TIPS Position Paper

August 2009

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Abstract

Given the amount of fiscal and monetary stimulus enacted to revive the United States economy, many are concerned about inflation emerging as a credible threat to the economic recovery. While such a threat is not foreseeable in the near future, unexpected inflation can negatively impact portfolios. However, several asset classes can protect against higher than expected inflation. Treasury Inflation Protected Securities ("TIPS") is one asset class which offers inflation protection. The following paper analyzes the asset class in detail, and offers a recommendation for investors interested in adding the asset class to their portfolios.

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Overview

While investment returns are measured in nominal dollars, long-term investors should be concerned about their real return which adjusts for the rate of inflation. Inflation is a decrease in the value of money, and is measured by a rise in the general level of prices (usually measured by the Consumer Price Index). Simply put, when prices rise, money is worth less. A nominal return is calculated from the amount of money actually earned, and the real return is the nominal return less the amount of inflation. While inflation remains unlikely in the near term, over the long-term inflation risk is a concern.

The predominant risk of inflation is that it will be higher than expected. Even relatively high long-term inflation, for example 6%, is not much of a concern for fixed income investors if this inflation is stable and expected. Investors will demand a higher return on their investments and still earn about the same real return after inflation. However, if investors expect 3% inflation, but inflation rises to 6%, their future interest payments will be worth less money: they will earn a lower real rate of return. Although inflation relative to expectations is the more important part of inflation risk, at some point even stable inflation becomes so high it is a drag on the economy because there are real costs of constantly increasing prices. These costs are called "menu costs" by economists, named for the costs of constantly printing new menus to display increased prices.

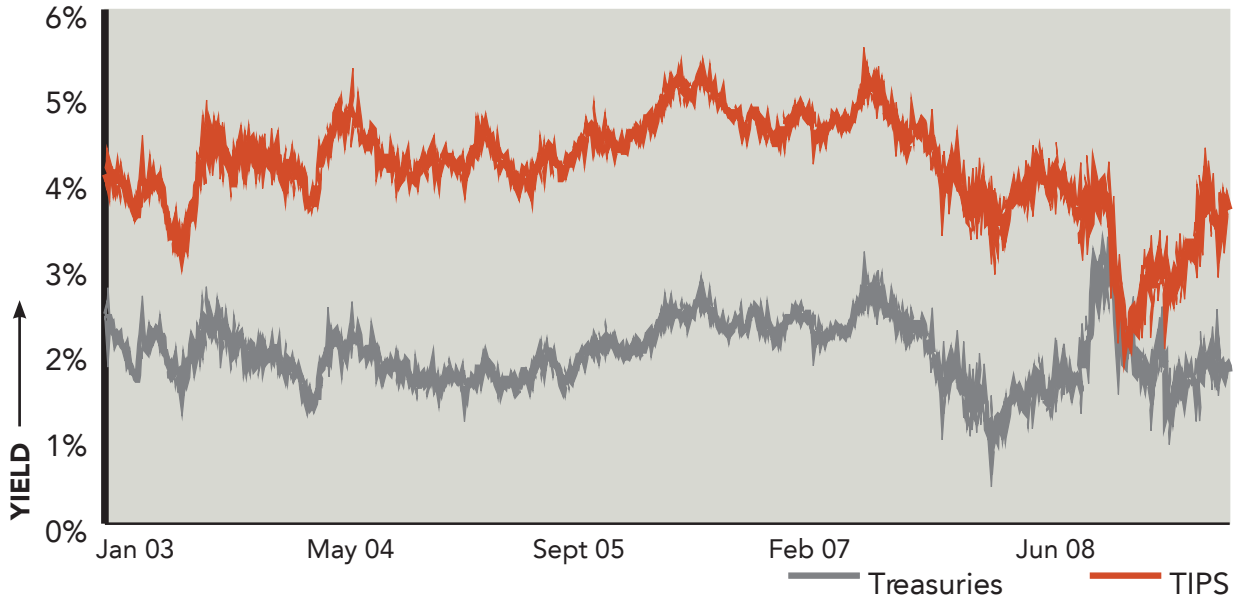
In this environment, Treasury Inflation-Protected Securities "TIPS" can be a valuable addition to a portfolio. First issued by the U.S. Treasury in 1997, TIPS are treasury securities that protect against the risk of inflation. Unlike nominal treasuries which are subject to inflation risk, TIPS pay a guaranteed real (inflation adjusted) rate of return. Once the real yield is determined at auction, the principal value of TIPS is adjusted semi-annually for inflation, as measured by the non-seasonally adjusted Consumer Price Index (CPI) For All Urban Consumers. The CPI is a broad measure of consumer prices, and includes such goods as food, clothing, housing, and automobiles. If the CPI increases, the face value of TIPS increases. Since the value of TIPS is determined by CPI, TIPS provide a direct inflation hedge.[1]

