



Investment Strategy Considerations for Inflation-Sensitive Investors

February 2011



RBC Global
Asset Management™

Introduction

The United States, along with many developed economies, has enjoyed relatively stable inflation during much of the past two decades. However, the unprecedented fiscal and monetary response by governments globally (to combat the recent credit crisis) increases the potential for a return to an era of higher inflation.

The potential for higher inflation is a concern to investors for two key reasons:

General: History suggests that inflation experience can have an impact on asset class returns. Expectations for higher inflation therefore, or even increased uncertainty around future inflation, may be a cause for investors to revisit asset mix policy; and

The World is “Short” Inflation: The investment objective for many investors, including defined benefit (DB) plan sponsors, other post-employment benefit (OPEB) plans, workers compensation plans, endowments and foundations, and individuals saving for retirement, is to secure long-term income streams to meet expenditure requirements that are tied to inflation. The key for these investors is to earn sufficient long-term investment returns over and above inflation. Heightened inflation uncertainty coupled with a maturing population challenges investors’ ability to do so.

Key Findings:

Section 1: Inflation Risk and Core Investment Vehicles

- The extreme range of sentiment suggests that inflation is a relevant risk for U.S. investors; this is evidenced by a marked uptick in inflation volatility since April, 2010. **(Pg. 2)**
- The tactical decision to purchase Treasury Inflation Protected Securities (TIPS) (versus Treasury Securities) should reflect one’s sentiment that actual inflation will exceed market expectations. **(Pg. 4)**
- Holding TIPS over longer investment horizons is an effective means of providing inflation protection; short holding period strategies are an ineffective hedge. **(Pg. 5)**

Section 2: The MRP and TIPS as a Legitimate Asset Class

- The least risky investment for investors with a real return objective is a Minimum Risk Portfolio (MRP) of TIPS (not cash). **(Pg. 5)**
- The availability and liquidity of the TIPS market has steadily increased since 1997, and is currently at roughly \$615 billion. **(Pgs. 5/Appendix)**

- Naysayers dismiss TIPS as a legitimate asset class primarily on the belief that Owners Equivalent Rent (OER) artificially distorts published CPI data, especially in periods of extreme house price volatility. In fact, even during the most recent housing crisis, this mis-pricing has largely corrected itself. This again supports TIPS as a longer-term buy-and-hold strategy. **(Pgs. 5/Appendix)**

Section 3: Increasing Expected Return and Risk

- For the vast majority of investors, the MRP will not meet minimum return goals. Although a litany of potentially higher returning asset classes/strategies exist, we limit our analysis to investment strategies typically associated with a degree of inflation protection/linkage. **(Pg. 6)**
- Nominal Bonds offer the potential for superior return opportunities (versus TIPS) due to the greater availability of higher yielding spread product. Second, shorter-term nominal bonds partially mitigate inflation risk through frequent reinvestment at yields updated for inflation expectations. However, the tracking error of nominal bond returns relative to the MRP over the last eight years was in excess of 5%, highlighting that nominal bonds are potentially risky investments relative to a real income objective. **(Pgs. 6-8)**
- Foreign Currency Real Return Bonds: A basket of currency-hedged inflation-linked bonds should deliver similar holding period returns to domestic TIPS. Emerging market foreign currency (\$US hedged) real return bonds have provided double-digit returns in five of the last seven years; however, the limited depth of these markets make achieving those returns a challenge at this time. **(Pg. 8)**
- Public Equities: Equity investments alone should not be considered an effective hedge against short-term inflation-sensitive objectives; however, they may be a consideration for (real-return minded) investors with long time horizons. **(Pg. 9)**
- Other Inflation-Linked Assets: Commodities, real estate, infrastructure and timberland have the potential to maintain real long-term purchasing power objectives. Investors are better served by considering these asset classes as inflation-like based on perceived improvements to the risk and return profile of the investment portfolio, rather than as a full hedge against the underlying inflation-related investment objectives. **(Pgs. 9-10)**

In future reports we will investigate commodities, real estate, infrastructure and timberland in greater detail.

Section 1: Inflation Risk and Core Investment Vehicles

The fundamental question is whether inflation remains a risk worthy of concern. For the past 14 years, inflation has averaged around 2.4% per year and has generally fluctuated within a 1.0%-4.0% band, with a few small and short-lived exceptions such as the recent 2008 credit crisis (Chart 1). Recent average levels of inflation are not that dissimilar from the long-term average of 3.4% dating back to the First World War (Chart 2).

The inflation experience in most western economies during the past ten years is commonly attributed to the success of central bank monetary policy.¹ Whether high and volatile inflation continues to be a meaningful risk depends on the extent to which the role of central banks has actually been a significant driver behind the experience of the last decade. More importantly, whether they can continue to play a role in managing inflation going forward remains to be seen.

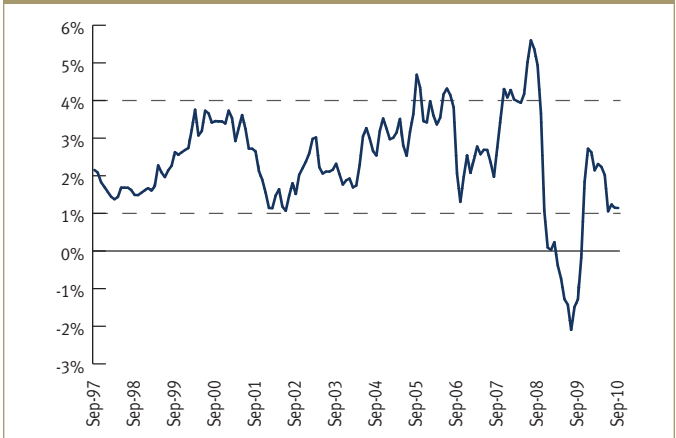
Since embarking on formal inflation targeting, central bank policy for the most part has remained credible, and longer-term inflation expectations for now remain well anchored.² However, unprecedented fiscal and monetary responses to the deep global downturn of 2008/2009 have stoked fears of a return to higher and potentially more volatile inflation such as that experienced in the 1970s (Chart 3).

Indeed, looking beyond the current environment to a sustained return to global economic growth, we may find that central banks will struggle, in the face of massive liquidity injections, to manage inflation within target bands.

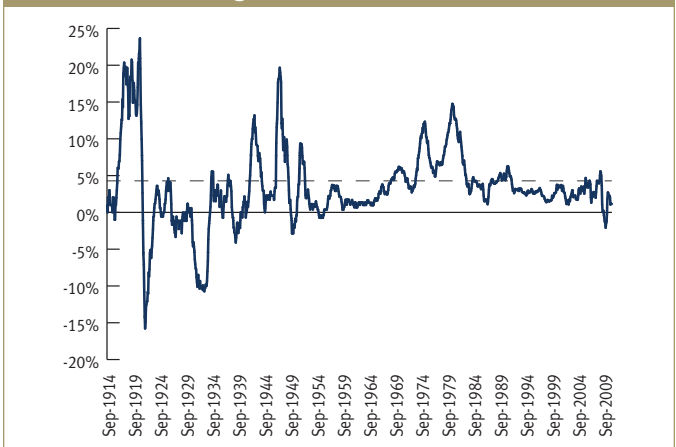
An additional element to consider with respect to the longer-term outlook for inflation is centered in China. For the past decade the world economy has benefited from the disinflationary impact of manufacturers relocating production to take advantage of China's excess labor supply and considerable wage gap. However, the Chinese labor force (prime working ages 20-59) is expected to peak in 2016 and decline thereafter.³ Further, as standards of living continue to improve and savings decline from currently high levels, we may see China transform from a source of disinflationary pressures to a source of inflation, as its population becomes a major consumer of goods and services.

