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ASSET MANAGEMENT

MAJOR CONSIDERATIONS FOR TIPS INVESTORS TODAY

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You don't have to go farther than your local grocery store to appreciate the impact of inflation on our daily lives. Getting the current bout of inflation under control has taken longer than expected and remains a key focus for the Federal Reserve System's Federal Open Market Committee (the Fed). It has also garnered heightened interest in Treasury Inflation Protected Securities (TIPS). While TIPS have been around since 1997, inflation over the past 27 years has been fairly contained until recent years. In this paper, we seek to answer some of the main questions we are getting about these fixed-income securities.

WHAT ARE TIPS AND HOW IS INFLATION PRICED IN?

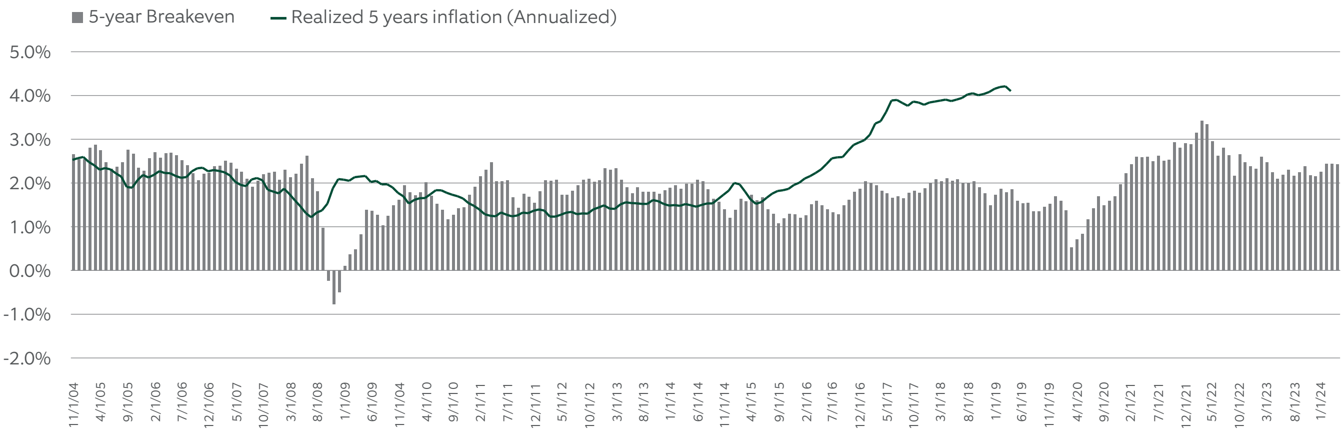
TIPS are U.S. Treasury securities whose principal amount increases with inflation and decreases with deflation[1]. They capture a fixed real interest rate while accruing actual changes in the Consumer Price Index (CPI)[2], subject to an approximate three-month lag. The inflation rate priced into the market reflects the difference between a similar-maturity fixed-rate Treasury bond (a "nominal Treasury") vs. TIPS. The difference in yield — the breakeven rate — is primarily the inflation expectation priced into the market along with smaller variables including a risk premium, liquidity differences, fluctuations in value from a deflation floor embedded in TIPS, and differences in tax treatments. If inflation, measured by CPI, comes in above the breakeven rate over the life of the bond, an investor earns more relative to similar-maturity nominal Treasuries. The opposite is true if inflation comes in below the breakeven rate[3]. If inflation comes in at the breakeven rate, the investor makes the same in either a similar-maturity nominal Treasury or TIPS — hence the term "breakeven rate." The difference between TIPS and similar-maturity nominal Treasuries can help provide guidance on where the market expects inflation to be.

DOES THE MARKET USUALLY GET INFLATION RIGHT?

