The Origin of TIPS, How They Work, and an All Weather Mistake

movement.capital/history-of-tips-and-how-tips-bonds-work

July 24, 2019

In 1963 James Tobin said:

> *"Markets do not provide, at any price, a riskless way of accumulating purchasing power for the future."*

Fortunately for investors in 2019, we can buy Treasury inflation-protected securities. I rarely see TIPS in prospective client portfolios and the next few posts explain why I frequently use them.

Inflation-indexed bonds fill an important gap in the fixed income market. Regular Treasury bonds are riskier than they seem – long-term Treasuries fell 60% in inflation-adjusted terms between 1940 and 1981. Minimizing duration is not a solution since real rates for short-term Treasuries have been as low as -9%. TIPS solve these issues by offering a safe bond investment not vulnerable to inflation.

To kick off this post series, let's start with some historical context on how TIPS came to be:

History of Inflation-Indexed Bonds

May 1780: The first inflation-indexed bonds were issued by the Commonwealth of Massachusetts to soldiers during the Revolutionary War. Wartime inflation meant soldier pay rapidly decreased in value between when it was promised and when it was paid. 1780 was a low point in the war and inflation-indexed bonds were viewed as a way to increase soldier morale.

March 1981: The UK was the first major country to issue inflation-indexed bonds – nicknamed "linkers" since they are linked to inflation. Annual British inflation peaked at 27% in 1975, much higher than in the US. The 1981 bond was restricted to institutional investors. Pension funds have a natural need for inflation-indexed bonds since future liabilities are typically tied to inflation.


Economic Progress Report

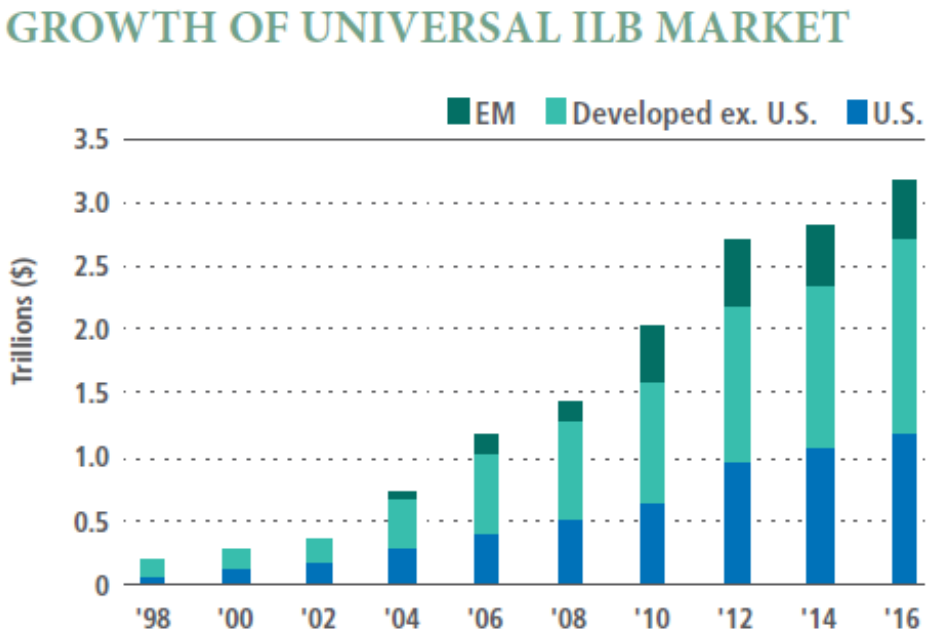
Published by the Treasury No. 133 May 1981

309.1

Indexed gilts

Source: United Kingdom Debt Management Office

January 1997: The US first issued TIPS in 1997. The first few years were defined by slow acceptance and high real yields that look like a bargain in retrospect. The US is now the world's largest single issuer of inflation-linked bonds, closely followed by the UK and Brazil.



Source: PIMCO

How TIPS Work

TIPS are different than regular Treasuries in two ways:

- The principal value of a TIPS bond is adjusted based on inflation
- Coupon payments are based on this adjusted principal value

The easiest way to show this is with an example:

TIPS

Year	Coupon	Inflation	Principal nominal value	Principal real value	Principal adjustment	Standard coupon	Inflation portion	Total nominal coupon	Total real coupon
2019	1.00%	0.00%	$1,000.00	$1,000.00	$0.00	$10.00	$0.00	$10.00	$10.00
2020	1.00%	3.00%	$1,030.00	$1,000.00	$30.00	$10.00	$0.30	$10.30	$10.00
2021	1.00%	4.00%	$1,071.20	$1,000.00	$41.20	$10.00	$0.71	$10.71	$10.00
2022	1.00%	5.00%	$1,124.76	$1,000.00	$53.56	$10.00	$1.25	$11.25	$10.00
2023	1.00%	-1.00%	$1,113.51	$1,000.00	($11.25)	$10.00	$1.14	$11.14	$10.00

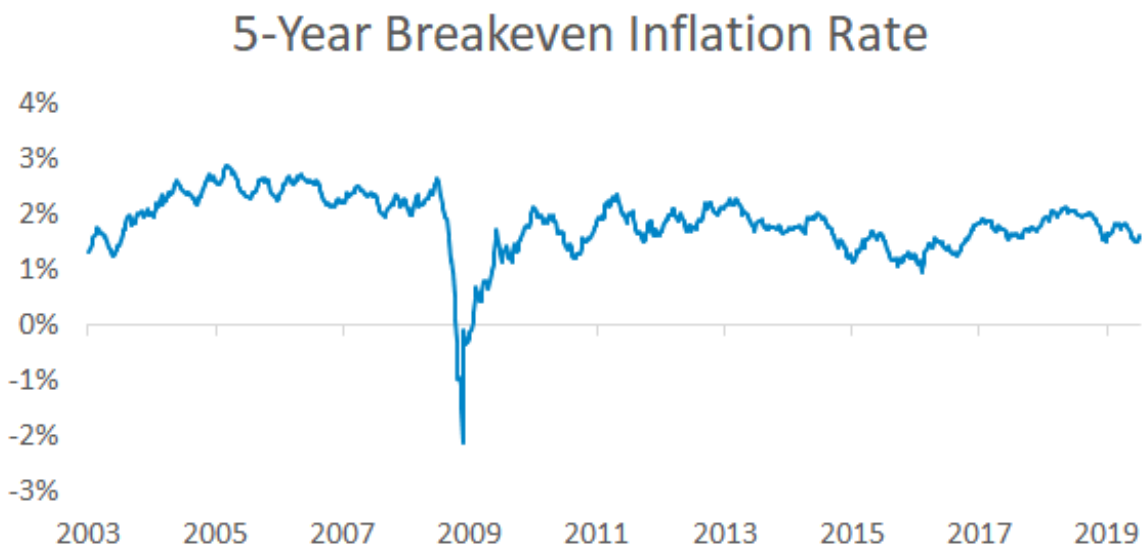
Regular Treasuries

Year	Coupon	Inflation	Principal nominal value	Principal real value	Nominal coupon	Real coupon
2019	3.00%	0.00%	$1,000.00	$1,000.00	$30.00	$30.00
2020	3.00%	3.00%	$1,000.00	$970.00	$30.00	$29.10
2021	3.00%	4.00%	$1,000.00	$931.20	$30.00	$27.94
2022	3.00%	5.00%	$1,000.00	$884.64	$30.00	$26.54
2023	3.00%	-1.00%	$1,000.00	$893.49	$30.00	$26.80

Sources and Disclosures

Unlike a regular Treasury where the inflation-adjusted principal erodes over time, the real value of a TIPS bond holds steady. The coupon also increases with inflation since it's based on a higher principal value. This is why a TIPS yield is called a real yield.

The breakeven inflation rate is the difference between a TIPS yield and a Treasury yield of the same maturity. It's the inflation rate where owning TIPS and owning Treasuries would result in the same inflation-adjusted cash flows. There's an interesting story behind the big drop in breakeven rates in 2008 – I'll write about that on Friday.



