

## Dial 'D' For Default

While there is an excellent chance you have not lied awake at night wondering how to reconcile those periods when the costs of credit default swaps (CDS) on government bonds have been rising while the implied volatility on those bonds has been falling, chances are your trading positions have been affected by this apparent discrepancy.

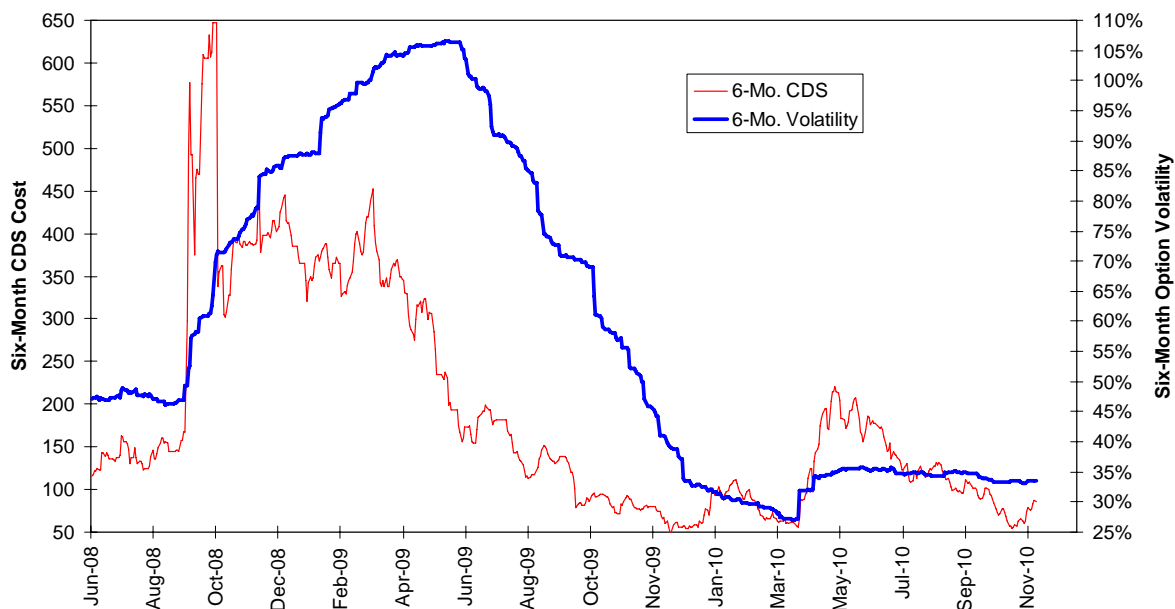
No one would blink an eye at the statement, “Declining stock prices lead to higher volatility.” While this is not as simple and straightforward as various traders of VIX derivatives might like it to be, it is directionally correct, and for good reason: As most investors are net long stock, they seek to buy insurance to protect themselves from further losses once the market starts to crack. That they do not buy such insurance when the market is rising is no more remarkable than saying most umbrellas are bought on rainy days; this is simply human nature.

### The Corporate Case

As the VIX is based on the S&P 500 and the probability of an entire index going to zero is low, let's illustrate the link between CDS costs and volatility for a single name, such as Goldman Sachs. This stock was chosen for its brief bout with bad press last year associated with bad mortgage derivatives and remember today mostly for “the Fabulous Fab.” As an aside, a similar analysis could be done for firms such as BP and Transocean associated with the Macondo well blowout in the Gulf of Mexico. Just wait; someone else will step in it sooner or later.

As most actively traded equity options are short-dated, we will match the six-month option volatility for GS with the shortest-tenor CDS quoted, also a six-month; please note the most active CDS tend to be five-year tenors.

