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Musings from Harley Bassman:

THE CONVEXITY MAVEN

Value Concepts from the BofA Merrill Trading Desk
March 15, 2011

"How I Learned to Stop Worrying and Love MBS……"

With apologies to Dr. Strangelove, 1964

As fully disclosed in the top line, I fashion myself as the "Convexity Maven"; this would make me a lover Volatility and all its related implications for Financial Markets. So it is with no great pleasure that today we must examine the implications that two substantial changes in the MBS mart will have upon both Implied and Realized Volatility. As a preview to the conclusion, the contribution of Volatility to the Rates market from the MBS product will decline. While this does not mean that Realized Volatility will uniformly decrease, it does imply a less Volatile market than would otherwise be expected from future events.

The Birth of Derivatives

While some may celebrate the birth of derivatives as the date the Chicago Exchanges started trading Financial Futures in the early 1980's, I would instead point to the Spring of 1995 when FASB 122 was finalized. For this is the date when Mortgage Backed Servicing Rights (MBSR), created from loan origination, was changed from an off balance sheet intangible to an on balance sheet asset subject to fair value impairment (Lower of Cost or Market – LOCOM). Suddenly, an entirely new risk was introduced into the market and a new skill set was demanded, by both the buy side and the sell side, to manage this process.

Let's examine what occurred and its implications.

When a loan is securitized by the GSEs, a portion of the coupon (presently mandated at 25bps) is clipped off by the Servicer to pay the costs of "passing through" the Principal + Interest (P+I) payments to the bondholders as well as the process of delinquency management (including foreclosures) should a homeowner default.

This 25bps income stream, which could be as short as a few month to as long as thirty years, was initially regarded as an "off balance sheet intangible asset" that was not marked to market. As such, any valuation change did NOT appear on the income statement. Consequently, the hundreds of small mortgage companies that were predominate at the time had no accounting need to hedge the value...and they didn't.

As time went by, some of the cleverer mortgage companies started to produce discount mortgages that resulted in the creation of below Par bonds and the retention of excess servicing rights, i.e., an income stream greater than 25bps. This had the interesting consequence of mortgage companies booking an up front tax loss (issuing a MBS at 99-00 while lending out 100-00) while creating a large off balance sheet deferred value. Since many of these companies were privately held, this was a great tax avoidance strategy (or at least a tax deferment game).

Notwithstanding the fact that the Government does not like the notion of taxpayers accelerating losses while deferring gains (unless it's the Government's idea), in May of 1995, FASB 122 was finalized and closed the gap between originated and purchased servicing rights. This converted MBSR to an on balance sheet asset where value changes would flow through the income statement. [An added benefit, to sooth the banking industry, was that MBSR could now count as part of their Tier 1 Capital.]

A vastly simplified example might be instructive:

Original MBS origination process – (Late 1980's)

Homeowner loan rate = 8.50%
Borrower pays 1% up front origination fee
Bank clips 25bps for the GSE (cost of "wrapping" into an MBS)
Bank keeps 25bps for the cost of servicing (let's assume this is a cash flow wash)
Bank sells FN/H 8.0% as a TBA to Merrill Lynch at 100-00
Result: Bank books 1 point profit and owns 25bps of Servicing as an off b/s rev source.

"Clever" MBS process pre-FASB 122 – (Early 1990's)

Homeowner loan rate = 8.50%
Borrower pays 1% up front origination fee
Bank clips 25bps for the GSE (cost of "wrapping" into an MBS)
Bank keeps 75bps servicing strip
Bank sells FN/H 7.5% as a TBA to Merrill Lynch at 97-00
Result: Bank books a 2 point net loss (one point fee less three point funding loss) and owns 75bps of Servicing as an off b/s revenue source. Taxable income reduced while excess income of 50bps is earned (and taxed) in later years.

MBS process post-FASB 122 – (After 1995)

Homeowner loan rate = 8.50%
Borrower pays 1% up front origination fee
Bank clips 25bps for the GSE (cost of "wrapping" into an MBS)
Bank keeps 75bps for the cost of servicing
Bank sells FN/H 7.5% as a TBA to Merrill Lynch at 97-00
Result: Bank books a one point profit and owns 75bps of Servicing as an on balance sheet asset valued at 3 points (offsetting the 3 point loss on the TBA sale). This asset is accounted for under LOCOM and is thus tested for impairment. An income statement loss will occur if prepayments occur faster than originally anticipated.

