United States

The Mortgage Analyst

Credit Strategy Research

MBS basis tightening consistent with declining rate volatility

Mortgage basis and rates volatility are at historically low levels

Both the mortgage basis and market implied interest rate volatilities are at historically low levels. Declining interest rate volatility and declining mortgage borrower refinance rates have combined to reduce option costs for mortgages, leading to historically tight mortgage vs. Treasury spreads.

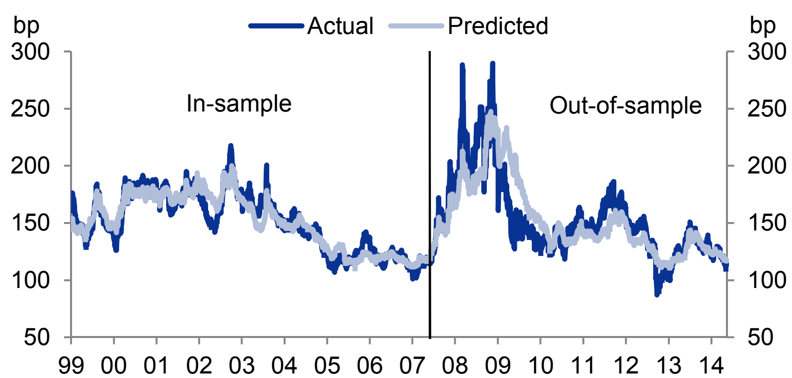
Interest rate volatility is consistent with low macro volatility

Low interest rate volatility is partly a search-for-yield phenomenon, but is also driven by low real economic volatility. Rolling standard deviations of inflation and unemployment rates have reverted down to levels seen during the Great Moderation period of 1984-2007.

Mortgage basis looks fair relative to historical levels

Accounting for low interest rate volatilities and tight swap spreads and credit spreads, mortgage spreads look fair vs. historical relationships.

Mortgage basis looks close to fair value relative to historical patterns
Actual vs. regression model predicted mortgage vs. Treasury basis



Source: Goldman Sachs Global Investment Research

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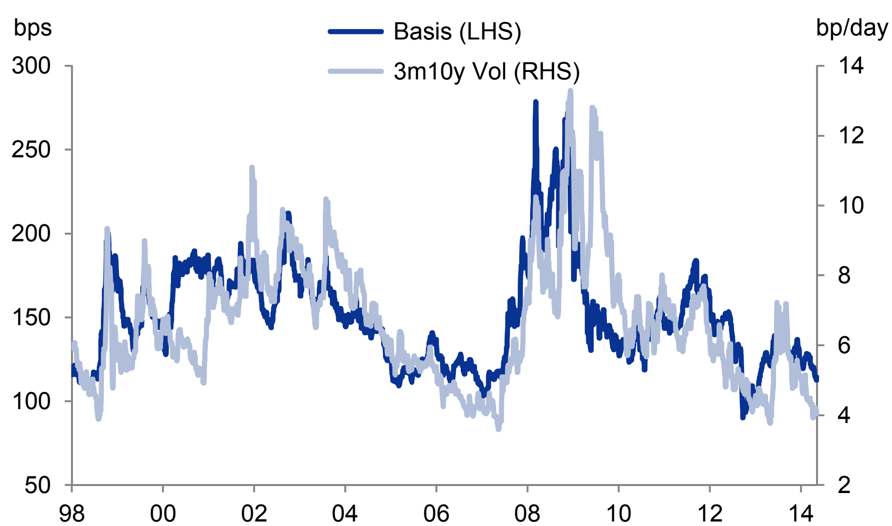
Mortgage basis is historically tight, rates volatility historically low

The mortgage basis (defined here as the spread between a par MBS rate and the average of the 5- and 10-year Treasury rates) is currently at a historically tight level of 115 bps, vs. an average of 150 bps during the 1998-2007 period. At the same time, implied interest rate volatilities are also near historically low levels. Exhibit 1 highlights the close connection between mortgage spreads and rate volatilities. Mortgage bonds underperform Treasuries when rates have a large move down (as the underlying mortgage borrowers refinance), as well as when rates have a large move up (because refinance rates decline and mortgage bonds extend). When rate volatility is low, mortgages have less risk of underperforming Treasuries in these wing scenarios, so mortgage investors require a smaller coupon spread.

