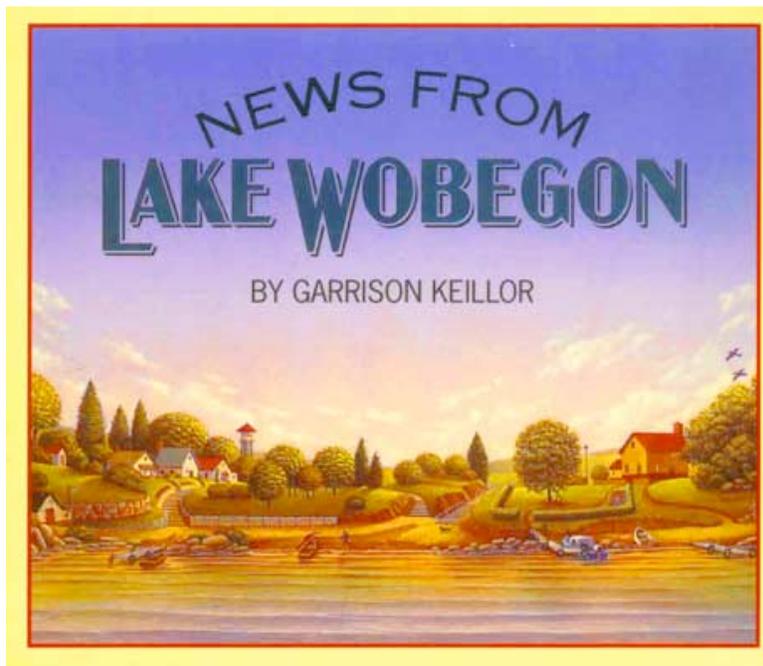


Convexity Maven

A Commentary by Harley Bassman

February 09, 2015

"All the Children are above Average"



"Well, that's the news from Lake Wobegon,
where all the women are strong,
all the men are good looking,
and all the children are above average."

Garrison Keillor- A Prairie Home Companion

One might think the fact that words are etched onto a printed page would offer them some sort of permanence, but this is simply not the case; time and tide often alter their meaning. The once popular masculine names of Ashley and Leslie are now common names for women, and I am still not sure if the person who commented on my "fierce" haircut the other day meant it as a compliment.

And so it is that radio legend Garrison Keillor must have been peeking around the curve when he recognized that being "average" would someday no longer be a neutral concept; in fact, average is now almost disrespectful. Does anyone have a desire to dine at an average restaurant despite the fact that it is by definition better than half of all food establishments?

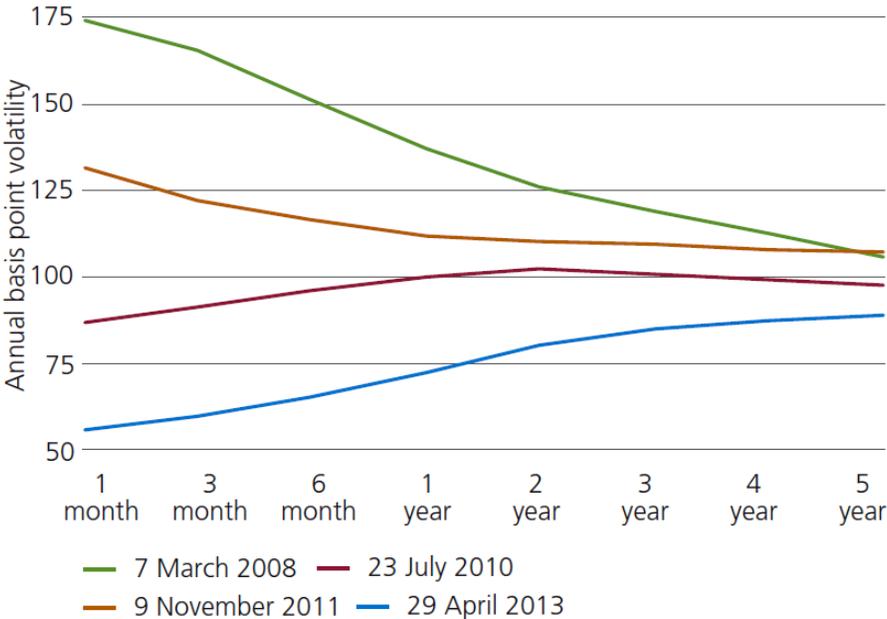
For better or worse, most financial managers’ analytical tools are not nearly as pliable as their language skills since we often anchor ourselves to some long-term average until we either claim the mantle of victory or are carried out on a stretcher.