For these reasons, relative to the prevailing environment of the past two decades, the outlook for inflation is

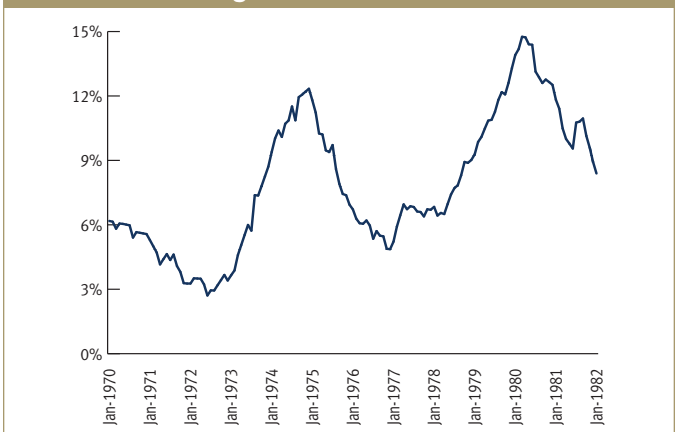
**Chart 1: Rolling Annual Inflation: US CPI
1997-2010 – Average: 2.4%**



**Chart 2: Rolling Annual Inflation: US CPI
1914-2010 – Average: 3.4%**



**Chart 3: Rolling Annual Inflation: US CPI
1970-1982 – Average: 7.9%**



Source: U.S. Department of Labor: Bureau of Labor Statistics - Series CPIAUCNS

¹The U.S. Federal Reserve has not adopted a formal inflation target, however, is quite explicit about managing inflation risk being an important objective. Canada, the United Kingdom and the European Union, for example, have all maintained explicit inflation targets and manage key lending rates aggressively in an attempt to maintain inflation within these targets.

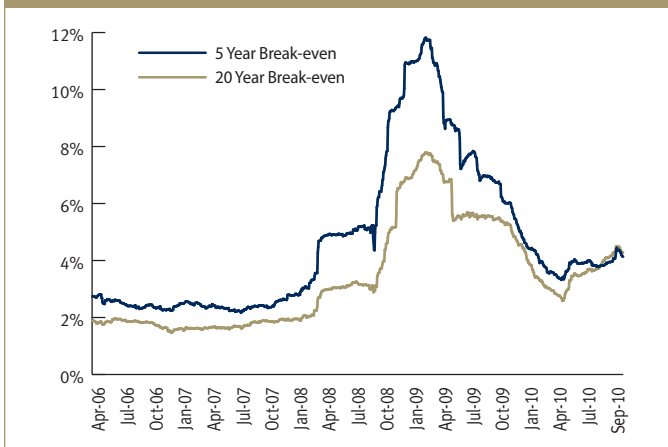
²The issue as to whether the FOMC policy surrounding the fed funds rate – such as reducing rates as the only blunt instrument – is beyond the scope of this report.

³U.S. Census Bureau International Data Base

considerably more uncertain as the world economy and financial systems continue to recover. Such short-term uncertainty and longer-term pressures should be cause for many investors to revisit their investment strategy.

With debt-to-GDP ratios reaching critical 100% thresholds in many countries (and forecasted to exceed these levels), many argue that inflation is inevitable.⁴ On the other hand, it is quite possible we could see an extended period of deflation (or disinflation) further postulating that even if these developed countries wanted to inflate their problems away, they could not do so at this time. This extreme range of sentiment suggests a period of more volatile break-even (b/e) inflation on the horizon. Chart 4 illustrates that although b/e inflation volatility is trivial compared to the late 2008/2009 period, there has been a marked uptick since April of 2010 bringing it to twice that of pre-crisis levels.

Chart 4: 6-Month Rolling Break-even Standard Deviation



Source: Market Inflation Expectations

TIPS 101

Actual and expected inflation are important concepts in explaining the relative performance of nominal and real return bonds (see Market Inflation Expectations).

The cash flows (i.e., interest income and return of principal) of nominal bonds are fixed in absolute terms at issue; however, the real value or purchasing power of these cash flows ultimately depends on actual inflation during the term of the bond. Nominal bonds pay a fixed nominal yield to maturity that is independent of actual inflation during the term of the bond.

Cash flows from TIPS, by contrast, adjust to reflect actual inflation during the term of the bond. The interest income and maturity value of a real return bond are therefore variable in absolute terms, however fixed in real (i.e., over and above

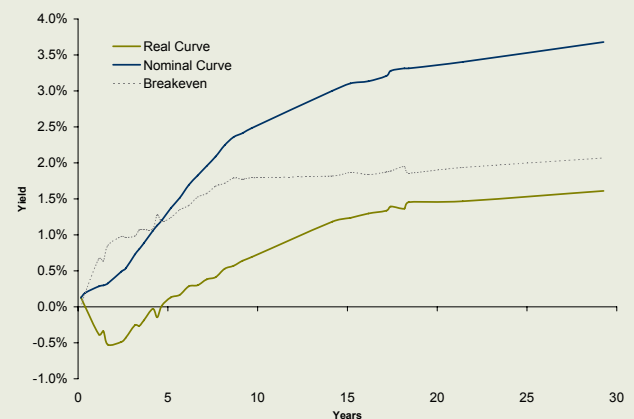
Market Inflation Expectations

The difference between nominal bond yields and real yields on real return bonds (of similar term) is referred to as break-even inflation over the particular term of the bonds, and reflects two factors:

- **Expected Inflation:** the level of inflation investors expect will occur during the term of the bond, plus
- **Inflation Risk Premium:** the additional premium investors require for accepting the risk that actual inflation will be higher than expected (thus reducing the realized real return for holding the bond).

By observing the Treasury and TIPS curve in the market one can impute the market's expectation of inflation for the entire term structure. Although a common oversight, break-even inflation rates are not pure measures of expected inflation as one needs to include the inflation risk premium.⁵

Real and Nominal Yield Curves as of 9.30.10



Source: Bloomberg

⁴American Review Papers and Proceedings, January 7, 2010. "Growth in a Time of Debt" (Carmen M. Reinhart & Kenneth S. Rogoff)

⁵One could even decompose the TIPS yield into its real yield and risk premium components. Please see FAJ Vol. 66, Number 5. "A TIPS Scorecard: Are They Accomplishing Their Objectives." (Barnes, Bodie, Triest, Wang)

inflation) terms. TIPS yields are quoted based on their real yield. TIPS pay a fixed real yield plus actual inflation that occurs during the holding period of the bond. This is an extremely important point to remember as real yields can occasionally be negative; for example, real yields are negative out to 2016 (see Market Inflation Expectations on previous page). Treasuries and TIPS are full obligations of the U.S. government; that is, since both securities have the same underlying credit quality, they both must trade at the same expected yield (Chart 5a).

Hypothetical Example

We start by comparing the choice of purchasing a ten year Treasury versus ten year TIPS. In our hypothetical example, TIPS are paying a fixed real yield (i.e., coupon) of 1.5% per annum or \$1,500 in the initial year (\$100,000 x 1.5%); just as the principal is compounded with inflation, the \$1,500 coupon is compounded by inflation (see Year 2 in Chart 5b). Actual inflation over the entire holding period (ex-post) is assumed equal to the market expectations of 2.5% per annum at purchase (ex-ante). As mentioned above, since both Treasury and TIPS have the same underlying credit quality, they both must trade at the same expected yield. Thus (in this hypothetical example) a ten year Treasury would receive a fixed (nominal) yield of 4.0% per annum or \$4,000 each year (\$100,000 x 4.0%) and a return of the original \$100,000 of principal at maturity. The TIPS investor would receive their original \$100,000 investment with ten years of compound inflation growth at 2.5%. Chart 5b shows the relationship between the two examples.