Here, we review the questions of (1) is the low current interest rate volatility "reasonable", relative to fundamental drivers? and (2) is current mortgage basis "reasonable", relative to the level of interest rate volatility and other drivers of mortgage spreads? With respect to question (1) on rate volatility, we point to recent GS research[1] which suggests that low rate volatility is in fact consistent with prevailing economic conditions, including low macro volatility and proximity to the Zero Lower Bound (ZLB). The framework of this research suggests that rates volatility could realistically stay low for another year. This research does highlight, though, that under an alternative scenario involving earlier than expected exit from ZLB, volatility could rise earlier and higher.

With respect to question (2), we model the historical relationship between mortgage spreads vs. rate volatility and other drivers of mortgage spreads such as swap spreads and credit spreads, and find that mortgage basis is currently at fair or expected levels. Given that we expect tapering of the Federal Reserve MBS purchase program to be completed by this year, and given an expectation that rates volatility will increase in 2015-16, we would look to a long term modest widening of mortgage basis. However, the expected timing and amount of widening is such that it would be difficult to outright short MBS, given the negative carry of such a position.

Exhibit 1: Interest rate volatility and mortgage basis are both near historical lows
Mortgage basis (par mortgage rate minus blended 5-year/10-year treasury rate), and 3m10y implied swaption volatility



Source: Goldman Sachs Global Investment Research

[1] "A low-volatility landscape", *Global Economics Weekly*, May 14, 2014

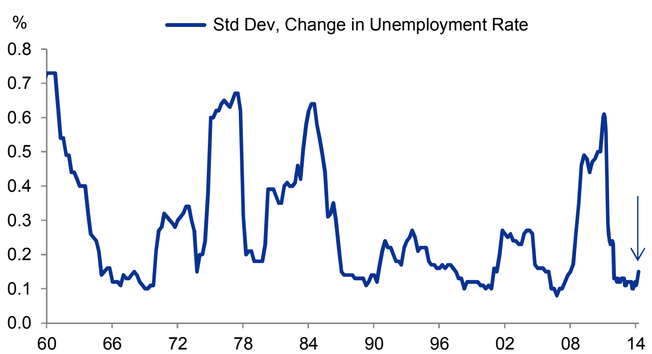
Low rates vol driven by low macro vol, low MBS hedging demand

Macro-economic volatility is low, financial conditions are easy

Low implied rates volatilities may partly reflect risk-on, search-for-yield market conditions, but they are also connected to low real macro-economic volatilities. Exhibit 2 below shows the rolling 12-month standard deviation in month-over-month unemployment rates, while Exhibit 3 shows the standard deviation in inflation rates; for both variables, recent volatilities have been low, comparable to levels seen during the Great Moderation period of 1984-2007. Policy interest rates can be viewed as related to macro-variables via a Taylor rule, so recent stability in macro-economic indicators logically supports moderate realized rates volatility. Transparency of monetary policy, for example via forward guidance, has arguably increased in recent years as well, further stabilizing interest rates.

