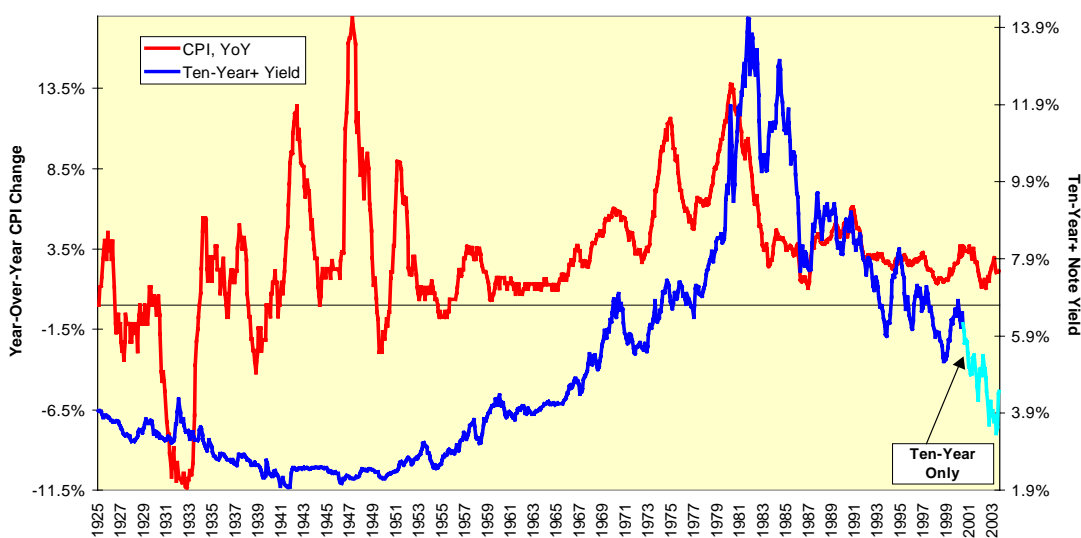


Futures And Expectations

Irving Fisher of Yale was one of the great economists of the 1920s, his unfortunate remark on October 17, 1929 that “stocks have reached what looks like a permanently high plateau” notwithstanding. He must have been a terrific professor and a likeable sort, too, otherwise why would Yale alumni have chipped in to get him a place to live after he got clobbered in the subsequent crash and Great Depression?

One aspect of his legacy has come to be known as Fisher’s Law, which states that nominal interest rates are the real interest rate plus the expected rate of inflation. Those who forget the “expected” part of the equation are guilty of abusing Fisher’s Law, and this happens with distressing regularity. Simply subtracting a measure of inflation – and it does not matter all that much which measure you choose to use – from a selected nominal interest rate does not produce the real rate of interest. This can be seen in the comparison between annualized CPI changes and the nominal yields on Treasury bonds of ten years’ maturity or longer (ten years only since July 2000) since 1925.

Why Simple Subtraction Is Not Enough



The Chicago Mercantile Exchange has announced plans to launch a futures contract on the non-seasonally adjusted all-urban Consumer Price Index (CPI-U). This is the CME's first foray into a macroeconomic market, and it is designed to serve, amongst other markets, the growing derivative market on economic indicators. A Yale professor of later vintage, Robert Shiller, championed this development in his 1993 book, *Macro Markets*. Shiller's timing was much better than Fisher's was, however: His book *Irrational Exuberance* was published in April 2000.

CPI futures, first traded prematurely and unsuccessfully by the Coffee, Sugar & Cocoa Exchange in 1987, appear quite attractive on the surface. Those with a passing acquaintance with Fisher's Law can connect the dots and think they are creating their own do-it-yourself Treasury Inflation-Protected Securities (TIPS) by buying both Treasury bonds and CPI futures. But "good enough for government work" is only going to take you so far in financial markets. A deeper understanding of the various moving parts involved is necessary to trade successfully.

