

Research Note

TIPS and the nature of inflation protection

Daniel W. Wallick
Jill Marshall

October 2009

The aggressive and accommodative policies of the Federal Reserve to counteract the recession have sparked considerable interest in Treasury Inflation-Protected Securities (TIPS) and other inflation-hedging assets.¹ Indeed, cash flows into TIPS funds through the first three quarters of 2009 were especially strong, representing 33% of the total assets invested in TIPS mutual funds and ETFs.

To help investors assess the role of TIPS in a broader portfolio, we briefly review the nature of the inflation protection provided by a TIPS fund. We compare the absolute performance of a broad TIPS portfolio over the past decade with the actual inflation rate, and we discuss the relative performance of a TIPS portfolio compared with that of a portfolio of nominal U.S. Treasury bonds. Finally, we frame a discussion about an appropriate allocation to TIPS in a broader taxable bond portfolio by summarizing the relative market capitalization of the TIPS market.

Overall, this note serves as a reminder that the total return on a TIPS fund is a function of *both* actual trailing inflation and the bond market's expectation regarding future inflation. Consequently, while a TIPS portfolio does adjust an investor's principal investment by the actual trailing inflation rate, changes in inflation expectations can produce subpar or negative total returns even when actual

inflation is positive. Yet regardless of the direction inflation takes in the future, some bond investors may benefit from knowing that they have some degree of inflation protection.

Should I own TIPS or nominal Treasury bonds?

The difference between the yields of a nominal Treasury bond and a similar-maturity TIPS bond is known as the break-even inflation rate (BEI). The BEI rate represents not only the bond market's expectation of future inflation over the life (or maturity) of the bonds, but also risk premiums that reflect the uncertainty about future inflation and the relative liquidity of the two bonds.²

As illustrated in Figure 1, the performance of a TIPS portfolio relative to that of a portfolio of similar-maturity nominal Treasury bonds is determined not only by the level of actual inflation but also by whether that realized inflation has exceeded the BEI rate at the time the portfolio was purchased.

Hypothetically, if actual inflation is above the BEI rate, TIPS will outperform fixed-rate Treasuries of equivalent maturities. For this reason, TIPS can provide an economic benefit in the event that future inflation in the United States turns out to be higher than the bond market currently anticipates. If actual inflation is equal to the BEI rate, theoretically investors would be indifferent about owning TIPS or

¹ For more on the outlook for U.S. inflation in the years ahead, see Davis (2009).

² For an in-depth discussion of TIPS mechanics and expected performance under various macroeconomic scenarios, see *Investing in Treasury Inflation Protected Securities* (2006) and Dektar (2005).

equivalent Treasuries. If actual inflation is lower than the BEI rate, nominal bonds may outperform over the life of the bonds.

In the long run, nominal returns should surpass the returns of TIPS by an amount equal to the cost of the inflation risk premium. This premium is the reward earned by investors in nominal Treasury bonds for bearing inflation risk (i.e., the uncertainty over what the rate of future inflation will actually be). For this reason, the total return on a Treasury bond portfolio has tended to be slightly more volatile than that of a similar-maturity TIPS portfolio.

A look back at annual TIPS returns, 1998-2008

As an inflation hedge, TIPS should be evaluated in terms of their ability to provide returns above the rate of inflation. However, inflation alone does not determine how well TIPS perform. There is no guarantee of a positive return, real or otherwise, even in the case of an inflation surprise.³ TIPS returns are a function of the inflation accrual and the change in real yields.

Yields are affected by many risk factors. The most significant would be changes in the BEI rate associated with either a change in forward inflation expectations or a change in the inflation risk premium required by investors in nominal bonds. TIPS returns may also be affected by changes in the shape of the yield curve, or liquidity risk, new issue supply, or the amount of inflation built into a bond.

To demonstrate that TIPS returns can be less than inflation or even negative when inflation is high or rising, we compared actual annual inflation with annual returns for TIPS and nominal Treasury bonds of comparable duration (about 3 years) for the period from 1998 through 2008 (Figure 2).

During this period, there were several years when the TIPS total returns did not provide a return above actual inflation. For example, in 1999, 2005, and

2006, negative inflation-adjusted returns were primarily the result of rising real rates as the Fed tightened monetary policy. TIPS underperformed nominal Treasuries in 2008 owing to investors' dramatic flight to quality and the relative illiquidity of TIPS compared with nominal Treasuries. On the other hand, there were five years during this time when the BEI rate rose and TIPS outperformed nominal Treasuries (2000, 2002, 2003, 2004, and 2007).