TIPS can be purchased in multiples of $1,000 with five, ten, and twenty year maturities; however, the Treasury recently indicated it may replace twenty year TIPS with thirty year TIPS.[2] Like other fixed income securities, they pay a semi-annual coupon and the face value at maturity. The principal is adjusted for inflation at the time of each coupon payment, and the coupon is paid based on this new amount. Because the principal of TIPS is adjusted for inflation, the difference in yield between TIPS and nominal Treasuries is the implicit expected inflation rate. This difference is known as the breakeven inflation rate; if inflation is higher than this rate over the lifetime of the bond, TIPS will provide a higher total return than a nominal Treasury with the same maturity. Exhibit 1 shows the historical spread between a ten-year nominal Treasury Security and a ten-year TIPS bond. The gray line represents the yield of a constant maturity ten-year Treasury, and the red line represents the yield of a constant maturity ten-year TIPS. The gap between the two lines is the ten-year "break even" inflation rate that would cause TIPS and nominal treasuries to offer the same ten-year return.

1 Source: Treasury Direct

2 Walker, Suzanne; "Treasuries Fall as U.S. Sets Auction Amounts, May Expand TIPS"; Bloomberg

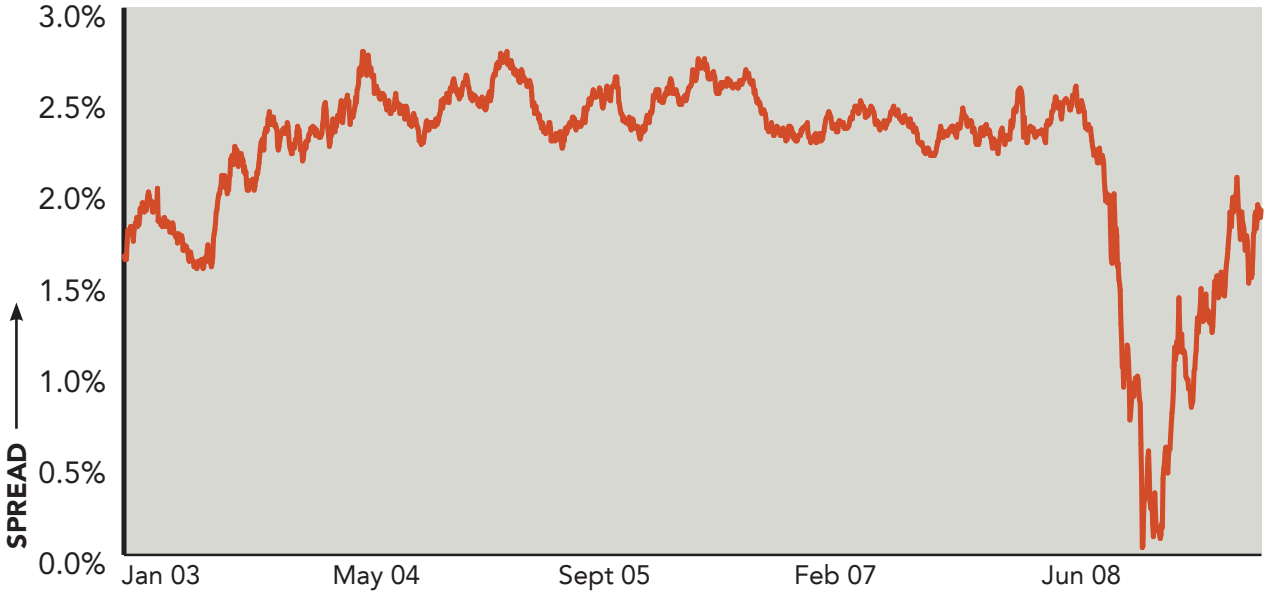
Exhibit 1: 10 Year Constant Maturity Yield