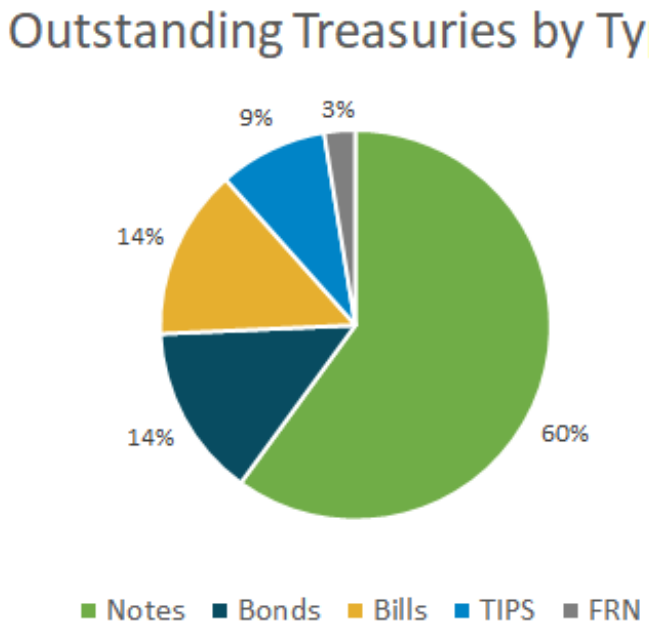
Source: FRED

TIPS offer *unlimited* potential outperformance over Treasuries in inflationary environments, while regular Treasuries only offer *limited* potential outperformance over TIPS in deflationary environments. The limited Treasury outperformance during deflation is because TIPS have a deflation floor. At maturity, a TIPS investor receives the higher of the adjusted principal value or the original principal value.

The deflation floor is most relevant for newly issued TIPS with principal values close to par. **The most important thing to remember about TIPS is that they protect against unexpected inflation.** Expected inflation is built in to the yield of a regular Treasury bond.

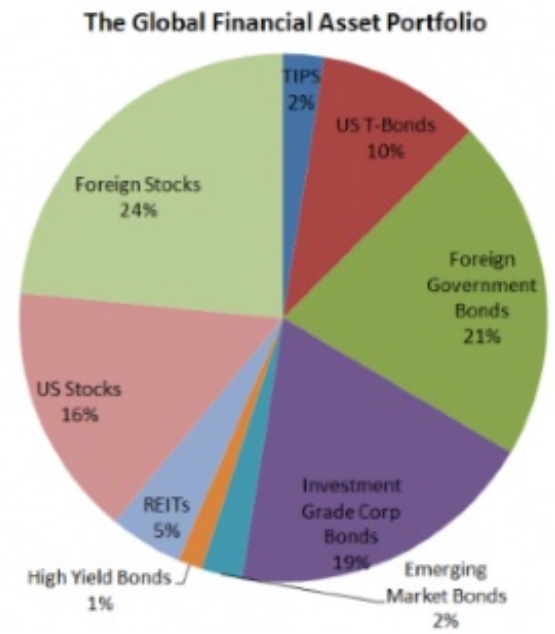
TIPS Market Share and an All Weather Mistake

TIPS make up 9% of outstanding Treasury debt and only 2% of global financial assets.



Source: SIFMA

Bridgewater was instrumental in developing the TIPS market.



Source: Pragmatic Capitalism

Source: Bridgewater

The All Weather strategy allocates an equal amount of risk between assets that perform well in different economic environments. Inflation-linked bonds are one of the few assets that have historically worked in two environments: falling growth and rising inflation.

All Weather strategies gained mainstream attention in 2014 when Tony Robbins wrote about the approach in *Money: Master the Game*. A Google search for "all weather ETF strategy" shows many articles suggesting this portfolio:

- 40% long-term regular Treasuries
- 30% stocks
- 15% intermediate-term regular Treasuries
- 7.5% commodities
- 7.5% gold

This is not an all weather portfolio. The 55% in regular bond exposure will significantly underperform if inflation accelerates. Portfolios structured for all potential economic environments need TIPS due to their unique inflation hedging characteristics.

Summary

- Inflation-indexed bonds were first used to protect the purchasing power of soldiers in the Revolutionary War.
- Both the principal value and coupon of a TIPS bond are adjusted based on inflation.
- TIPS are a small segment of the bond universe and few investors own them.

Here are links to other posts in the TIPS series:

How to Hedge Inflation and Avoid the Biggest Bond Risk

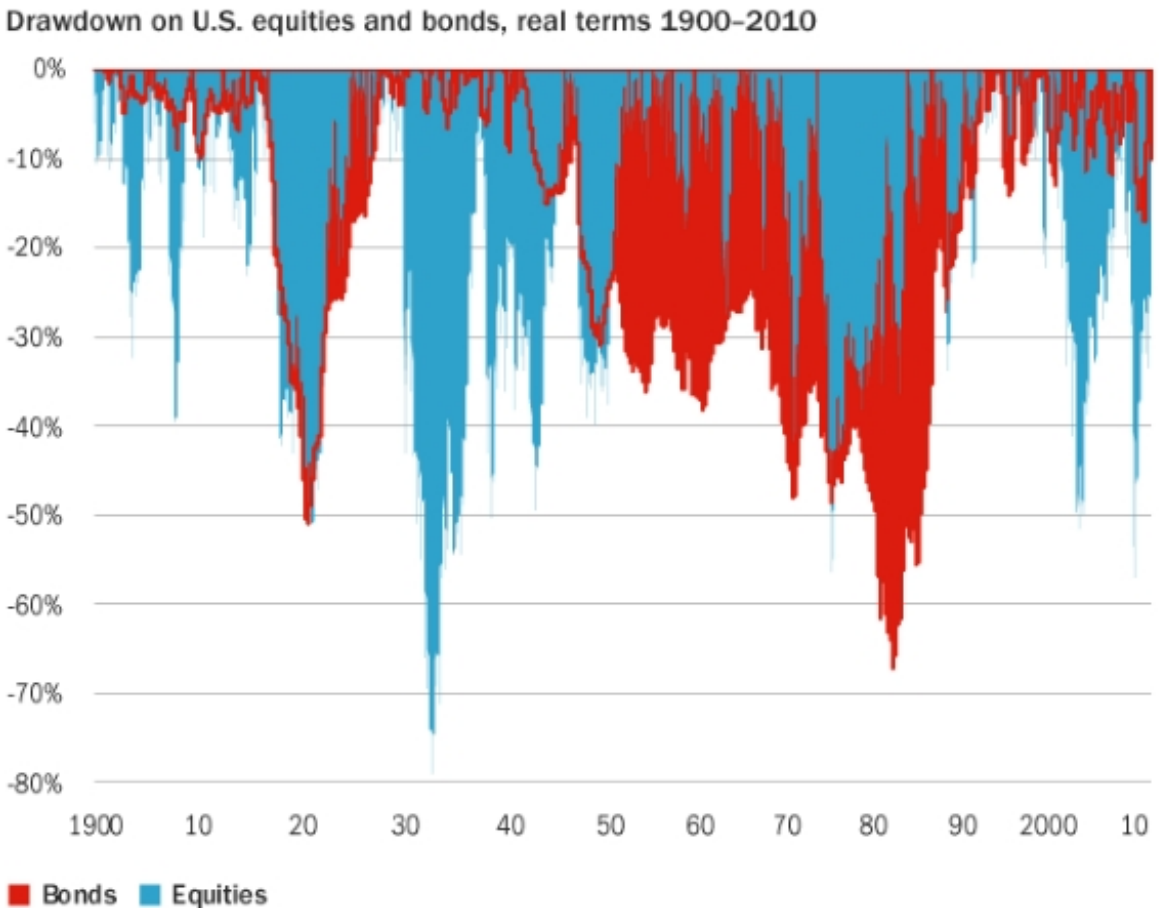
movement.capital/how-to-hedge-inflation-and-avoid-the-biggest-bond-risk

July 25, 2019

There's a big difference between volatility and risk. **Volatility** is the magnitude of short-term price changes. **Risk** is the potential of permanently losing money.

> *"Uncertainty is not the same as risk. Indeed, when great uncertainty drives securities prices to especially low levels, they often become less risky investments."*
>
> *Seth Klarman*

Bonds are less volatile than stocks – but in the long-term they're just as risky. Long-term US Treasury bond investors lost 60% in inflation-adjusted terms from 1940 to 1981.