This anchoring effect explains why term surface risk vectors tend to rotate around a long-term average. This is a fancy way of saying that the forward value of many liquid assets tends to cling to its average price, and as such, there is an implicit validation in the concept of “regression toward the mean.”

Actually, upon reflection, that was not a simpler explanation – maybe some colorful graphs and charts will help.

Figure 1 plots four snapshots of the implied volatility (IVol) term surface (IVol for different expirations) on the 10-year swap rate. The *shamrock line* represents the term surface on 7 March 2008. On that date, a one-month option had an IVol of 174 nv while the five-year option had an IVol of 106 nv. (Think of implied volatility as the cost of interest rate insurance.) This downward-sloping term surface implied that a six-month option in six months would cheapen from 150 nv to approximately 120 nv (its forward value).

FIGURE 1: FIVE-YEAR TERM SURFACES FOR OPTIONS ON THE 10-YEAR SWAP RATE



Source: All charts courtesy of CS LOCUS

Lower down in Figure 1, the *catalina line* is a snapshot of the term surface almost five years later on 29 April 2013. At this local IVol low, the one-month option closed at an IVol of 56 nv while the five-year option closed 60% higher at nearly 90 nv. This steeply sloped surface produced forward values that pointed to much higher implied volatilities in the future. And while the *melon line* and *umber line* are not as extremely sloped, all four term surfaces share the notion

that implied volatility in the future appears to “mean revert” toward someplace slightly above 100 nv – and this is indeed what occurred.

As evidence, look no further than Figure 2, where the *orchid line* is the 20-year history for one-year options on the 10-year rate. Its long-term average of 104.5 nv is generally where forward volatilities have converged, and almost by definition, is the inflection level where the term surface will invert in a high-volatility environment.

FIGURE 2: HISTORY AND LONG-TERM AVERAGE OF ONE-YEAR OPTIONS ON THE 10-YEAR RATE



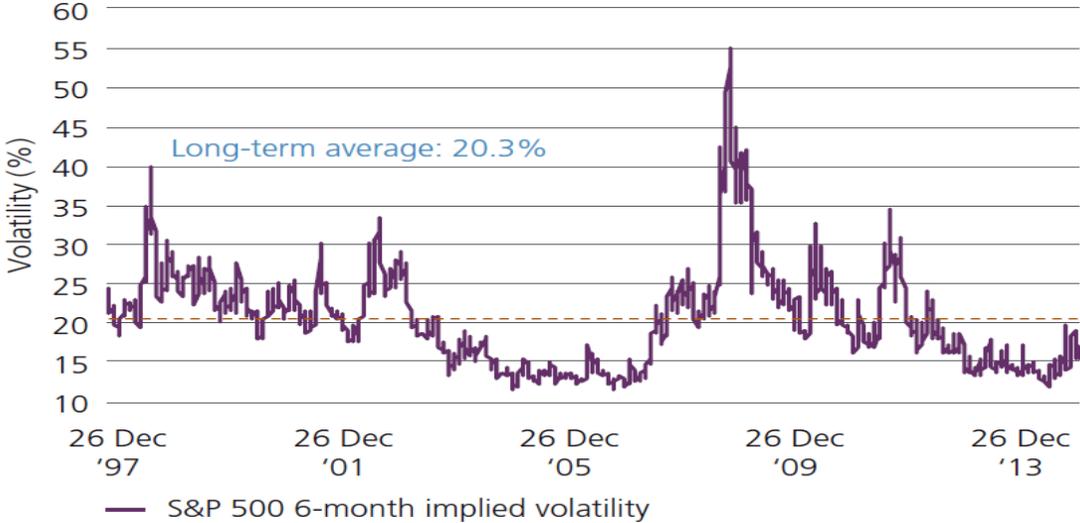
It may come as no surprise that we find a similar pattern with respect to the options on the S&P 500 Index (see Figure 3). The *apricot*, *cameo*, and *jungle* lines from April 2002, March 2011 and December 2014 all produce forward implied volatilities that point toward 20ish.

FIGURE 3: S&P 500 INDEX IMPLIED VOLATILITY TERM SURFACE



Then, as consistently as the 3:10 train to Yuma arrives on time for tea, the *pinot line* is a 20-year history of implied volatility on six-month S&P options with an average of 20.3%.