Source: St. Louis Federal Reserve Bank

The implicit breakeven rate, given by the spread between ten-year yields of TIPS and nominal Treasuries is shown in Exhibit 2. As expected during a period of relatively stable inflation, this rate hovered near 2.5% between 2003 and 2008, which is comparable to the historic long term inflation over the same time period (Exhibit 11). The sharp decline visible in 2008 reflects growing deflationary concerns as well as liquidity issues resulting from market deleveraging.[3]

Exhibit 2: 10 Year TIPS Spread



Source: St. Louis Federal Reserve Bank

[3] Campbell, John Y.l, Shiller, Robert J., and Viceira, Luis M.; "Understanding Inflation-Indexed Bond Markets"; .p 20

Understanding TIPS

To better understand how inflation affects the value of TIPS, it is best to use an example. For simplicity, we will use a TIPS bond recently issued and purchased for $1,000, a coupon rate of 3%, and a CPI of 100.

Exhibit 3: Starting Values

- Original Purchase price: $1,000
- Original CPI: 100
- Original Coupon rate 3%

After six months, the bond will be adjusted based on the CPI. Exhibit 4 shows the inflation adjustment given a CPI of 101 (an annual inflation rate of 2%).

Exhibit 4: Inflation after 1 period

- Original Purchase price: $1,000
- Original CPI: 100
- Original Coupon rate: 3%

- CPI after six months: 101 (2% annual inflation rate)
- Principal adjusted for inflation: 101/100 * $1,000 = $1,010
- Adjusted biannual coupon: 3% / 2 * $1,010 = $15.15 (if there had not been inflation, the coupon would equal $15 and the face value would remain at $1,000)

Inflation increases both the value of the coupon paid, as well as the face value paid at maturity. What if inflation turned into deflation? Continuing the example, the TIPS bond now has a principal of $1,200 after years of inflation and annual deflation is 2% when the principal is reset.

Exhibit 5: Effects of a brief bout of deflation

- First period CPI: 100
- Previous period CPI: 120
- Current Principal: $1,200
- Previous Coupon: 3% / 2 * $1,200 = $18 (An increase from the original $15 coupon due to inflation over time)

- Current CPI: 118.8 (2% Annual deflation from previous period)
- Principal Adjusted for Deflation: 118.8/120 * $1,200 = $1,188
- Adjusted biannual coupon: 3% / 2 * $1,188 = $17.82 (with zero inflation from the previous period, the coupon would equal $18 and the principal would remain at $1,200)

From this example, it is clear that while TIPS protect against inflation risk, deflation is a concern for holders of TIPS. The severity of the deflation impact for long-term investors in TIPS depends on the inflation rate over the life of the bond. TIPS holders are offered some protection from deflation because they will always receive a minimum of the $1,000 principal at maturity. Because only the interest payments are decreased with deflation and not the principal, holders of TIPS effectively have a "put" option in a deflationary environment.

To get an idea of how TIPS behave in inflationary and deflationary environments, we will compare real and nominal yields of a ten-year TIPS bond and a ten-year nominal bond in different inflationary environments. With a TIPS bond priced to yield 3% in real terms and a nominal bond with a yield of 5%, the breakeven ten-year inflation rate is 2%. The breakeven rate is the long-term inflation rate causing TIPS to earn a total return equal to nominal treasuries. This information is contained in Exhibit 6. Exhibits 7, 8, 9, and 10 show returns under different scenarios given constant inflation and interest rates. Exhibit 11 shows ten year average inflation rates. Reminder: real return equals nominal return minus the inflation rate.