Once MBSR went on balance sheet, it became a source of income statement volatility, and thus, it needed to be hedged; otherwise impairment (prepayment driven) losses would flow to the income statement. Fortunately, there was an allowance created for "Hedge Accounting"; if it could be shown that there was a reasonably strong correlation between the asset and the hedge product, the asset and the hedge could be paired. Since large companies do not like income statement volatility, hedging strategies became a new Wall Street industry. This newly created demand for off balance sheet hedges gave birth to a vastly larger Derivatives market. [See FASB 140 and 156 for updated information]

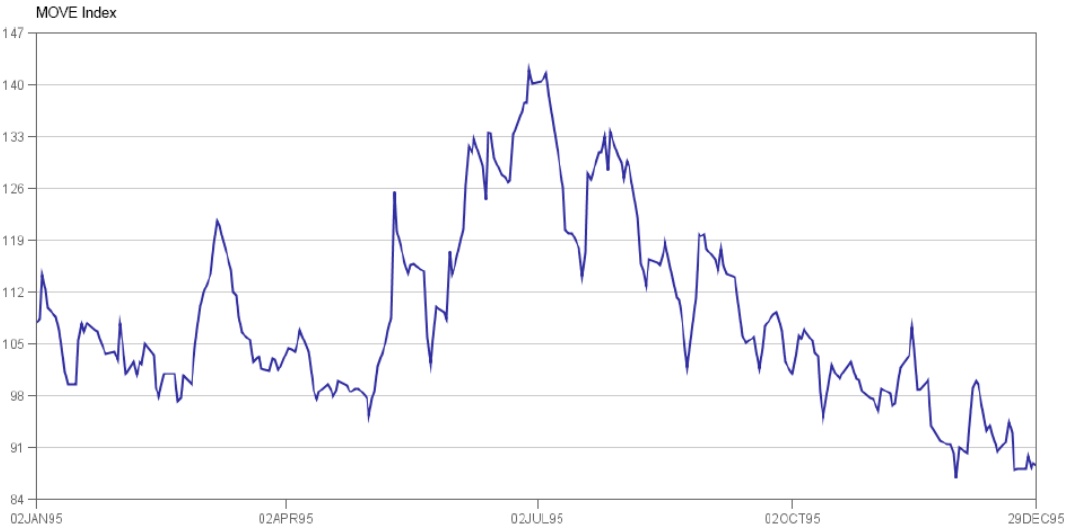
The Reaction

FASB 122 had been in discussion for some time, but it was promulgated in early 1995 and was finalized in May 1995. With such a large impact looming, markets started to adjust quickly.

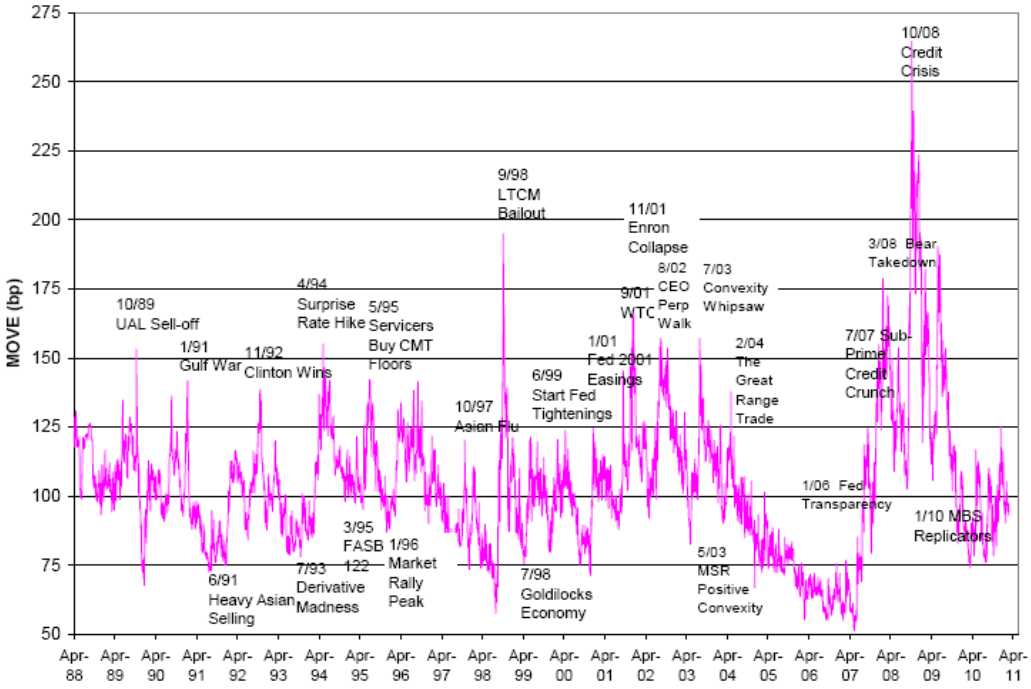
MBSR has two main risk components: 1) Short Duration and 2) Short Convexity. As such, it is probably no coincidence that rates started a slow decline early in the year and then rallied a hard 100bps soon after the May effective date as shown by the –apple green line- below.

