

The World's Largest Buyer of Volatility Returns

The reason that Implied and Realized USD rate Volatility is greater than the rate Volatility for all other G-7 countries is quite simple: We have a huge "at will pre-payable" Fixed-Rate Mortgage market.

The patriarch of this family of bonds is the 30-year MBS; it is effectively an Agency thirty-year non-call one twelfth, the most negatively convex bond created on a regular basis. Analytically, each time \$100mm of new MBS bonds are issued, the homeowners behind these bonds are effectively buying the Vega Equivalent of \$50mm 3yr-10yr straddles. Taken as a whole, the USD rate market, comprised of nearly 40% MBS bonds, has a core short convexity structure that creates substantial duration drift as rates vibrate. As such, Asset/Liability managers at Banks, Insurance companies, and Pensions must actively monitor their risk dynamics. To maintain a stable portfolio at the margin, managers must be net buyers of the market as prices rise and yields fall, and vice versa, as prices fall and rates increase. This is the primary source of the additional USD rate volatility over other currencies.

Today's RateLab proposes that there is a grand correlation between the net buying (or selling) of Volatility by US homeowners via the Fixed-rate MBS market and the level of Implied Volatility.

Moreover, this relationship will be maintained regardless of the buying or selling of Volatility by MBS Servicers, Agencies, Hedge Funds or other market participants. This is because the MBS issuance activity is the ultimate buyer or seller of options into the USD market and all other intra-market transactions just shift the risk between investors.

What follows is further support for our February 16, 2007 issue of **RateLab - "Professional Javelin Catching: This is the Bottom of Vega"**. To reiterate, we believe that Vega has bottomed and has much greater potential to rise than fall over the medium term.

The Analysis:

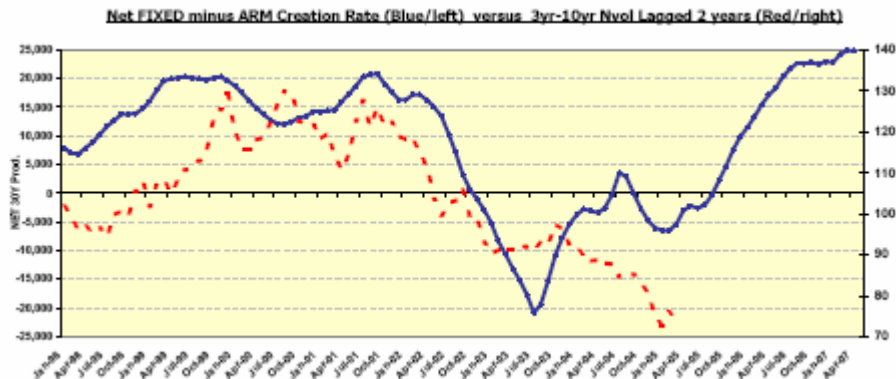
Although there is no “right” answer for how to conduct this analysis, there are a series of “better” answers. We wish to examine the Net Purchases of Volatility by the US homeowner. If he takes out a thirty-year fixed-rate mortgage, we will assume he wants to own the prepayment option and as such, is a net buyer of Volatility. If he takes out an ARM, he is a net seller of Volatility since he is willing to take rate risk in exchange for a lower initial rate. This creates the simple formula: Net Agency thirty-year MBS issuance minus Net Agency 3/1 and 5/1 ARM issuance.

We chose to use only thirty-year fixed rate MBS because not only are they most negatively convex, but also the fifteen-year market has a selection bias in favor of homeowners who desire to payoff their mortgages instead of utilizing the prepayment feature.

We chose to use only 3/1 and 5/1 ARMs because not only are they the least negatively convex, but also 7/1 and 10/1 ARMs are too similar to fixed-rate MBS once you accounted for the fact that that average homeowner moves every seven years.

Finally, this construction captures the broad sweep of homeowners who switch from Fixed-rate to ARMs and back.

The **-blue line-** below shows twelve-month moving average of our Net Issuance formula. The **-red line-** is the Implied Normal Volatility for 3yr-10yr a-t-m straddles, lagged by two years. The supporting data is included in the Appendix at the end of this RateLab.



Critical Observations:

- 1) From early 1998 to mid 2002, the MBS market averaged net issuance of about \$20 billion a month. This would be the Vega equivalent of homeowners purchasing about \$10 billion a month of 3yr-10yr straddles.
- 2) From mid 2002 to late 2003, Fixed-rate to ARM refinancing reduced the net issuance figure substantially. During the summer of 2003, the net issuance figure reached NEGATIVE \$20 billion a month. This had the impact of homeowners selling \$10 billion a month of 3yr-10yr.
- 3) Homeowners were basically NET SELLERS of Volatility for almost three years. This coincided with the dramatic drop in both Implied and Realized Volatility.
- 4) Since the middle of 2005, homeowners have again become net buyers of Volatility. In fact, they are now implicitly buying Volatility at the greatest rate ever. Our net issuance figure is now running at \$25 billion a month and has been over \$20 billion for the last twelve months. This is the Vega equivalent of homeowners buying \$12bn a month of 3yr-10yr straddles.