Six-Month CDS And Option Volatility: Goldman Sachs



The match is not perfect, nor should it be. The 'D' in CDS stands for default and that is a very different concept than the slide in stock price and level of variability measured in the stock option's volatility. When Goldman's CDS costs shot higher during the financial crisis of September-October 2008, there was in fact a significant probability it would disappear as an entity. As that probability receded and Goldman's stock price recovered vigorously, implied volatility rose. It was only later, when both the violent stock movement and the probability of Goldman disappearing were out of the picture, that both measures receded in tandem.

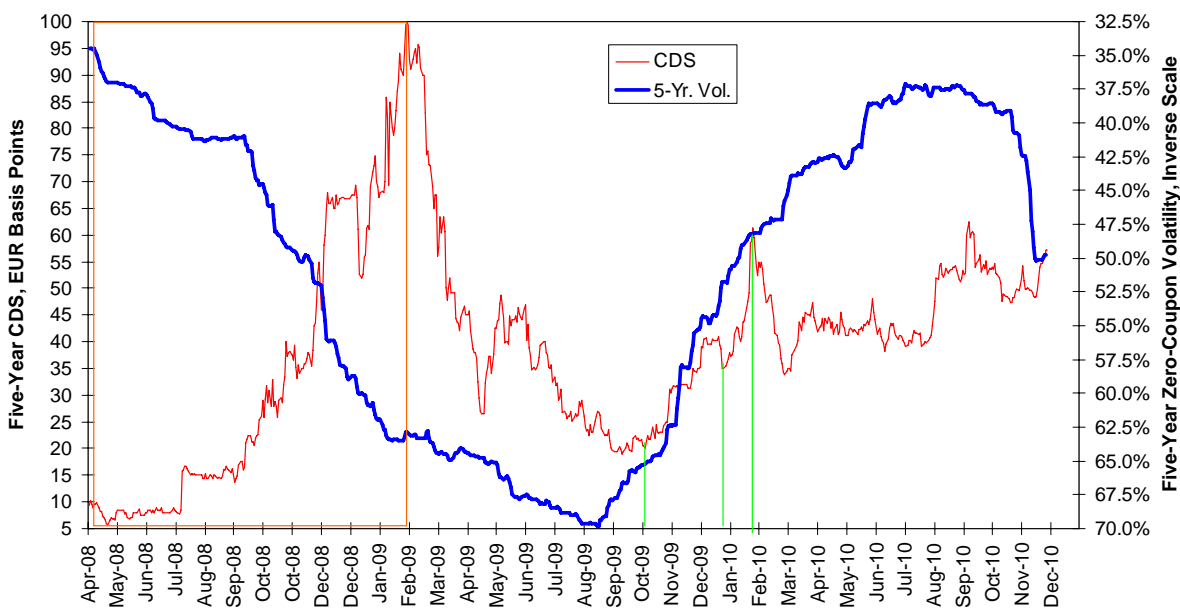
What we do know in practice is many CDS writers either cannot or do not sell the corporate bond as a hedge against their position. The bonds are relatively scarce relative to the stock and are a “negative carry” trade, one that involves the seller paying the bond's coupon. The writers engage in correlation trades, highly imperfect sales of the corporation's stock to hedge their short position in the CDS. These stock sales were part of the whooping-and-hollering of 2008; many alleged the short positions helped drive companies such as Bear Stearns and Lehman Brothers out of business; in reality, both firms along with huge CDS writer AIG were responsible for their own problems.

## The Sovereign Case

Now let's switch back to the sovereign CDS case. Here we can compare five-year CDS on U.S. Treasuries with the implied volatility on a five-year zero-coupon Treasury, plotted inversely. We have argued the CDS market on sovereign credit actually represents a bet on catastrophic inflation (see "The Risk of Risk-Free Bonds," October 2010). Accordingly, CDS costs and volatility both rose between April and February 2009, marked with an orange rectangle in the chart below. As yields were driven lower, bond volatility rose as the market considered the rate untenable, which it was: 2009 was the worst year on record for long-term Treasuries. This pattern repeated in 2010, too: Once the bond market got a whiff of money-printing to come in August 2010, volatility rose. CDS costs were propelled higher in both instances as the market fretted about the government's increasingly strained balance sheet. All was not right with the world, but all was right with the correlation.