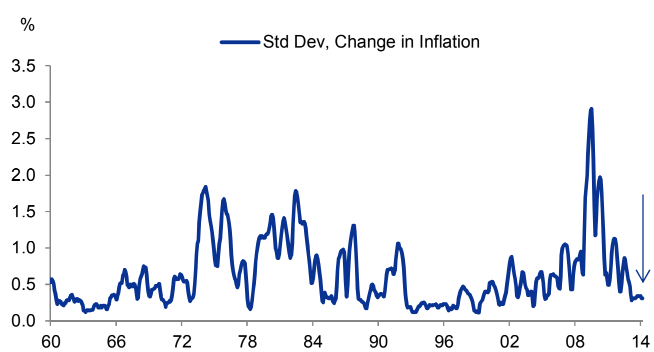
The Goldman Sachs Financial Conditions Index, which summarizes conditions across asset markets including rates, stocks and corporate credit is shown in Exhibit 4; the current index level is low, indicating easy conditions, or low financial stress, as compared to periods such as 2010-2011 (the Eurozone crisis), 2007-2008 (the subprime crisis), or 1998 (the Asian debt crisis). Reduced levels of financial stress lowers the potential for near-term rate dislocations, helping to keep implied and realized rates volatilities bounded. Also, as we have recently emphasized ("Does low volatility signal the end of the credit cycle?", *Global Markets Daily*, May 15, 2014), recent financial regulatory developments reduce the potential for excessive leveraged risk-taking, both for households and for financial intermediaries, putting a further damper on volatility.

Exhibit 2: Volatility in unemployment rates is low…
Rolling 12-month standard deviation in monthly unemployment rate changes



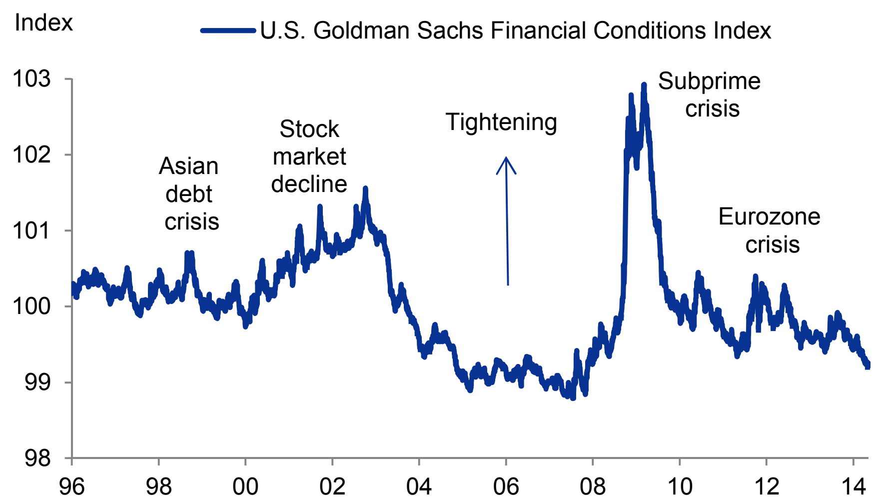
Source: B:S and Goldman Sachs Global Investment Research

Exhibit 3: ... as is volatility in inflation rates
Rolling 12-month standard deviation in monthly inflation rate changes



Source: B:S and Goldman Sachs Global Investment Research

Exhibit 4: Financial conditions index remains low, suggesting reduced financial stress
Goldman Sachs U.S. Financial Conditions Index



Source: Goldman Sachs Global Investment Research

Low convexity risk in the mortgage market contributes to low vol

Beyond the impacts of relatively stable macro-economic variables, recent developments in the mortgage market have also helped keep interest rate volatility low. In past decades, MBS investors and servicers were the largest users of the swaption products used to calibrate rates volatility; swaptions were used to hedge the negative convexity embedded in mortgages. This demand for volatility put upward pressure on option premium in swaptions, pushing implied vols upward.