Caveats:

To some degree, we have manufactured the correlation we were looking for via our selection of inputs and the length of the lag used for the Implied Volatility measure. Nonetheless, the underlying logic is compelling and does produce a handy chart. The key driver is that the homeowner is a non-mark-to-market investor who does NOT delta hedge his optionality. This is what creates the non-linearity in the equation: USD Asset/Liability managers must hedge over the medium term to maintain some sort of stability while homeowners do not. What if we introduce a new class of investors who also do NOT mark-to-market and manage duration drift ?? These investors could offset the net Volatility impact of homeowners on the market. I am obviously alluding to Foreign Central Banks who have been the largest buyers of Fixed-rate MBS over the past few years. This is an uncertainty we are not prepared to address just yet.

Summary:

It is indisputable that US homeowners have been refinancing out of ARMs and into Fixed-rate mortgages as the reset date is reached. Current rates will reset most ARMs to about 7.5% while a new Fixed-rate mortgage can be had for roughly 6.25%. Moreover, this activity certainly adds not only a great deal of negative convexity, but also significant duration to the market. At some point, the giant US Mortgage Machine adding \$25 billion a month of Fixed-rate bonds has to have an impact.

Will we see Implied Volatility on 3yr-10yr reach 125 NVol as the chart implies...??? Nope !!! But I can assure you that this impact is real and today's current 73.5 NVol will be seen as a gift by early 2008.

The ML US Rates Strategy team urges you to purchase mid-tail Vega, specifically via our Volatility Swap structure as highlighted in our April 10, 2007 issue of **RateLab – “Building a Superior Volatility Mousetrap”**.