Throughout their history, the TIPS breakeven rate has served as a reliable predictor of inflation when inflation was relatively stable and close to the Fed's 2% target[4]. TIPS generally underperformed since they effectively paid a risk premium relative to nominal Treasuries in exchange for their additional inflation protection. In recent years, however, when inflation moved notably above the Fed's target, TIPS served their intended purpose and outperformed similar-maturity nominal Treasuries.

The below chart shows the beginning 5-year breakeven rate over time in gray, and the actual average annual inflation experienced over the subsequent 5 years in green. When the green line was below the gray lines, investors earned more by buying 5-year Treasuries. When the green line was above the gray lines, investors earned more with 5-year TIPS. (The green line stops 5 years back as the full period has not yet transpired.)

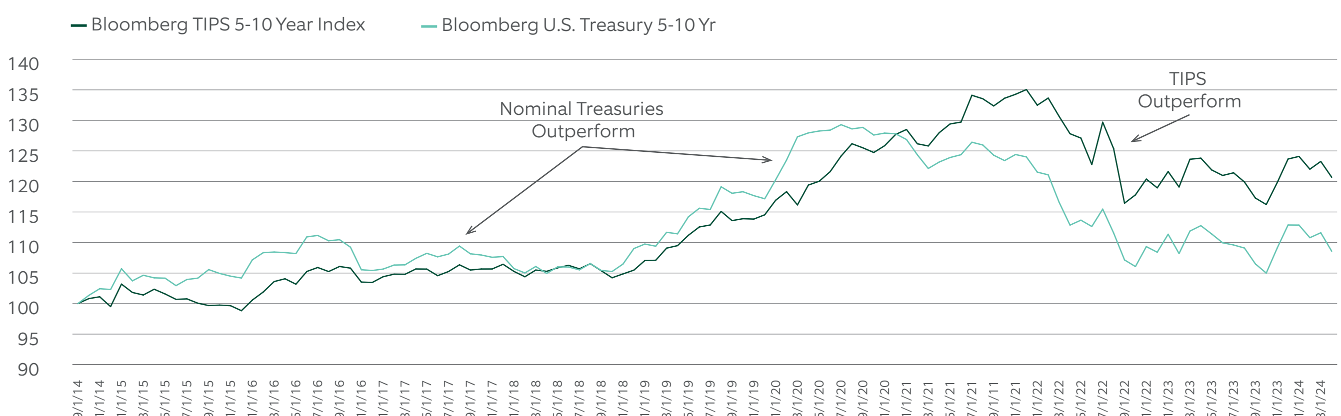
5 YEAR MARKET PRICED INFLATION VS. ACTUAL INFLATION



Source: Bloomberg, data as of 11/01/2004-1/01/2024. Historical trends are not indicative of future results.

Note that outside of the global financial crisis, when breakeven rates reflected an expectation of longer-term deflation (which did not occur), TIPS outperformed as inflation started to lift the 5-year averages. This includes 2021 to the current period. We also see this in the performance of TIPS relative to nominal Treasuries of similar maturity ranges. Below is a chart of the total return of the Bloomberg TIPS 5-10 Year Index and the Bloomberg US Treasury 5-10 Year Index for the last 10 years. TIPS started to outperform in 2021 when inflation began to outpace expectations.