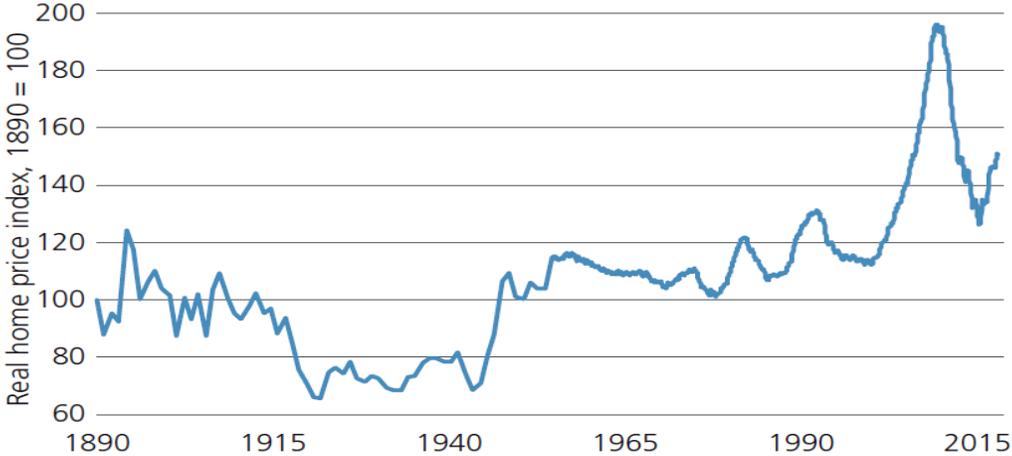
FIGURE 4: S&P 500 SIX-MONTH IMPLIED VOLATILITY



In fact, many investment strategies revolve around establishing averages and baseline levels, creating a framework for selecting assets that will revert to their long-term value. This is why a term surface illustration can be so useful; it may help identify a long-term average.

So in a slight digression, this is why it was stunning that many large Wall Street banks seemed to have developed a case of temporary amnesia in the early 2000s, when they loaded their balance sheets with mortgage bonds despite a near doubling of real home prices (see Figure 5). Before the bubble, real home prices were contained within a relatively tight band.

FIGURE 5: REAL HOME PRICE INDEX



Of course, the classic problem with trading against an established long-term average is that prices can stay irrational longer than many investors can remain solvent.

Yet while arriving too early to an investment idea can lead to rude returns, somewhat similar to ringing your dinner party host's doorbell before the appointed hour, trading early still has potential to be ultimately profitable if effectively managed via proper sizing and superior structuring. This is in stark contrast to the less common but ultimately greater problem that can result in huge losses: failing to recognize a secular change that has shifted the long-term average, in other words, that rare occasion when it truly is "different this time."

Thus the question haunting so many grizzled bond investors: Will U.S. interest rates eventually return to their much higher long-term (average) level, or are interest rates now permanently lower?

Figure 6 displays an interesting contrast between the rather stable *brandeis line* of the five-year forward five-year swap rate from the decade starting in 2001, and the distinctly volatile *venetian line* of the spot two-year swap rate. While the two-year spot rate twice traversed a range of over 500 bps, the five-year, five-year-forward rate gently rotated around its 5.45% average.

FIGURE 6: A STABLE 5-YEAR FORWARD 5-YEAR SWAP RATE VERSUS A VOLATILE SPOT 2-YEAR SWAP RATE



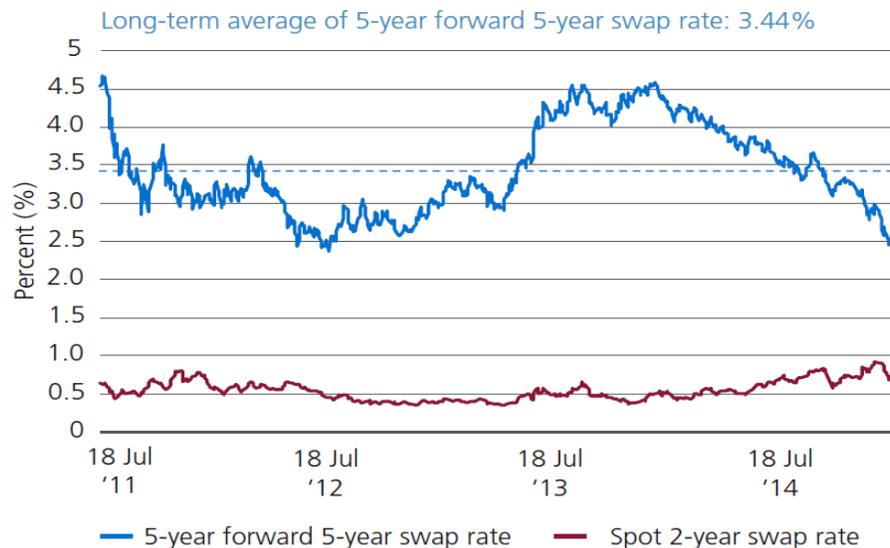
These gyrations are fundamentally similar to how most term surfaces configure to anchor the forward value near the long-term average. So despite the fact that by early 2011 the Federal

Reserve had maintained policy rates pinned to zero for over two years, the five-year, five-year-forward was still bouncing around 5.25%.