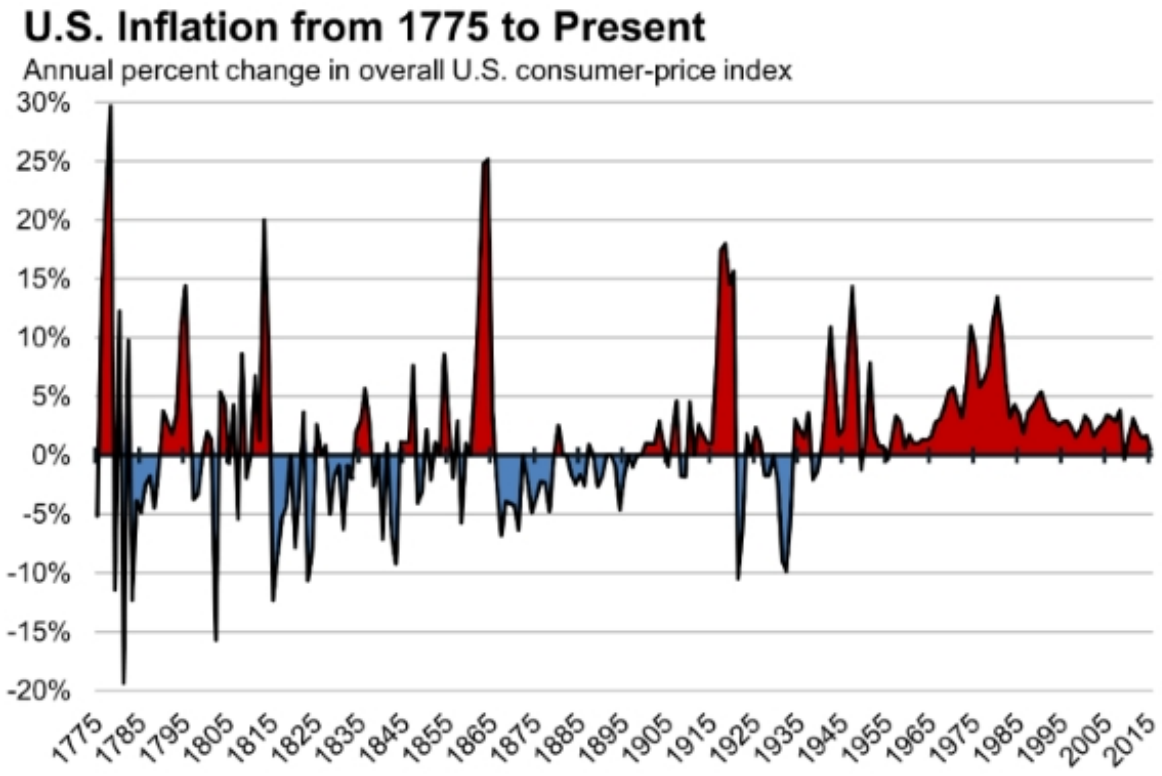


Source: Credit Suisse

Inflation is the biggest long-term risk for bond investors. A 10-year Treasury bond yielding 7% in 1976 might have seemed like a fair rate at the time – but annual inflation accelerated to 15% by 1981, completely eroding the yield's true value.

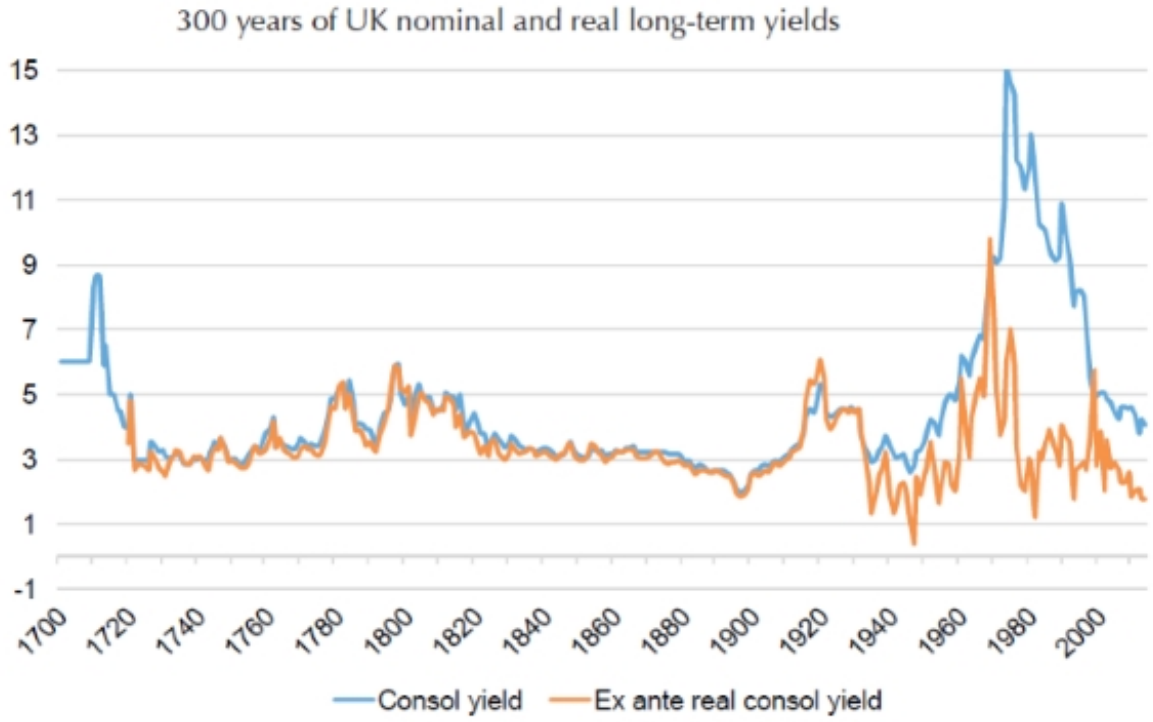
Treasury inflation-protected securities (TIPS) are not exposed to this risk since their principal and interest are adjusted higher with inflation. US TIPS were first issued in 1997 and are still thought of as the new kid on the bond block. The nature of TIPS cash flows make them *more* similar to bonds of 100 years ago than the regular Treasuries we think of as the "original" bonds.

Inflation behaved differently before countries abandoned the gold standard. Inflation was volatile, but not persistent.



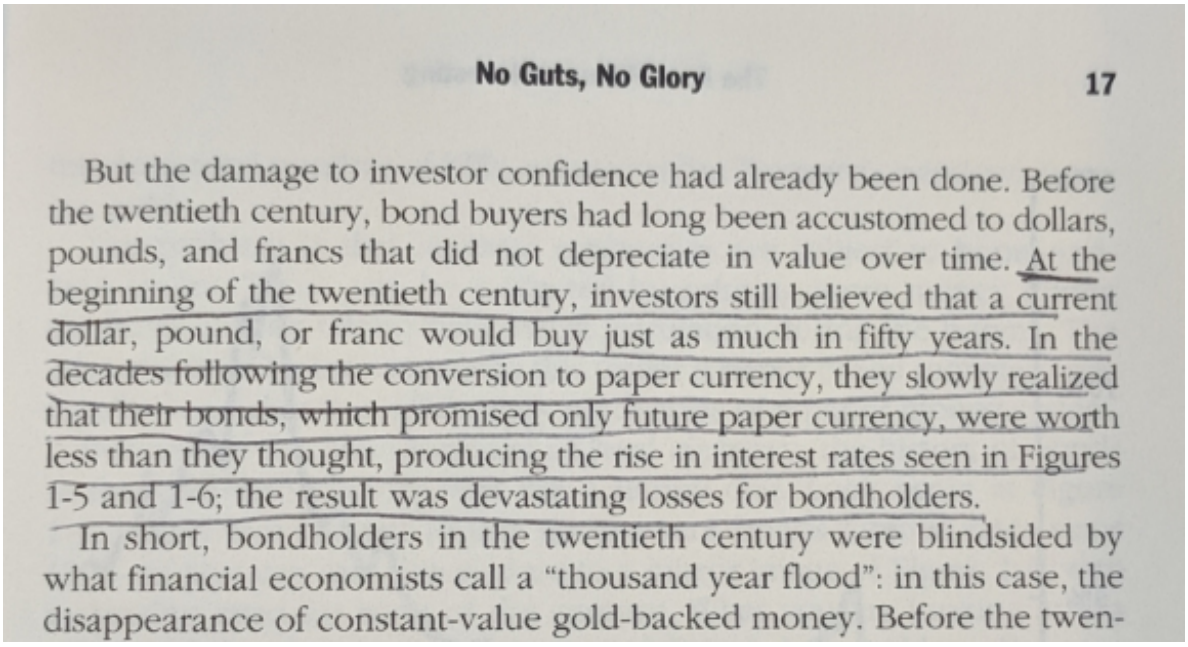
Source: Wall Street Journal

A lack of long-term inflation meant a bond investor in the 1800s was confident $1 in the present would buy the same amount of goods in the future. Pre-inflation government bond yields were essentially the same as after-inflation yields.



