

Topic of the Month: MSR HPA Sensitivity Analysis – Part 2

An excerpt from Compass Analytics September 2009 Month in Review

In last month's Compass Corner, we introduced the concepts behind how housing values and housing value forecasts ("HPAs") impact the valuation of mortgage servicing rights ("MSRs"). By reviewing a traditional cash flow function and mechanics of mortgage servicing, we pointed out several cash flow components that are impacted by HPA, namely prepayment speeds and servicer advances/expenses associated with non-performing loans. We discussed the challenges modelers face in formulating and translating assumptions into model adjustments to appropriately reflect realistic impact of HPA in models. And finally, we promised in this month's Compass Corner to try our hand at doing just that and providing some measures of HPA sensitivity in the process.

We start with HPA impact on prepayment speeds and consequently MSR valuations. First, let's differentiate between voluntary and involuntary prepayments. Voluntary prepayments are refinances and home sales, involuntary prepayments are defaults leading to foreclosure. For this exercise, we'll assume that voluntary prepayments *increase* as HPA assumptions are relatively more positive than baseline, i.e. house values are expected to rise more than predicted, prompting more housing turnover. We'll also assume involuntary prepayments rise as property values *decline* relative to baseline, leading to less or negative equity in property values. As a corollary to HPA induced defaults (and involuntary prepayments), we expect servicers expenses to rise as loans go into default. Servicers must make advances to the investor, taxing authority and insurance company, make calls to delinquent borrowers, implement loan modification efforts, initiate legal proceedings and ultimately manage property disposition. As noted last month, model assumptions bake in baseline assumptions about HPA prepayments so any HPA impact to MSR values will be due to HPA forecasts *different* than those already incorporated in baseline assumptions.

Turning from the business logic to implementing model adjustments, let's try the following:

Prepayments speeds, expressed as CPR for annual prepayment rate and SMM for single monthly rates might be adjusted as follows:

HPA-Adjusted $SMM(i)_{(Voluntary)} = Original\ SMM(i)_{(Voluntary)} + HPA\ Increase(i)$ where i represents the month of the future payment and HPA Increase would be the percentage the new HPA Forecast exceeds the original HPA forecast. In addition, we put a 4% SMM floor in place. See Table I, which illustrates the change in prepayment speeds this simplistic model would imply if HPA forecasts improved:

Delinquency and Default rates are also expressed in percentages of the portfolio, and here our modeling would be more realistic by considering how HPA changes to impact the future LTV, or equity, a borrower has in his or her home. However, to keep things simple for this exercise, we'll express HPA impact on delinquency as follows:

HPA-Adjusted Delinquency Rate $(i,d) = Original\ Delinquency\ Rate\ (i,d) * ((HPA\ Increase(i)/20)-1)$ where d refers to the delinquency status, including 30-Day, 60-Day, 90-Day, 120-Day and

Foreclosure and *i* represents the month of the payment again. In this oversimplified formula, delinquency rates would be cut by 50% for HPA forecasts 10% over baseline and delinquency rates would increase by 50% in 10% HPD scenarios. See Table I for more examples.

Table I: Hypothetical HPA Impacts on SMM and Delinquency/Default Rates


Months	0-12	13-24	25-36	37-48	49+
HPA Increase	0	5	10	10	10
Baseline SMM	6	10	15	15	15
Adjusted SMM	6	15	25	25	25
Baseline Delq.	4	8	12	12	10
Adjusted Delq.	4	6	6	6	5

So what impact will different HPA forecasts if we employ our hypothetical models discussed above? Using CompassPoint™'s MSR model, new agency production and otherwise standard industry assumptions, we implemented the simplistic assumptions above and derived the following MSR value (price in %) sensitivity to HPA, first considering prepayments alone and then considering HPA impact on prepayments and delinquency and default behavior. Table 2 below summarizes the results:

Table 2: Sample HPA Impact on MSR Prices (%)

HPA Scenario	1) SMM Alone	2) SMM w/Delq.	2) % Change
-10	1.44	1.33	21%
-5	1.37	1.32	20%
Unch	1.10	1.10	0
5	0.94	0.96	-13%
10	0.82	0.86	-22%

Interpreting the results above demonstrate that when HPA deviates from baseline assumptions, MSR values can change appreciably. With our simple assumptions, the results indicated that HPA impact to voluntary prepayments significantly outweighed any credit impact. However, these results are dependent on the collateral modeled – in this case agency loans. Whereas we oversimplified HPA/Prepayment and Delinquency relationships in this exercise, it is incumbent upon analysts to translate changes from HPA baselines into meaningful model adjustments that appropriately modify prepayment and delinquency assumption given their portfolio composition and the current marketplace. This analysis would necessarily disaggregate a portfolio by product type, performance and MSA and other variables to express HPA exposure on a more granular basis. Analysts will need to run HPA scenario analysis frequently as HPA and market conditions change

The background of the page is a blue-tinted image of a compass. The compass is shown from a top-down perspective, with its circular face and needle visible. The needle is pointing towards the top right. The image is slightly out of focus, creating a sense of depth.

Compass Analytics | 4040 Civic Center Drive, Suite 450 | San Rafael, CA 94903 | www.compass-analytics.com

and regularly update their portfolios' loans' current property values so as to more accurately derive a future LTV moving forward, a task well suited for Radar Logic Prices. Another goal will be to unearth what HPA assumptions are already built into the prepayment and delinquency models employed by the analyst so changes from baseline assumptions may be more explicitly identified. Finally, once MSR HPA sensitivity is confidently modeled and disaggregated, MSR investors can contemplate hedging MSR HPA risk with derivatives such as RPX derivatives, using their modeled MSR HPA sensitivity to derive appropriate hedge notional. *—Rob Kessel*

This article was originally written for Radar Logic's monthly newsletter, to see the newsletter in its entirety, please visit www.radarlogic.com.