However, the relationship changed after the February 2009 joint statement by the Federal Reserve and Treasury no further major financial defaults would be allowed. CDS costs fell and fell sharply as investors realized they would be paid, perhaps in inflated dollars but paid nevertheless, on their loans to Uncle Sam. However, bond volatility continued to rise until the start of September 2009, the point at which U.S. short-term interest rates became the lowest in the world and the dollar replaced the Japanese yen as a funding currency for carry trades even when the yen once again became cheaper to borrow in March 2010. The relationship reversed again in September 2009; bond volatility fell as investors felt low rates were sustainable and CDS costs rose along with fears of catastrophic inflation at some point. These are the divergent relationships in need of reconciliation.

U.S. Sovereign CDS And Volatility



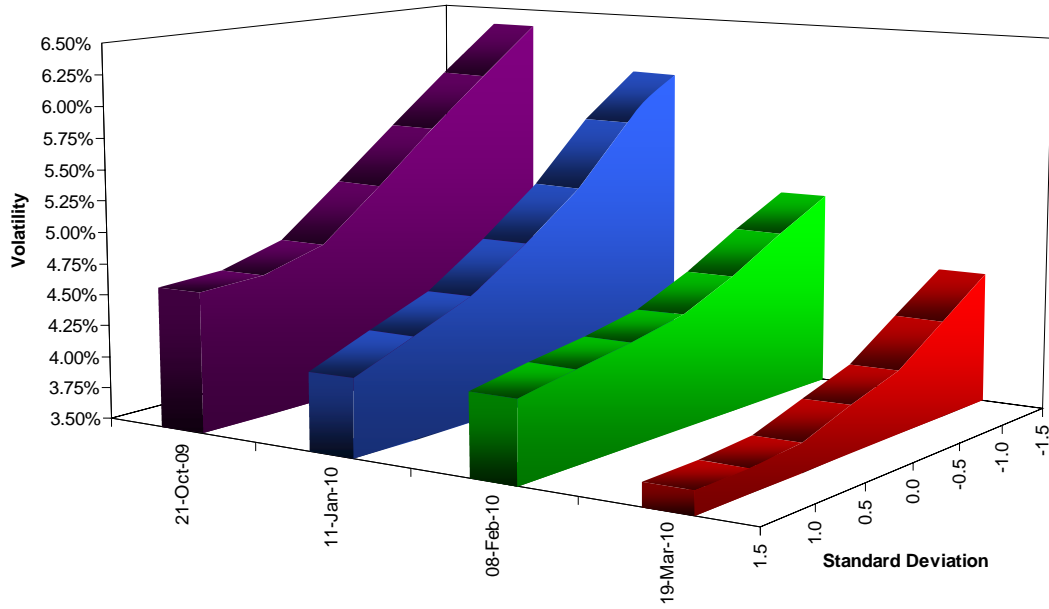
Three dates are marked on the chart with green vertical lines: The October 21, 2009 local takeoff point for higher CDS costs as the market feared inflation would be allowed to run rampant, the January 11, 2010 takeoff point corresponding to the acceleration of the Greek sovereign credit crisis and the February 8, 2010 local maximum for CDS costs. These, along with the last data point in the analysis, will be used below.

## Five-Year Skew And Smile

The pattern of volatility across strikes is called a smile because volatility tends to be lower at-the-money and higher at the wings. As a market becomes priced for risk of ruin, investors tend to demand more in-the-money and at-the-money puts as opposed to out-of-the-money puts, and ATM volatility rises proportionately. Equity options in general tend to be priced with a skew; the lower-priced strikes tend to have higher volatility than do the higher-priced strikes as the fear in stocks is asymmetrical. Bond options have to reflect a different asymmetry, that of yields spiking lower during a flight-to-quality trade.

