Currency Volatility And Long-Term Treasury Returns

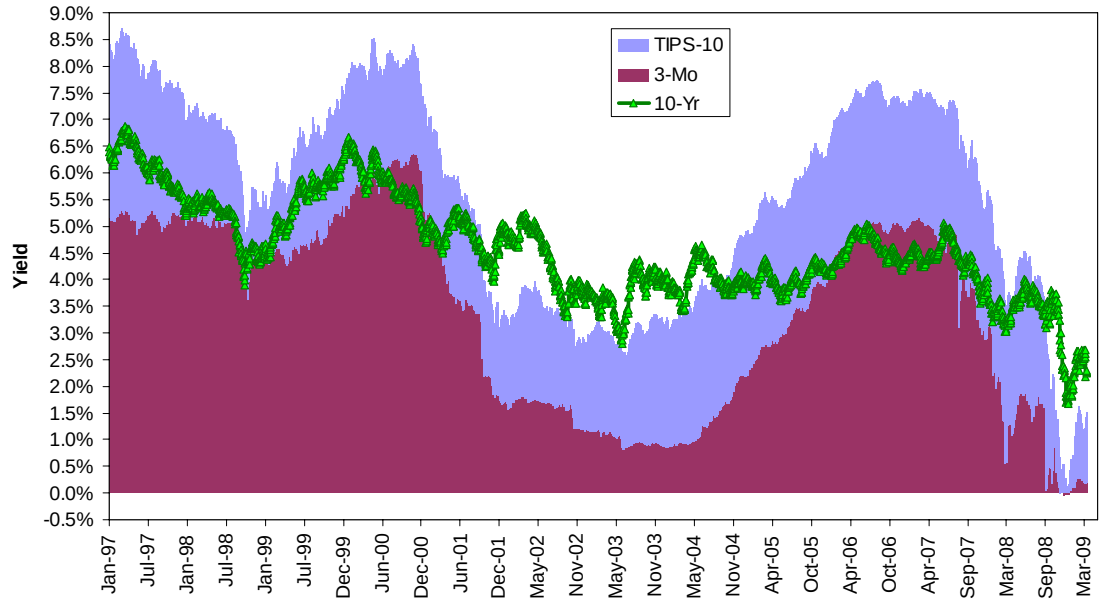
How can we describe this sorry decade for financial markets? A good start might be, "Everything you know is wrong." After all, lower interest rates are supposed to be good for equities, and yet that was disproven in both directions. How about higher commodity prices and a weaker dollar being negative for bonds? That did not work either. What of the benefits of global diversification? Um, no, that just seemed to mean you lost money in a large number of places simultaneously.

Let's get a little more specific and turn our attention to one of those theories of the yield curve taught in business schools and economics programs everywhere, the liquidity premium. Like other theories with wide acceptance, this one makes sense upon initial examination. It states long-term lenders demand a higher rate of interest in compensation for expected inflation. This should mean the long-term rate should equal the short-term rate plus expected inflation, plus or minus adjustments for what are called preferred habitats and market segmentation.

What do the data say? Prior to the introduction of Treasury Inflation-Protected Securities (TIPS) in January 1997, we had no concrete market-derived measure of inflation expectations. The TIPS breakeven rate of inflation, or the difference between nominal Treasury yields and the yield on TIPS at a given maturity, is an imperfect measure (see "TIPS, Treasuries And Insurance," *Active Trader*, May 2008).

Even with that caveat in mind, no one can look at the chart below and match the ten-year Treasury note's yield to the sum of three-month Treasury bills and the ten-year TIPS breakeven rate of inflation. Something other than inflation expectations must be affecting the liquidity premium.

Long-Term Rates Seldom Equal Short-Term Rates Plus Inflation Expectations



Currency Volatility

The U.S. is highly dependent on foreign investors to fund its massive trade and budget deficits. While neither of these deficits has as much effect on the dollar as we might think (see "What Drives The Dollar Index?" January 2006), the opposite is not true. A foreign investor in the U.S. is long the dollar and will need to sell those dollars forward at some point in the future.

Two risk factors arise for the foreign investor in the U.S. The first and most straightforward is the risk of dollar depreciation over time. That risk, which has been realized many times over the entire floating exchange-rate era, can be hedged using known techniques and instruments. The second is less straightforward but is just as real, and that is high currency volatility. Even within a long-term static trend, such as the one between the dollar and the Japanese yen between late-1999 and mid-2008, higher volatility raises the dispersion of outcomes for the ultimate repatriation of funds. Restated, higher currency volatility per se is a risk for investors, and that risk for bond investors must be accounted for in lower prices and higher yields. If this is indeed the case, we should be able to see

some measure of a long-term relationship between the liquidity premium and currency volatility. Let's examine the long-term high-low-close (HLC) volatility for two currencies going back to 1977, the Japanese yen and the Swiss franc. Japan has been an important creditor to the U.S. for the past three decades. The Swiss franc was chosen because it has a continuous history uninterrupted by the advent of the euro.