Fast-forward to when the world's major central banks have employed QE on a massive scale, and suddenly the financial markets are digesting the notion that maybe PIMCO's New Neutral is more than just a fancy phrase.

Figure 7 is an extension of Figure 6, commencing in July 2011, soon after the start of the Fed's second round of QE. While the spot two-year rate is basically unchanged, the five-year, five-year-forward rate is rotating around an average that is 200 bps lower.

FIGURE 7: A NEW NEUTRAL FOR U.S. RATES?



While one could argue that this is a QE residual, the counterpoint observation is that this forward rate has declined nearly 50 bps since the Federal Reserve purchased its last bond. Further confounding is the fact that interest rate implied volatility has risen by 15% since the end of QE, an event usually associated with a steeper curve and a higher forward rate. (See the October 2014 *Viewpoint*, "Financial Market Cognitive Dissonance.")

If it is indeed the case that the long-term rate structure has been significantly reduced, and that the yield curve is creating forward rates that now rotate around a "new average" rate that is substantially lower, then there are myriad implications.

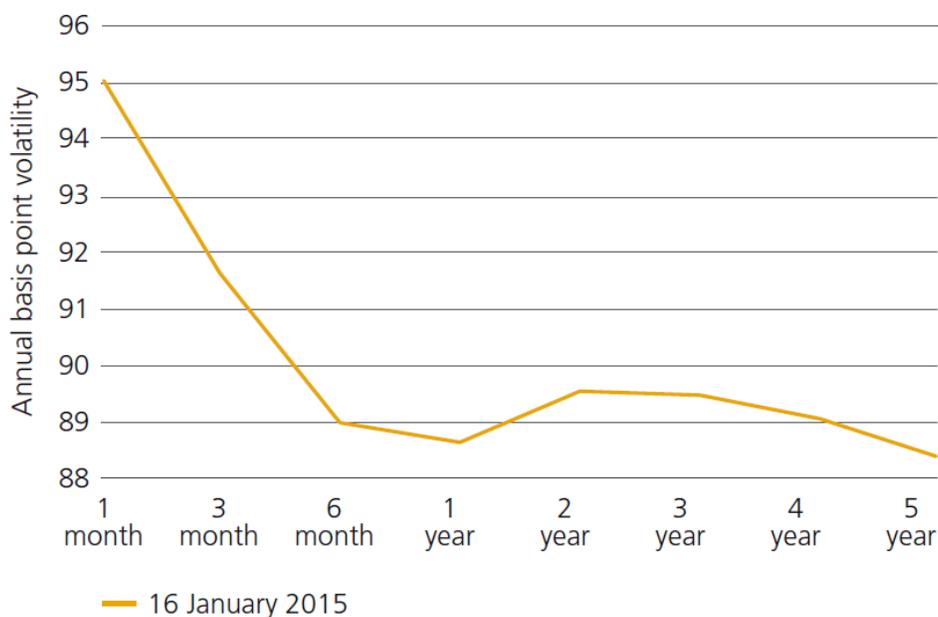
Foremost is the level at which the yield curve will invert, as this tends to mark the peak of a Fed hiking cycle. The current rate profile, supported by the pricing structure of various option-linked derivatives, indicates the yield curve may likely invert near 3.50%, about 200 bps lower than the previous two cycles.

Second, it is likely that the average level of implied volatility will be 10% to 15% lower. Remember that IVol can be thought of as the cost of interest rate insurance. If the "new

average" interest rate is now closer to 3.25% instead of 5.25%, then the range of outcomes (and potential losses) will likely be smaller, and thus the cost of insuring against adverse outcomes will likely be lower.

This transition may have already occurred as the IVol term surface (the *apricot line* in Figure 8 below) has inverted at 90 nv, or about 15% lower than its long-term average.

FIGURE 8: U.S. 10-YEAR TREASURY RATE IMPLIED VOLATILITY TERM SURFACE



Another spillover effect would be tighter credit spreads, as IVol is a primary input into valuation models.

Finally, equities may continue to rise as price-to-earnings (P/E) multiples have room to expand to incorporate a lower discount factor. We would highlight that it is precisely the relationship between earnings, dividends and interest rates that supports our overall favorable view on European equities (see the November 14, 2014 Commentary, "*The Tortoise and the ECB*").

That's the news from the trading floor, where all the portfolios are strong, all the managers are good-looking, and we hope that all the returns are above average.

Harley S. Bassman
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