Chart 6 effectively summarizes the above example (except coupon payments are typically semi-annual). In our hypothetical world, where actual inflation exactly equalled expected inflation (plus risk premium), investors (ignoring second order benefits such as taxes) would be indifferent between either investment choice; that is, the internal rate of return (IRR) is 4.0% in both cases.

Tactical Decision: Treasury or TIPS?

Ultimately, inflation expectations have no impact on the real return of nominal bonds held through to maturity – it is actual inflation that ultimately will determine this real return. However, changes in expected inflation during the term of a nominal bond are critically important to holders of nominal bonds. Because the cash flows from a nominal bond are fixed at issue, changing inflation expectations cause fluctuations in the price of a nominal bond. Rising inflation expectations, for example, negatively impact the value of a nominal bond because investors will pay less for fixed cash flows that could erode in value if actual inflation does in fact increase (more than expected). The market value of a similar real return bond will be unaffected by rising inflation expectations because the cash flows from real return bonds adjust based on actual inflation.

Chart 5a: Nominal Yield = Real Yield + Inflation

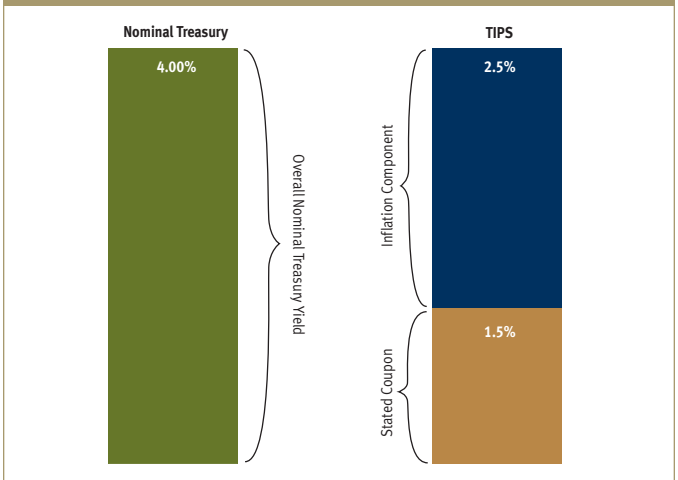
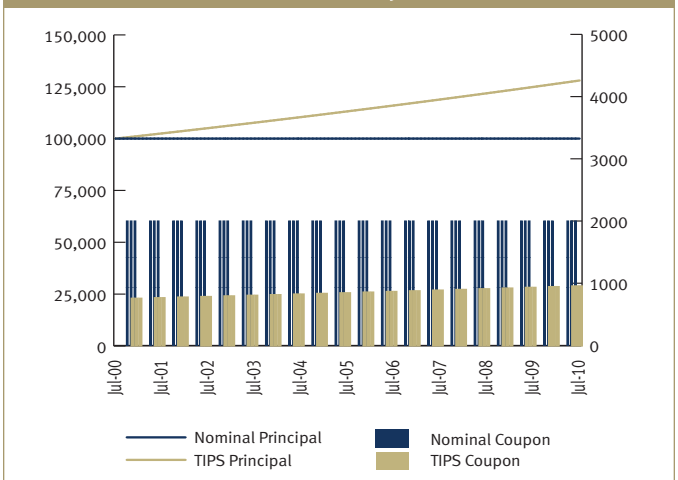


Chart 5b: Hypothetical Example

Initial Investment	Treasury	TIPS
Tsy Principal (Par)	\$100,000	
Tsy Coupon (\$100k x 4.00%)	\$4,000	
TIPS Principal (Par)		\$100,000
TIPS Coupon (\$100k x 1.50%)		\$1,500
Year 2	Treasury	TIPS
Tsy Principal	\$100,000	
Tsy Coupon	\$4,000	
TIPS Principal (\$100k x 1.025)		\$102,500
TIPS Coupon (\$1,500 x 1.025)		\$1,538
Year 10	Treasury	TIPS
Tsy Principal	\$100,000	
Tsy Coupon	\$4,000	
TIPS Principal (\$100k x 1.025 ⁹)		\$124,886
TIPS Coupon (\$1,500 x 1.025 ⁹)		\$1,873

Chart 6: TIPS vs. Nominal Treasury Investment



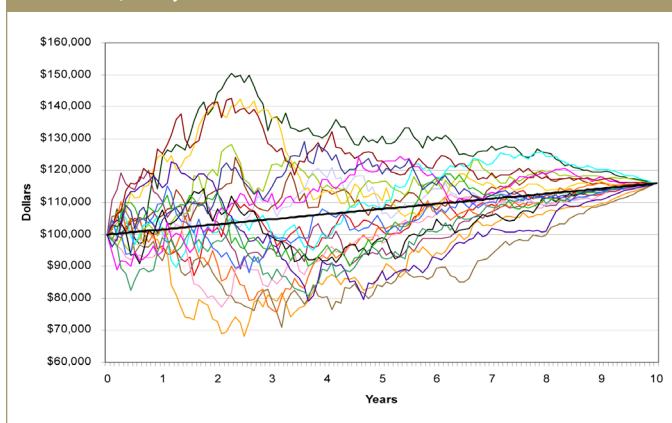
These hypothetical illustrations are shown for illustrative purposes only.

Section 2: The MRP and TIPS as a Legitimate Asset Class

TIPS: Buy & Hold Strategy

We find that holding TIPS over long time horizons is the most effective means of providing inflation protection. Using the earlier example (Chart 5b), if we actually earned a 1.5% real yield over 10 years we would have roughly \$116,000 (in present day dollars). Stated another way, irrespective of whether inflation was running at 2.5% p.a. (in our earlier example), -2.5% p.a. or 7.5% p.a., we would still have \$116,000 in today's dollars. However, it is (real) yield volatility over shorter holding periods that has the potential of swamping our primary goal of maintaining purchasing power. That is, if this same \$100,000 TIPS investment were sold after a few years it could easily be worth significantly more (or less) if real yields were lower (or higher) than expected (Chart 7).⁶

Chart 7: \$100,000 Investment in 10 Yr. TIPS over 20 Paths



Source: Path forecasts based on TIPS data obtained from Bloomberg

TIPS: Asset-Liability Perspective

In the next two sections we show why investing in an asset that is perfectly correlated with inflation is not necessarily the correct measure (i.e., benchmark) for an investor with a real asset-liability objective; that is, although higher real yields directionally result in lower asset values, they also translate into lower liability values.

Investment Objectives

Maintaining the long-term real purchasing power of invested assets usually requires that investors balance two competing risk and return objectives:

Return: Earning a sufficient long-term real rate of return (over inflation) on invested assets in order to secure a target long-term income adjusted for inflation (see Section 3); and

Risk: Managing volatility within acceptable levels relative to the expected cost of delivering on future income objectives.

An investor's target real rate of return can involve a very broad range of factors and incorporate any number of objectives. However, at a minimum, the target return will ideally be sufficient for invested assets to accumulate to levels required to deliver a minimum ongoing income threshold required by the investor.

The Minimum Risk Portfolio

The Minimum Risk Portfolio (MRP) is an investment strategy that delivers an income objective with the least amount of risk, and for an investor looking to realize a real (i.e., inflation-adjusted) level of income, the MRP is a portfolio of TIPS.⁷ As outlined in section 1, TIPS strategies guarantee real rates of return over inflation by paying coupons on an inflation-adjusted par value of the bond, and by increasing the maturity value with the actual rate of inflation during the life of the bond.⁸

The appeal of investing in the MRP is that asset values should closely track the expected cost to deliver the future inflation-adjusted income objective over time. By guaranteeing a long-term real rate of return over inflation, a portfolio of real return bonds ensures investors are able to meet current income requirements. It also provides for real growth in the value of assets commensurate with changes in the expected cost of meeting future inflation-adjusted income requirements over the long-term.

