United States

The Mortgage Analyst

Credit Strategy Research

Negative convexity returns to the mortgage market

Rate rally has led to an increase in MBS convexity

The recent rally in rates has brought negative convexity back to the market, with aggregate index convexity now matching 2003 levels. The increase in convexity heightens the need for hedging of MBS and MSR portfolios.

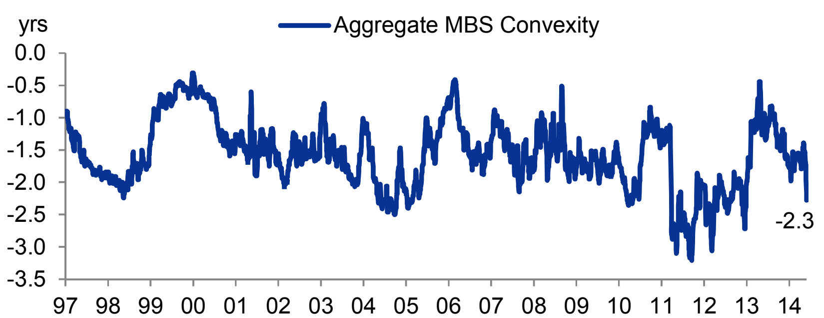
Small changes in prepay rates lead to large changes in duration

The fact that MBS are as negatively convex today as in 2003 may seem surprising given the vastly lower prepay responsiveness in the current environment. However, today's low baseline prepay speeds mean that small changes in prepayment rates lead to large changes in duration. An increase in prepayment rates from 11 to 15 CPR shortens duration by over one year, more than the effect of an increase from 40 to 70 CPR.

Refi risk highest for 2013-2014 vintage borrowers

Prepay rates may remain bounded for seasoned pools which have already passed up refi opportunities at mortgage rates below 3.5%, but more recent vintages are not similarly burned out, and could see larger speed increases. We expect high LTV pools will likely continue to offer call protection.

Aggregate MBS market convexity has returned to 2003 levels
Aggregate MBS index convexity



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Mortgage negative convexity has returned to 2003 levels

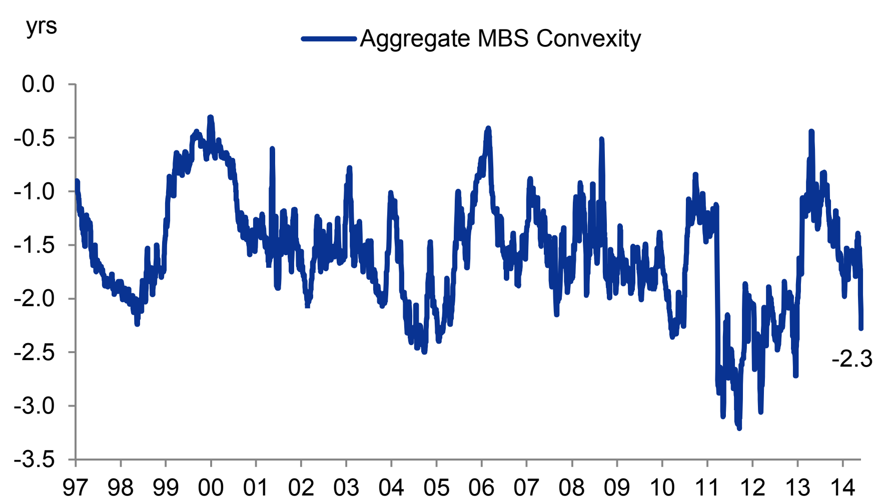
Negative convexity has increased, despite slow prepay rates

Benign prepay rates over the past twelve months have led some observers to conclude that there is little negative convexity in the MBS market. However, this week's interest rate rally has brought mortgage convexity back to 2003 levels, heightening the need for hedging MBS risk exposures. Exhibit 1 shows the convexity for the aggregate MBS index; the current level of -2.3 suggests that MBS market duration could change by 0.23 years for just a 10 bp change in interest rates.