All charts, unless otherwise noted, are sourced from BofA Merrill data

But buying the duration was not enough as it is the Convexity risk vector that makes the Servicing asset so difficult to manage. This would certainly explain the 40% jump in the -MOVE Index-, from 100 to 140, starting in early May 1995.



The –pink line- presents the MOVE Index in a broader perspective over the past twenty years. You can see, as labeled, the rise in the MOVE was quite substantial. What makes this story all the more compelling is that the increase in the MOVE occurred during a decline in interest rates. At that time, before the growth of the GSE portfolios, there was an extremely high correlation of Implied Volatility to Rates. As such, a large increase in the MOVE with Rates declining would be extremely anomalous. One can almost certainly point to FASB 122 as the culprit.



Implications from an MBSR Re-Boot

We left out a few salient details in our "instructive example" of MBSR creation.

First off, the rate paid by the homeowner is demarcated in eighths, not halves. And since there is a minimum spread required over the MBS coupon rate, the Originator (Servicer) will usually have to keep an "excess" portion of MBSR on his b/s, as opposed to booking as a profit. And as noted, this potential future profit is at risk vanishing via early prepayments. This increases the hedging risk/cost.

Additionally, we made the assumption that the 25bps minimum was a wash versus the actual cost of doing the job. As such, there was little economic value to the minimum servicing strip. While this may have been true thirty years ago, it is a far different world now. A 25bps servicing strip on a $250,000 loan will toss off $625 per year in cash flow. Yet it only costs the "bulk" servicers $65 to

$75 per loan per year to manage a "current" loan. As such, Servicers are carrying a massive economic value on their books, and used as Tier 1 Capital, that could vaporize in a volatile rate move. This is why the large Servicers have fleets of analysts and acres of "server farms" to process the market risk of this important asset. If Government regulators, acting in concert with the GSE's, reduce the minimum servicing strip to 5bps, or close to the cash cost of processing a "current" loan, the business model will adjust so that the economic value of the Origination process shows up on the income statement as earned income as opposed to on the balance sheet as a volatile asset. This will virtually eliminate the need to hedge current pay prime servicing. Since these are the folks who are the largest "traders" of MBS risk, as well as the largest natural buyers of options, one can be assured that both Implied and Realized Volatility will decline in the USD market over time as this change becomes effective.

What are the odds of this change occurring? Quite high. It helps the largest holders of MBSR who may be impacted by the new Basel III regulations that will limit this asset to maximum 10% contribution to Tier 1 Capital.

Back to the Future in MBS PrePayments

I refuse to totally date myself, but I will reveal that many years ago, the rule for a consumer ReFinance was 200bps. After considering the cost of engaging a lawyer and appraiser, paying for a credit report and the origination points, it took at least that much of a rate improvement to make the transaction economically advantageous. Consequently, Par MBS bonds traded much longer than today. In fact, believe it or not, I traded some of these bonds one for one versus the USA Bond Contract.

OK, it was 1985 and Par MBS rates were north of 12%, but it did happen!