Some investors inadvertently dismiss TIPS on the belief that:

- There are supply limitations; and
- Owners Equivalent Rent (OER) distorts "true" inflation.

We explore both of these perceptions in the Appendix.

⁶Chart 7 graphically represents the simulation of twenty real return paths over a ten year period for differing real yield volatilities. The simulations are based on randomly sampling the distribution of U.S. CPI changes since 1950 to model the volatility of real rates. The growth of 1.5% coupon bond with reinvestment is plotted in black.

⁷Where the income objective is partially inflation-adjusted, the MRP will constitute a combination of nominal and real return bonds.

⁸Inflation-linked fixed income securities in most countries typically reference published CPI indices and apply a lag factor when determining the rate of inflation (to coupon payments and maturity values). In Canada, they are called Real Return Bonds (RRBs), whereas in the UK, they are commonly referred to as Linkers.

Section 3: Increasing Expected Return & Risk

To the extent that the MRP (consisting of some combination of nominal and inflation-linked fixed income securities) does not meet minimum return targets, the vast majority of investment strategies typically include potentially higher returning assets. The commensurate downside (i.e., mismatch) risk is that actual returns are lower than the MRP would provide, such that additional funding may be required as income objectives are not met.

In the case of pension plans, the mismatch risk associated with higher assumed-returning investment strategies (that deviate from the MRP) is made very explicit for corporate plans, and to a lesser extent, multi-employer pension plans (MEPPs) governed under ERISA; these federal regulations require pension plans to be evaluated regularly, and asset shortfalls to be mitigated through additional funding or reductions in the level of future benefits. Even for state and municipal public-sector pension plans – where the reporting requirements are not explicit – the economic consequences of pursuing investment strategies with higher expected long-term real rates of return must be balanced with the risks associated with potential short- to medium-term volatility in asset values relative to the long-term cost of delivering the underlying income objective.

These same fundamental economic principals apply to non-pension related plans such as 401(k) participants⁹, OPEB plans, Workers Compensation Plans, Nuclear Decommissioning trusts (NDTs) and endowments and foundations to name a few. That is, while not necessarily subject to the formal regulatory regime of pension plans, these entities do not escape the hard rules of the capital markets; they too are also subject to the risks associated with investment alternatives that seek additional returns while deviating from the MRP. When asset values fall sufficiently below the expected cost to meet long-term income objectives, investors become increasingly reluctant to draw down capital despite believing that certain investment strategies will pay off in the long term; individual investors will defer retirement, and endowments and foundations may be forced to defer or eliminate capital expenditures important to meeting program goals.

In cases of extreme asset shortfall, risk is also not limited to a perceived inability to spend because drawing down capital can permanently impair any long-term prospects for assets

to recover even if future returns are commensurate with long-term expectations. These scenarios represent real risks imposed by the choice of investment strategy.

Thus, in this section, we want to make the distinction between an inflation hedge and asset classes that may be correlated over very long periods. As a result, plan sponsors need to understand that incorporating inflation-linked benefits may be expensive to fund and/or entail considerable investment risk.

Evaluating Strategies versus the MRP

We therefore build a core framework where alternative strategies are not only evaluated in terms of their expected long-term real rates of return (i.e., total returns net of inflation), but also in terms of the volatility of returns relative to the expected long-term cost of delivering the income objective. The relevant questions for investors to consider are first whether they are willing or able to accept the investment risks associated with alternative investment strategies to the MRP, and second, whether these alternative strategies offer a sufficient long-term expected return for the incremental investment risk relative to investing in the MRP. For analytical ease, we use the Barclays U.S. TIPS Long (10+) Index as a proxy for the MRP.¹⁰

Our analysis focuses on nominal bonds, foreign currency real-return bonds, public equities, commodities, gold, real estate, infrastructure and timber since they are strategies commonly considered by investors and frequently cited as delivering favorable long-term inflation plus returns. Our analysis starts with a review of nominal bonds since most investment portfolios include them (even when the underlying investment objective is real in nature).

A. Nominal vs. Inflation-Linked Bonds

As outlined in section 1, the tactical decision to purchase a nominal Treasury versus a TIPS depends on an investor's view of future inflation; if an investor believes that future inflation will be higher than the market is expecting (i.e., break-even inflation), TIPS would be chosen over nominal Treasuries.

Nominal bonds, when held to maturity and in the absence of defaults, offer fixed absolute returns that compensate an investor for expected inflation; however, real returns on nominal bonds (or any other asset class for that matter) are variable depending on actual inflation. For example, revisiting the yield curves on page 3, we see that real yields are negative out to 2017.

⁹In fact, one could argue that 401(k) participants have an even greater exposure to inflation as they are taking this investment risk themselves.

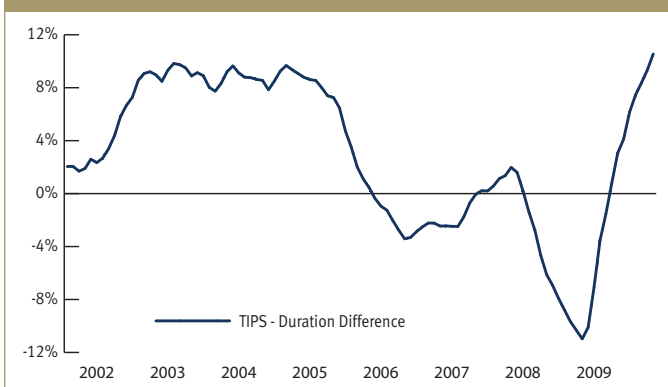
¹⁰The average duration of this benchmark over the last 10 years is approximately 10 years.

Similarly, real returns can be lower than expected if actual inflation during the holding period of the bond is higher than the expected rate of inflation (embedded in nominal bond yields at the time of purchase). Relative to a real return objective, therefore, nominal bonds are potentially “risky” investments.

Notwithstanding the variability of real returns, nominal bonds have long played a very prominent role in investment portfolios, including those whose primary objective is to maintain the real purchasing power of invested assets. A number of factors may explain the emphasis on nominal bonds:

- Opportunities to enhance nominal bond returns through spread product not available in the real return bond market;
- Investor beliefs that real return bond yields are artificially low due to structural imbalances between supply and demand from risk-averse investors;
- Investor beliefs that success in targeting inflation policy reduces the risk of nominal bonds relative to a real return investment objective;
- Legacy limitations in the supply of real return bonds (see Section 2); and
- OER may artificially distort published CPI data during periods of extreme housing market increases or decreases (see Appendix).

Chart 8: Duration Matched Nominal Bonds & MRP



Source: Barclays

Duration-Matched Nominal Bonds

The intuition behind investing in duration-matched bonds is to mitigate the risks associated with changes in interest rates by better matching the bond portfolio maturity profile to that of the underlying income objectives. This strategy is effective when the underlying income objective is fixed in nominal terms; however, when target income levels depend on future

levels of inflation, the risk of investing in nominal bonds is that actual inflation increases greater than expectations (thereby eroding the expected real return).

Rising market inflation expectations will therefore suppress nominal bond prices, causing them to underperform (relative to an inflation-linked bond).

Shorter-Term Nominal Bonds

Shorter-dated nominal bonds partially mitigate inflation risk through more frequent reinvestment at yields that reflect updated expectations for inflation. However, the duration mismatch relative to a longer-term income objective introduces the risk of having to reinvest the portfolio at lower real yields. That is, reduced exposure to rising inflation expectations comes with greater exposure to declining real interest rates.

Chart 8 examines rolling annual relative returns between nominal bonds and TIPS (since they were first issued in 1997). Although exposed to different kinds of risks, volatility has been considerable for both duration-matched and shorter-term nominal bonds relative to TIPS.¹¹

- Total returns from the Barclays TIPS Long Index outperformed a duration-matched composite portfolio of the Barclays Treasury index by 0.605% per annum over the last eight years. However, as no surprise, the nominal portfolio outperformed over the deflationary period (i.e., 2008/2009 crisis).
- The tracking error of nominal bond returns relative to the MRP was more than 5%.

