Beware: Agency MBS May be More Expensive than You Think

Agency mortgage-backed securities have become much more expensive over the past 16 months, following the onset of the COVID-19 pandemic. Market participants are aware that the option-adjusted spread ("OAS") on these securities has tightened, and most would attribute this to the buying of mortgage-backed securities ("MBS") by the Federal Reserve. After dramatic intervention in March and April of 2020, the Federal Reserve has been replacing runoff and adding $40 billion a month in new holdings. Thus, some tightening would be expected due to the re-introduction of Federal Reserve demand. Remember, from 2014 to March of 2020 when the pandemic started, the Fed was letting its MBS holdings run off.

However, the tightening on OAS models understates how dramatically more expensive these securities have become as the prepayment curve has become more responsive with respect to increased rates. That is, prepayment speeds in the past 18 months have increased more than most models would have predicted in light of the interest rate declines. In this article, we argue that there has been a structural shift in the market; the use of automation has lowered the "hassle factor of refinancing", enabling a greater sensitivity to interest rates and making agency mortgages more negatively convex instruments. When one takes this into account, agency MBS looks extremely expensive. Moreover, we believe the negative convexity of the mortgage product is apt to increase in the years ahead, as technology continues to develop. Market participants need to wake up and take another fresh look at the valuation of this sector considering both Federal Reserve buying and the increased negative convexity of this sector.

In the first section of this article, we look at how the prepayment curve has shifted. In the second section, we discuss the reasons for the shift. In the third section, we show the impact of this on value, and the final section looks at the implications going forward.

A Walk Down Memory Lane — the Prepayment Curve Over Time

It is important to realize that the mortgage market was more negatively convex in the early 2000s than it is now. While it was necessary to verify income, the verification process consisted of only submitting a paystub. While appraisals were a part of the process, the submitted appraisal was taken at face value with no further questions.

FIGURE 1: CONDITIONAL PREPAYMENT RATE FOR GSE SECURITIES VS. REFINANCE INCENTIVE
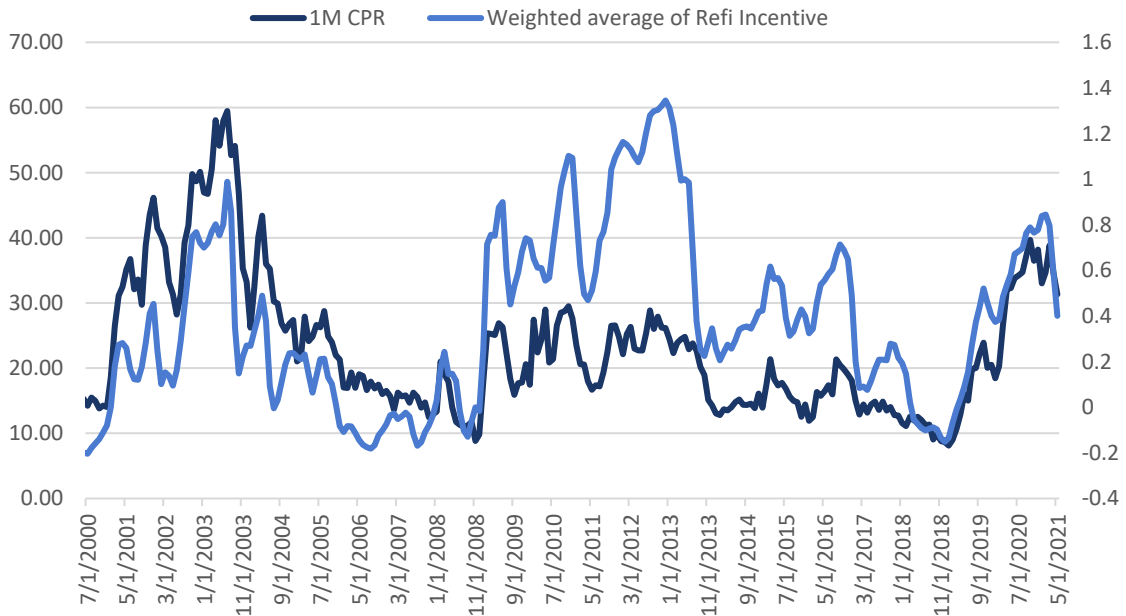
Source: Amherst calculation of eMBS data