HLC volatility will be mapped against the yield curve over three different segments, three months against ten years, one year against ten years and two years against ten years. The Federal Reserve's constant-maturity measures from the H15 report are used for the interest rate data at the note horizons. The shape of the yield curve will be normalized by the forward rate ratio (FRR) between the maturity pairs. The FRR is the forward rate between two bonds divided by the yield of the longer-dated instrument. The FRR between two and ten years, for example, is the rate at which we can lock in borrowing for eight years starting two years from now, divided by the ten-year rate itself. The more a FRR exceeds 1.00, the steeper the yield curve is; a FRR less than 1.00 denotes an inverted yield curve.

HLC volatility is defined as:

$$\sum_{i=1}^{N}\left[\frac{\left[.5*\left(\ln\left(\frac{\max(H,C_{t-1})}{\min(L,C_{t-1})}\right)\right)^2-.39*\left(\ln\left(\frac{C}{C_{t-1}}\right)\right)^2\right]*260}{N}\right]^{1/2}$$

Where N is the number of days between 4 and 29 that minimizes the function:

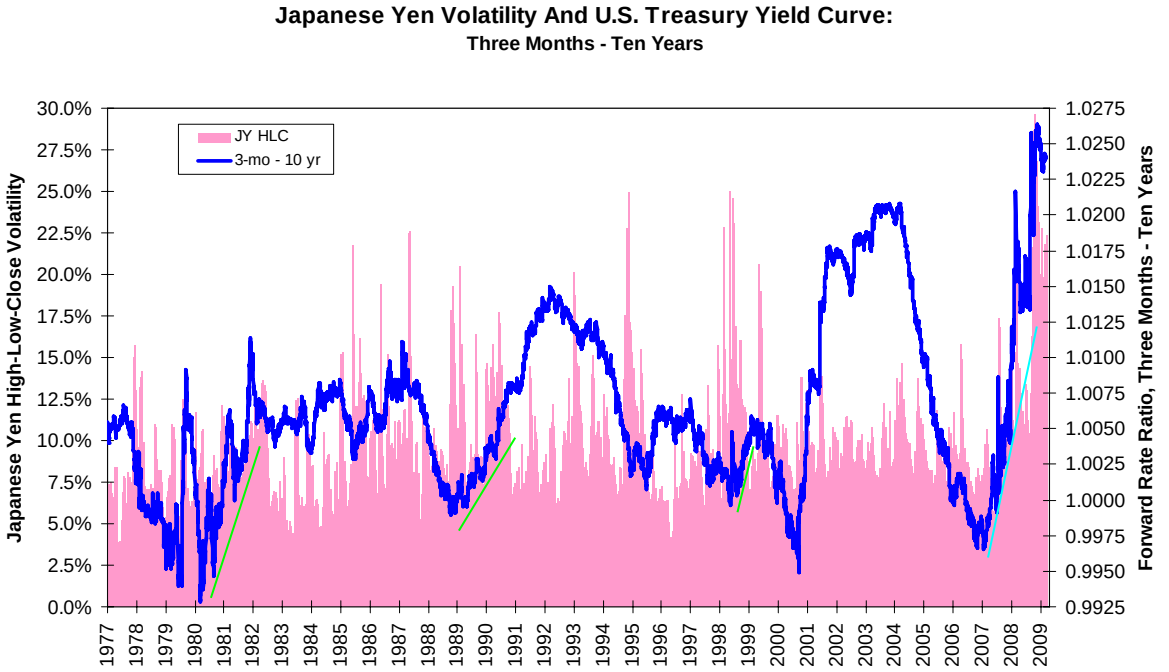
$$\frac{1}{N}*\sum_{i=1}^{N}\frac{N}{Vol^2}*|(P-MA)|*|\Delta MA|$$

The Yen And The Yield Curve

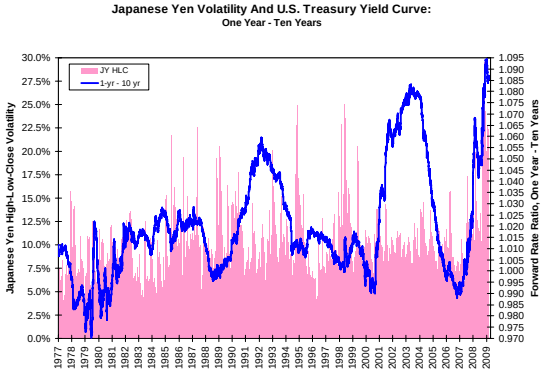
Much of the trade in the yen during recent years has been driven by the yen carry trade, the borrowing of low-interest yen to lend elsewhere (see "Looking At The Carry Trade," June 2007). Whenever the Bank of Japan threatens to tighten credit or whenever the world's investors flee risk, as happened in late 2008 and early 2009, the yen strengthens and its volatility jumps.