Allocating to TIPS

While there is no single solution for preserving purchasing power that is appropriate for all policy portfolios, TIPS are a useful option in a real-return strategy (Bennyhoff, 2009). The decision to invest in TIPS is based on one of two things (or both): a speculative view that future inflation will be higher than market expectations, or a preference for diversifying higher inflation risk, albeit at the cost of a lower expected return.

A useful starting point to frame a discussion about an appropriate allocation to TIPS in a broader taxable bond portfolio is to summarize the relative market capitalization of the TIPS market. As illustrated in Figure 3, TIPS represent only a modest portion (3.9%) of the overall U.S. taxable fixed income market, represented by the Barclays Capital U.S. Aggregate Bond Index. For investors considering substituting TIPS for standard Treasuries, TIPS represent 8.2% of all Treasuries and 16.0% of the Treasuries included in the Barclays Index.^{4,5}

Summary

For investors looking to protect themselves from the risk of unexpected high inflation, TIPS are a viable option. Although TIPS represent only a modest portion of the bond market, they do generally provide a relatively low-risk hedge against unexpected inflation. This hedge, however, is not a guarantee. There can be circumstances when TIPS do not

³ See *Investing in Treasury Inflation Protected Securities* (2006) for further details.

⁴ In each of the market capitalization percentage weightings, the TIPS market cap (\$458 billion as of December 31, 2008) is added to the denominator. For example, TIPS / (TIPS + comparative bond market, as represented by a, b, or c as described in the Figure 3 notes).

⁵ TIPS have a different tax treatment than conventional bonds. As is the case with conventional debt, the coupon interest on TIPS is taxed annually at the ordinary income tax rate. The government also requires that taxes be paid annually on any increase in TIPS principal resulting from inflation adjustments in that year, even if it is an unrealized gain. For conventional debt, capital gains taxes (if applicable) are paid in the year the bond is sold or in the year the bond matures.

provide positive returns, even during periods of unexpected inflation. Nevertheless, in most instances of an inflation surprise, TIPS can provide an important benefit.

References

Bennyhoff, Donald G., 2009. *Preserving a Portfolio's Real Value: Is There an Optimal Strategy?* Valley Forge, Pa.: Vanguard Investment Counseling & Research, The Vanguard Group.

Campbell, John Y., Robert J. Shiller, and Luis M. Viceira, 2009. *Understanding Inflation-Indexed Bond Markets*, NBER Working Paper 15014. Cambridge, Mass.: National Bureau of Economic Research.

Davis, Joseph H., and Jonathan Cleborne, 2009. *Recent Policy Actions and the Outlook for U.S. Inflation*. Valley Forge, Pa.: Vanguard Investment Counseling & Research, The Vanguard Group.

Dektar, Daniel C., 2005. *ABCs of TIPS*. CFA Institute Conference Proceedings, Fixed-Income Tools for

Enhancing Returns and Meeting Client Objectives (February): 43–51.