It is not surprising that the recent decline in mortgage rates increases negative convexity, as more borrowers are now in-the-money for refinancing. However, it may be surprising to find that negative convexity matches 2003 levels, given the vast changes in the prepay environment from 2003 to today. Exhibit 2 shows the historical prepay rates for the 30-year conventional MBS universe; peak speeds in 2003 were over twice as high as peak speeds in 2013. Exhibit 3 compares the profiles of prepay rate vs. interest rate incentive across exposure years: in 2003, borrowers with 150 to 200 bp refinance incentive prepaid at 73 CPR, vs. 23 CPR for borrowers with comparable incentive in 2014.

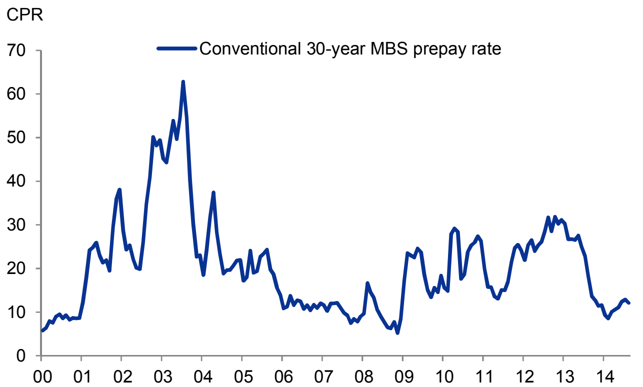
Negative convexity is high now partly because, at low baseline speeds, small changes in prepay rates lead to large changes in duration. Exhibit 4 shows the duration on a 3.5% conventional MBS as a function of annualized conditional prepayment rate (CPR): an increase from 11 to 15 CPR shortens duration by over one year, greater than the impact of increasing prepays from 40 to 70 CPR. As speed expectations for most pools in the index had, until recently, ranged from 6 to 25 CPR, changes in mortgage rates will lead to large changes in duration, despite the relatively flat prepayment S-curves currently prevailing.

Exhibit 1: Aggregate MBS convexity has returned to 2003 levels
Convexity, Barclays Capital U.S. MBS index



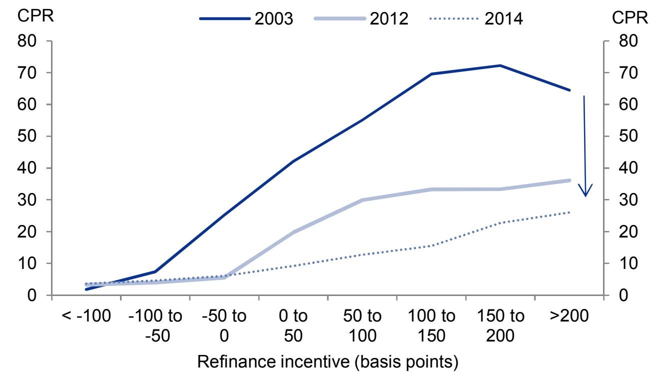
Source: Haver and Goldman Sachs Global Investment Research

Exhibit 2: Post-crisis prepayment rates have been far below 2003 levels ...
Annualized conditional prepayment rates, conventional 30-year MBS