PERFORMANCE: TIPS VS. TREASURIES



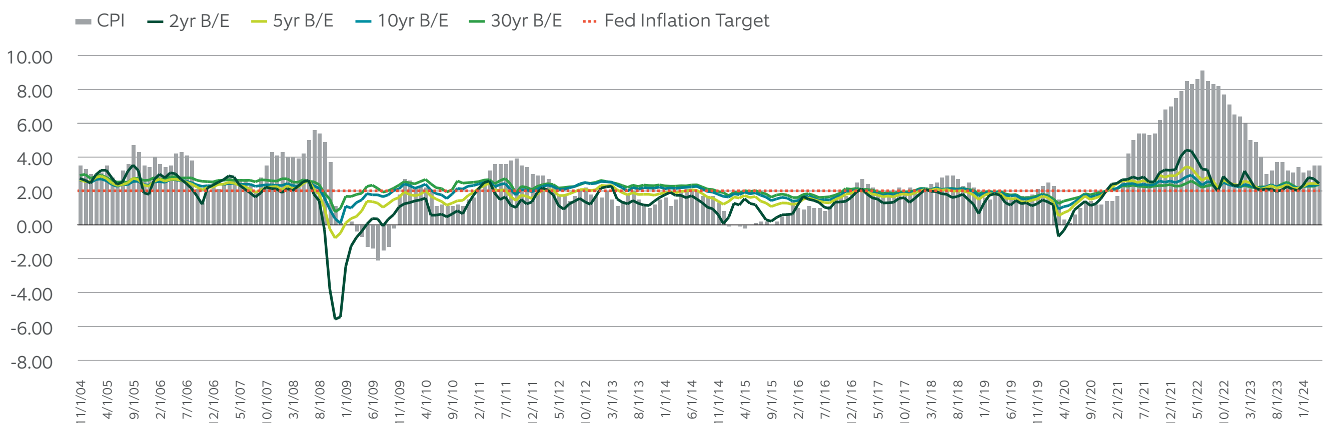
Source: Bloomberg, data as of 09/01/14-03/01/24. **Past performance is not indicative or a guarantee of future results.** Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index. Indexes are the property of their respective owners, all rights reserved.

HOW IS THE TIPS MARKET CURRENTLY PRICING FOR INFLATION?

Breakevens have remained close to the Fed's 2% target through the recent inflationary period. Today we see breakevens at approximately 2.2 to 2.3%[5] for the next 5-, 10-, and 30-year periods, even as inflation remains above 3%[6] for the CPI and 2.7%[7] for Personal Consumption Expenditures (PCE), a measure of consumer spending on goods and services among households in the U.S. The latter is the Fed's preferred inflation measure.

We believe inflation will decline over time to meet the Federal Reserve's target. Meanwhile, TIPS holders capturing the currently higher inflation accruals may also potentially benefit should inflation prove to be more sticky than anticipated. On the other hand, if inflation falls below the breakeven of 2.2%[8], or if deflation takes hold, TIPS will likely benefit in price performance as real rates are likely to decline in sympathy. However, similar maturity nominal Treasuries would likely do even better. The below chart shows breakeven rates for different tenors over time relative to the annual inflation rate as measured by CPI.

BREAKEVENS OVER TIME



Source: Bloomberg, data as of 11/01/04-11/01/2024.

DO TIPS HAVE A STRUCTURAL PLACE IN PORTFOLIO CONSTRUCTION EVEN THOUGH THEY ARE NOT REPRESENTED IN MOST FIXED INCOME INDICES?

So many of our liabilities are inflation based, and while many sectors that capture a market risk premium can help to buffer a portfolio over time – e.g. equities, high yield bonds -- TIPS are one of few asset classes anticipated to perform well in a defensive environment with a direct link to inflation. This can be especially important in an unanticipated environment, such as a supply shock where the inflationary pulse will immediately pass through to TIPS holders through inflation accruals, or periods of stagflation in which inflation remains persistently higher than expected while growth softens or turns negative.

HOW DO TIPS BEHAVE WITH THE REST OF A FIXED INCOME PORTFOLIO?

This has been a primary source of confusion since TIPS were introduced in 1997, because the price sensitivity to interest rates or duration of TIPS is different than that of similar-maturity nominal bonds. TIPS yields are a function of real rates[9] while nominal yields are a function of real rates plus the breakeven rate.

TIPS Yield = **Real Rate**

Nominal Yield = **Real Rate** + **Breakeven Rate**

We typically compare bonds to one another by how their yields move up and down together. To understand how nominal bonds and TIPS react to market movements, one must understand the drivers of yield for each type of bond.