Figure 1 shows that prepayment speeds are related to the refinance incentive. You will notice that both in 2002-2003 and in 2020, the prepayment speeds were more responsive to the drops in interest rates than during other time periods. However, prepayment speeds in 2020 were less responsive than they were in 2002-2003.

We break the government-sponsored enterprise ("GSE") data, which combines Fannie Mae and Freddie Mac pool-level data, down by incentive buckets and weighted average loan age ("WALA") in Figures 2a, 2b, and 2c. Note that an incentive bucket of 75 basis points refers to a range of 62.5 bps -87.5 bps between the rate to the borrower and Freddie Mac's Prime Mortgage Market Survey® rate (PMMS® rate). We have used three-month smoothing to eliminate some of the month-by-month choppiness, as there were some months when there were not many loans in some incentive buckets.

FIGURE 2: CONDITIONAL PREPAYMENT RATE FOR A RANGE OF INCENTIVES
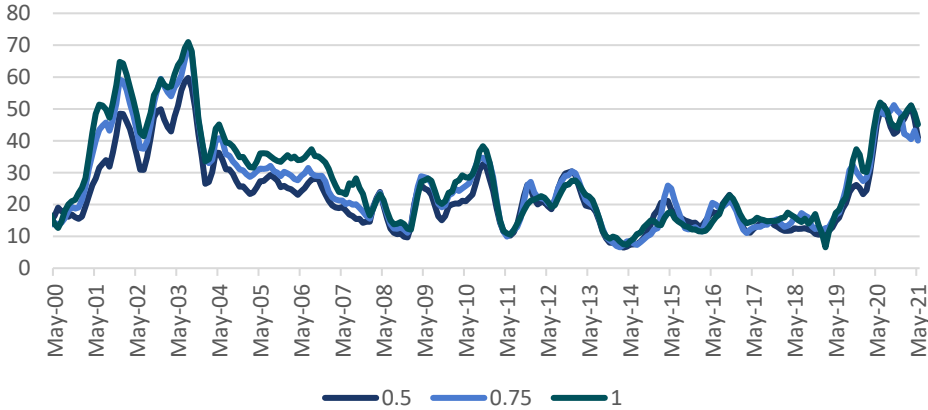
FIGURE 2A

WALA (7-12 Months)

FIGURE 2B

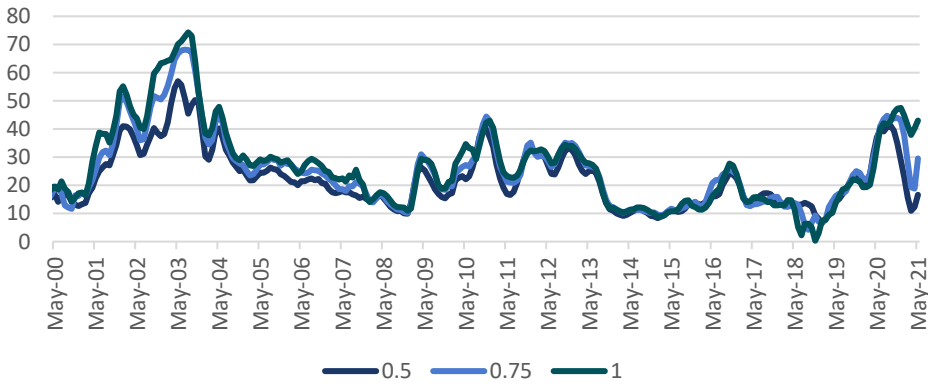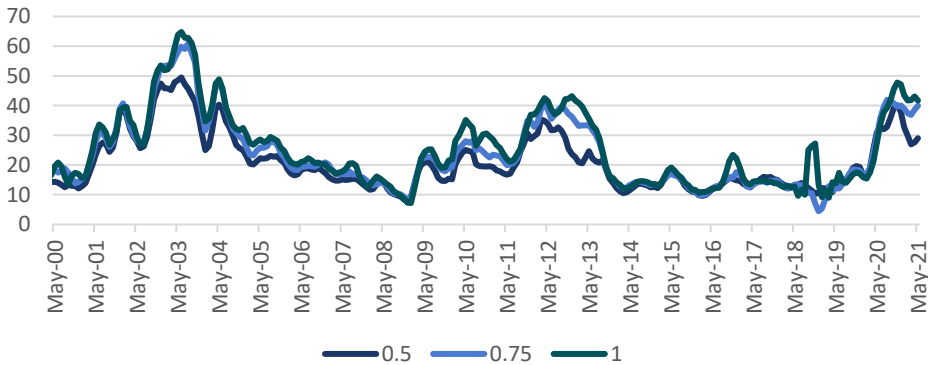## WALA (13-24 Months)