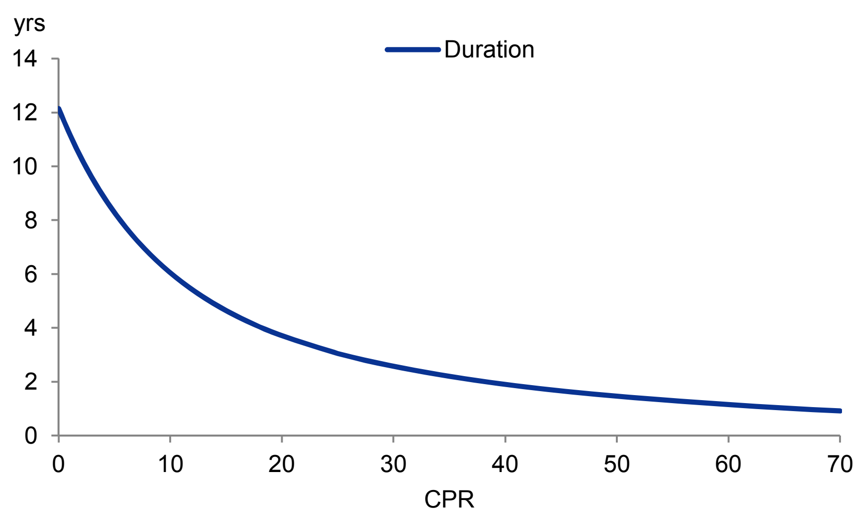
Source: eMBS and Goldman Sachs Global Investment Research

Exhibit 3: ...with less sensitivity to mortgage refinance incentives
Conditional prepayment rate vs. mortgage refinance incentive, conventional 30-year MBS, by exposure year



Source: eMBS and Goldman Sachs Global Investment Research

Exhibit 4: At low baseline speeds, small changes in prepay rates lead to large changes in duration
Duration vs. annualized conditional prepayment rate, conventional 3.5% MBS

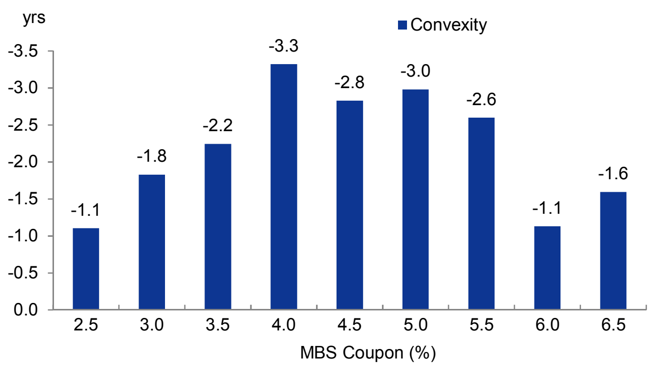


Source: Goldman Sachs Global Investment Research

MBS balance is concentrated in highest convexity coupons

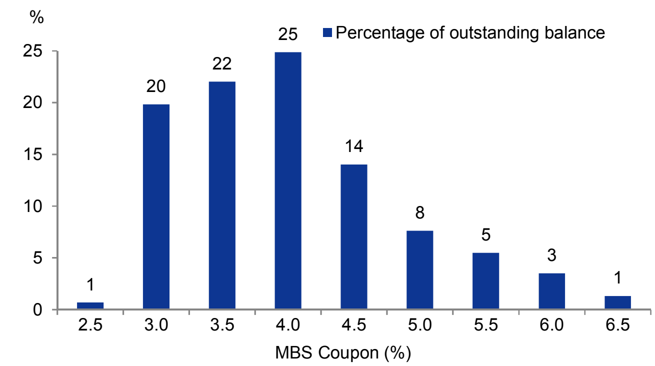
The aggregate convexity of the mortgage index is influenced by the distribution of balance across different MBS coupons. Exhibit 5 shows that the coupons with highest negative convexity are those which are at the cusp of refinancability (e.g., the 4% coupon for 30-year MBS). The 2.5% coupon is deep out the money for refinancing, so a 100 bp change in rates would not change refinance behavior materially. Similarly, the highest coupon cohorts (e.g., 6.0% and 6.5%) already have over a 250 bp incentive to refinance, so a further rate decrease will not be expected to substantially boost refi rates. Exhibit 6 shows that a large fraction of MBS are in the high convexity coupons, but a significant fraction are also in the lower convexity 3.0% and 3.5% coupon cohorts. If rates were to rally further from here, these lower coupon cohorts would become more negatively convex, which would drive aggregate MBS negative convexity higher still.