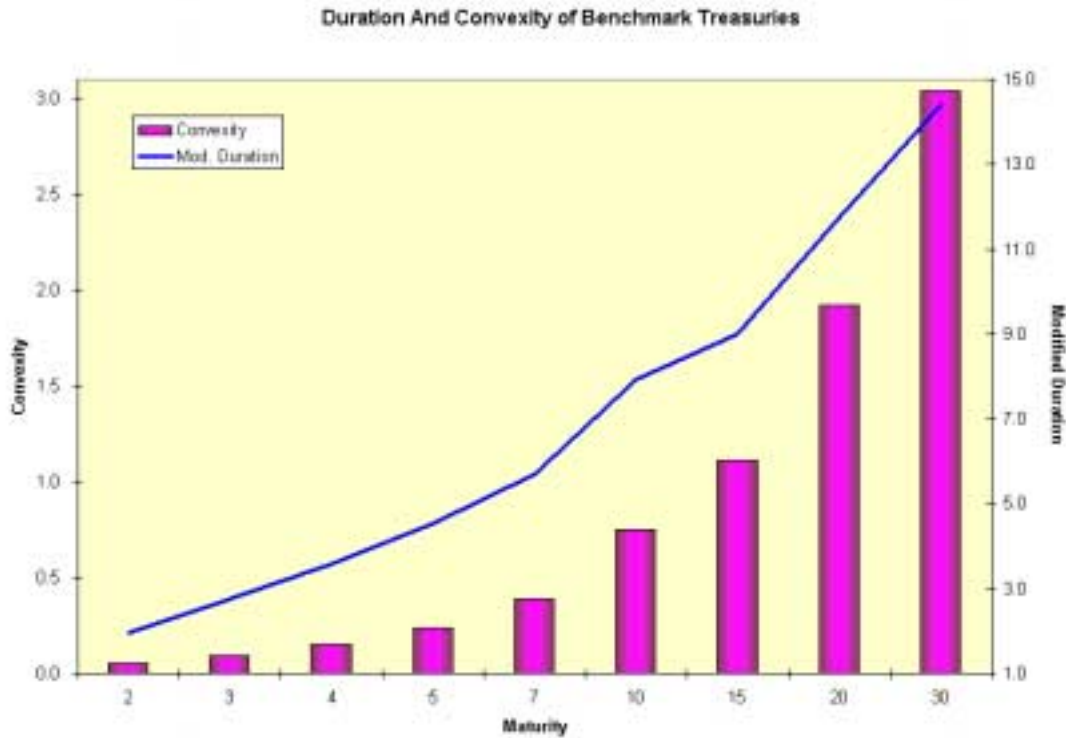
Fisher's Law And Implications For Inflation-Linked Instruments

The reported inflation measures are a backward-looking snapshot; any longer-term interest rate embeds a series of forward rates and what is called a liquidity premium, or protection against the effects of inflation. The liquidity premium is responsible for the generally positive slope of the yield curve, and it counteracts the effects of convexity, the second derivative of a bond's price with respect to its yield, divided by the bond's price.

A bond with positive convexity will see its price rise faster for a given basis point decline in yield than it will fall for an increase in bond yields of the same magnitude. Callable bonds, which include many corporates, convertibles and mortgage-backed, have negative convexity. Puttable bonds, more common in the high-yield arena, have very

positive convexity. In the absence of convexity effects, the normal shape of the yield curve would be slightly inverted; investors would accept a lower yield in order to obtain the more convex, longer-dated bonds.

The economic liquidity premium of a bond includes this convexity effect expressed in basis points, which restores a greater recognition of inflation than what is apparent in the yield curve itself. Nominal yield curves, what you see on a chart, do not add back the convexity effect and therefore look flatter at longer maturities than we should expect given a set of inflation expectations. The convexity and modified duration of selected Treasuries, which are non-callable, are depicted below.

