



ABSTRACT

In this paper, we address how much of an investment fund's portfolio should be strategically allocated to Treasury Inflation Protected Securities (TIPS). Overall, Meketa Investment Group recommends that for (a) moderately risky or balanced portfolios, TIPS should constitute 5 to 15% of the entire portfolio, or roughly 15 to 35% of the bond sub-portfolio, and for (b) conservative portfolios, TIPS should constitute approximately 30 to 50% of the entire portfolio, or roughly 40 to 60% of the bond sub-portfolio.

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

History of Inflation-Linked Bonds

The U.S. government first issued Treasury Inflation-Protected Securities (TIPS) in 1997. However, the U.S. was not the first country in modern times to issue inflation-linked bonds. For example, the U.K. first issued "linkers," as they are commonly called, in 1981, while Australia and Canada followed suit in 1985 and 1991, respectively. Presently, more than twenty countries now offer some form of inflation-linked bonds. Though the mechanics of each country's inflation-linked bonds differ, the concept is the same: investors are guaranteed an inflation-adjusted return. Notably, as of the end of 2007 roughly 10% of the outstanding value of world government debt was inflation-linked, up from 3% in 1997 (Mauro and Hopkins, 2008).

U.S. TIPS

With one important difference, TIPS are identical to traditional U.S. Treasury securities. Traditional U.S. Treasuries pay a specified rate of income (via a coupon payment) and return the owner's principal at the stated maturity date. Likewise, TIPS also pay income and return the owner's principal at the stated maturity date. And, as with traditional Treasuries, the full faith and credit of the U.S. government backs TIPS. However, unlike that of a traditional Treasury, the principal value—and thus the coupon payment—of TIPS is adjusted to reflect inflation at the consumer price level, as measured by the Consumer Price Index (CPI-U).²

¹ Note that at their introduction, inflation-linked bonds are usually far less liquid than their nominal counterparts. This implies that there is a liquidity premium associated with inflation-linked bonds *relative* to their nominal counterparts (Carlstrom and Fuerst, 2004).

² 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 estimate 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 July 1st, 2008 the real yield for the 10-year TIPS was approximately 1.39%. At that time, the Survey of Professional Forecasters predicted that the CPI-U would average 2.50% over the next ten years.³ Therefore, a buyer of a 10-year TIPS could expect a nominal return of $(1.39 + 2.50 =) 3.89\%$ over the subsequent ten years.

In contrast, a buyer of a 10-year traditional Treasury bond would receive a nominal return of 3.95% over ten years. The 0.06% difference in yield can be attributed to the net effect of both an inflation risk premium for Treasuries and a liquidity premium for TIPS (see footnote 1). In this example, it appears as though the inflation risk premium dominates the liquidity premium by 0.06%. This is roughly in line with academic work which suggests that the inflation and liquidity premiums are equal to 0.6% and 0.5%, respectively (Durham, 2006; Campbell and Shiller, 1996; D'Amico et al., 2007).

As the market for TIPS becomes deeper (i.e., more liquid) the liquidity premium TIPS enjoy relative to Treasuries should diminish.⁴ However, the inflation risk premium will remain as a structural feature of traditional Treasuries. Therefore, as time goes on, the difference in nominal yields between Treasuries and TIPS of the same maturity should approach the inflation risk premium.

Inflation Risk Premium

Since over the longer term the only difference in nominal yields between Treasuries and TIPS should be the inflation risk premium, it makes sense to consider what might increase or decrease this premium. This is because 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. Furthermore, the inflation risk premium appears to vary considerably with investor sentiment: studies have found that volatility in the inflation risk premium is substantial, ranging from 0.3% to 1.0% (Campbell and Shiller, 1996; Durham, 2006; D'Amico et al., 2007).

Intuitively, investors should be willing to pay a higher inflation risk premium when they expect future inflation to be especially volatile; or, more specifically, when they believe that likelihood of having inflation exceed their expectation is high. Behavioral finance suggests that periods of rising (falling) inflation will cause investors to overestimate the likelihood of further increases (decreases), with a commensurate increase (decrease) in the inflation risk premium. This intuition is corroborated by the fact that, globally, the inflation risk premium

³ Survey of Professional Forecasters, 2nd Quarter 2008. Federal Reserve Bank of Philadelphia, www.philadelphiafed.org/files/spf/survq208.html.