The above analysis highlights both the magnitude of potential risks (i.e., volatility), and the challenges of determining an appropriate portfolio structure when investing in nominal bonds to meet an inflation-related income objective.

Summary - Nominal Bonds

Whereas TIPS deliver a fixed real yield plus actual inflation over the life of the bond, nominal bonds pay the real interest rate plus a fixed premium for inflation. Investors in nominal bonds, therefore, accept the risk (and potential reward) if actual inflation during the life of the bond is higher (or lower) than the premium embedded in bond yields at purchase.

At the same time, the nominal bond market offers investors opportunities, generally not available in TIPS, to invest in municipal, investment grade and high yield nominal corporate bonds. For investors willing or able to accept inflation risk, the higher yields on these bonds may result in higher returns from nominal bonds versus TIPS. However,

¹¹We did not show the shorter-term nominal portfolio (relative to TIPS) as the figures were virtually identical to Chart 8 (i.e., duration matched)

absent strong views on the future direction of real interest rates and inflation expectations, there are no clear answers on how best to structure a nominal bond portfolio to meet an inflation-related income objective.

Finally, nominal bonds should form part of an MRP for investors looking to provide some, but not necessarily full, inflation protection. Examples include an underlying income that is proportionally inflation-adjusted (e.g., 50% of CPI increases) or inflation-adjusted up to a fixed maximum (e.g., full CPI increase capped at 2%). In the case of partially inflation-adjusted income objectives, the MRP will consist of both nominal and real return bonds.

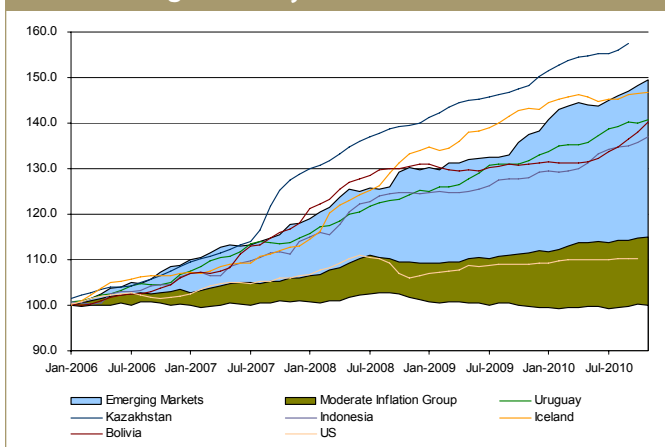
B. Foreign Currency Real Return Bonds

Like U.S. TIPS, inflation protected securities issued in other countries grow in value with inflation, albeit that of the reference inflation index (e.g., Canadian CPI for Canadian Real Return Bonds). The rationale for foreign currency inflation protected securities as a hedge against domestic inflation is embedded in the view that inflation of individual countries is becoming increasingly intertwined with economic globalization (converging inputs costs, consumption demand, etc.).

Chart 9 compares a basket of nine countries we refer to as the moderate inflation group (in green).¹² With the U.S. roughly one-half of the \$1.2 trillion outstanding market value, it is no surprise the U.S. yellow line is in the upper middle of the green band. Incidentally, Japan is the lowest line at the bottom of the green band. We also plot a basket of nine investable emerging market countries¹³ and a handful of non-investable countries.

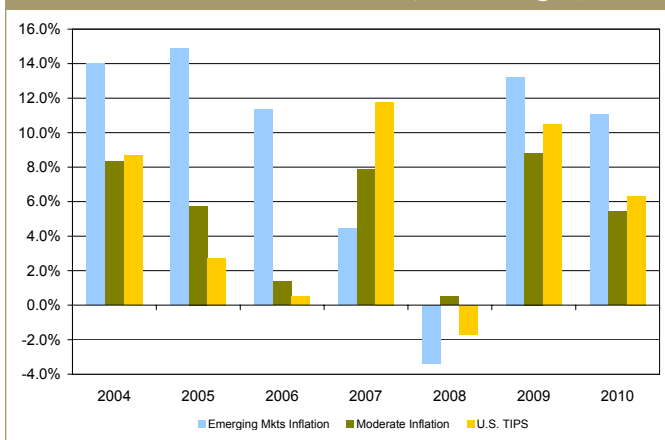
Thus, we would expect that a basket of currency-hedged inflation-linked bonds should deliver similar holding period returns to those of domestically issued inflation-linked bonds. From Chart 10, we see that U.S. TIPS tracks with the Moderate Inflation basket. In practice, a second reason for exploring foreign-currency bonds is the desire to earn CPI “plus” returns. For example, workers compensation plans have their liabilities tied to medical trend, university endowments are concerned with rising tuition; both of these structures typically have costs rising well above CPI. The decision to invest in foreign currency real-return bonds may provide inflation-plus returns (with acceptable tracking). In fact, we see that emerging markets have produced double digit returns in five of the last seven years. However, the limited depth of these markets makes this a challenge at this time. As such, in the remainder of this report we introduce and investigate public equities and other inflation-linked asset classes.

Chart 9: Foreign Currency Real Returns



Source: Barclays

Chart 10: Inflation-Linked Returns (U.S. \$ Hedged)



Source: Bloomberg

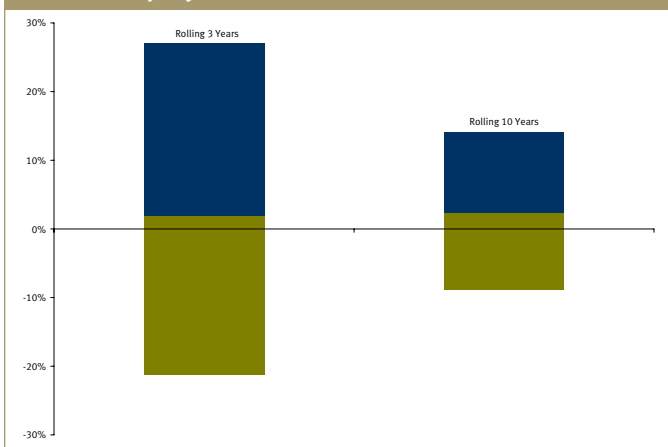
¹²This includes Australia, Canada, France, Germany, Italy, Japan, Sweden, United Kingdom and the U.S. These nine countries also comprise the World Government Inflation-Linked Index (U.S. hedged).

¹³This basket includes Argentina, Brazil, Chile, Columbia, Mexico, Poland, South Africa, South Korea and Turkey. This outstanding market value of this index is only \$150 billion, with the majority of issuance in two countries: Brazil at \$94 billion and Mexico at \$20 billion.

C. Public Equities

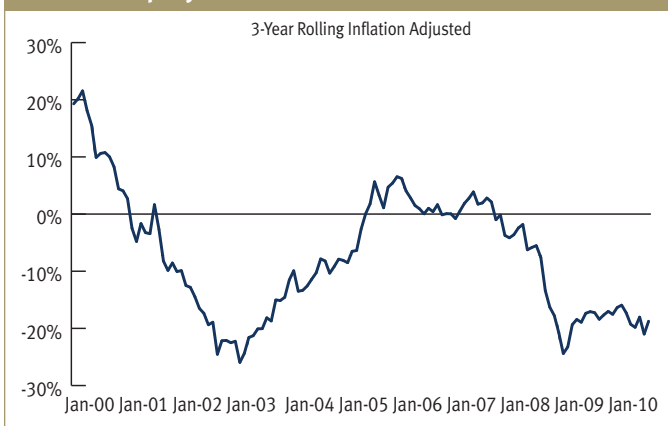
Historically, public equities have delivered some of the highest long-term real rates of return. Perhaps this should not be surprising considering that equities are geared positively to real economic growth and that over medium-to long-term horizons many companies can pass increasing production costs through to the prices of their goods and services. Pricing flexibility is particularly true in the case of companies producing consumer necessities such as food, clothing, health care, and energy, where there are few or no substitutes. Company assets such as land, buildings and inventory also tend to increase with inflation.