Alternatively, instead of managing convexity risk through swaptions, MBS investors can manage changes in duration by dynamic hedging: as rates and mortgage durations rise, investors can offset the effect by hedging (e.g., shorting treasuries). This dynamic MBS hedging can also increase (realized) rates volatility: as rates rise, MBS hedgers sell treasuries, causing rates to rise further. In 2003, Federal Reserve researchers studied the impact of mortgage hedging on rates volatility ("Does Mortgage Hedging Amplify Movements in Long-term Interest Rates?", R. Perli and B. Sack, FEDS Paper 2003-49), and found that the impact is large: "the volatility … implied by swaptions increases when the prepayment risk of outstanding mortgages increases — most likely because investors expect the hedging of prepayment risk to amplify future interest rate movements. These amplification effects can be considerable in magnitude…"

While mortgage hedging was an important source of rates volatility historically, for several reasons the MBS market is currently doing less convexity hedging than was the case in earlier periods. The rise in rates last year reduced borrower incentives to refinance, and mortgage lending standards in the U.S. remain tight, so few borrowers now are able and willing to refinance. Lower refinancing of mortgages reduces the amount of mortgage convexity needed to be hedged.

Shifts in MBS ownership over the past decade have also contributed to a reduction in mortgage hedging. In 2003, 33% of outstanding mortgage debt was held in portfolio by Fannie Mae and Freddie Mac. These enterprises aimed to maintain a zero duration gap through the rates cycle, and made extensive use of swaptions and dynamic hedging to achieve the duration targets. Today, the enterprises own only 5% of outstanding MBS, while the Federal Reserve owns close to 30%. The Federal Reserve does not hedge the convexity in their mortgage portfolio, so this shift in ownership reduces the amount of dynamic hedging and demand for swaptions.

In addition to reduced hedging by MBS investors, reduction of origination volume reduces the hedging needs of mortgage originators, who use swaptions to hedge pipeline risk. MBS issuance fell by 70% from 2013Q1 to 2014Q1, suggesting a substantially smaller need for convexity hedging by lenders.

In short, multiple forces coming from the mortgage market have combined to keep the demand for convexity hedging low, putting downward pressure on the option premium embedded in swaptions and thus lowering implied rates volatilities.

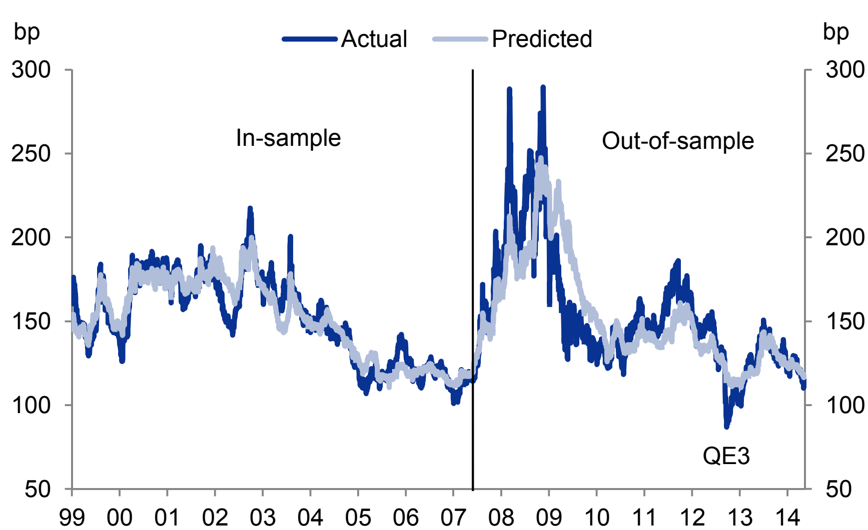
Mortgage basis looks fair relative to volatility, swap spreads

Mortgage spreads correlated with vols, other fixed income spreads

Mortgage spreads have historically been highly correlated with other fixed income spreads including corporate bond spreads and swaps-vs.-Treasury spreads. The correlation with swap spreads likely reflects a common connection to demand for liquidity – in periods of stress, investors seek liquid Treasury bonds, driving up both mortgage-vs.-Treasury and swaps-vs.-Treasury spreads. Exhibit 5, below, shows the results of a regression model of mortgage basis vs. 10-year swap spreads, 5-year IG corporate bond spreads, 2s10s Treasury curve slope, and 3m10y normal interest rate volatility. The model is fit to the period 1/1999 through 6/2007, and then applied out-of-sample to the post-crisis period. Exhibit 5 shows the actual and predicted mortgage basis resulting from the model.