⁴ For evidence that suggests the liquidity premium for TIPS has dropped substantially, see D'Amico et al. (2007).

has gradually shrunk for countries that have issued inflation-linked bonds. This decline accompanied a marked decrease in inflation over most of the developed world, indicating that investors may have become accustomed to stable and gradually declining inflation.

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 5.1% for TIPS versus 4.5% for Treasuries during the period from March 1997 through June 2008.⁵ What's more, sub-samples of the time period reveal the same counterintuitive relationship.

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 (low) expected real interest rate may serve as a brake on economic growth, thereby discouraging (encouraging) 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.

For example, assume that initially investors expect future real interest rate of 2% and inflation of 3%, for a nominal yield of 5%. (For the sake of simplicity, also assume that the inflation risk premium is 0%.) In this case, TIPS are priced at a 2% yield and Treasuries at a 5% yield. After a shock to the economy, investors now expect a future real interest rate of 1%, which they believe will stoke future inflation to 4%. Now, TIPS are priced higher at a 1% yield and Treasuries *remain* at a 5% yield. Based on this simple price history, TIPS are more volatile. Therefore, in consideration of history and this theoretical example, we set the expected annual standard deviation for TIPS at approximately 0.5% more than that for nominal Treasuries.

One would also expect TIPS to be more volatile than cash, as prices for TIPS must reflect investors' expectations about future real interest rates. This has indeed been the case since their introduction: the annualized standard deviation of monthly returns was 5.1% for TIPS versus 0.5% for cash during the period from March 1997 through June 2008.⁶

Correlations

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

⁵ Source: Merrill Lynch TIPS Index; Lehman Treasury Index.

⁶ Source: Merrill Lynch TIPS Index; 30-day T-Bill Index.

Correlation Matrix
(March 1997 - June 2008)⁷

	TIPS	Bonds	Stocks	Inflation
TIPS	1.00			
Bonds	0.77	1.00		
Stocks	-0.24	-0.14	1.00	
Inflation	0.05	-0.12	-0.10	1.00

From 1997 to 2008, TIPS exhibited a positive correlation with bonds. This makes intuitive sense because both are similarly affected by changes in expectations about future real interest rates. (Note that changes in the inflation outlook prevent the correlation from being perfect.)

Next, TIPS exhibited a negative correlation with stocks. This also makes intuitive sense, because fixed-income securities generally perform better (worse) than stocks in times of economic weakness (strength), hence the negative correlation between both TIPS and bonds with stocks.

Finally, TIPS exhibited 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.

Relative Performance in Various Economic Scenarios

Regarding the relative performance of TIPS compared with those of nominal bonds and stocks, there are six economic scenarios worth considering. Given the factors that influence the yield on TIPS and its counterparts, two economic dimensions are especially relevant for categorizing these scenarios: inflation and growth. Different instances of these two dimensions help define six relevant economics scenarios, as seen in the following table. For the sake of this discussion, “high/stable” and “low” growth means growth above or equal to and below the real growth potential of the economy, respectively. In the U.S., real GDP growth potential is often assumed to be 3%.⁹ Using theory and intuition, one can rank the performance of each asset class under each of the six scenarios.

⁷ Source: Merrill Lynch TIPS Index; Lehman Aggregate Index; Wilshire 5000 Index; CPI-U.

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

⁹ For this discussion, assume that GDP growth is a reliable proxy for the business cycle.

Scenario	TIPS	Bonds	Stocks
Increasing inflation <i>and</i> High/Stable growth	2	3	1
Low growth	1	2	3
Stable inflation <i>and</i> High/Stable growth	3	2	1
Low growth	2	1	3
Decreasing inflation <i>and</i> High/Stable growth	3	2	1
Low growth	2	1	3