Chart 11: Equity Returns Less CPI: 1970-2010



Source: Bloomberg, U.S. Department of Labor: Bureau of Labor Statistics - Series CPIAUCNS

Chart 12: Equity Returns Less MRP: 2000-2010



Source: Barclays, Bloomberg, U.S. Department of Labor: Bureau of Labor Statistics - Series CPIAUCNS

At the same time, unexpected inflation can have a very severe short-term impact on company earnings, particularly where companies are locked into long-term contracts. Price shocks can also cause higher interest rates and risk premiums required by equity investors, which in turn compress P/E ratios and stock prices. Such impacts were evident in stock prices during the 1970s and early 1980s.

Consequently, real returns on equities have been highly variable over both short and relatively long time horizons.¹⁴

Over that last 40 years, equities delivered an average real return (over CPI) of approximately 2.3% per annum; however they were extremely volatile (standard deviation of 17.3%). Over rolling 3-year periods (Chart 11), excess annualized returns over inflation range between 27% and -21%. Over rolling 10-year periods, the range still remains wide with a high of 14% to a low of -9% per annum.

Similarly, equity returns over the last decade, also exhibit significant short-term volatility relative to the MRP¹⁵ (Chart 12).

Summary - Public Equities

The key conclusions to draw from this analysis are that real equity returns historically exhibit considerable variability; thus equities may be considered an attractive asset class for (real-return minded) investors with long investment horizons. Second, the tracking over shorter-term periods between equities and the MRP (typically very relevant to investors with real liabilities) can be substantial. Thus, equity investments may not be considered an effective hedge against inflation-sensitive benefit obligations.

D. Other Inflation-Linked Assets

Commodities, gold, real estate, infrastructure and timber are five real asset classes often cited as providing effective protection against inflation. The following briefly summarizes the rationale for owning these inflation-linked assets.

1. Commodities

The primary reason commodities are viewed as an effective hedge against inflation is that their prices are embedded, either directly or indirectly, in many consumable goods and services (e.g., energy, livestock, agriculture). The relationship between commodity returns and CPI should therefore materialize through the translation of changes in commodity prices through to the cost of goods and services that comprise the consumption basket underlying the CPI.

¹⁴Equity returns calculated from the S&P 500.

¹⁵TIPS Long index returns were only available in June 2000. Thus, TIPS Long index returns before this period are based on modeled real returns and inflation expectations.

Two challenges with this theory are that: (1) CPI is affected not only by commodity prices but also by other factors such as labor and housing costs, and (2) specific commodities can have a varying impact on CPI from time to time. Commodity prices are also subject to speculation that results in significant departures from inflation over both short and also very long-term horizons. Finally, there are a number of different ways to access commodities as an asset class, including direct investment, levered and un-levered passive futures positions, and actively managed futures programs. Although well beyond the scope of this report, investors should examine carefully the risk and return characteristics of the different vehicles to accessing commodities before deploying capital.

2. Gold

Unlike other commodities, gold does not find its way into CPI through consumption to the same extent as many other commodities. Gold is often cited as an inflation hedge simply through empirical observations that it has “held its value in real terms over very long periods of time.”¹⁶ Another important justification for gold being considered an inflation hedge is a belief that gold should hold its value due to limited supply.

Much of the debate around the hedging characteristics of gold is in the context of U.S. inflation, although foreign inflation has generally tracked fairly closely. Another challenge is that the definition of long term often spans multiple generations – indeed while gold prices often have responded favorably in periods of extreme inflationary fear or pressures, the reality is that gold prices have also lagged inflation significantly over very long periods of time. With that said, gold is better characterized as a crisis hedge or a third reserve currency (behind the U.S. dollar and the EURO).

3. Real Estate

As with gold, real estate is often cited as an inflation hedge due to its history of delivering stable and consistently positive (until recently) rates of return. Viewed as a financial asset, revenues to real estate as represented by lease and rental agreements tend to be adjusted over time with reference to inflation, and thus provide some form of inflation protection. Replacement cost, for example building materials and labor costs, also tend to influence real estate prices and increases in these factors of production influence CPI.

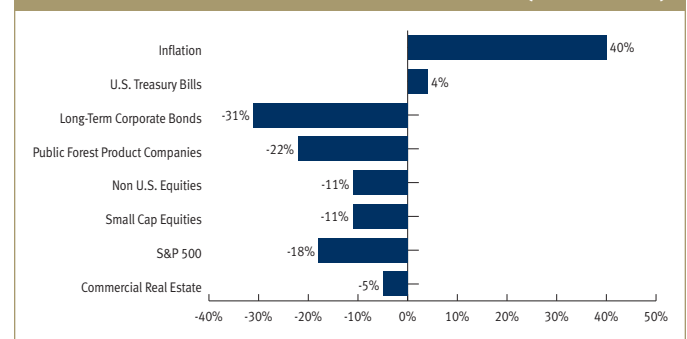
4. Infrastructure

Infrastructure assets have the potential to maintain real long-term purchasing power objectives (although limited data exists that would allow comparison to other asset classes). The extent of this inflation linkage comes down to the individual characteristics of specific assets. Across infrastructure sub-sectors, there are many examples of assets with this inflation linkage. Toll roads, electric/gas/water regulated utilities, social infrastructure (schools, hospitals or courthouses) and energy purchase agreements are examples that often contain explicit inflation adjustments.¹⁷

5. Timber

Timber has a mildly positive correlation with inflation and a very low negative correlation with most other asset classes (Chart 13). In fact, in a 2007 Merrill Lynch Timber Survey: diversification, low correlation and inflation protection were cited as the most important reasons for owning timber nearly 60% of the time. On the other hand, valuation and lack of liquidity were cited as the primary concern nearly 60% of the time.¹⁸ Analogous to infrastructure, limited data exists allowing for a sound comparison to other asset classes.

Chart 13: U.S. Correlations with Timberland (1960-2006)



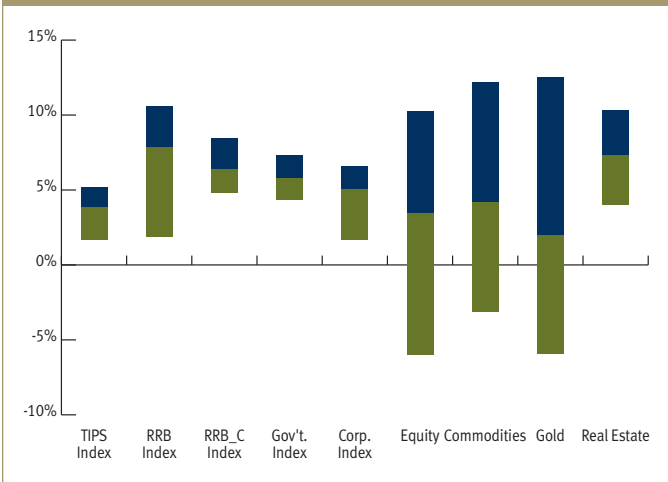
Source: CALPERS, Merrill Lynch. Data for commercial real estate is from 1970-2006. Data for international equities are from 1970-2006. Data for public forest product companies are for 1977-2006. Data for timberland returns refer to John Hancock Timberland index for 1960-1986, NCREIF timberland index for 1987-2006, and HTRG estimates for 2006.

¹⁶Source: Based on historical performance of the Gold Index.