Source: VOX

The disappearance of the gold standard resulted in a “thousand year flood” for bond investors.



No Guts, No Glory 17

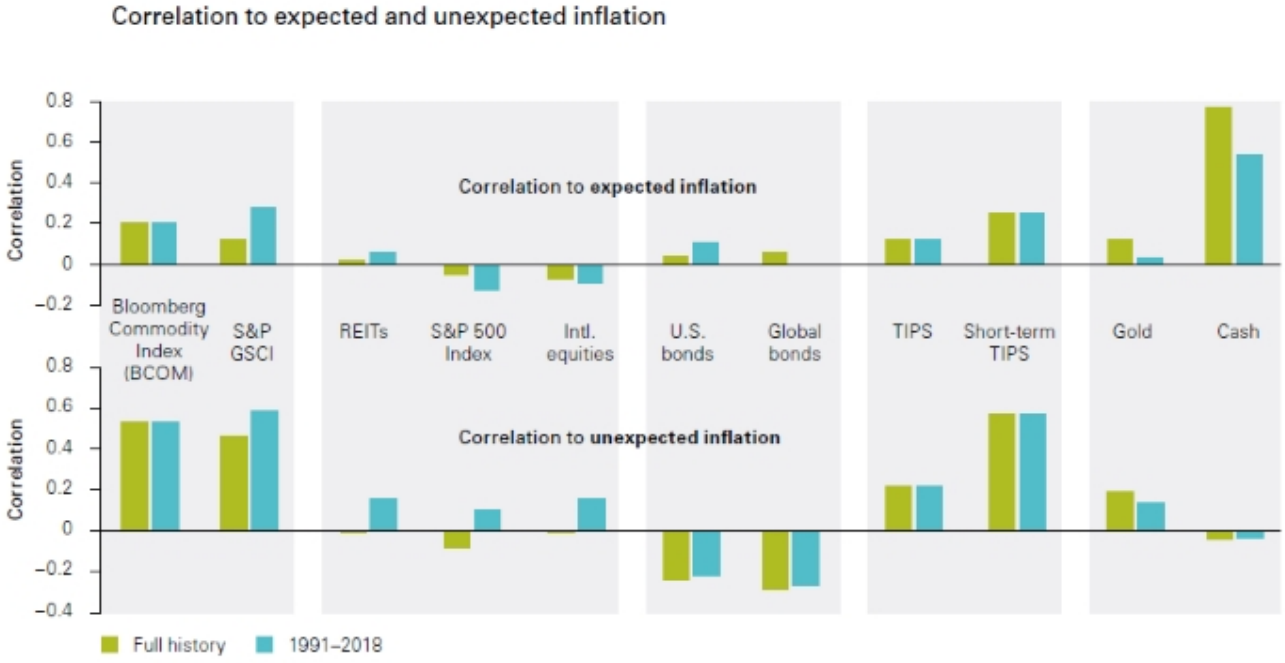
But the damage to investor confidence had already been done. Before the twentieth century, bond buyers had long been accustomed to dollars, pounds, and francs that did not depreciate in value over time. At the beginning of the twentieth century, investors still believed that a current dollar, pound, or franc would buy just as much in fifty years. In the decades following the conversion to paper currency, they slowly realized that their bonds, which promised only future paper currency, were worth less than they thought, producing the rise in interest rates seen in Figures 1-5 and 1-6; the result was devastating losses for bondholders.

In short, bondholders in the twentieth century were blindsided by what financial economists call a “thousand year flood”: in this case, the disappearance of constant-value gold-backed money. Before the twen-

Source: The Four Pillars of Investing

Inflation Hedges

The chart below shows the correlation of major asset classes to inflation.



Source: Vanguard

Investors should care more about correlation to unexpected inflation – expected inflation is already baked into current market prices.

All TIPS receive the same inflation adjustment, so you might wonder why short-term TIPS exhibit a higher correlation. Short-term TIPS have a lower duration than long-term TIPS and are less sensitive to changes in real yields. This means inflation-indexed income payments make up a larger portion of the investment's total return. Additionally, long-term TIPS have more to do with inflation experienced over the entire life of the bond – not an immediate inflation shock.

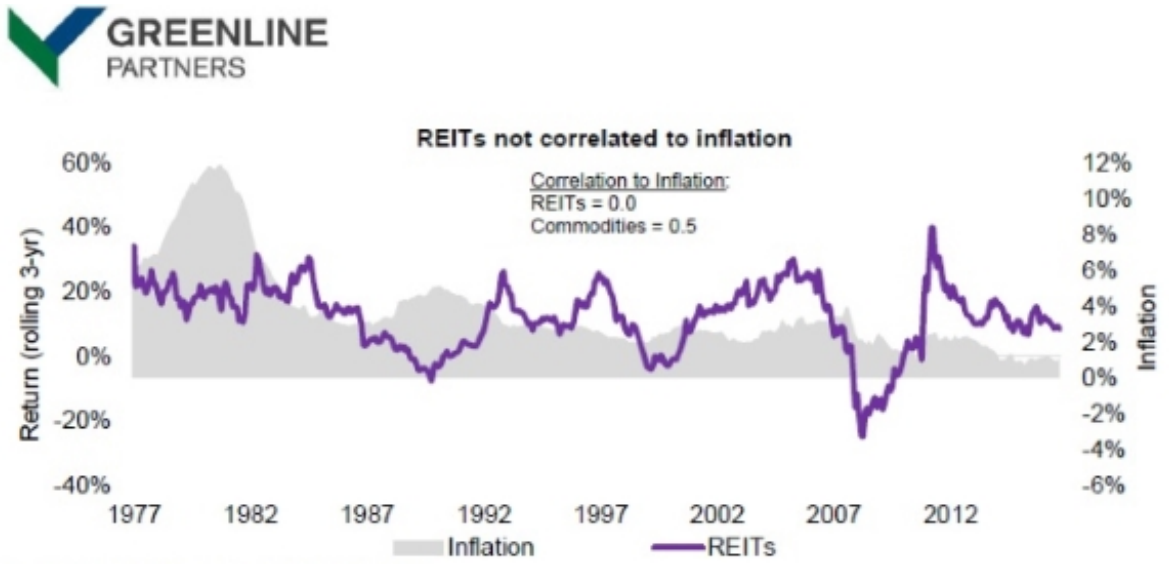
TIPS don't offer a perfect 1.0 correlation to inflation since TIPS prices move inversely to real yields in the short-term. It's important to not get caught up in correlation minutiae – TIPS held to maturity guarantee a real return regardless of the path they take along the way.

Gold is not an effective inflation hedge for time horizons that matter. The inflation-adjusted price of gold has fallen for extended stretches of time. If gold closely tracked inflation its inflation-adjusted price would be a horizontal line.

Source: The Golden Constant

It's true that gold investors do have (extremely) long-term data on their side. The annual pay of a U.S. Army private, in ounces of gold, is roughly equal to how much a Roman soldier earned in gold. That said, it doesn't help an investor if their gold allocation trailed inflation during their lifetime only to gain it back thirty years later.