In any case, until the financial debacle, the big MBS story has been the massive technization of the market. Streamlined ReFinancing, minimal paperwork, lower fees, internet searches, etc, reduced both the dollar cost and the time commitment to ReFinance a prime loan. At the peak of the ReFi boom in 2003 to 2004, MBS were prepaying with as little as a 40bps incentive. Now that house prices have wilted like so many warm tulips, the market has reverted to a much more pensive manner.

The market now demands (and Dodd / Frank requires) a full income verification, and a proper appraisal. Moreover, the "broker" business model where commissions were paid on volume, not quality, has vanished. Finally, the GSEs have raised their fees and implemented LLPA (Loan Level Pricing Adjustment). LLPA effectively acts as a prepayment penalty for high LTV and low FICO loans. [See Commentary – *"The Best Laid Plans of Mice and Men"*, July 23, 2010]

All this has acted as a giant brake on prepayments. How powerful? The –orange line- below is the dollar price of FN 6 ½ bonds. Notice that the highest price they reached during the 2003/4 ReFinance boom was 105. Presently, they are north of 111-00

Another way to look at the impact is to compare a MBS bond to the Par MBS Rate; after all, this is the key driver to economic ReFinancing. Below, the –lime line- is the price of FN 6s while the –magenta line- is the MBS Rate (inverted). Notice how the relationship between price and rate has been expanding over time as prepayment sensitivity has been reduced.

While this may be interesting to MBS specialists who trade the coupon stack versus IOs, there is a much larger Rates story here.

Let's examine the components of a Par MBS bond:

One part Amortizing 30yr Fixed Rate Bond + One part full American call option.

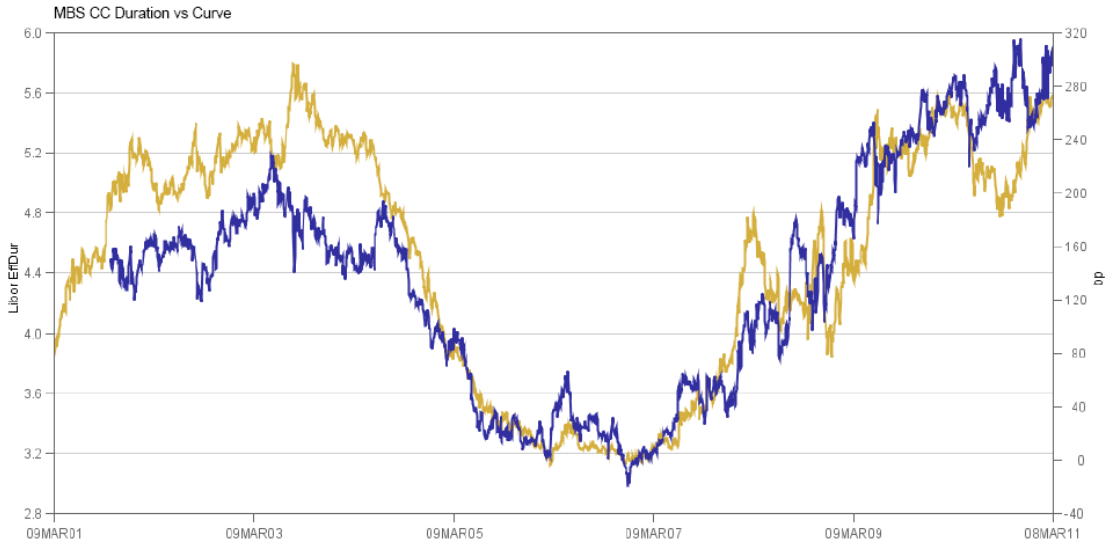
The risk vectors of the pure bond component are relatively easy to analyze; it is the call option that drives all the uncertainty. So instead of trying to capture the absolute risk, let's just focus upon the relative components.

Like any option, the further the strike is from the at-the-money forward rate, the lower the Convexity (gamma). Similarly, all else equal, longer expiry options have less Convexity than shorter-dated options. Finally, to state the obvious, the further more an option is out-of-the-money, the lower the Duration (delta).

What are the Implications?