Exhibit 6: Calculation of breakeven inflation rate

- TIPS yield: 3%
- Nominal Treasury yield: 5%
- Breakeven Inflation rate: 5% - 3% = 2%
- Over the life of a nominal bond, the real return is the nominal yield minus the rate of inflation. Since TIPS will always earn a real return, subtracting the TIPS yield from the yield of a comparable nominal treasury will give the level of "breakeven" inflation.

Exhibit 7: Ten year inflation rate is 2%, which is equal to breakeven rate

- TIPS earn 3% real return
- Nominal Treasury earns 5% nominal – 2% inflation = 3 % real return
- When the inflation rate equals the breakeven rate, TIPS and Nominal Treasuries provide the same rate of real return. TIPS real return will always be the same in a long-term inflationary environment.

Exhibit 8: Ten year **deflation** rate is 2%: long-term deflation

- TIPS earn 2.72%[4] + 2% deflation = 4.72% real return
- Nominal Treasury earns 5% + 2% deflation = 7% real return
- Inflation is subtracted from nominal yields to reach real yields, thus deflation is added (it is negative inflation). If there is deflation over the life of the bond, nominal treasuries will outperform TIPS. However, the real return offered by TIPS will actually be greater than its stated yield of 3% because the principal will not decrease below $1,000.

Exhibit 9: Ten year inflation rate is 1%: inflation is below the breakeven rate

- TIPS earn 3% real return
- Nominal Treasury earns 5% nominal return – 1% inflation = 4% real return
- Nominal Treasury will outperform TIPS in the long run if inflation is lower than the breakeven rate.

Exhibit 10: Ten year inflation rate is 5%: inflation is above the breakeven rate

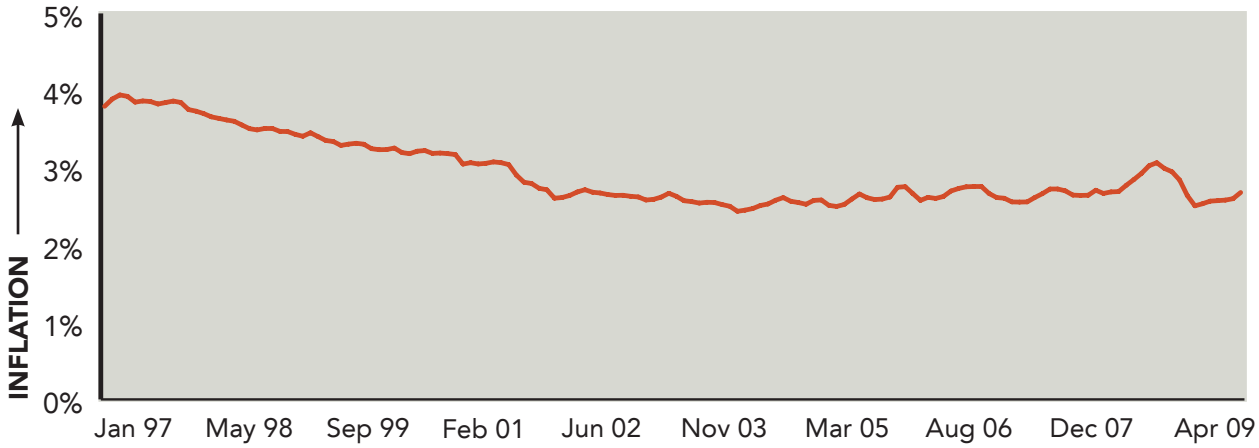
- TIPS earn 3% real return
- Nominal Treasury earns 5% nominal return – 5% inflation = 0% real return
- TIPS will outperform nominal Treasuries in the long run when the inflation rate is above the breakeven rate.

[4] The nominal yield of a TIPS bond in this scenario is calculated based on an annual rate of -2% inflation. The principal is deflated at 1% biannually (2% annual deflation), and each coupon payment (20 total) is calculated based on the new principal. At maturity, the original $1000 is repaid, the equivalent of a "put" option given long term deflation. The yield to maturity of 2.72% is calculated as the value that equates the cash flows of each deflated coupon payment and the return of the $1000 principal with the original face value of $1000.