Exhibit 5 highlights that mortgage basis was substantially too tight in the period directly after the inception of QE3. However, since the 2013 sell-off, mortgage spreads have looked roughly in-line with levels of volatility and other fixed income spreads. At present, the actual basis looks just a couple bp too tight relative to model predicted spread.

Exhibit 5: Current mortgage basis level is consistent with level predicted based on swap spreads, credit spreads, curve slope, and rate volatilities
Actual vs. model predicted mortgage basis



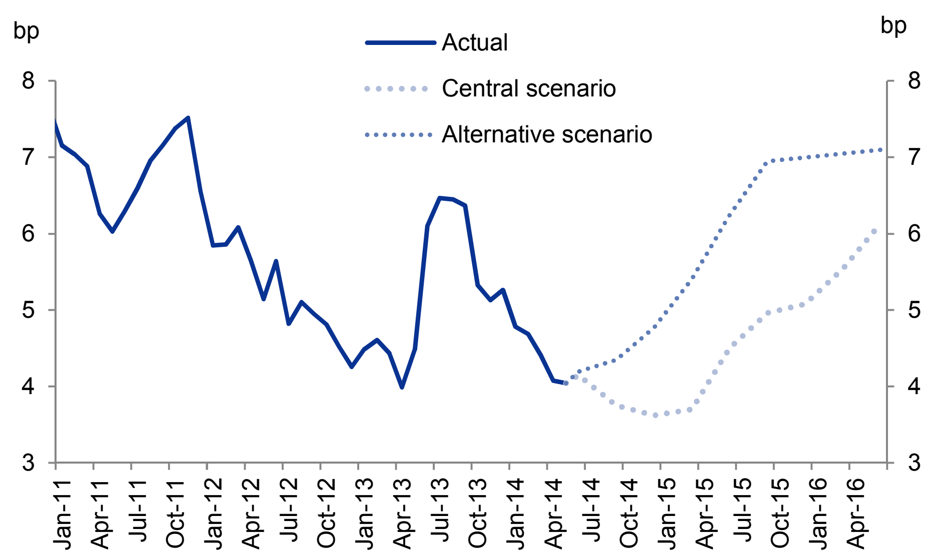
Source: Goldman Sachs Global Investment Research

Forward outlook for basis: slow, moderate upward drift

If mortgage basis is currently close to fair value, what is the expected path for basis going forward? For two of the drivers in our model, swap spreads and rates volatility, we expect gradual increases from the current historically low levels, imparting a widening trajectory to the basis. For example, Exhibit 6 shows the central and alternative scenario forecasts for 3m10y swaption volatility, as shown in our latest Global Economics Weekly. The central scenario suggests vols remain low through Q12015, when the market starts pricing in exit from ZLP. An alternative scenario, though, in which exit from ZLP gets priced earlier, leads to an earlier and larger increase in volatilities.

Accounting for expected trajectories of swap spreads, corporate bond spreads and volatilities would lead to a 15-25 bp widening of mortgage spreads from current levels by end of 2015. Needless to say, such a modeling exercise leaves out a number of potential future drivers of mortgage spreads, such as leverage constraints and changes to GSE policies. However, we see the regression approach as useful in highlighting (1) the fact that current mortgage spreads look roughly consistent with the low levels of swap spreads, credit spreads, and rate vols, and (2) the fact that mortgage spreads could potentially widen going forward, should these other competing spreads widen from here.

Exhibit 6: Rate volatilities are expected to remain low for a while longer, but alternative scenario suggests a larger, faster increase
Actual and projected 3m10y swaption volatility



Source: Goldman Sachs Global Investment Research, "A low-volatility landscape", Global Economics Weekly, May 14, 2014

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Disclosure Appendix

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