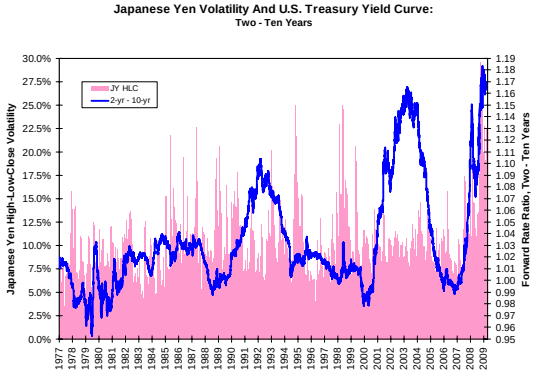
A policy response by the Federal Reserve often is associated with this trade; it certainly was after the onset of the credit crunch in August 2007. This is not, however, a rule. Volatility spikes for the yen during the late 1980s, in 1995 and later during the Long Term Capital Management crisis of 1998 occurred within the context of a flattening yield curve. Both the Federal Reserve and the Bank of Japan were trying either to stem the dollar's slide, the yen's rise or both during these episodes.

Let's map the yen's HLC volatility against the three FRRs mentioned above. First, let's look at the FRR between three month Treasury bills and ten-year Treasury notes. Three periods of a bearish steepening of the yield curve; that is, a steeper yield curve driven by rising long-term rates, are marked with green lines. A fourth, marked with a turquoise line, is the bullish steepening of 2007-2008. All are associated with increases in yen HLC volatility.



We should not expect the effect to be as pronounced during bearish steepenings for the other two FRRs, those between one- and two-year notes on the short end and ten-year notes on the long end: If ten-year note yields are rising during periods of rising inflation, rising economic growth or both, the incentives to maintain yen carry trades are high. However, we should expect yen HLC volatility to rise during a bullish steepening, one defined by a change in American monetary policy and one where the dollar's interest rate advantage to the yen may be decreasing. That is the case for both of these FRRs.