Risk and Return

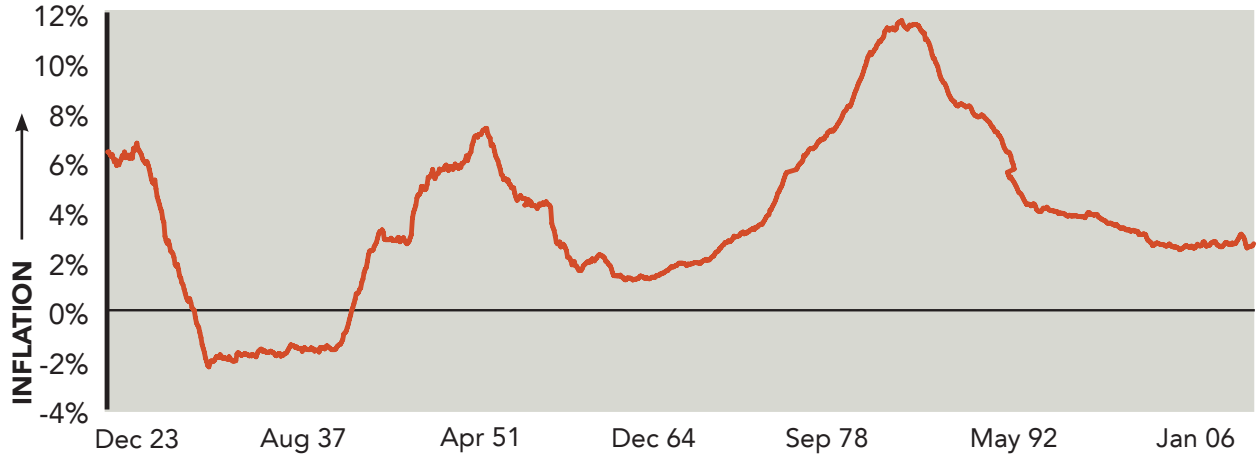
Nominal bonds' performance compared to TIPS over the long term depends on the inflation rate over the life of the bond. However, even if the yield on nominal bonds is high enough to offer an attractive return, there will be periods when inflation will be either higher or lower than the long term expected rate. TIPS are protected against this inflation risk, and are therefore one of the least risky asset classes.[5] Long term inflation since the introduction of TIPS in 1997 has been relatively stable as shown in Exhibit 11, however, as highlighted in Exhibit 12 there have been periods of more dramatic movement.

Exhibit 11: Ten year Moving Average of Inflation since introduction of TIPS



Source: St. Louis Federal Reserve Bank

Exhibit 12: Ten Year Moving Average of Inflation (as measured by CPI)