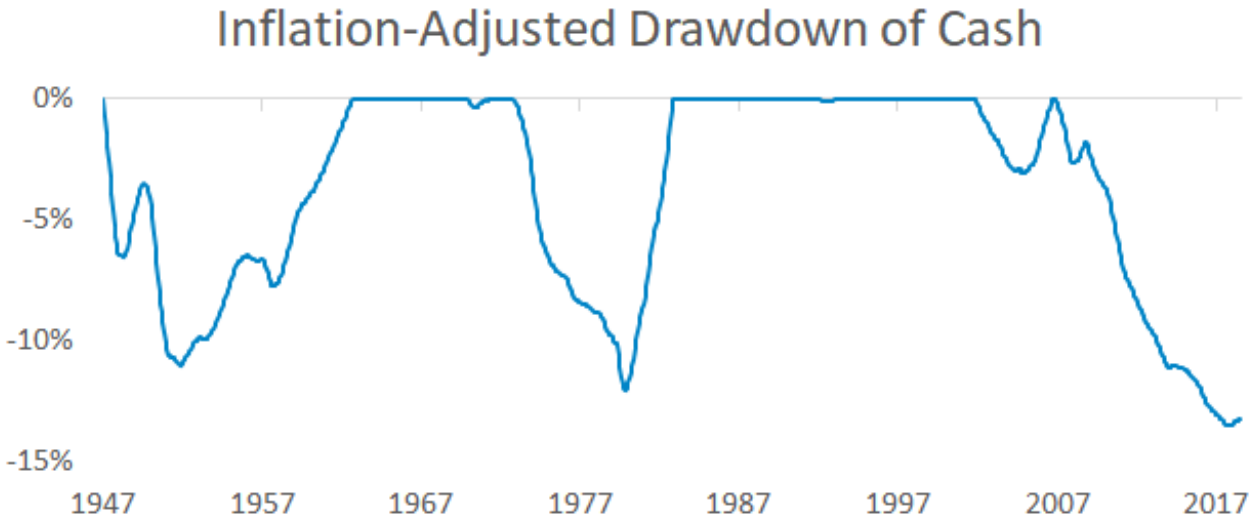
Stocks and REITs are not effective short-term inflation hedges. Both stocks and REITS have outperformed inflation over extended periods of time – but this doesn't mean they're inflation *hedges*. Companies can eventually pass on higher costs and REITs can eventually raise rents. Your inflation adjustment will come, but it might be years after inflation takes off.



Source: Greenline Partners

Cash is not an inflation hedge. There have been multiple 10+ year periods where Treasury bills have failed to outpace inflation. The ability of cash to hedge inflation is a function of how benevolent central bankers are in giving savers a fair rate.

Based on the post-crisis experience, I wouldn't be comfortable betting on cash to provide investors with a real return in the future.



Source and Disclosures

Summary

- Regular bonds are risky in the long-term since they're vulnerable to inflation.
- The inflation-protected cash flows of TIPS make them similar to bonds before the era of persistent inflation.
- TIPS have historically exhibited a high positive correlation to unexpected inflation.

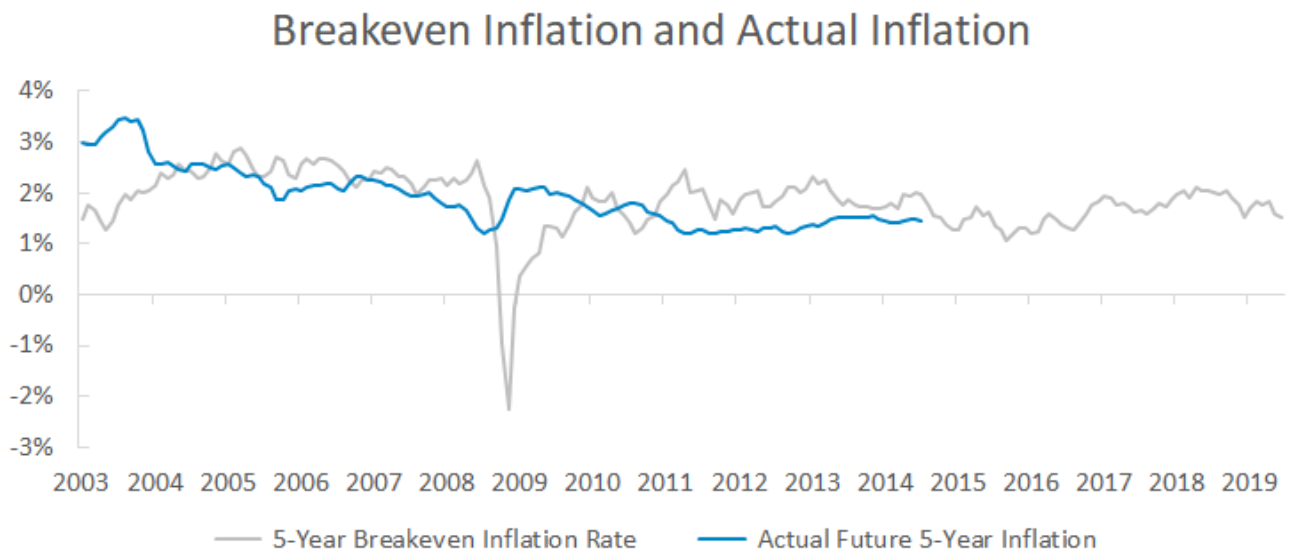
When TIPS Outperform and How I Invest in Them

movement.capital/when-tips-outperform-and-how-i-invest-in-them

July 30, 2019

TIPS outperform regular Treasuries when the market underestimates future inflation.

The chart below shows the 5-year breakeven rate and actual future inflation.

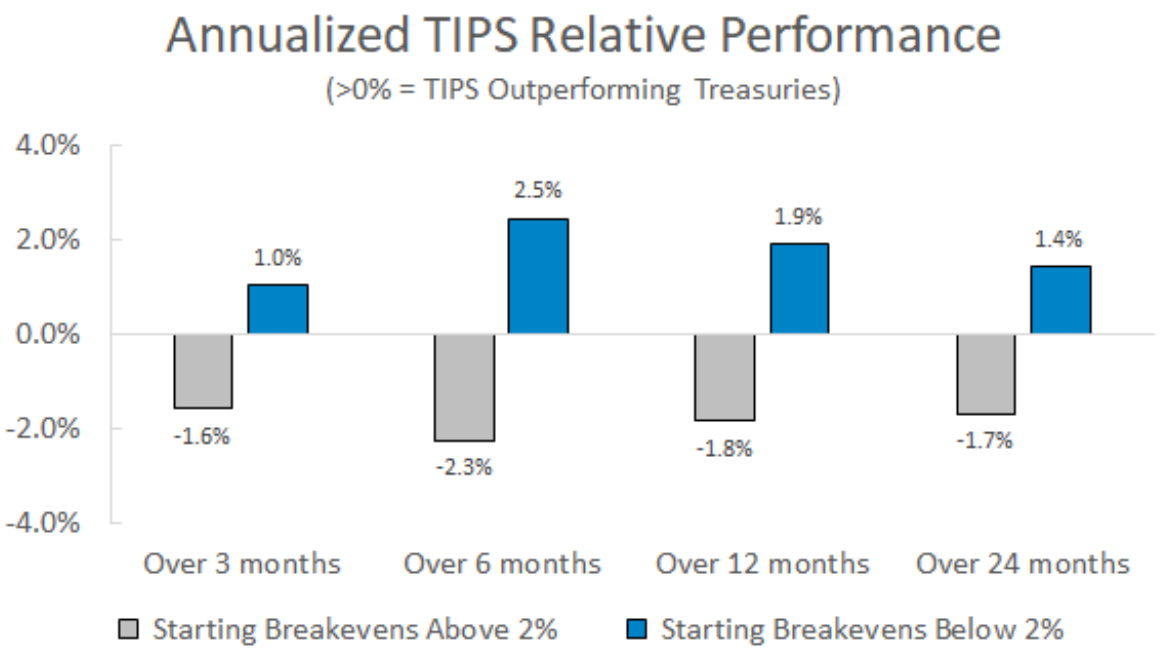


▶ Sources and Disclosures

The market has typically overestimated inflation, although expectations in 2003 and 2008 were overly conservative and TIPS went on to outperform.