Over any holding period the relationship between the return on the two types of bonds depends on the combination of real rate and breakeven rate movements. While traditional fixed-rate bond yields are easily explained by general interest rate moves, and TIPS yields by moves in real rates, the relationship of real rates and nominal rates are not always stable. Consider these scenarios:

1: Interest rate changes are dominated by changes in real rates; breakeven rates remain unchanged.

- TIPS and nominal bonds with similar maturities respond similarly to changes in interest rates.

2: Interest rate changes are dominated by changes in inflation expectations; real rates do not change, but breakeven rates do.

- TIPS prices do not change while nominal bond prices do.

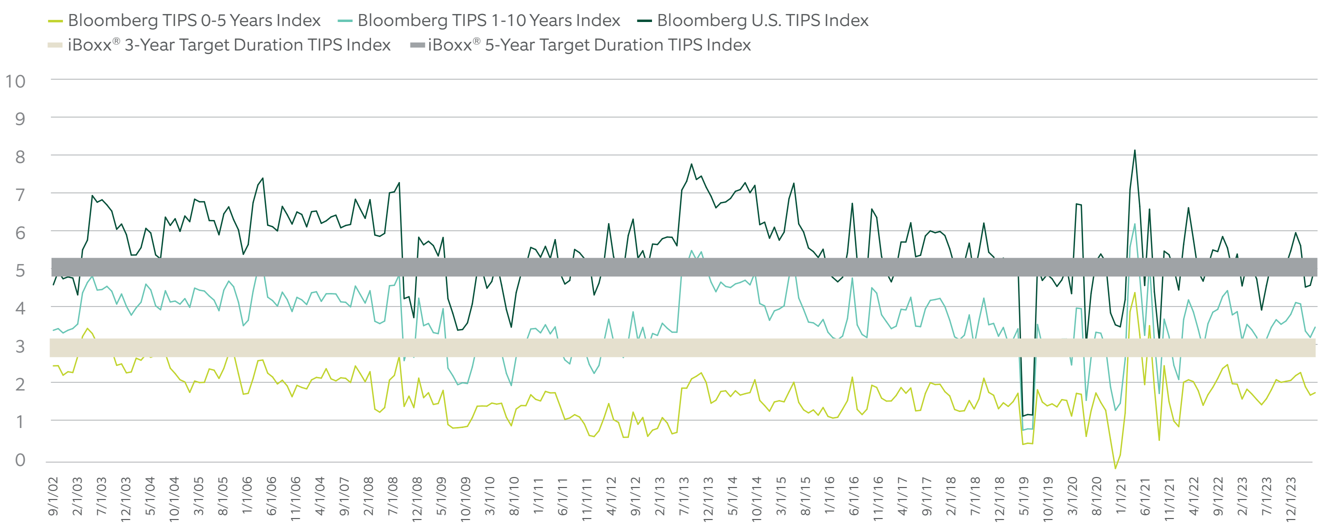
3: Interest rate changes are due to changes in both real rates and inflation expectations in the same direction.

- Similar maturity Nominal bond prices move more than TIPS prices.

4: Interest rate changes are due to changes in real rates and inflation expectations moving in different directions.

- TIPS prices experience a greater move than nominal bonds.

Different scenarios can cause the duration contribution of TIPS to fluctuate throughout the total portfolio's duration. The below chart shows the duration[10] of iBoxx 3-Year and 5-Year Target Duration TIPS indices relative to the Bloomberg US TIPS Indices in 0-5 year, 1-10 year, and full index breakouts[11] as represented by the index providers. While there is no agreed-upon adjustment to duration, since methodologies can be based on historical relationships or different forward-looking assumptions, the impact on a portfolio can be quite material to total portfolio duration. This is why we believe a targeted approach to duration management can add precision to TIPS inclusion within a traditional fixed-income portfolio.