Source: St. Louis Federal Reserve Bank

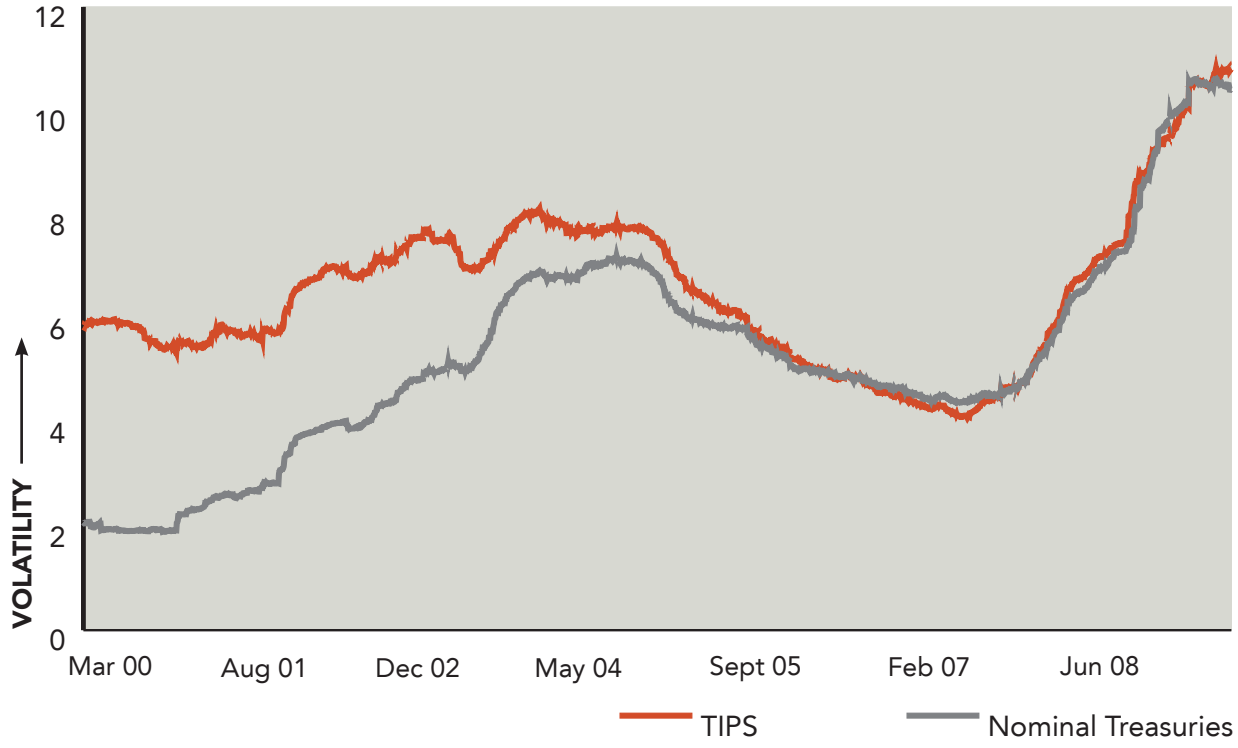
From these examples, it is clear that while TIPS will underperform nominal treasuries if inflation is lower than expected, they will outperform if inflation is higher than expected. TIPS will provide a real rate of return in any environment, and importantly, hedge against the risk of unexpected inflation.

[5] Dudley, William C., Roush, Jennifer, Steinberg Ezer, Michelle; "The Case for TIPS"; New York Fed; p. 11

While investors in TIPS are protected against inflation risk, there remains a liquidity risk. The market for TIPS is generally less liquid than the market for nominal treasuries; therefore, investors should demand a premium over Treasuries for higher liquidity risk. However, the market for TIPS is still quite liquid, and the illiquidity premium over treasuries has been decreasing over time. Initially close to 200bps, the illiquidity premium is now estimated below 50bps.[6] Bid/ask spreads are relatively narrow, and over $6.0 billion worth of TIPS were traded every day in 2010.[7] This is about a third of the volume traded of corporate debt, but with less than 40 TIPS securities outstanding, this volume is spread over many fewer issues. Therefore, while TIPS are somewhat less liquid than nominal Treasuries (nominal Treasuries are the most liquid market in the world) in absolute terms, TIPS are quite liquid securities.

Historically, the market for TIPS was less volatile than the market for nominal Treasuries; however, the volatility of TIPS has gradually increased over time as shown in Exhibit 13. Paradoxically, the short-term volatility of TIPS highlights the long-term risk of inflation against which they protect. While many investors in TIPS are long-term investors concerned about earning a consistent real return, TIPS are also actively traded due to constantly fluctuating expectations of future inflation. Again, even though the yields of TIPS bonds will fluctuate in the short term, for long term holders of TIPS the two main concerns are the real yield and longer term inflation (as measured by CPI).

Exhibit 13: Annual Volatility



Source: Bloomberg; TIPS represented by the BarCap US Government Inflation-Linked Bond Index; Treasuries by BarCap US Treasury 10yr Term Index

[6] Dudley, William C., Roush, Jennifer, Steinberg Ezer, Michelle; "The Case for TIPS"; New York Fed; p. 11

[7] Securities Industry and Financial Markets Association (SIFMA)

Exhibit 14 highlights other characteristics of the BarCap TIPS index. As a large portion of TIPS total return is paid at maturity in the form of the increased principal, TIPS have a longer duration[8] than comparable Treasuries. As Exhibit 13 shows, this does not mean that TIPS are necessarily more volatile than nominal Treasuries of the same maturity. This is partially because TIPS' interest rate risk is based on the real interest rate, which is more stable, and nominal Treasuries fluctuate based on the nominal interest rate, or the real rate plus any inflation.[9]

Exhibit 14: BarCap TIPS Characteristics

Number of Securities	27
Modified Adjusted Duration	4.1 Yrs.
Avg. Maturity	9.1 Yrs.
Coupon	2.30%
Yield to Worst	0.80%
Quality	Govt.