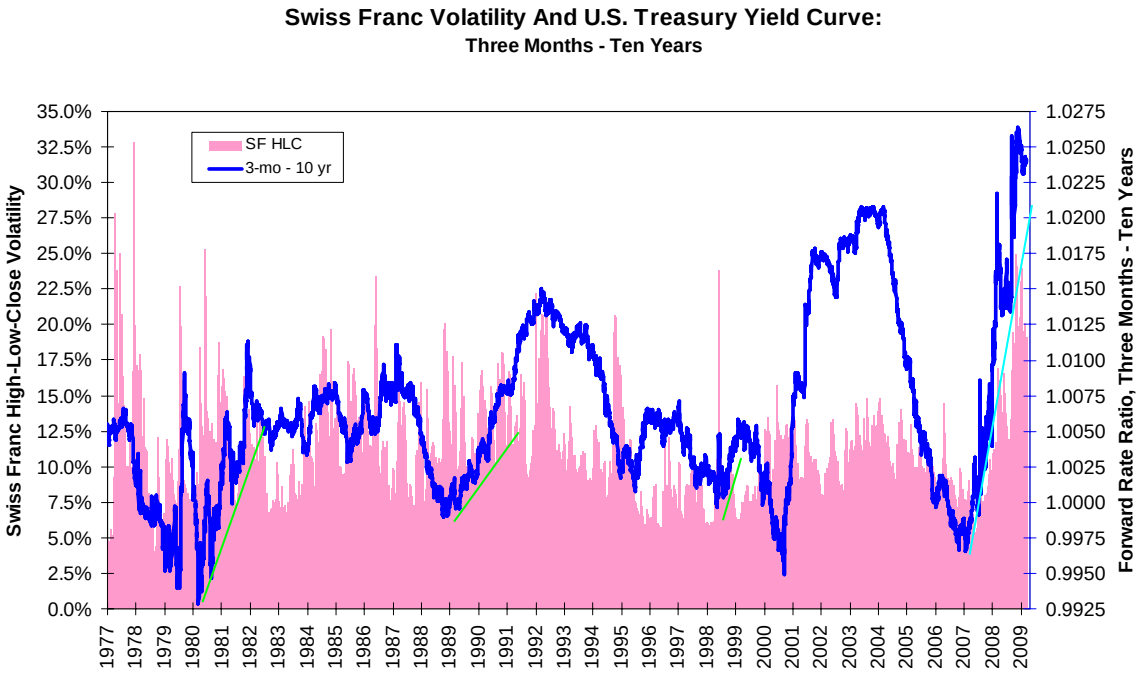




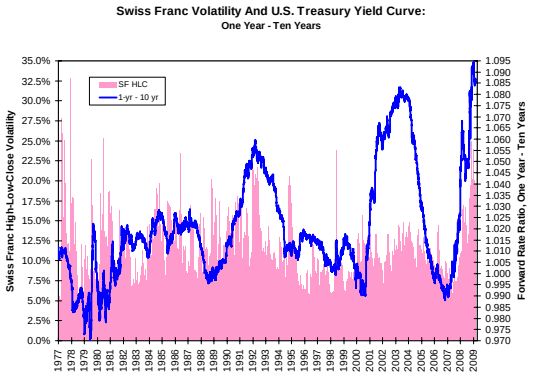
The Swiss Franc And The Yield Curve

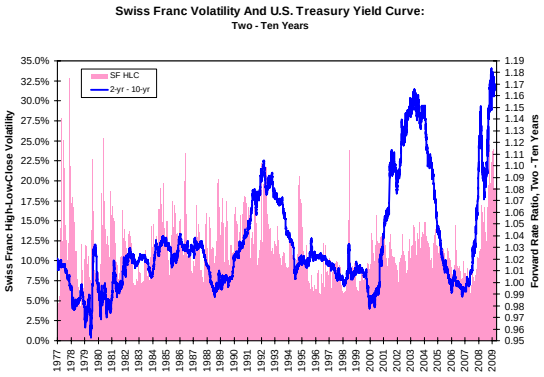
The Swiss franc's HLC volatility history has been considerably different from that of the yen. It reached its highs during the strong inflation of the late 1970s and early 1980s as the world sought refuge in the franc, so much so the Swiss imposed an interest rate penalty on foreign deposits (see "Franc-ly My Dear, I Don't Give A Carry," and "The Swiss Franc's Commodity Connection," September and October 2008, respectively). As the franc is a funding currency on carry trades, its HLC volatility rose after the onset of the credit crunch in 2007 as these were unwound.

As the Swiss National Bank has been far less interventionist over the years than the Bank of Japan, we should get a cleaner trace of its effects on the FRR between three months and ten years, and we do. The same comments made for yen HLC volatility apply and the chart below is marked identically.



The FRRs starting at one- and two years track franc HLC volatility similarly to yen HLC volatility, and for the same reason. The relationship during the bullish steepening of 2007-2008 is especially strong.





Implications For Long-Term Treasury Returns

If rising currency volatility steepens the yield curve and if the best time to buy bonds is when the yield curve is flat-to-inverted, then it should stand to reason a combination of high currency volatility and a steep yield curve should lead to poor returns on ten-year Treasury notes.

We can gauge this effect visually by mapping three month-ahead returns on ten-year Treasury notes against the three FRRs and each currency's HLC volatility. If the conjecture is true, we should see a preponderance of white bubbles – negative three month-ahead returns – on the northeast corner of each bubble cluster. Positive returns are marked with blue bubbles; negative with white; the size of each bubble corresponds to the magnitude of the return. The green horizontal and vertical lines mark the values on March 23, 2009.

Prior to the extreme dislocations in both currency and bond markets starting in September 2008, the northeast edges of the clusters had been largely white. This changed once the yen carry trade started to unwind; the jump in yen volatility combined with a flight into U.S. Treasuries pushed the northeast corner into a zone of positive forward returns for the yen.

A different situation prevailed for the Swiss franc. Here the northeast corner became largely empty, but the forward Treasury returns in the southeast corner turned negative. What we have here is one more instance of a long-term relationship reversing under extreme financial stress.

[Charts Not Shown For Space Reasons]

The long-term verity of higher currency volatility leads to steeper yield curves and ultimately to negative returns on bonds has been challenged by the financial upheavals of 2008-2009. We should expect this relationship to return, and lead to higher long-term interest rates. These higher interest rates in turn lower risk multiples for stocks and raise the cost of capital throughout the economy. This lesson should have been learned by policymakers in the 1970s. If it was, it has been forgotten, and the long-term consequences will be as negative now as they were between 1971 and 1982.