ML US Rates Strategy
May 15, 2007

Appendix

| MONTH | 3r1 | 5r1 | 30 | NET 30s | 12MO MA | 3Y-10Y: 2y Lag |
|--------|--------|-------|---------|---------|---------|----------------|
| Apr-07 | -1,479 | 3,531 | 28,912 | 26,860 | 24,803 | |
| Mar-07 | -1,299 | 5,081 | 29,656 | 25,874 | 24,914 | |
| Feb-07 | -938 | 4,384 | 34,349 | 30,903 | 24,066 | |
| Jan-07 | -1,042 | 9,074 | 28,869 | 20,837 | 22,773 | |
| Dec-06 | -1,129 | 1,900 | 27,802 | 27,031 | 22,909 | |
| Nov-06 | -575 | 3,378 | 23,848 | 21,045 | 22,481 | |
| Oct-06 | -969 | 4,776 | 28,523 | 24,736 | 22,768 | |
| Sep-06 | -512 | 4,526 | 29,744 | 25,730 | 22,603 | |
| Aug-06 | -1,351 | 3,422 | 27,918 | 25,847 | 22,654 | |
| Jul-06 | -1,196 | 4,244 | 26,181 | 23,133 | 21,642 | |
| Jun-06 | -1,262 | 2,771 | 26,294 | 24,785 | 20,332 | |
| May-06 | -1,447 | 1,726 | 21,138 | 20,859 | 18,302 | |
| Apr-06 | -972 | 1,114 | 28,329 | 28,187 | 17,093 | |
| Mar-06 | -1,135 | 1,938 | 16,504 | 15,701 | 15,397 | |
| Feb-06 | -620 | 5,963 | 20,725 | 15,382 | 13,269 | |
| Jan-06 | -172 | 7,976 | 30,271 | 22,467 | 11,481 | |
| Dec-05 | -446 | 3,437 | 24,885 | 21,894 | 9,830 | |
| Nov-05 | -1,078 | 3,298 | 26,716 | 24,496 | 7,553 | |
| Oct-05 | -1,048 | 1,352 | 23,053 | 22,749 | 4,687 | |
| Sep-05 | -367 | 7,593 | 33,578 | 26,352 | 2,159 | |
| Aug-05 | -1,192 | 2,945 | 15,448 | 13,695 | -382 | |
| Jul-05 | -419 | 3,184 | 10,182 | 7,417 | -2,103 | |
| Jun-05 | 26 | 3,855 | 4,308 | 427 | -2,612 | |
| May-05 | 283 | 3,344 | 9,976 | 6,349 | -2,196 | |
| Apr-05 | 892 | 3,558 | 12,287 | 7,837 | -3,043 | 73.52 |
| Mar-05 | 472 | 2,401 | -6,965 | -8,838 | -5,460 | 75.97 |
| Feb-05 | 1,352 | 3,805 | -921 | -6,078 | -6,513 | 73.05 |
| Jan-05 | 2,301 | 4,783 | 9,746 | 2,662 | -6,474 | 75.25 |
| Dec-04 | 1,981 | 4,364 | 910 | -5,435 | -5,999 | 81.11 |
| Nov-04 | 1,442 | 4,079 | -4,370 | -8,891 | -4,616 | 83.00 |
| Oct-04 | 1,748 | 3,705 | -2,140 | -7,593 | -2,603 | 85.05 |
| Sep-04 | 2,105 | 5,058 | 3,032 | -4,131 | 45 | 85.64 |
| Aug-04 | 1,734 | 4,487 | -740 | -6,961 | 2,833 | 84.72 |
| Jul-04 | 2,453 | 4,780 | 8,536 | 1,303 | 3,555 | 87.68 |
| Jun-04 | 2,940 | 4,262 | 12,622 | 5,420 | -199 | 87.96 |
| May-04 | 2,532 | 3,556 | 2,276 | -3,812 | -2,562 | 88.75 |
| Apr-04 | 2,366 | 2,701 | -16,097 | -21,164 | -3,420 | 88.47 |
| Mar-04 | 2,028 | 1,873 | -18,573 | -22,474 | -3,080 | 90.10 |
| Feb-04 | 1,611 | 1,289 | -2,712 | -5,612 | -2,765 | 91.80 |
| Jan-04 | 2,704 | 3,200 | 14,269 | 8,365 | -3,796 | 92.79 |
| Dec-03 | 2,331 | 3,325 | 16,817 | 11,161 | -5,391 | 96.22 |
| Nov-03 | 1,974 | 3,757 | 19,995 | 14,264 | -7,772 | 97.51 |
| Oct-03 | 1,389 | 4,946 | 30,515 | 24,180 | -10,813 | 92.79 |
| Sep-03 | 1,443 | 6,026 | 36,798 | 29,329 | -15,235 | 92.90 |
| Aug-03 | 290 | 1,897 | 3,888 | 1,701 | -19,340 | 91.12 |
| Jul-03 | 744 | 2,453 | -40,546 | -43,743 | -20,846 | 91.96 |
| Jun-03 | 1,220 | 3,731 | -17,983 | -22,934 | -17,579 | 92.11 |
| May-03 | 1,216 | 4,342 | -8,551 | -14,109 | -15,082 | 91.25 |
| Apr-03 | 1,211 | 4,953 | -10,919 | -17,083 | -13,038 | 91.34 |
| Mar-03 | 1,622 | 3,789 | -13,286 | -18,697 | -10,569 | 91.30 |
| Feb-03 | 1,580 | 4,014 | -12,396 | -17,990 | -8,355 | 90.23 |
| Jan-03 | 1,390 | 4,811 | -4,567 | -10,768 | -5,148 | 93.00 |
| Dec-02 | 1,605 | 4,263 | -11,543 | -17,411 | -2,851 | 98.91 |
| Nov-02 | 1,301 | 3,249 | -17,678 | -22,228 | -1,045 | 99.68 |
| Oct-02 | 1,365 | 3,639 | -23,885 | -28,889 | 753 | 105.80 |
| Sep-02 | 1,510 | 3,958 | -14,465 | -19,933 | 3,276 | 103.34 |
| Aug-02 | 1,150 | 2,486 | -12,735 | -16,371 | 7,138 | 102.56 |
| Jul-02 | 1,490 | 2,688 | -362 | -4,540 | 10,395 | 99.74 |
| Jun-02 | 2,025 | 2,703 | 11,767 | 7,039 | 13,460 | 103.54 |
| May-02 | 1,307 | 1,299 | 13,020 | 10,414 | 15,000 | 111.18 |
| Apr-02 | 2,005 | 2,390 | 16,944 | 12,549 | 16,183 | 115.00 |
| Mar-02 | 1,845 | 3,058 | 12,773 | 7,870 | 17,148 | 117.90 |
| Feb-02 | 1,912 | 1,911 | 24,310 | 20,487 | 17,152 | 117.97 |
| Jan-02 | 820 | 1,047 | 18,665 | 16,798 | 16,276 | 119.06 |