1. *Increasing inflation and stable-to-high growth* describes a strong but possibly “overheating” economy. During these periods, stocks should perform the best as excellent productivity gains lead to superb earnings growth. As real interest rates may also be increasing, fixed-income securities should suffer. In addition, increasing inflation should prompt investors to pay increasingly more for inflation insurance, thereby further eroding the returns of nominal bonds. Hence, stocks should perform best, followed by TIPS, then nominal bonds.
2. *Increasing inflation and low growth* describes a weak, “stagflationary” economy. During these periods, stocks should perform the worst as low or declining productivity gains lead to substandard earnings growth. As real interest rates are probably decreasing, fixed-income securities overall should benefit. In addition, increasing inflation should prompt investors to pay increasingly more for inflation insurance, thereby attenuating the returns of nominal bonds. Hence, TIPS should perform best, followed by nominal bonds, then finally stocks.
3. *Stable inflation and stable-to-high growth* describes a strong economy. During these periods, stocks should perform the best as excellent productivity gains lead to superb earnings growth. As real interest rates may also be increasing, fixed-income securities overall should perform less well. What’s more, stable inflation may indicate a stable inflation risk premium. Hence, stocks should perform best, followed by nominal bonds, and then finally TIPS.
4. *Stable inflation and low growth* describes a moderately weak economy. During these periods, stocks should perform the worst as low or declining productivity gains lead to substandard earnings growth. As real interest rates are probably decreasing, fixed-income securities overall should benefit. Additionally, stable inflation may indicate a stable inflation risk premium. Hence, nominal bonds should perform best, followed by TIPS, then finally stocks.
5. *Decreasing inflation and stable-to-high growth* describes a strong, “goldilocks” economy. During these periods stocks should perform the best as excellent productivity gains lead to superb earnings growth. As real interest rates are probably also increasing, fixed-income securities overall should perform less well. In addition, declining inflation should prompt investors to pay increasingly less for inflation insurance, thereby boosting the returns of nominal

bonds relative to TIPS. Hence, stocks should perform best, followed by nominal bonds, and then finally TIPS.

6. *Decreasing inflation and low growth* describes a weak, “deflationary” economy. During these periods, stocks should perform the worst as low or declining productivity gains lead to substandard earnings growth. As real interest rates are probably decreasing, fixed-income securities overall should benefit. In addition, declining inflation should prompt investors to pay increasingly less for inflation insurance, thereby boosting the returns of nominal bonds. Hence, nominal bonds should perform best, followed by TIPS, then finally stocks.

Note that periods of unstable (or volatile) inflation have not been included. This is because *periods of volatile inflation should generate rankings similar to that of increasing inflation*. Both periods should be associated with an increase in inflation risk premiums, as investors forecast a higher probability of inflation exceeding their initial expectations.

Since the introduction of TIPS, the U.S. economy has experienced most of the above economic scenarios lasting at least six months. These scenarios, including the total returns of each of the above three asset classes, are presented below.

Period	Scenario	TIPS	Bonds	Stocks	Predicts?
March 1997 - April 1998	Decreasing Inflation/ High Growth	2.78%	11.33%	42.89%	Y
May 1998 - January 1999	Stable inflation/ High Growth	4.40%	7.22%	11.66%	Y
February 1999 - July 2000	Increasing Inflation/ High Growth	9.09%	3.32%	15.77%	Y
August 2000 - February 2001	Stable Inflation/ Low Growth	9.15%	9.07%	- 13.79%	N
March 2001 - March 2002	Decreasing Inflation/ Low Growth	5.46%	5.87%	-4.36%	Y
July 2002 - March 2003	Increasing Inflation/ Low Growth	11.67%	7.71%	- 13.07%	Y
April 2003 - March 2004	Decreasing Inflation/ Stable Growth	10.93%	5.40%	39.37%	N
April 2004 - July 2006	Increasing Inflation/ Stable Growth	6.01%	4.76%	20.41%	Y
December 2006 - May 2008	Increasing Inflation/ Low Growth	12.53%	7.63%	3.62%	Y

The last column indicates that in seven of the nine cases, the model accurately predicts the relative performance of the three asset classes. Admittedly, these period categorizations are rough, though changing the beginning and end months do not affect the results in general. And, of course, several exogenous factors may have affected relative returns, such as a sustained decrease in the liquidity premium for TIPS and the “flight to quality” during the

debt crises of the late 1990s and the bear market of the early 2000's. Nevertheless, these results give confidence in the hypothesized relative performance described above.

Putting it all together, over their history TIPS have been much more volatile than cash and slightly more volatile than Treasuries. In addition, TIPS have been more negatively correlated with stocks than nominal bonds, while having maintained a slight positive correlation with inflation. Theoretically, TIPS should outperform their nominal counterparts during periods of increasing (or unstable) inflation, while still enjoying the benefits of fixed-income securities during periods of low economic growth or flights to quality. Thus, TIPS as an asset class should provide meaningful portfolio diversification.