I use breakeven rates as a way to see if TIPS are trading expensive or cheap relative to regular Treasuries. The chart below groups TIPS performance into periods when 10-year breakevens were above and below 2%.

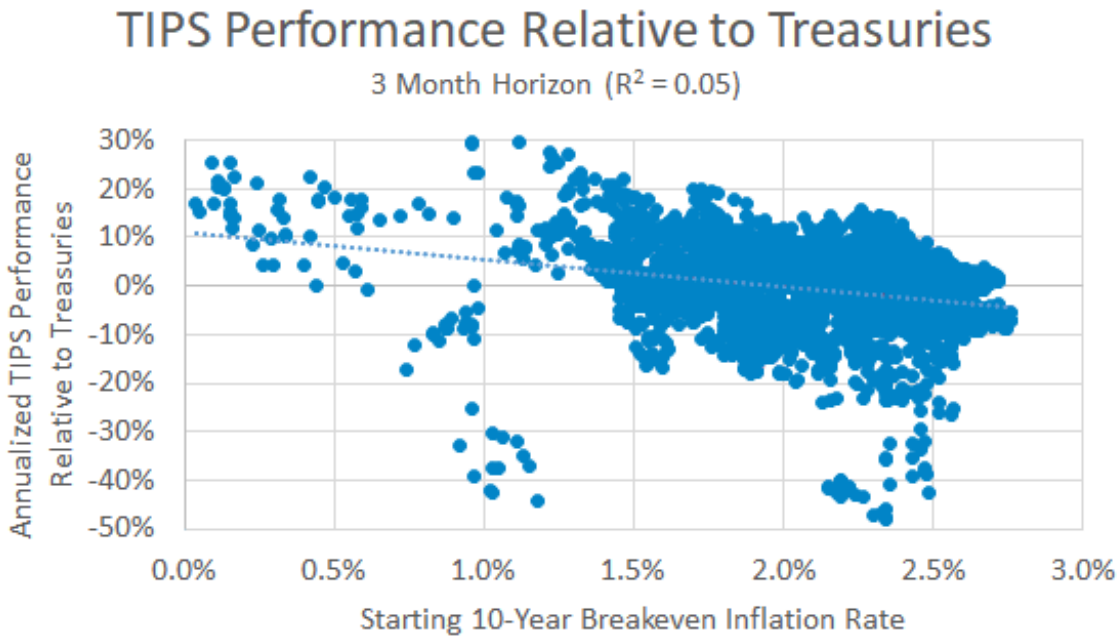
For example, the 12 month blue bar shows that TIPS have outperformed regular Treasuries by 1.9% on average over the next 12 months when the starting 10-year breakeven inflation rate was below 2%.



▶ Sources and Disclosures

The GIF below provides more detail and shows daily breakevens and future relative TIPS performance.

Any dots above 0% on the y-axis mean TIPS outperformed regular Treasuries over that time horizon.



▶ Sources and Disclosures

There's a positive correlation between starting breakevens and future TIPS performance relative to Treasuries, particularly for longer time horizons. The current 10-year breakeven rate of 1.77% has historically been associated with TIPS outperforming regular Treasuries by 1.3% over the next twelve months.

How I Use TIPS

An investor that only allocates to regular bonds is vulnerable to higher than expected inflation, yet solely using TIPS would result in underperformance if future inflation is less than expected.

I own an equal amount of regular and inflation-protected bonds to avoid making a bet on the direction of inflation. Just as investors have consistently failed to forecast future interest rates, I'm confident nobody truly knows where inflation is headed.

I mainly use Vanguard's VTIP ETF and occasionally buy individual TIPS bonds when someone wants to target a specific amount of future inflation-adjusted cash flow.

Summary

This post wraps up my series on TIPS. Main takeaways:

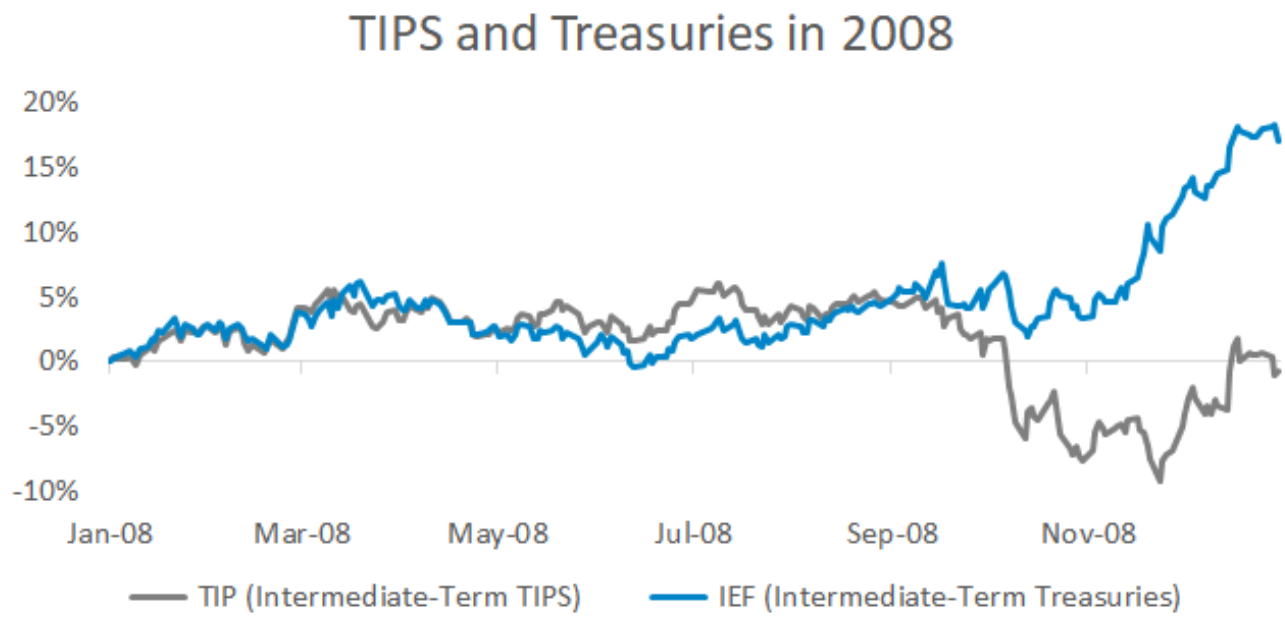
I hope these posts were useful and feel free to get in contact if you have any questions.

The Largest Arbitrage Ever Documented – TIPS in 2008

movement.capital/the-largest-arbitrage-ever-documented-tips-in-2008

July 26, 2019

One issue with TIPS is their performance in 2008:



Sources and Disclosures

Some investors say "TIPS didn't protect you in 2008, so I'm not using TIPS because that's when bonds should work."