Source: Bloomberg

Exhibit 15: Ten Year Correlations

	TIPS	Treasuries
TIPS	1.000	0.619
Treasuries	0.619	1.000
S&P 500	-0.085	-0.649
GSCI	0.541	-0.067
BarCap Aggregate	0.765	0.827
MSCI EAFE	0.003	-0.557

Source: Bloomberg; TIPS represented by the BarCap US Government Inflation-Linked Bond Index; Treasuries by BarCap US Treasury 10yr Term Index

In addition to offering an inflation hedge, TIPS have some attractive correlation qualities. TIPS, similar to Treasuries, are negatively correlated with U.S. equities. This suggests that when U.S. equities decrease in value, TIPS will rise in value, thus offsetting the equity declines. In addition, if historical relationships continue a TIPS allocation can provide the low volatility of fixed income assets while acting as an inflation hedge, thereby offering further portfolio diversification benefits. Predictably, TIPS are highly correlated with Treasuries and other fixed income securities, but because the correlation is not perfect, TIPS can still offer diversification benefits as part of a portfolio's fixed

[8] Duration is a measure of a bond's sensitivity to interest rates, presented as a number of years. As interest rates increase, bond prices decrease. A bond with a higher duration will experience a greater decrease in price for a given increase in interest rates. TIPS will have a higher duration based on the relevant real yield

[9] McCulloch, Huston J.; "Duration"

income allocation. It should be noted that TIPS are highly correlated with commodities, as represented by the GSCI commodities index. Considering commodities are dollar denominated assets, their value will increase with inflation as the dollar decreases in value.

Mechanics

To add TIPS to an investment portfolio, they can be purchased directly from the Treasury, and indirectly by investing with TIPS asset managers, or through ETFs that track the returns of TIPS. Asset managers can provide the benefit of diversification across different maturities, however this benefit will be partially offset by the management fee. The average management fee for Morningstar's top rated Inflation-Protected Bond Funds is 0.51%[10], while the expense ratios of the iShares ETF tracking the BarCap TIPS index is 0.20%.[11] More generally, the average fee for a separate account TIPS portfolio ranges from 10 to 30 basis points, while commingled funds are about 25 basis points. If an investor chooses a mutual fund, he can expect to pay between 30 and 60 basis points.

Recommendation

TIPS can offer an attractive risk adjusted-return to the long-term portfolio, diversification benefits, and inflation protection. For clients interested in a TIPS allocation to their portfolio, Marquette Associates, Inc. recommends a dedicated allocation to the asset class, achieved through a passively managed TIPS fund. Marquette Associates, Inc. considers TIPS a component of a portfolio's fixed income allocation (as opposed to a real asset). Thus, clients must assess their other fixed income allocations, most especially the credit quality, duration, strategy, and style components. For portfolios utilizing an active core (or core plus) manager, it is crucial to limit active core managers' exposure to TIPS in order to avoid an over allocation to TIPS between the active core manager and the dedicated allocation to TIPS. Typically, this limitation would be achieved by adjusting the guidelines for the primary fixed income managers. In addition, clients must carefully assess their liquidity needs, investment goals, and risk tolerance before making an allocation to TIPS. For the sake of evaluating managers, the Barclays Capital U.S. Government Inflation-Linked Bond Index should be utilized. With widely varying future inflation expectations, there is a risk that long-term inflation will be lower than expected, and portfolios heavily allocated to TIPS will underperform. Consequently, we suggest clients limit their overall portfolio allocation to no more than 10% of the total fund's market value. In addition, the TIPS allocation should constitute no more than 20% of the overall fixed income allocation of the portfolio. Given the appropriate analysis and research, TIPS can provide positive benefits, most notably inflation protection and further portfolio diversification.

[10] Morningstar Direct

[11] Bloomberg; The iShares BarCap TIPS ETF is the largest TIPS ETF. Its ticker symbol is TIP.

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