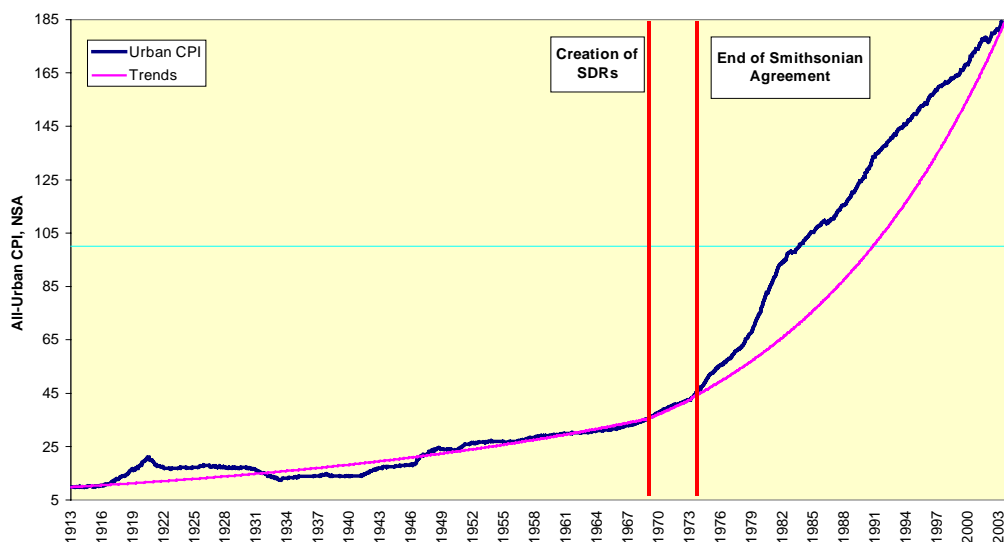


The annualized expected rate of inflation for any given maturity needs to be expressed as the internal rate of return implied by the spread between a nominal-rate instrument and an inflation-protected instrument, adjusted for the convexity of the bonds. This rate can be calculated on a real-time basis and is forward-looking. Any comparison between a reported inflation measure and this market-derived expectation of inflation is, therefore, of the apples and oranges variety.

Are TIPS And Treasuries Option-Free?

While we classify Treasuries as risk-free for obvious reasons and the Treasury has not issued callable bonds for decades, that does not mean Treasury bonds are truly option-free. We do not like to think in these terms, but each and every one of us is short a call option on inflation to the government. The chart below depicts the CPI-U, the basis of the CME contract, going back to 1913.

What Does This Look Like?



The inflection points are the creation of Special Drawing Rights, sometimes called "paper gold" by the International Monetary Fund in 1968 and the breakdown of the Smithsonian Agreement in 1973. Except there is no paper gold and currencies floating against nothing but each other can be created in a reckless manner. The CPI-U shot higher as governments exercised their call option on their citizenry and confiscated real purchasing power through inflation. This call option is embedded in all Treasury bonds and therefore by extension in all financial instruments.

A second option exists in the CPI-U itself. This is a Laspeyres index, one wherein the price of a fixed basket of goods is tracked forward in time. It ignores such simple economic realities as price elasticity of demand, substitution, technological improvements and discounting. Moreover, the CPI-U is subject to huge political pressures; many government contracts, labor union agreements and escalators for Social Security and other pension plans are linked to its value. As we have found to our collective dismay in the matter of executive compensation, if you give someone, anyone, a large enough incentive to manipulate a number to their benefit, sooner or later they will avail themselves of the opportunity to do so.

A third option exists on index revisions. The CPI-U, like all government releases, is subject to revision after release. The Bureau of Labor Statistics reviews its methodology and occasionally recalculates the history of an index; it did so for the CPI in September 2000. The CPI futures will not incorporate any of these revisions.

TIPS have two additional embedded options. The principal amount of the TIPS bond is adjusted higher by the CPI multiplier, but just as the implied interest of an original issue discount bond is taxed even though your cash flow is zero, the inflation adjustment of TIPS is taxed. As you do not know what future tax rates will be, you are short a call option on tax rates to the government.

A second TIPS option is subtler, and that is a put option on deflation. Should deflation occur, the principal of TIPS will not fall below par. However, the pricing of the CPI futures contract is $100 - (100 * \text{CPI-U})$. That means the CPI future could get priced above 100. If you choose to create your own TIPS by buying Treasuries and CPI futures, you need to be aware of this effect: The combination can disconnect from a stable relationship with TIPS and make hedging impossible.

Other Trading Applications

The complexities of do-it-yourself TIPS and the poor relationship between reported inflation and expected inflation are unlikely to receive much attention. I expect a number of retail-oriented houses to create funds and other products using the CPI futures and to market them as "inflation-protected." Fine; this is why we have a market, and as we should never let the best be the enemy of the good, let's accept that imperfect inflation protection is likely to be better than no inflation protection in the years to come.

An additional class of trading applications, those relating CPI futures to commodities, equities and currencies exists and will be discussed here next week.