Exhibit 5: Convexity is highest for mortgage coupons at-the-money for refinance (4.0%-5.0%)…
Convexity, 30-year conventional MBS



Source: Goldman Sachs Global Investment Research

Exhibit 6: …and the outstanding balance of these high convexity coupons is large.
Balance distribution, 30-year conventional MBS



Source: eMBS and Goldman Sachs Global Investment Research

Federal Reserve portfolio reduces mortgage hedging need

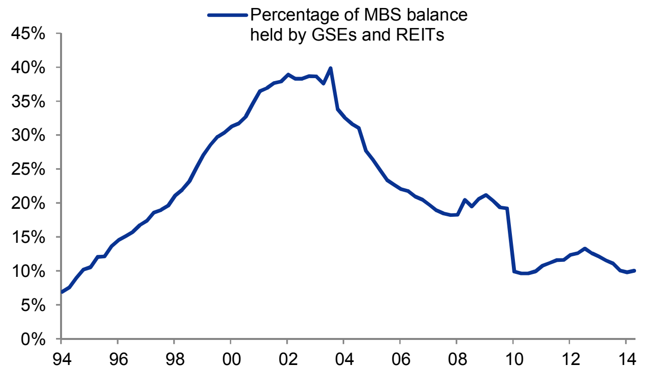
The increase in negative convexity shown in Exhibit 1 suggests that mortgage hedging demand will have grown during the past week. Research by the Federal Reserve[1] has suggested that mortgage hedging activity has the potential to amplify interest rate movements, as MBS investors sell bonds in a rising rate environment to offset their increasing durations, and similarly buy bonds into a rate rally.

One factor that will mitigate this risk is the increasing share of MBS held by the Federal Reserve, as the Federal Reserve does not engage in active portfolio convexity hedging. By contrast, the Government Sponsored Enterprises (GSEs), Fannie Mae and Freddie Mac, have traditionally actively hedged duration and convexity exposures, but have seen declines in their MBS portfolios. Exhibit 7 shows that the percentage of agency MBS held by Fannie Mae, Freddie Mac, and mortgage REITs has declined from 40% in 2003 to 10% today.

While the smaller role of GSEs in the mortgage market has likely reduced convexity hedging activity, it will not eliminate it completely. Exhibit 8 shows that market-implied interest rate volatility spiked up during the past week, so non-Fed MBS investors and mortgage servicers may come to feel an increased need to hedge against the risk of large rate moves which could change portfolio values and durations.

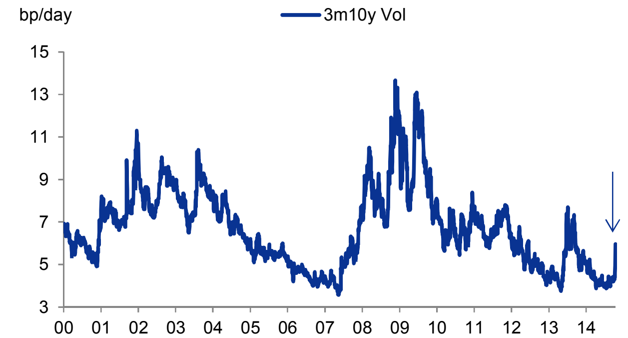
[1] "Does mortgage hedging amplify movements in long-term interest rates", R.Perli and B. Sack (2003), Journal of Fixed Income 13(3), 7-17.

Exhibit 7: Percentage of MBS balance held by GSEs and REITs has declined
Percentage of agency MBS held by GSEs and REITs



Source: Haver and Goldman Sachs Global Investment Research

Exhibit 8: Implied interest rate volatility has increased during recent rate rally
Swaption-implied 3m10y rate volatility



Source: Goldman Sachs Global Investment Research

Specified pools would continue to provide call protection

A combination of rising interest rate volatility and increasing mortgage negative convexity would imply mortgage durations are at increased risk of extension or contraction. In particular, the 2013-2014 vintage pools, which have never before seen mortgage rates below 4% and which are known to have extremely strong credit profiles, are at particular risk of refinancing in a new low rate environment.