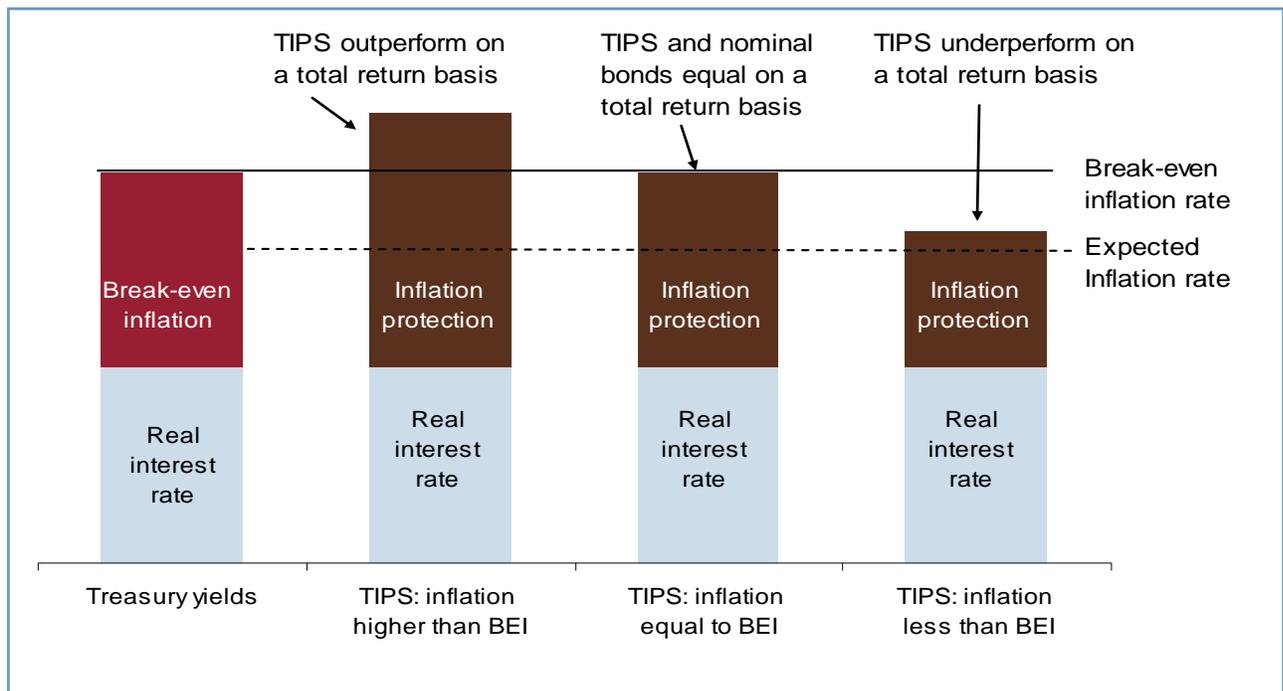
Durham, J. Benson, 2006. *An Estimate of the Inflation Risk Premium Using a Three-Factor Affine Term Structure Model*. Finance and Economics Discussion Series, Federal Reserve Board Working Paper No. 2006-42.

Gurkaynak, Refet S., Brian Sack, and Jonathan H. Wright, 2008. *The TIPS Yield Curve and Inflation Compensation*. Finance and Economics Discussion Series, Federal Reserve Board Working Paper No. 2008-05.

Hammond, P. Brett, 2002. *Understanding and Using Inflation Bonds*. TIAA-CREF Institute, September, No. 73.

Investing in Treasury Inflation Protected Securities, 2006. Valley Forge, Pa.: Vanguard Investment Counseling and Research. The Vanguard Group.

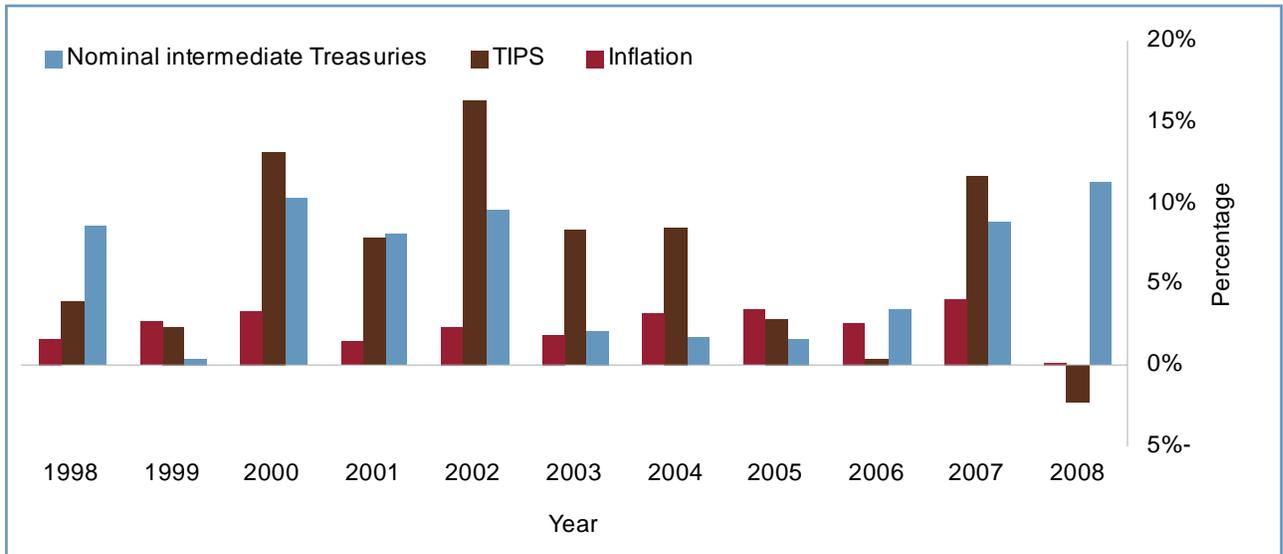
Figure 1. Hypothetical illustration of TIPS return



Note: The break-even inflation rate comprises expected inflation along with an inflation risk premium and a TIPS liquidity premium. For more details on the components of, and changes in, the BEI rate over time, see Durham (2006) and Gurkaynak et al. (2008).