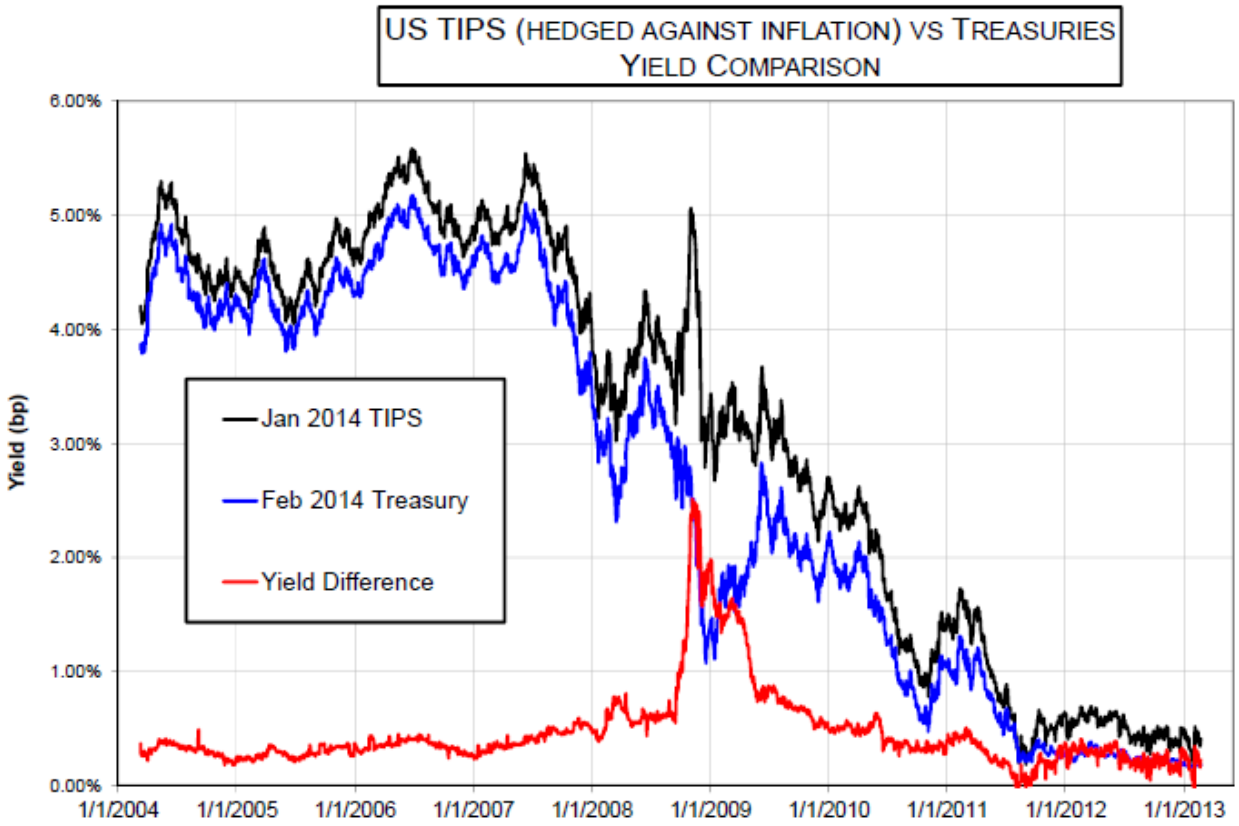
The Lehman Brothers bankruptcy is at the heart of why the TIPS market acted so strangely. In 2009 the United States Government Accountability Office wrote:

> *"Lehman Brothers owned TIPS as part of repo trades or posted TIPS as counterparty collateral. Because of Lehman's bankruptcy, the court and its counterparty needed to sell these TIPS, which created a flood of TIPS on the market."*

Lehman's counterparties and the bankruptcy court were forced sellers. A relative value fixed income fund named The Barnegat Fund was on the other side of the trade.

Barnegat noted the triple whammy facing TIPS in 2008:

- Forced unwind of Lehman collateral
- Real return funds took a bath on commodities and were also forced to sell TIPS
- Nobody was interested in allocating to relative value funds like Barnegat – letting the arbitrage persist for longer



Source: The Barnegat Fund

Barnegat bought TIPS, shorted Treasuries, and hedged out the inflation risk with inflation swaps. Without the swaps the trade would be a direct bet on inflation.

There wouldn't be a huge arbitrage opportunity if TIPS were accurately reflecting inflation expectations. But the inflation swaps market wasn't affected by the forced TIPS selling and priced in a less deflationary future than TIPS.

At its peak, the trade netted 2.5% on unleveraged capital with zero credit risk, zero rate risk, and zero inflation risk. Barnegat returned +132% in 2009 and researchers nicknamed the trade "the largest arbitrage ever documented in the literature."

> In this paper, we study the relative pricing of TIPS and Treasury bonds. A simple no-arbitrage argument places a strong restriction on the relation between the prices of these securities. We show that this no-arbitrage relation is frequently violated in the markets. To our knowledge, this arbitrage, which can exceed $20 per $100 notional amount, represents the largest arbitrage ever documented in the literature.

Source: National Bureau of Economic Research

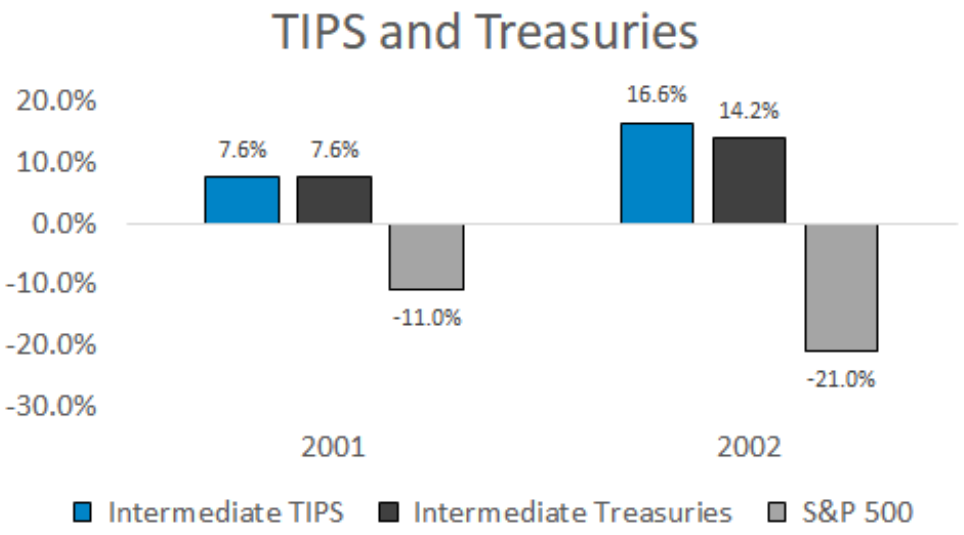
Geek Note: A number of funds had this trade on but some were unable to hold it through the crisis. A letter from Barnegat explains two of the unique ISDA clauses that helped them hold the trade to maturity.

Here's a video of Barnegat's founder talking about the trade:

Watch Video At: https://youtu.be/V-ssGaTnl8o

While TIPS have been more positively correlated to stocks than regular Treasuries, their performance in 2008 was more of a one-off event than a blueprint for how they'll perform in the next downturn.

For example, TIPS and Treasuries closely tracked each other during the early 2000s recession:



Sources and Disclosures

This is the third post in a five-part series on TIPS. Links to the previous two:

On Monday I'll explain why TIPS are not the tax nightmare they're made out to be and show an attractive TIPS alternative that's available until October 31.

Debunking TIPS Tax Inefficiency + A Tax Deferred Alternative

movement.capital/debunking-tips-tax-inefficiency-a-tax-deferred-alternative

July 29, 2019

TIPS have a reputation for being less tax efficient than other bonds:

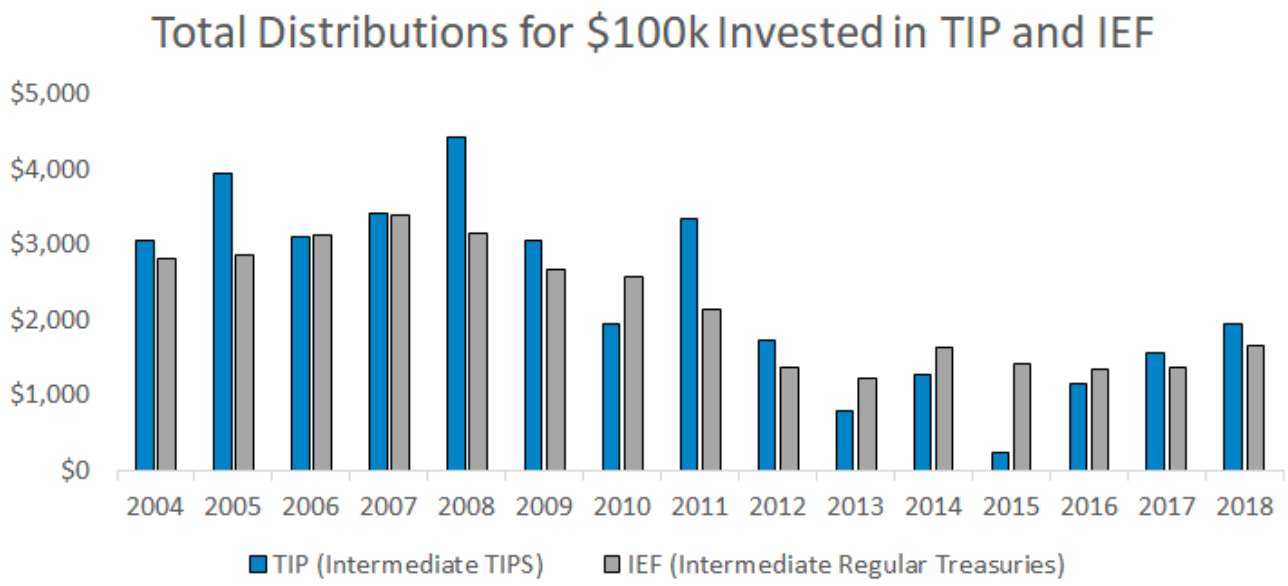
> **Abstract:** In 1997 the U.S. Treasury introduced Inflation Indexed (or Protected) Securities with substantial promotional fanfare. Yet, due in part to what some in the finance profession have described as a "tax disadvantage" placed upon TIPS, many are questioning whether they should appeal to a wide audience.

