydirect.gov/instit/marketable/tips/tips.htm>.

¹³ Bloomberg, average monthly bid-ask spread of on-the-run 10 year TIPS and Treasuries between February 28, 2019 and December 31, 2019.

¹⁴ See Feldhutter and Poulsen, 2018.

¹⁵ Source: Bloomberg, bid-ask spread of 30 Year TIPS issuance with expiration of 2032.

Another means of adding value includes making a relative value decision between TIPS and nominal Treasuries, switching between these instruments accordingly. However, note that too much exposure to nominal Treasuries would defeat the inflation-hedging purpose of a strategic allocation to TIPS.

Finally, a manager may try to add value by investing in other inflation-linked bonds, such as TIPS not included in the standard benchmark or those issued by US corporations or foreign governments. Investments in the former may offer additional yield at the expense of credit risk and limited liquidity. Investment in the latter may be a relative value decision between real rates in the US versus those in foreign countries. However, while foreign real rates may look attractive, it is important to note that these inflation-linked bonds track inflation in those countries, which can differ significantly from US inflation. This would be undesirable to an investor seeking to hedge their US dollar-denominated liabilities.

In our opinion, there is little potential for an active manager to add value, net of fees, unless they meaningfully deviate from their benchmark. The interquartile range of the active universe was 41 basis points on a 5-year period¹⁶, gross of fees. Further the fees for active management were 3x that of passively managed funds, though fees tend to be highly negotiable for investors committing larger mandates to TIPS.

¹⁶ Represents the difference between the 25th and 75th percentile of the eVestment US TIPS universe as of March 31, 2020.

Active Management	Passive Management
30 bp	10 bp

TABLE 3
Average Fee¹⁷

Benchmark

There are several benchmarks appropriate for TIPS investors. The two most commonly used are the Merrill Lynch US Treasury Inflation-Linked Securities index and the Bloomberg Barclays US TIPS index. The differences in methodology between these indices are subtle and should result in return dispersion of only a few basis points per month. Both indices only include TIPS that have at least one year remaining to final maturity, and they are rebalanced on the last calendar day of the month.

¹⁷ Source: eVestment as of March 31, 2020.

Alternatively, if an investor is structuring a custom TIPS portfolio, a custom index may be constructed using the appropriate issues. For example, an investor concerned only about near-term inflation may invest only in TIPS maturing in the next five years and would construct a benchmark accordingly.

Timing

Even sophisticated investors frequently err in presuming that the recent past will persist indefinitely. During the first year that TIPS were issued, the US inflation rate fell from 2.8% to 1.4%. Because TIPS tend to underperform Treasuries when the rate of inflation declines, early TIPS investors experienced relatively weak performance (see earlier table).

More broadly, the annual rate of inflation fell from 13.3% in 1979 to 0.1% in 2008 before rebounding to 1.9% in 2018. This sustained decline in inflation surely led some to expect persistently falling inflation in the future. These expectations may have depressed the prices of TIPS to unusually attractive levels early in their existence.

Note that because TIPS exhibit lower volatility than most asset classes, the risk of mistiming an entry into the TIPS market is not as high as it would be with most other assets.

Vehicle

Investors willing to accept the term structure offered by the market (or more accurately, the Treasury) may invest in a commingled vehicle that is charged with matching or slightly outperforming the index, net of fees. Because the potential to add value is minimal, *low fees are essential to meeting this goal.*

Alternatively, if an investor seeks a custom portfolio, a separate account structure must be utilized. In this case, the investment manager would construct a portfolio to match the liability or inflation requirements of the investor. This portfolio could be actively traded or treated as a buy-and-hold portfolio.

Summary and recommendation

TIPS have risk and return patterns that differ from those of stocks or traditional (nominal) bonds and, importantly, provide a durable stream of income linked to CPI-U. For investors with liabilities that are significantly impacted by broad measures of inflation, TIPS would likely help hedge against a rise in liabilities in an environment where the performance of stocks and traditional bonds is uncertain. Even for investors without inflation-indexed liabilities, TIPS can ultimately benefit investors by acting as an insurance policy against unexpectedly high inflation.

Meketa Investment Group recommends that its inflation-sensitive clients consider including TIPS in their portfolios. TIPS, particularly those with shorter duration and thus low sensitivity to interest rates, are expected to provide a reliable inflation hedge to investors for which inflation is a substantial risk (e.g., pensions for which benefits are indexed to inflation, as well as endowments and foundations). For such investors, short duration TIPS, combined with real assets, would serve as the backbone of an inflation-protection program in their portfolios. That said, a market-duration TIPS portfolio will be at least as sensitive to changes in interest rates as it is to changes in inflation expectations.

Being issued by the US Treasury, TIPS can also play the role of high quality bonds, serving as a unique kind of ballast. As with other Treasury bonds, TIPS' modest level of returns means that substituting them for other investments in a portfolio comes with an opportunity cost. Investors must make the decision based upon their own specific circumstances to determine the sizing of their TIPS allocation, balancing their needs for an inflation hedge with the likely reduction in return that would ensue in ordinary markets.

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