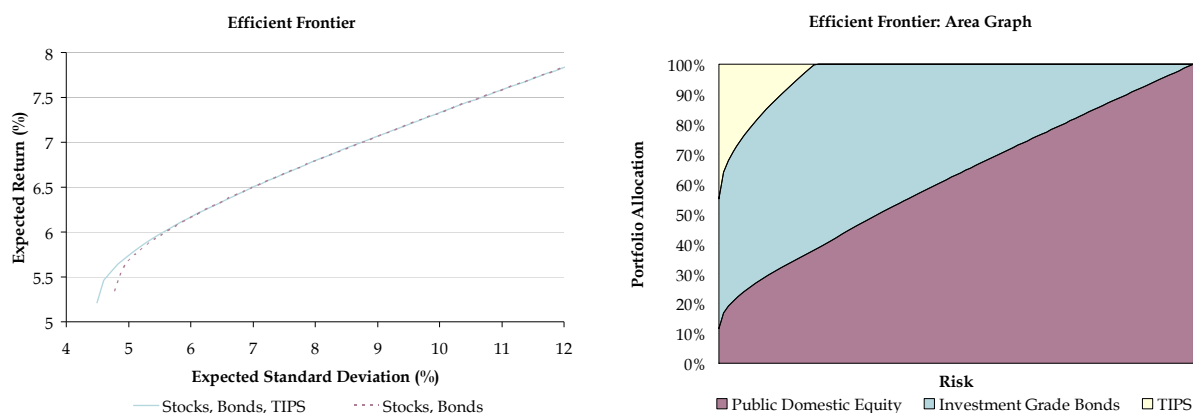
PORTFOLIO ROLE

Total Portfolio Context

In diversified investment programs, traditional bonds mitigate equity volatility and provide a predictable level of income. Over most time periods, high quality bonds provide a modest return in excess of the rate of inflation. However, when actual inflation significantly exceeds investor expectations of inflation, nominal bond returns may suffer. As discussed above, it is in these cases where TIPS can benefit investors the most.

In the following figure, the chart on the left compares an efficient frontier of a portfolio comprised solely of U.S. stocks and nominal bonds to an efficient frontier of a portfolio comprised of U.S. stocks, nominal bonds, and TIPS.¹⁰ Note that the efficient frontier including TIPS is upward and to the left of the efficient frontier excluding TIPS, suggesting that TIPS may help achieve more efficient portfolios. This is especially true for more risk adverse investors. The chart on the right shows the allocation to each of the three asset classes for every portfolio on the efficient frontier. The mean-variance optimization indicates that TIPS play a prominent role in less risky portfolios, but that their role diminishes as risk increases.

¹⁰ The efficient frontier analysis uses inputs from Meketa Investment Group's 2008 Annual Asset Study combined with the historical correlations among the three asset classes contained in this paper.



Impact in Balanced and Conservative Portfolios

Shifting assets from higher yielding nominal bonds to TIPS will make most portfolios more efficient, though its impact will be greater the more conservative the portfolio. As shown in the following table, a moderately risky or balanced portfolio – loosely defined as a 60-40 mix of U.S. stocks and bonds—benefits from increasing allocations to TIPS in its bond sub-portfolio. However, the ratio of expected return to expected annual standard deviation increases only mildly, from 0.742 for a 60-40-0 allocation to 0.760 for a 60-0-40 allocation. This represents a total efficiency change of $((0.760 - 0.742)/0.742 =) 2.4\%$.

At the same time, an investor gives up a 7.28% expected return for a 60-40-0 allocation for a 7.08% return for a 60-0-40 allocation. Thus, the efficiency gains come at a “cost”: for example, the 0.4% gain in efficiency moving from a 60-40-0 portfolio to a 60-35-5 portfolio costs $(7.28\% - 7.25\% =) 3$ basis points (bp). Dividing the return cost by the percentage efficiency change gives an average efficiency cost, which indicates how many basis points must be spent to increase efficiency by 1% by an investor who moves from a 60-40-0 portfolio to a given mix with TIPS. Note that average return cost is susceptible to rounding errors, so direct comparisons across the different portfolio mixes should be taken lightly.