Source: Federal Reserve Bank of Atlanta

Phantom income is why some investors think TIPS are a tax nightmare. Inflation adjustments make up the majority of return in a TIPS bond. Higher principal values are not realized until the bonds mature. Hence the phantom income name – the tax liability is owed before the income is received.

This keeps TIPS and regular Treasuries on a level playing field. If the inflation adjustment *wasn't* taxed until maturity a long-term TIPS bond would offer decades of tax deferral.

The tax disadvantage is an illusion because TIPS and Treasuries generate similar tax liabilities if realized inflation is equal to expected inflation. The chart below shows the taxable distributions of investing $100,000 at the beginning of each year in intermediate-term TIPS and Treasuries. The higher TIPS distributions in years like 2005 are a result of higher than expected inflation.



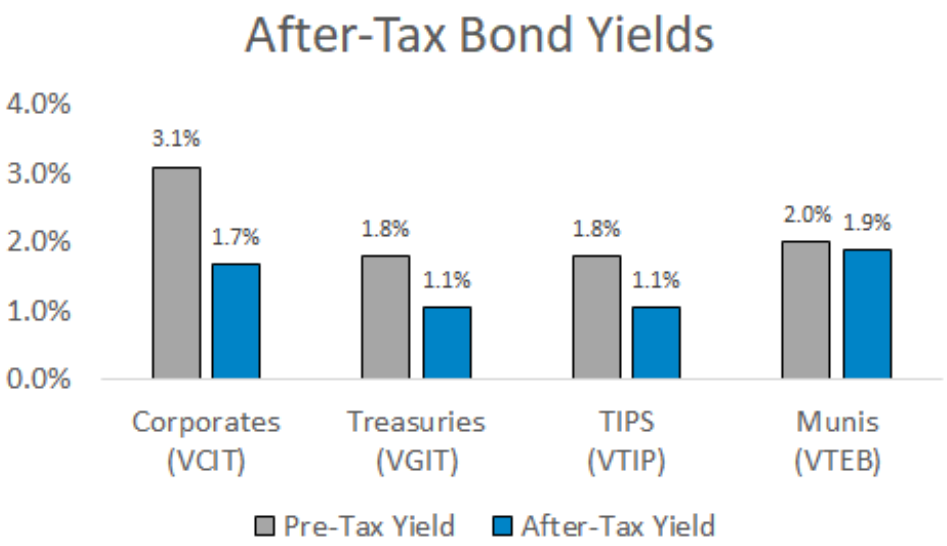
▶ Sources and Disclosures

Researchers concluded:

> *"There is not a consistent, sizable difference in the after-tax yields on TIPS versus their fixed-rate counterparts."*
>
> *Source: Are TIPS Really Tax Disadvantaged?*

The tax inefficiency argument doesn't hold water when comparing TIPS to Treasuries, but it is difficult to make the case for substantial allocations to taxable bonds in the taxable accounts of wealthy investors.

The chart below shows pre-tax and after-tax bond yields. The example assumes 37% federal, 5% state, and 3.8% net investment income taxes. Treasuries and TIPS are exempt from state taxes and munis are exempt from federal and net investment income taxes.



▶ Sources and Disclosures

Series I Bonds: A Compelling Alternative to TIPS

Series I bonds are a lesser known but unique investment option. Main things to know about them:

- Can only be bought directly from the U.S. Treasury
- They earn a fixed interest rate and a variable inflation rate
- Interest accrues monthly and is paid out when the bond is redeemed
- Three months of interest are lost if redeemed before five years
- Zero cost of ownership (no commissions or expense ratios)
- Interest is exempt from state and local taxes
- Interest is exempt from federal taxes if used for education
- **Most importantly, the interest is not taxable until the bond is redeemed**

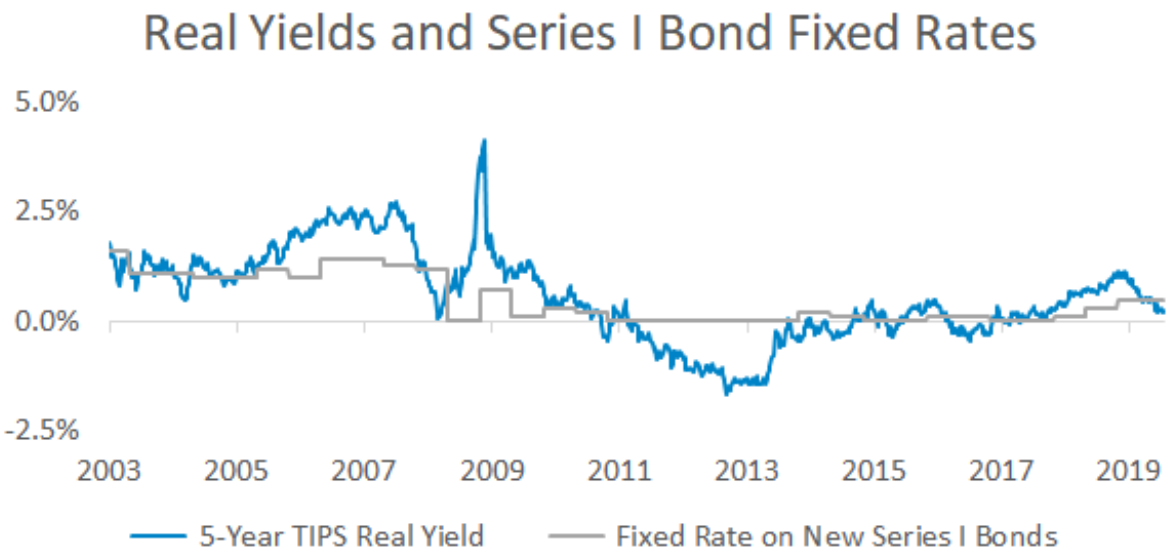
Series I bonds are a more tax efficient version of TIPS. Here's an example of how the total interest rate is calculated:

The composite rate for I bonds issued from May 1, 2019 through October 31, 2019, is 1.90%	
Here's how we set that composite rate:	
Fixed rate	0.50%
Semiannual inflation rate	0.70%
Composite rate = [fixed rate + (2 x semiannual inflation rate) + (fixed rate x semiannual inflation rate)]	[0.0050 + (2 x 0.0070) + (0.0050 x 0.0070)]
Composite rate	[0.0050 + 0.0140 + 0.0000350]
Composite rate	0.019035
Composite rate	1.90%

Source: Treasury Direct

The biggest downside is that investors can only buy $10,000 of series I bonds per year.

While the inflation rate changes every six months, the fixed rate stays the same for as long as you own the bond. The fixed rate of a series I bond is similar to the real yield of a TIPS bond. The current fixed rate of 0.50% is the highest in nine years and is double the current 5-year TIPS real yield of 0.25%.



▶ Sources and Disclosures

Summary

- TIPS are not tax disadvantaged relative to other taxable bonds.

- Series I bonds are a more tax efficient version of TIPS and offer an attractive fixed rate until October 31.

This is the fourth part in a series on TIPS. Links to the other posts:

- Part 1: The Origin of TIPS, How They Work, and an All Weather Mistake
- Part 2: How to Hedge Inflation and Avoid the Biggest Bond Risk
- Part 3: The Largest Arbitrage Ever Documented – TIPS in 2008

Tomorrow I'll analyze environments when TIPS have outperformed and show how I use TIPS.