| | | | | | | |
|--------|------|-------|--------|--------|--------|--------|
| Dec-01 | 327 | 1,472 | 6,663 | 4,264 | 16,306 | 122.20 |
| Nov-01 | 659 | 1,754 | 1,759 | -654 | 17,738 | 121.52 |
| Oct-01 | 208 | 164 | 1,760 | 1,388 | 19,024 | 125.87 |
| Sep-01 | 652 | 1,307 | 28,376 | 26,417 | 20,814 | 121.30 |
| Aug-01 | 612 | 806 | 24,126 | 22,708 | 20,653 | 127.43 |
| Jul-01 | 550 | 2,214 | 35,001 | 32,237 | 20,266 | 122.68 |
| Jun-01 | 30 | 1,373 | 26,930 | 25,527 | 18,662 | 114.28 |
| May-01 | -258 | -319 | 24,026 | 24,603 | 17,268 | 110.65 |
| Apr-01 | -213 | 7 | 23,921 | 24,127 | 15,974 | 114.38 |
| Mar-01 | 306 | 824 | 9,055 | 7,925 | 14,543 | 119.68 |
| Feb-01 | -225 | 41 | 9,784 | 9,968 | 14,360 | 118.12 |
| Jan-01 | -166 | -104 | 16,897 | 17,167 | 14,222 | 121.54 |
| Dec-00 | 254 | 1,920 | 23,616 | 21,442 | 14,244 | 122.17 |
| Nov-00 | 637 | 3,439 | 18,653 | 14,777 | 13,403 | 122.65 |
| Oct-00 | -12 | -33 | 22,825 | 22,870 | 13,176 | 129.32 |
| Sep-00 | 350 | 101 | 24,941 | 24,490 | 12,516 | 129.85 |
| Aug-00 | 96 | 766 | 18,526 | 18,064 | 11,997 | 126.71 |
| Jul-00 | -17 | 363 | 13,333 | 12,987 | 12,128 | 122.00 |
| Jun-00 | 104 | 493 | 9,388 | 8,791 | 12,700 | 118.55 |
| May-00 | -31 | -46 | 9,008 | 9,085 | 13,844 | 118.07 |
| Apr-00 | 56 | 186 | 7,191 | 6,949 | 14,815 | 115.69 |
| Mar-00 | 125 | 66 | 5,823 | 5,732 | 16,047 | 115.71 |
| Feb-00 | -28 | -20 | 8,259 | 8,307 | 17,458 | 119.79 |
| Jan-00 | -19 | -7 | 17,402 | 17,428 | 18,719 | 128.91 |
| Dec-99 | 6 | -21 | 11,338 | 11,353 | 19,545 | 125.41 |
| Nov-99 | 274 | 313 | 12,647 | 12,060 | 20,274 | 122.96 |
| Oct-99 | 148 | 334 | 15,422 | 14,940 | 20,091 | 115.97 |
| Sep-99 | 302 | 231 | 18,803 | 18,270 | 19,748 | 112.94 |
| Aug-99 | 89 | 13 | 19,741 | 19,639 | 19,962 | 111.08 |
| Jul-99 | 1 | -105 | 19,740 | 19,844 | 20,045 | 110.62 |
| Jun-99 | -5 | -87 | 22,427 | 22,519 | 20,322 | 108.03 |
| May-99 | -3 | 291 | 21,030 | 20,742 | 20,127 | 104.96 |
| Apr-99 | -1 | 669 | 22,398 | 21,730 | 19,942 | 108.25 |
| Mar-99 | -17 | 92 | 22,744 | 22,669 | 19,541 | 106.85 |
| Feb-99 | -126 | -214 | 23,090 | 23,430 | 17,935 | 101.93 |
| Jan-99 | -103 | -225 | 27,010 | 27,338 | 16,011 | 107.94 |
| Dec-98 | -129 | -68 | 19,505 | 20,102 | 14,691 | 105.46 |
| Nov-98 | -204 | -233 | 9,434 | 9,871 | 13,818 | 99.81 |
| Oct-98 | -144 | -153 | 10,530 | 10,827 | 13,792 | 100.62 |
| Sep-98 | 107 | 404 | 21,344 | 20,833 | 13,775 | 99.72 |
| Aug-98 | -146 | -112 | 20,379 | 20,637 | 12,613 | 94.42 |
| Jul-98 | -32 | 31 | 23,167 | 23,168 | 11,657 | 96.40 |
| Jun-98 | -51 | -23 | 20,101 | 20,175 | 10,187 | 95.05 |
| May-98 | 48 | 73 | 18,646 | 18,525 | 8,889 | 97.05 |
| Apr-98 | -117 | 442 | 17,237 | 16,912 | 7,894 | 96.23 |
| Mar-98 | 93 | 292 | 3,791 | 3,406 | 6,842 | 99.04 |
| Feb-98 | 10 | 550 | 892 | 332 | 6,372 | 101.74 |
| Jan-98 | 124 | 279 | 11,907 | 11,504 | 7,835 | 105.70 |

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