FIGURE 2C

WALA (25-36 Months)

Source: Amherst calculation of eMBS data

Figure 2 confirms that for any given rate incentive and loan age, prepayment speeds were faster in 2020 than they have been for the bulk of the 2000s, although not as fast as they were in 2002-2003.

For some of the seasoned mortgages (those with a WALA of 25-36 months), there was a spike in prepayment responsiveness in 2010-2013. This reflects the fact that the Home Affordable Refinance Program ("HARP"), one of the programs enacted in the aftermath of the Great Financial Crisis, increased refinance speeds. This program provided a streamlined refinance option for mortgages originated prior to May 31, 2009, as long as the borrower had a loan-to-value ("LTV") ratio greater than 80 percent (those under 80 LTV could theoretically refinance easily) and the borrower was current on mortgage payments at the time of the refinance (the borrower was permitted to have one late payment in the 12 months prior to the refinance, none in the six months prior to the refinance). Note that HARP was in place from 2009-2018, 2011-2013 were the years with the most significant amount of refinancing.

In a reaction to the no-income, no-asset mortgages and the huge amount of appraisal fraud following the Great Financial Crisis, mortgage credit tightened appreciably, and documentation standards became much higher. Thus, there was a long period in which prepayment speeds were less responsive to decreases in interest rates due to tighter credit, higher document standards, and changes in the appraisal process. That is until recently...

Recent Events: Increase in Negative Convexity Due to the Streamlining of the Process and Introduction of Property Inspection Waivers

Enter the impact of technology, which allowed the credit box to stay tight, but automated the origination process and allowed for the introduction of property inspection waivers.

Property Inspection Waivers ("PIW"s) were originally introduced by Fannie Mae in October 2016 and by Freddie Mac in May 2017. The PIW allows a loan applicant to forgo the traditional method of appraising a home, in which an appraiser determines the valuation after a visit and a survey of where comparable homes in the area have traded, and instead relies on Fannie Mae or Freddie Mac's automated valuation models ("AVM"). These PIWs were initially offered on low LTV rate-term refinances and a very small number of purchase loans with very low LTVs.

PIWs were made possible by the development and improvement of automated valuation models. This model, which Fannie Mae refers to as AVM, and Freddie Mac refers to as Home Value Explorer, relies on a huge amount of data. It requires pertinent information about individual homes — number of bedrooms, number of bathrooms, square feet, lot size, location, quality characteristics (type of countertops, type of air conditioning and heating system), and other home-specific characteristics. Additionally, AVMs consider the sales price history of the home in question and analyze the sales price and property characteristics of like-kind properties in the area. Both the speed and accuracy of these models have improved tremendously.