¹⁷For additional reading, please see “The Global Infrastructure Investment Opportunity” by the RBC GAM (US) Infrastructure Investment Group.

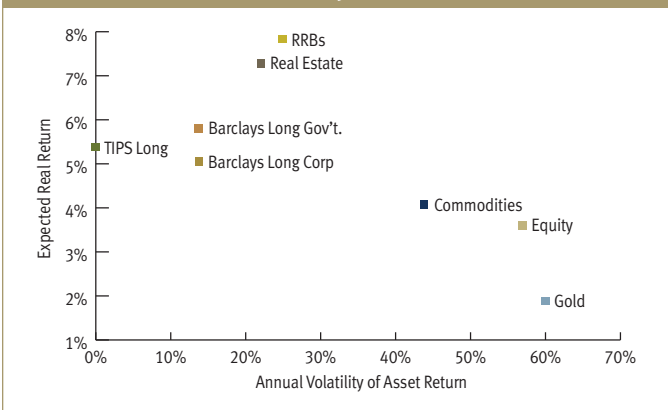
¹⁸Source: 2007: Timber Survey: What Will Investors Do Next? Pensions & Endowments 20 (Merrill Lynch/Gordon Litter).

Chart 14: Distribution of Returns Less Inflation: 1990-2010



Sources: Barclays, Bloomberg, and PCBond. The intersection of the colors represents the mean return.

Chart 15: Risk & Return Analysis: 1990-2010



Sources: Barclays, Bloomberg, and PCBond

Risk & Return

This section closes by examining historical real returns and volatility relative to the alternative of investing in the MRP.¹⁹

Supporting the focus on these asset classes in relation to inflation is that long-term real returns have generally been quite attractive. The exception is gold, which has exhibited very low real returns during the period 1980-2010. However, historical returns even over relatively long time horizons are very end-date sensitive. Chart 14 illustrates this end-date sensitivity by showing the range of 10-year real returns (for the periods ending 1990-2010) for most asset classes. As TIPS came into existence in 1997, this data was synthesized prior to 1997. Since RRBs first appeared in 1992 (i.e., 12/31/91 RRB price index is \$100 CAD), figures were only based on data for that period. As expected, non-currency hedged Canadian RRB returns (second floating bar chart) were wider than if one were to currency hedge in \$U.S. (third floating bar chart).

Analogous to public equities, these other “real” assets also exhibit considerable volatility relative to the MRP (Chart 15). Given this variability and the very wide dispersion in real returns over even relatively long holding periods, to consider these asset classes a hedge is a mischaracterization. In our view, the term hedge suggests at the very least a reasonable tracking in the relative value of the value of an asset to the underlying investment objective, which is clearly not the case with these asset classes whether it be relative to inflation or more importantly to the expected value of the underlying income objective. Nonetheless, each may play a potentially legitimate role in a portfolio context, either because of attractive long term real rates of return, or alternatively due to the diversification benefits relative to other asset classes.

¹⁹Asset class returns are based on returns from the SPGSCI Commodity Index, the NPNCRE Real Estate Index, and Gold bullion spot prices.

Appendix: Legitimizing TIPS

Until relatively recently, legitimate supply limitations made incorporating TIPS into the MRP very challenging. In addition, some investors dismiss TIPS as a legitimate asset class as they feel the main input – Consumer Price Index (CPI) – is not a good representation of “true” inflation. We explore both of these issues in greater detail.

1. TIPS Issuance & Liquidity

TIPS liquidity has steadily increased since their introduction in 1997 (Chart 16).

The U.S. Treasury issued four new TIPS in 2010 and re-issued four existing securities. Based on estimates, there will likely be \$100 billion of TIPS issued in 2011, the most on record. This brings the face amount of outstanding TIPS to more than \$615 billion, which represents approximately 7% of all outstanding marketable debt (Chart 17). February 26, 2010 marked a very important date as the U.S. Treasury issued new 30-year TIPS, marking the first time since 2001 the bond (i.e., its nominal cousin) was issued.

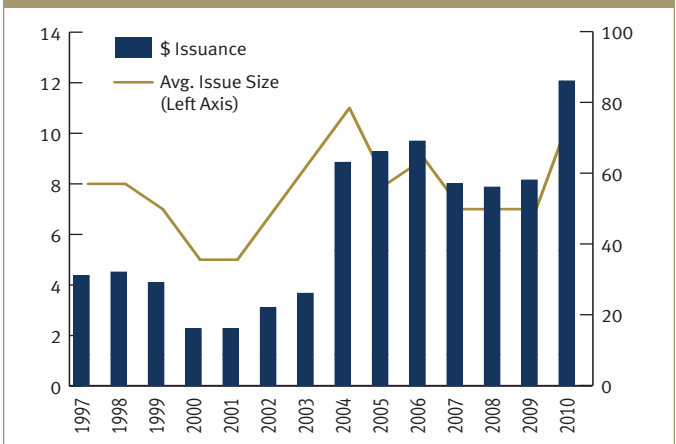
2. CPI Inputs - Owners' Equivalent Rent

The core escalator factor in TIPS is pegged to changes in the CPI. The inflation escalator is based on the Non-Seasonally Adjusted (NSA) CPI index, which consists of the following determinants:

Housing	42%	Recreation	6%
Transportation	17%	Education & Communication	6%
Food & Beverages	16%	Apparel	4%
Medical Care	6%	Other Goods & Services	3%

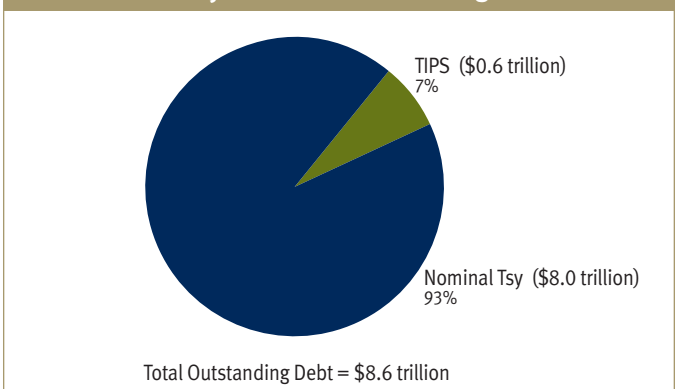
Owners' Equivalent Rent (OER) comprises roughly 60% of the Housing category²⁰, thus, OER constitutes roughly 25% of CPI (i.e., 60% x 42%). This is far and away the largest component of the CPI. At a quarter of the overall measure, its change alone has the potential to skew CPI considerably. Many claim that in the early/mid 2000s it did just that by underestimating what consumers were paying for housing. Chart 18 shows the monthly change for the OER portion of CPI against the monthly change for the Case Shiller index over the first half of the decade. Chart 18 shows CPI-measured OER at a nearly constant 25 bps month-over-month gain, leading to an annual increase of roughly 3.0%. Case-Shiller, on the other hand, measured month-over-month gains in housing prices for the source period to be 50-150 bps; which led to an annual increase of 12.5%.