Stocks-Bonds-TIPS (%):	60-40-0	60-35-5	60-30-10	60-25-15	60-20-20	60-0-40
U.S. Stocks	60%	60%	60%	60%	60%	60%
Bonds	40%	35%	30%	25%	20%	0%
TIPS	0%	5%	10%	15%	20%	40%
Expected Return	7.28%	7.25%	7.23%	7.20%	7.18%	7.08%
Expected Std. Dev.	9.81%	9.73%	9.67%	9.60%	9.54%	9.32%
Return-Risk Ratio	0.742	0.745	0.748	0.750	0.753	0.760
Efficiency Change (%)	--	0.4%	0.8%	1.1%	1.5%	2.4%
Avg. Return Cost (bp/%)	--	7.5	6.3	7.3	6.7	8.3

Increasing allocations to TIPS within an already conservation portfolio – loosely defined as a 20-80 mix of U.S. stocks and bonds – has a larger impact on efficiency. As the following table shows, increasing the allocation of TIPS from 0% of the full portfolio to 40% (or half of the

bond sub-portfolio) raises the ratio of expected return to standard deviation from 1.12 to 1.18 – a 5.4% gain in efficiency. This compares favorably with the meager efficiency gains attained in the balanced portfolio case. This increase in efficiency comes at a cost of only 20 basis points in expected return, yielding an average return cost of 3.7 bp/%. Again, this compares favorably with the relatively expensive average return costs in the balanced portfolio cases.

However, note that increasing the TIPS allocation beyond 40% of the full portfolio diminishes efficiency relative to the 20-40-40 portfolio. Hence, as opposed to the balanced portfolio case, it does not appear advisable to increase a TIPS allocation beyond roughly 40% (or half of a conservative fund's bond sub-portfolio).

Stocks-Bonds-TIPS (%):	20-80-0	20-60-20	20-40-40	20-60-20	20-0-80
U.S. Stocks	20%	20%	20%	20%	20%
Bonds	80%	60%	40%	60%	0%
TIPS	0%	20%	40%	20%	80%
Expected Return	5.76%	5.66%	5.56%	5.46%	5.36%
Expected Std. Dev.	5.12%	4.87%	4.72%	4.69%	4.78%
Return-Risk Ratio	1.12	1.16	1.18	1.16	1.12
Efficiency Change (%)	--	3.6%	5.4%	3.6%	0%
Avg. Return Cost (bp/%)	--	2.8	3.7	8.3	infinite

In sum, we recommend that; a) for moderately risky or balanced portfolios, TIPS constitute 5 to 15% of the entire portfolio, or roughly 15 to 35% of the bond sub-portfolio, and b) for conservative portfolios, TIPS constitute approximately 30 to 50% of the entire portfolio, or roughly 40 to 60% of the bond sub-portfolio. In the first case, we believe that 5 to 15% is the appropriate allocation because the cost of the efficiency gains is relatively high in balanced portfolios. In the second case, we believe that 30 to 50% is the appropriate allocation because this represents the range of peak efficiency, and efficiency is relatively cheap.

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. Thus, while equities have proven to be a good long-term hedge against inflation, in the short-term equity prices usually react negatively to inflation. Since TIPS react positively to inflation, an investor may consider TIPS as a hedge against inflation *for all time periods*.

Furthermore, since TIPS guarantee an inflation-adjusted income, they may be the most appropriate asset for investors who have at least a portion of their liabilities exposed to inflation. There are many such investors. Defined benefit plans 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.

It may be argued that investors in the U.S. have become desensitized to the effects of inflation as a result of the extended environment of disinflation since the early 1980s. During this period, the central bank has made it their primary objective to constrain inflation. However, circumstances since the middle of this decade suggest that the U.S. central bank is less focused on controlling inflation. Furthermore, structural features of the global economy may indicate rising dollar inflation in the longer term. Thus, an investor must be ever wary of inflation risks.

It is also important to note that the inflation adjustment is based on changes in the CPI-U, which is a price index corresponding to the *average* market basket of goods and services purchased by U.S. urban consumers. The urban consumers' basket *may not be directly relevant to a specific investor's basket*. For example, a university may spend more annually on real estate development than the average urban consumer. In these cases, the inflation adjustment will only be approximate—indeed, real purchasing power could be eroded considerably to the extent that the investor's basket differs markedly from the urban consumers' basket.

MISCELLANEOUS

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 seven years in mid-2008 when evaluated in terms of real interest rates.

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. Hence, the nominal duration for TIPS can range between zero and their duration in real terms. 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 is misleading because it conflates two different constructs. Therefore, an investor who has a dedicated allocation to TIPS should consider excluding them when calculating the duration of their 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 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 U.S. government, they possess no credit risk and are considered to be of the same quality as nominal Treasuries. Hence, an increased allocation to TIPS will increase the quality of a diversified bond portfolio.