In late March 2020, the GSEs greatly expanded the use of appraisal waivers in response to the pandemic. These waivers are now applicable to a wider array of loans. In particular, the PIWs apply only to one-unit homes with a home value less than $1mm and with a property type of "single family", Planned Urban Development ("PUD"), or "condo," which also meet the following characteristics.

- Purchases for owner-occupied and second homes with LTVs up to 80

- Rate/term refinances for owner-occupied and second homes with LTVs up to 90

- Cash-out refinances for owner-occupied loans with LTVs up to 70 and second homes up to 60

- Fannie Mae allows the use of PIWs only for rate/term investor loans with LTVs up to 75; Freddie Mac does allow the use of PIWs on investor loans under any circumstances.

Also beginning in March 2020, the GSEs encouraged the lenders to accept appraisal waivers when eligible. Note that two- to four-unit properties, manufactured homes, and co-ops are never eligible for PIWs. Neither are Texas cash-out refinances.

Other Streamlining Measures

While the PIWs are one sign of increasing reliance on technology to streamline the process, there are others. Rolled out at the end of 2016, Fannie Mae's "Day One Certainty" and Freddie Mac's "Loan Advisor Suite" encourage the use of electronic data. These programs are designed to automate the loan origination process, and lenders who use them receive relief from representations and warranties.

Income, asset, and employment information can all be validated through these systems. Borrowers are no longer required to spend time assembling pay stubs, bank statements, and investment account statements. It can be done electronically with the borrower giving the lender permission to seek the information and transfer it to the GSEs. This allows the GSEs to validate the income, asset, and employment information, and relieve the lenders from the representations and warranties on these variables.

For loans that do not qualify for the PIWs, the appraisals can be validated upfront by comparing the appraisal results with those from Fannie Mae's and Freddie Mac's AVM. If the appraisals fall within the tolerance range, the lender is free from representations and warrants on home valuation.

The use of this technology has grown since rollout in late 2016 and early 2017, and the number of loans going through these systems has increased tremendously.

Impact on Speeds

This increasing automation of the origination process and the increased use of PIWs enormously impacted prepayment speeds. Figure 2 illustrates that speeds have ramped up from 2014-2020 at any given incentive to refinance, reflecting improvements in the automation process. The use of the PIWs increased in March of 2020. Figure 3 shows a discrete jump in prepayment speeds for the 2019 originated 3.5 percent mortgages between February and April of 2020. Note that Figure 3 divides the loans by loan size: <=85k, 86-110k, 111-175k, 176-200k, 201-300k, 301-400k, >400k conforming loan limit, and over the conforming loan limit ("jumbo conforming"). The larger loans are faster than the smaller loans because borrowers with larger loans have a higher monthly savings from refinancing and originators prioritize their most profitable loans first.

FIGURE 3: PREPAYMENT SPEEDS FOR 2019 FANNIE MAE AND FREDDIE MAC LOANS, 3.5 COUPON
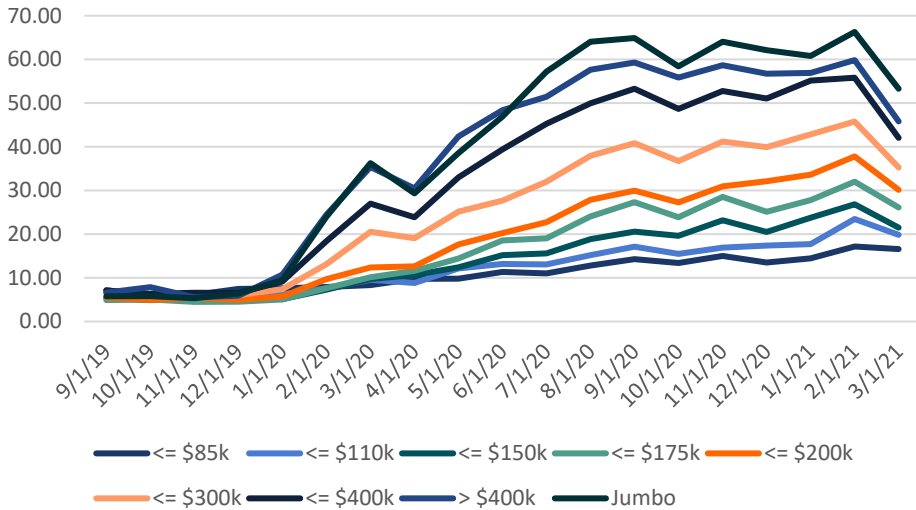
In Figure 4, we look at some of the buckets in Figure 3 and further divide PIW status. Note that we consider only loans that will never be PIW-eligible and loans that were PIW-eligible at origination. As mortgage interest rates continued to drop from March through the end of 2020, the loans that were PIW-eligible at origination accelerated more in speeds, and the differential widened between the PIW-eligible loans and the non-PIW-eligible loans of the same size with the same incentive.