One approach to managing refinance risk is through active portfolio hedging; a complementary strategy could be to rotate into collateral with more stable prepayments. For example, Exhibit 9 compares the prepayments of the 4.5% coupon 2011 vintage 30-year conventional MBS TBA cohort with the prepays on high LTV CQ-prefix pools. During 2012-2013, when rates declined substantially, the generic collateral speeds reached 25 CPR, while the CQ pools prepaid at less than 10 CPR.

To assess the collateral attributes which were most protective during the recent peak prepay period, we look at 2013Q2 prepayment rates for the 4.5% coupon cohort for a number of alternative call protection stories, including low, medium and high loan balance pools, high investor share pools, low FICO pools, and high LTV pools. Exhibit 10 charts the resulting prepay rates vs. the payups currently charged for these specified pools. The chart suggests that the specified pool payups are generally “rational”: higher payups correlate with lower peak prepay rates.

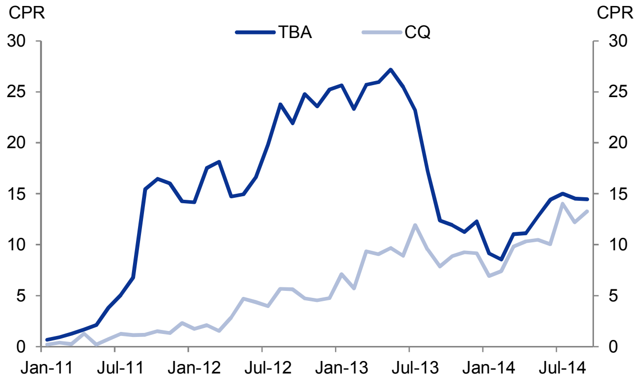
The CQ and Making Home Affordable (MHA) high LTV pools should continue to offer call protection in the current environment. Our house price model calls for a deceleration of price gains, with only 20% appreciation over the next ten years. Thus, loans recently originated at a high LTV will continue to have elevated LTV ratios for a few years, unlike the 2011-2012 high LTV pools which enjoyed early double-digit annual house price gains. Also, loans in high LTV pools were originated through the HARP streamlined refinance program, and thus their credit and income profiles are not proven to be as clean as is the case for loans originated under the strict underwriting standards applicable outside of HARP.

Heightened surveillance of portfolio durations and incremental rotation into specified pools both seem appropriate at current levels of rates, rate volatilities, and payups.

Marty Young

Exhibit 9: High LTV pools prepaid substantially slower than TBA pools in 2012-2013

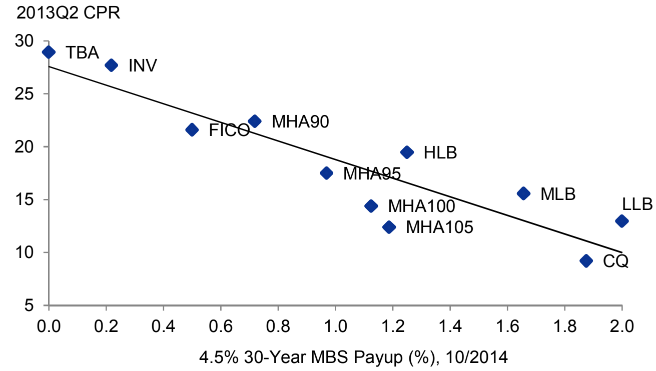
Annualized conditional prepayment rates, conventional 30-year MBS, 4.5% coupon, 2011 vintage



Source: eMBS and Goldman Sachs Global Investment Research

Exhibit 10: Increasing specified payups is correlated with increasing call protection

2013Q2 prepay rates vs. 10/2014 payups, 4.5% 30-year MBS



Source: eMBS and Goldman Sachs Global Investment Research

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