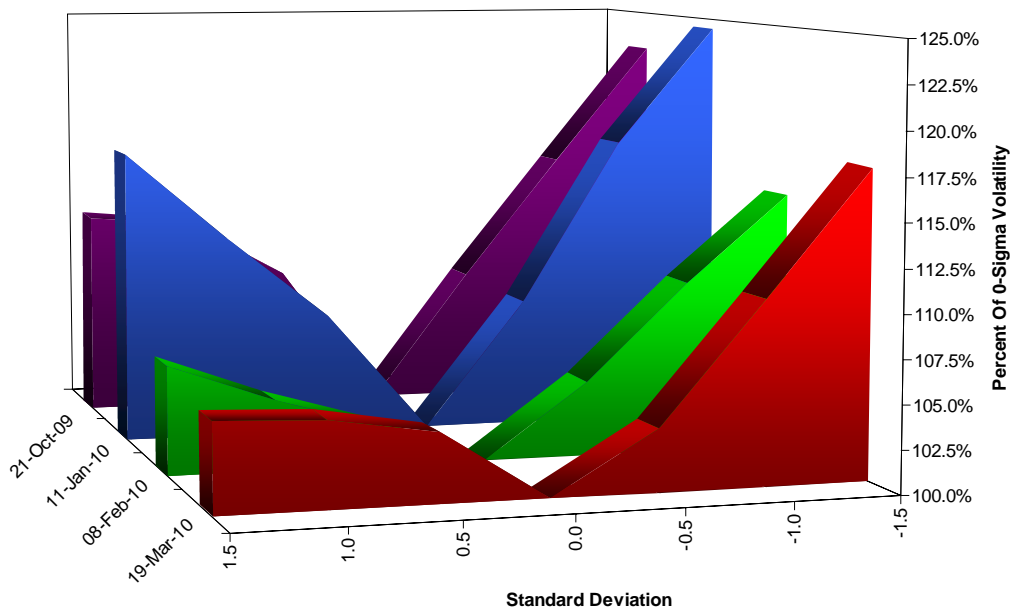
If we map the skew of five-year Treasuries at the dates noted above, we see some slight evidence of panic in the February 8, 2010 skew. The low-level CDS dates of October 21, 2009 and January 11, 2010 are skewed toward lower Treasury prices / higher Treasury yields. The high-level CDS date of February 8, 2010 shows a much flatter skew.

**Five-Year Treasury Option Skew At Selected Dates**



We can rearrange the skew data as a smile by normalizing the volatility readings so that the at-the-money level is defined as 100%. The prominent lower-priced strikes in October and January are exaggerated, as are the subdued lower-priced strikes in February 2010.

**Five-Year Treasury Option Smile At Selected Dates**



We can conclude in reconciliation the Treasury options market is pricing in the higher CDS level not so much in the ordinal level of volatility as in the flatter skew.

In addition, sovereign CDS need to be viewed in a different light from corporate CDS. Their cross-currency payoff (CDS on Treasuries are priced in euros), the ability of the issuer to inflate debt away, the ability of a reserve currency issuer such as the U.S. to abuse its privilege and the politics of currency blocs such as the European Monetary Union all combine to break the normal view of a CDS as a put option on an asset. Thus we can have the paradox of rising CDS costs with lower bond volatility, something that would be impossible in a market policed by correlation trades. A correlation trade in sovereign debt is virtually impossible as countries do not issue equity.

To which market should traders and investors pay the most attention, CDS or volatility? The former does not affect interest rates directly; indeed, we noted in August 2008 the perverse response of higher CDS costs contributing to lower sovereign debt costs. Higher volatility, however, leads to higher hedge costs, a steeper yield curve than would exist otherwise, reduced risk multiples and wider swap spreads.

It would seem, therefore, while higher CDS costs provide an excellent and incontrovertible warning signal from markets to policymakers (who love to yelp like beaten hounds when their CDS costs rise), higher volatility matters more to markets' day-to-day operations.