FIGURE 4: PREPAYMENT SPEEDS FOR 2019 FANNIE MAE AND FREDDIE MAC LOANS, 3.5 COUPON
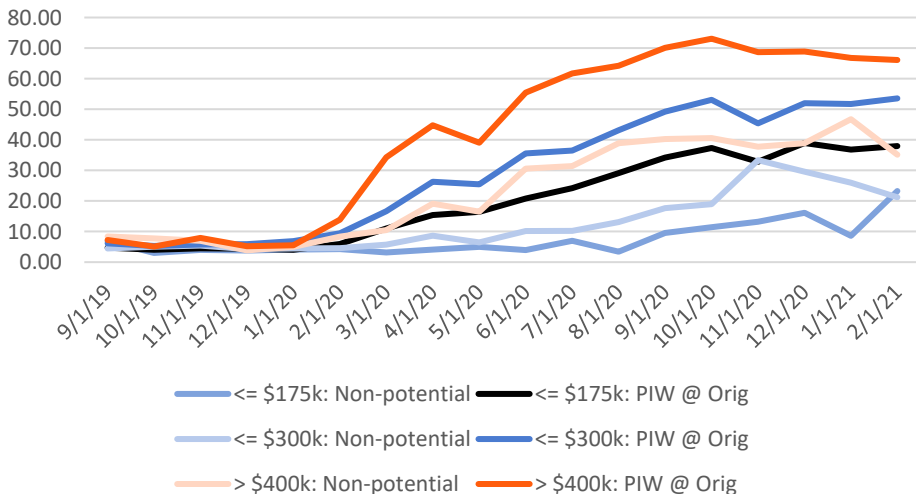
Source: Amherst calculation of eMBS data

What Does This Mean for Value?

This increased negative convexity of the mortgage market needs to be factored into today's investment decisions, as it has a very significant impact on value. In order to see this, we examine four securities with sizeable amounts of origination: the 30-year 2019 Fannie Mae 2.5s, 3.0s, and 3.5s, and the 2018 Fannie Mae 4.0s. The price of the Fannie Mae 3.0s on February 3, 2020, prior to the start of the pandemic, was $102.30 with an OAS of 38.4 based on the Yield Book Model. On July 12, 2021, the price was $104.52, corresponding to an OAS of 26.6. We then steepen the prepayment curve by 25 percent to account for the increased negative convexity. The intuition: the curve was approximately 50 percent steeper in 2002-2003 then it was in 2016-2019, and we allowed for half the difference. When we run the security with the new curve on July 12, 2021, the OAS is only 12.2 bps.

It is more intuitive to think of this in terms of price. In order to achieve the 38.4 OAS which prevailed on February 3, 2020, using the same prepayment curve, the price on July 12, 2021, would have been $103.98 rather than $104.52 ($.54 less). We can think of this primarily as the contribution from Fed buying. If we steepen the prepayment curve, the price necessary to achieve a 38.4 OAS would be $103.49, which is $1.03 less than the prevailing price. Thus, we believe 30-year 2019 Fannie Mae 3.0s are more expensive by $1.03 — $.54 from Fed buying and $0.49 from the increased negative convexity.