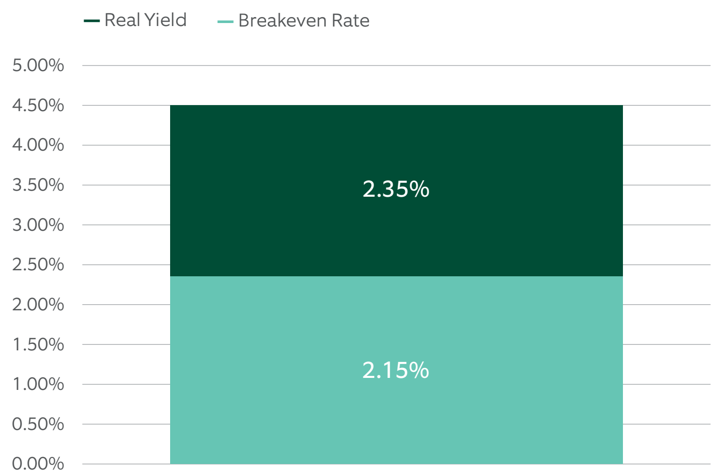


Source: Bloomberg, data as of 09/01/2002-12/01/2023. It is not possible to invest directly in any index. Indexes are the property of their respective owners, all rights reserved.

WHAT MATURITY SHOULD I SELECT FOR A TIPS ALLOCATION?

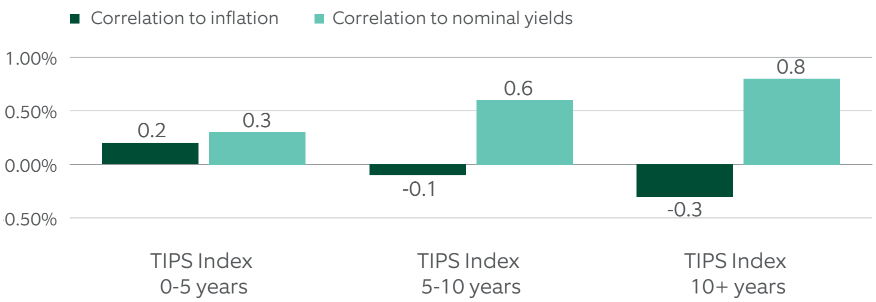
Like any fixed rate bond portfolio, the tenor can have a significant impact on TIPS holders' experience. TIPS have a fixed real rate, and the principal is adjusted up or down for inflation/deflation. The coupon payments[12] are then applied to the inflation adjusted principal amount. TIPS with a longer maturity have more price sensitivity to the fixed real rate and relatively little sensitivity to near-term changes in inflation. TIPS with shorter maturities have less price sensitivity to real rates resulting in a greater proportion of performance coming from inflation. The below chart shows the breakout of real rates and breakeven rates on 5/31/24 for a 10-year TIPS.

DECONSTRUCTING YIELD OF A 10-YEAR TREASURY



Source: Bloomberg, as of 05/31/2024. Bloomberg U.S. 10 Year TIPS index. **Past performance is not indicative or a guarantee of future results.** Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index. Indexes are the property of their respective owners, all rights reserved.

While all TIPS capture the same inflation accruals, the journey can feel very different depending on the tenor of the bonds. The chart below shows how TIPS with shorter maturities are more correlated with inflation, while TIPS with longer maturities are more correlated with changes in interest rates.



Source: Bloomberg, data as of 05/31/2024. Bloomberg US TIPS Indices in 0-5 year, 1-10 year, and 10+ years. **Past performance is not indicative or a is not indicative or a guarantee of future results.** Index performance returns do not reflect any management fees, transaction costs or expenses. It is not possible to invest directly in any index. Indexes are the property of their respective owners, all rights reserved.

Short-term price performance is not the only factor to consider. If the objective of an investor's TIPS allocation is to immunize the amount invested in TIPS from inflation over time, a full-maturity TIPS portfolio may be more appropriate. It is important, however, to understand how this allocation will interact with the rest of a fixed-income portfolio.