	Strike	Delta	Gamma	Vega
3yr into 10yr Receiver (call) option	25bp otm	35%	2.6 units	56 uts
3yr into 10yr Receiver (call) option	100bp otm	20%	1.8 units	46 uts

Referring to the above example, it is clear why the Yield Curve plays such an important part in MBS analytics. As the Curve steepens, the Forward rate rises; consequently, the fixed rate embedded ReFinance option is further out-of-the-money in forward space. The lower delta of this call option leads directly to a longer Duration for the entire MBS bond. [The Amortizing bond Dv01 is reduced by a lower delta call option.] In the chart below, the -gold line- is the Sw10 vs. Sw2 Yield Curve while the –blue line- is the OADuration of the Par MBS bond.



This by itself is not too interesting since we have detailed this fact frequently in past Commentaries. What is newsworthy is the fact that over the past two years the OADuration has increased by nearly 25% relative to the shape of the Curve.

We would conclude that this is a direct result of a permanent change in the ReFinance incentive. In fact, it is likely that the 40bps Refinance incentive realized during the 2003/4 period was an anomaly and not the "new normal". And while certainly technology and education has permanently lowered the "ReFi Elbow" from the ancient 200bps level, the recent 40bps "Elbow", enabled by commissioned Mortgage Brokers in a housing bubble, is also a level not to be repeated.

If the new level is now 125bps (75bps greater), we can roughly simulate the overall impact by simply raising the strike level of our above illustrative option.

If applied uniformly, we might expect this permanent adjustment to roughly:

1) Lengthen the MBS market by about 25%
2) Reduce the Convexity by about 30%
3) Decrease the Vega exposure by 20%

Now one may discount the last chart as a product of an analytical tool, as opposed to an empirical study. However, there are plenty of transparent risk vectors that support this result:

1) Much wider Coupon Swaps, both outright and Curve Adjusted
2) Lower Swap Spread volatility in "gapping" markets
3) Less demand from MBS Servicers for option products

Conclusion

The combination of a restructured MBSR business model as well as a permanently reduced homeowner Refinance incentive has the potential to both increase MBS Durations and vastly reduced both the Implied and Realized Volatility of the USD Rates market. And while the former is still in the early planning stages, the latter is already in full force.

Easy Trading Implications:

1) Reduction in the Volatility Surface "Hump"
2) Lower payer versus receiver skews
3) Reduced Swap Spread Volatility
4) Narrowing of USD versus EUR Implied Volatility

Much Harder Trading Implications:

MBS Options: Clearly the put vs. call skew will decline. However, it is unclear if the par to par Implied Volatility ratio between MBS and Swaps will increase or decrease. Since MBS are now longer, the higher Dv01 should increase the ratio. On the other hand, the much lower embedded prepayment convexity will reduce the spread management error leading to a lower ratio. Stated differently, MBS will no longer "extend and explode" in a fast rate rise; as such, there is less "tail risk" value.

CMM versus CMS: To the extent that these two risk vectors have similar credit exposure, this spread is strictly a function of Nominal Implied Volatility (since we are basically comparing a similar maturity callable vs. bullet bond). However, while the option value is clearly lower, and as such one should expect a tighter spread, the Dv01 of the Par MBS is now longer. Consequently, one needs to compare the cash flows to a more distant part of the Curve. In an ultra steep Yield Curve, this matters. In fact, every 2CPR change in a Par MBS is worth about 8bps on the Swaps Curve. These countervailing forces must be reconciled.

CMM Curve: The critical selling point of CMM is the ability to trade the Par MBS rate without the inherent Convexity of a TBA MBS bond. The buyer (receiver) of CMM pays an embedded option premium to own this Rate on a constant dollar payout. The cost of this Convexity can be measured via the slope of the CMM time Curve. Presently, the six month forward CMM rate is 23bps higher than the spot rate. This compares to a cost of carry for an MBS bond of maybe 34bps. As such, the CMM receiver is paying 11bps over six months to eliminate the Convexity of the embedded MBS prepayment option. If the prepayment elbow has been permanently shifted, the CMM Curve should steepen.

My Best Trade ideas:

1) Buy CMM vs. CMS spread 1yr forward [wait for under 55bps]
2) Sell 3y-10y 5.3% payers vs. Buy 10y-10y 6.0% payers [target costless]
3) Buy 5y-10y Payer ladder: (B)6.25% + (S)7.35% + (S)8.60% [costless]
4) Buy the TYM (May 20) 116 put vs. 114 put one by two [at 4/64s]

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March 15, 2011

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