IMPLEMENTATION ISSUES

Market Liquidity

As of June 2008, the market value of the twenty-seven outstanding TIPS issues was roughly \$450 billion, representing about 16% of the total outstanding issuance of the U.S. Treasury. TIPS are currently auctioned four times per year.¹¹ The TIPS market is not as liquid as that for nominal Treasury bonds, which is the most liquid market in the world. 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 0.06% (1/16th) of principal value for TIPS, versus approximately 0.03% (1/32nd) for Treasuries (Sack and Elsasser, 2004). Therefore, for every trade, Treasuries have a one-time 0.03% 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) (Chen et al., 2007). Of course, it is possible that during periods of high volatility the spreads for TIPS could widen, but if this occurs it would likely be a temporary phenomenon.

¹¹ For more information on recent and future auctions, see www.savingsbonds.gov/instit/anncceresult/press/press_secannpr.htm.

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 indexes. Or, a passive investor may design a term structure better suited to the term structure of their liabilities.

On the other hand, active investors in TIPS seek to consistently augment a passive return by intelligent trading. 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 his 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.

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

Finally, a manager may try to add value by investing in other inflation-linked bonds, such as those issued by U.S. 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 U.S. 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 U.S. inflation. This would be undesirable to an investor seeking to hedge their U.S. dollar-denominated liabilities.

In our opinion, there is little potential for an active manager to add value; at best, outperformance may equal 50 basis points.

Benchmark

There are several benchmarks appropriate for TIPS investors. The two most commonly used are the Merrill Lynch U.S. Treasury Inflation-Linked Securities index and the Lehman Brothers U.S. 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. The Merrill Lynch U.S. Treasury Inflation-Linked Securities index is rebalanced on the last calendar day of the month, as is the Lehman TIPS index. Both indices only include TIPS that have at least one year remaining to final maturity.

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 U.S. 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 2.1% in 2003. This sustained decline in inflation surely led some to expect persistently falling inflation. These expectations may have depressed the prices of TIPS to unusually attractive levels early in their existence.

More recently, TIPS have proven their attractiveness during inflationary times. Though the long-run forecast for inflation remains around 2.5% according to the Survey of Professional Forecasters, there are sound reasons to believe that inflation could get significantly worse. This should cause TIPS to be more attractive than Treasuries going forward. Indeed, during the period of rising inflation from December 2006 to June 2008, TIPS have returned 12.5% compared to 7.6% for Treasuries.

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 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 bonds, and thus provide valuable diversification to both long-term and short-term investment funds. An investment in TIPS would likely produce very attractive gains in a rising or unstable inflation environment, offsetting any losses in stocks and traditional bonds. Furthermore, they provide investors the ability to match their assets with their real liabilities. TIPS ultimately benefit investors by acting as an insurance policy against unexpectedly high inflation.

In summary, Meketa Investment Group recommends that for (a) moderately risky or balanced portfolios, TIPS constitute 5 to 15% of the entire portfolio, or roughly 15 to 35% of the bond sub-portfolio, and for (b) conservative portfolios, TIPS constitute approximately 30 to 0% of the entire portfolio, or roughly 40 to 60% of the bond sub-portfolio.

REFERENCES

- Campbell, John Y. and Robert J. Shiller. "A Scorecard for Indexed Government Debt." NBER Macroeconomics Annual 11 (1996): 155-197.
- Carlstrom, Charles T. and Timothy S. Fuerst. "Expected Inflation and TIPS." Federal Reserve Bank of Cleveland (2004).
- Chen, Long, David A. Lesmond, and Jason Wei. "Corporate Yield Spreads and Bond Liquidity." *The Journal of Finance* 42 (2007): 119-149.
- D'Amico, Stefania, Don H. Kim and Min Wei. "TIPS from TIPS: The Informational Content of Treasury Inflation-Protected Security Prices." Working Paper (2007).
- Durham, J. Benson. "An Estimate of the Inflation Risk Premium Using a Three-Factor Affine Term Structure Model." Finance and Economics Discussion Series. Federal Reserve Board, Washington, D.C. (2006).
- Gürkaynak, Refet S., Brian Sack, and Jonathan H. Wright. "The TIPS Yield Curve and Inflation Compensation." Finance and Economics Discussion Series. Federal Reserve Board, Washington, D.C. (2007).
- Mauro, James and Jim Hopkins. "Global Linkers versus U.S. TIPS." Fixed Income Essay & Presentation. State Street Global Advisors (2008).
- Sack, Brian and Robert Elsasser. "Treasury Inflation-Indexed Debt: A Review of the U.S. Experience." Federal Reserve Bank of New York (2004).