Chart 16: Annual TIPS Issuance



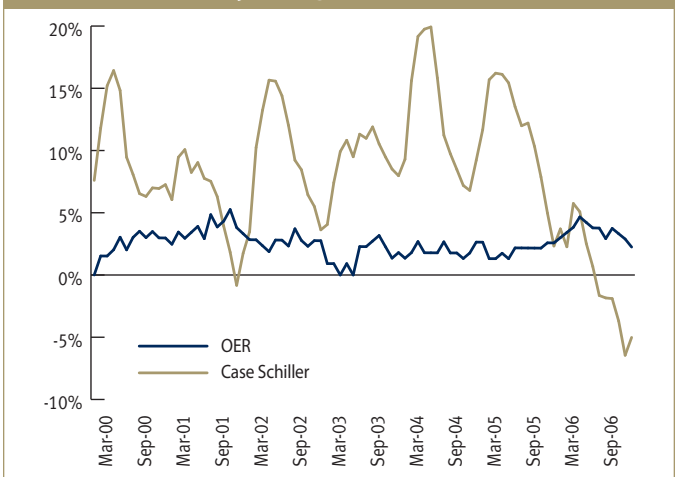
Source: treasurydirect.gov

Chart 17: Treasury Securities Outstanding as of 9.30.10



Source: treasurydirect.gov

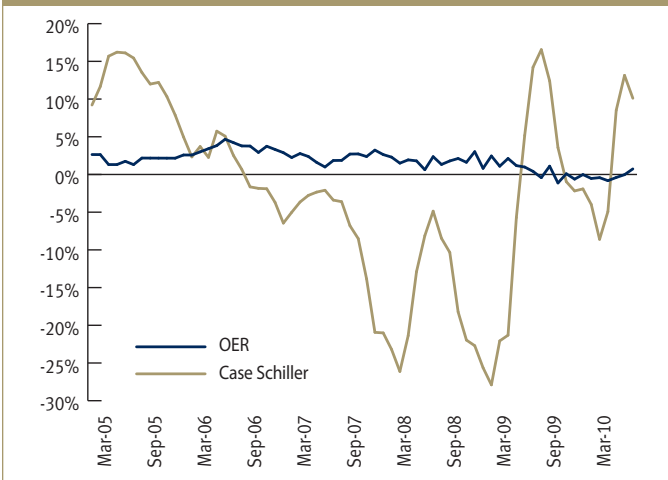
Chart 18: % Monthly Change for CPI OER & Case Shiller



Source: Bloomberg

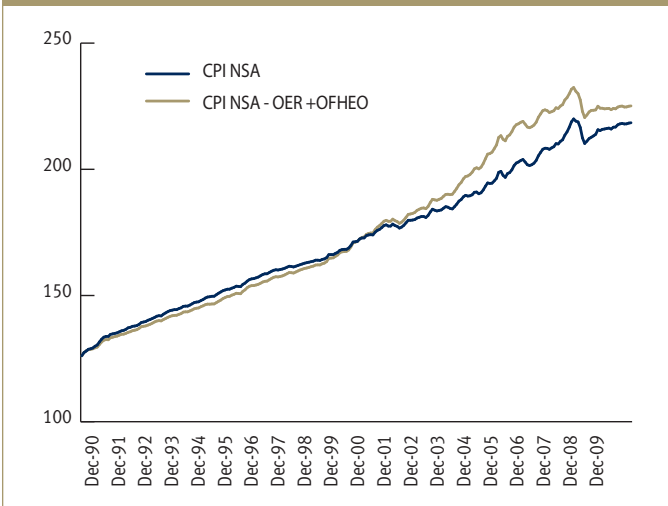
²⁰The remaining 40% of the Housing category is roughly split equally among: 1) Household Energy (i.e., fuel oil, gas, electricity), 2) Household Furnishing & Operations, and 3) Rent of Primary Residence.

Chart 19: % Monthly Change for CPI OER & Case Schiller



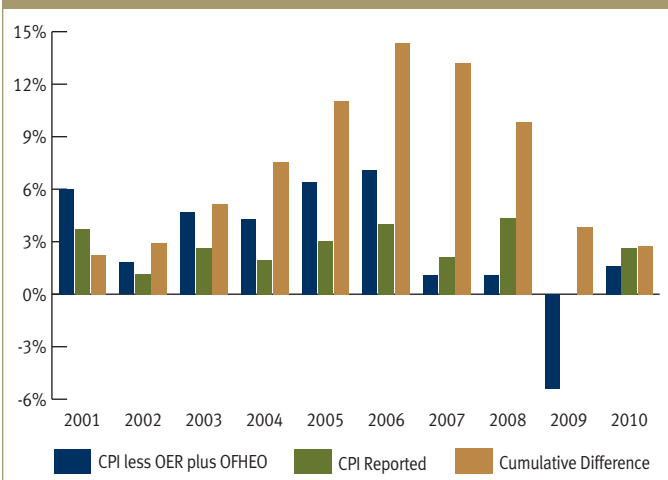
Source: Bloomberg

Chart 20: CPI vs. CPI Less OER Plus OFHEO



Source: Bloomberg

Chart 21: Annual Inflation Rates



Source: Bloomberg

Whereas housing prices are analogous to stock prices, OER is a rental equivalence approach that captures the implicit rent owner occupants would pay for “shelter” if they were renting their homes. Some investors dismiss TIPS as a legitimate asset class fundamentally on the belief that OER artificially distorts published CPI data (especially in periods of extreme house price volatility). We think it’s unreasonable to use home prices because like other investments, homes are capital goods. Further, annual turnover of (new and existing) homes are very low (less than 5%) and in fact, home buyers who are currently renting - primarily first-time buyers - are truly subject to home price inflation.

The U.S. Bureau of Labor Statistics calculates the OER based on a survey of about 50,000 landlords or tenants. Rents tend to be sticky and do not react to increases in housing (asset) prices as evidenced in the second half of the last decade when rents did not really respond to the housing correction (Chart 19). If we felt that CPI should reflect housing prices, then OER as a proxy for housing understated inflation during the early/mid 2000s. Conversely, inflation has been overstated since 2006 when housing prices decreased and OER was still positive.

Charts 20 and 21 show what CPI would have been if it included a market based measure of housing prices - like those provided by the Office of Federal Housing Enterprise Oversight (OFHEO). Chart 20 shows a good correlation until 2000 when the CPI including OFHEO number climbs at a faster pace. The difference begins to correct in 2006 when the lines begin to converge.

So where are we in terms of an over/under-reported CPI figure? Is CPI still understated? Using 2000 as a base year, Chart 21 keeps track of the cumulative differences between reported CPI and our hypothetical calculation that substitutes OFHEO housing data instead of OER. The cumulative difference peaked in 2006 at an understatement of nearly 15%. The housing correction has brought that difference down to less than 3%.

After the current correction runs its course, we would expect housing prices to rise roughly equal to that of overall inflation. In that case, OER and housing would be expected to return to their high historical correlation of the 1990s, making CPI a more accurate measure of actual inflation.

Report History - RBC GAM (US)

“Economically Targeted Investing: Capitalizing on Opportunities in Emerging Domestic Markets.” December 2010.

“Infrastructure Fund Investment Due Diligence.” October 2010.

“Case Study: Sydney’s M4 Motorway - Life Cycle of a Toll Road.” August 2010.

“The Global Infrastructure Investment Opportunity.” May 2010.

“Capital Structure Engineering: The Use of Leverage to Enhance Shareholder Returns.” May 2010.

Print copies of the above-listed reports and reports prior to 2010 are available upon request.

Past performance is not indicative of future results. There can be no guarantee that any investment strategy discussed in this brochure will achieve its investment objectives. As with all investment strategies, there is a risk of loss of all or a portion of the amount invested. No chart, graph, or formula can by itself determine which securities an investor should buy or sell or which strategies should be pursued.

The RBC Global Asset Management™ brand comprises RBC Global Asset Management Inc. (RBC GAM), RBC Global Asset Management (U.S.) Inc. (RBC GAM (US)), and RBC Alternative Asset Management Inc. (RBC AAM), which are separate but affiliated corporate entities. © Registered trademark of Royal Bank of Canada. RBC Global Asset Management is a trademark of Royal Bank of Canada. Used under license.

© 2011 RBC Global Asset Management (U.S.) Inc. | Equal Opportunity Employer M/F/D/V



**RBC Global
Asset Management™**

RBC Global Asset Management (U.S.) Inc.
100 South Fifth Street, Suite 2300
Minneapolis, Minnesota 55402
800.553.2143 • 612.376.7000
www.rbcgam.us