In conclusion, the market hasn't always gotten inflation right, especially when inflation has moved away from the Federal Reserve's target. Today, as in most of TIPS' history, inflation expectations priced into TIPS anticipate a successful return to the Fed's 2% target. While some investment sectors capture a risk premium that can buffer a portfolio over time (e.g. equities or high-yield bonds), TIPS are one of few asset classes that can perform well in a defensive environment with a direct link to inflation. With that said, there remains a need for intentionality when considering integrating TIPS as part of a broader fixed income portfolio. Understanding how the relationship between TIPS and other nominal bonds shifts over time as well as the maturity range that meets the intended portfolio objectives can make a substantial difference.

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How helpful was this paper?

FOOTNOTES

1 There is a deflation floor embedded in TIPS so that in the event of deflation over the term of the bond, TIPS return at maturity their original par value at the minimum.
2 The CPI referenced in TIPS is the Consumer Price Index for All Urban Consumers calculated by the Bureau of Labor and Statistics and not seasonally adjusted.
3 TIPS and similar nominal Treasuries can have difference risk profiles, this statement does not consider the compensation on a risk adjusted basis.
4 While the TIPS reference inflation index is CPI, the Fed's preferred measure of inflation is PCE. Personal Consumption Expenditures Price Index (PCE) is the measure of the prices that people living in the United States, or those buying on their behalf, pay for goods and services.
5 As of 6/13/24.
6 CPI for May came in at 3.3% year over year. Consumer Price Index (CPI) measures the change in the price of goods and services from the perspective of the consumer.
7 PCE for April 2024.
8 Approximate breakeven for 5 and 10 years as of 6/13/24.
9 Real Rate for Treasury Inflation-Protected Securities (TIPS) is the actual return on an investment after adjusting for inflation.
10 Duration is a measure of the sensitivity of the price of a bond or other debt instrument to a change in interest rates. A bond's duration is easily confused with its term or time to maturity because certain types of duration measurements are also calculated in years. Duration is one the key determinants of fixed income returns. Swings in TIPS durations expose portfolios to uncompensated interest rate risk.
11 Effective nominal duration. Methodology is differentiated to each index provider.
12 Coupon Payments are semi-annual interest payments that are based on a percentage of the adjusted principal amount.

INDEX DEFINITIONS

The Bloomberg U.S. TIPS Index measures US Treasury Inflation Protected Securities.

The Bloomberg US Treasury TIPS 0-5 Years Total Return Index Value Unhedged USD is composed of TIPS with remaining maturities of less than five years.

The Bloomberg 1-10 Year U.S. Government Inflation-Linked Bond Index is designed to measure the performance of the inflation protected public obligations of the U.S.

The Bloomberg U.S. Treasury 5-10 Year Index measures the performance of public obligations of the U.S. Treasury with maturities of 5-10 years, including securities roll up to the U.S. Aggregate, U.S. Universal, and Global Aggregate Indices.

The Bloomberg TIPS 5-10 Year Index Adjusted Total Return Index measures US Treasury Inflation Protected Securities with less than 10 years maturity.

The iBoxx 3-Year Target Duration TIPS Index measures the performance of Treasury Inflation Protected Securities (TIPS) as determined by Markit iBoxx's proprietary index methodology. The iBoxx index methodology targets a modified adjusted duration of 3.0 years and defines the eligible universe of TIPS as having no less than one year and no more than ten years until maturity as of the Index determination date. A proprietary regression calculation is then used to determine the modified adjusted duration of the TIPS and weight the TIPS in the Index at a modified adjusted duration level within a range of 5.0 years, plus or minus 5% within Index constraints. One cannot invest directly in an index.

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USGGBE02 Index represents the US TIPS Breakeven 2-year rate.

USGGBE05 Index represents the US TIPS Breakeven 5-year rate.

USGGBE10 Index represents the US TIPS Breakeven 10-year rate.

USGGBE30 Index represents the US TIPS Breakeven 30-year rate.

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