The hypothetical illustration does not represent the return on any particular investment.

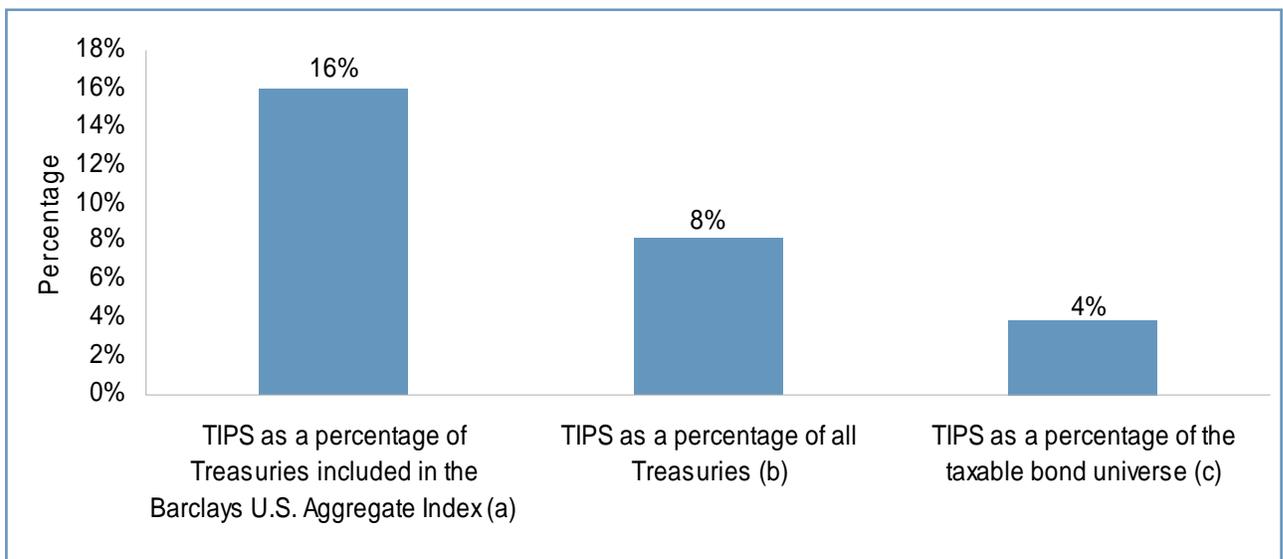
Figure 2. TIPS returns, nominal Treasury returns, and actual CPI inflation, annual data, 1998-2008



Notes: Annual year-end returns are represented by the Barclays Capital U.S. Intermediate Treasury Index for nominal intermediate Treasuries and by the Barclays Capital U.S. Treasury Inflation Protected Securities Index for TIPS. Inflation is represented by year-end over year-end results for the Consumer Price Index for Urban Consumers (CPI-U).

Sources: Barclays Capital Live (<https://live.barcap.com>) and Bureau of Labor Statistics.

Figure 3. TIPS as a percentage of various bond markets



Notes: (a) The market capitalization of U.S. Treasuries included in the Barclays Capital U.S. Aggregate Bond Index was \$2.9 trillion as of December 31, 2008. (b) "All Treasuries" reflects a market cap of \$5.6 trillion as of December 31, 2008, according to the Securities Industry and Financial Markets Association (SIFMA). (c) Taxable bonds in the Barclays Capital U.S. Aggregate Bond Index had a market cap of \$11.6 trillion as of December 31, 2008. The Barclays Capital U.S. Aggregate Bond Index includes U.S. securitized, corporate, government-related, and Treasury debt. It excludes high-yield bonds.

Sources: SIFMA and Barclays Capital Live.



P.O. Box 2600
Valley Forge, PA 19482-2600

Connect with Vanguard® > www.vanguard.com
> global.vanguard.com (non-U.S. investors)

E-mail > research@vanguard.com

All investments are subject to risk. Investments in bonds are subject to interest rate, credit, and inflation risk. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations.

*Past performance is no guarantee of future returns.
The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.*

Barclays Capital Global Family of Indices. Copyright 2009, Barclays Capital. All rights reserved.