Executing the same analysis for the 2019 Fannie Mae 2.5s, 3.5s, and 2018 Fannie Mae 4.0s, our analysis concludes that the numbers are comparable. Using the OAS on February 3, 2020, the securities on July 12, 2021, are $1.31, $0.11 and $.38 more expensive due to increased demand, primarily from the Federal Reserve. If we steepen the curve as well, the securities are $1.48 — $0.91 and $1.31 more expensive on July 12, 2021, than February 3, 2020, on an OAS constant basis. Fed buying more heavily impacts the lower coupons, while the increased negative convexity of the securities more heavily impacts the higher coupons.

TABLE 1 : IMPACT OF FED BUYING AND GREATER NEGATIVE CONVEXITY ON VALUE

Price Action							
	OAS	Price	OAS with steeper curve	Price to achieve 2/3/2020 OAS	Price Difference	Price to achieve 2/3/2020 OAS with steeper curve	Price Difference
2019 Fannie 2.5							
2/3/2020	31.5	100.62	28.4	100.62	0	100.46	0.16
7/12/2021	9.5	103.6	3.8	102.29	1.31	102.12	1.48
2019 Fannie 3.0							
2/3/2020	38.4	102.3	26.5	102.3	0	101.83	0.47
7/12/2021	26.6	104.52	12.2	103.98	0.54	103.49	1.03
2019 Fannie 3.5							
2/3/2020	57.4	103.3	36.5	103.3	0	102.63	0.67
7/12/2021	55.1	105.64	36.6	105.53	0.11	104.8	0.84
2018 FNCL 4.0							
2/3/2020	85.6	104.84	57.7	104.84	0	103.88	0.96
6/14/2020	74.2	106.78	45.9	106.4	0.38	105.5	1.28

Source: Amherst calculations using Yieldbook's model

What Can We Expect Going Forward?

The real question is whether the increased sensitivity of the mortgage market to drops in interest rates is a temporary blip, is driven by mortgage rates at generational lows, or suggests a more negatively convex mortgage market going forward. Certainly, the behavior of the loans with and without the PIWs indicates it is a structural shift. In early 2021, Amherst calculations on GSE origination estimate 42 percent of purchase production, 73 percent of rate/term refinances, and 12 percent of cash-out refinance production would qualify for a PIW.

In the years ahead we expect an ever-increasing number of loans to be PIW-eligible. Moreover, we believe the gains from technology will not be limited to PIWs. Rather the entire process is expected to become increasingly automated with fewer and fewer loans needing any sort of manual intervention.

Gains in efficiency are not expected to be limited to PIWs and the automation of the mortgage process. Title searches are becoming increasingly automated; approximately 2,000 of the 3,600 county assessor's offices having their records online, which enables automated searches. Those counties without online records tend to be smaller and more rural, but many of these will even be automating over the next few years. With increased clarity on title, one would anticipate title insurance costs to decline.

Moreover, electronic and remote online notarizations for closings are permitted in 32 states and are likely to become more widespread, perhaps even reaching nationwide through legislation.

In short, the entire mortgage origination process is becoming more automated, allowing more loans to get through refinancing at the same time. As rates drop, we would expect faster prepayment speeds in the years ahead. Therefore, our analysis shown above may actually understate how expensive these securities have become, as it does not take account increased automation going forward.

We believe it's time for investors to do a fundamental re-evaluation of agency MBS securities. If one did this evaluation, taking into account both the value distortions due to Fed buying as well as increased negative convexity due to advances in automation (both already completed and future advances) — we believe the conclusion is inescapable. Agency MBS is expensive.

IMPORTANT DISCLOSURES

A NOTE OF THANKS FROM THE AUTHOR

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*As of March 31, 2021,

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