

Mortgage Model Mayhem

JAE LIM, CFA | 23 MARCH 2023



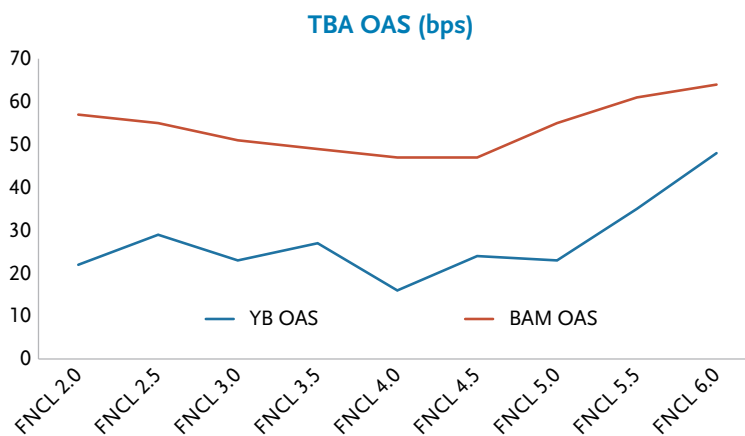
Jae Lim, CFA
Vice President
Fixed Income

Mr. Lim is a member of the Fixed Income group who specializes in agency mortgage-backed securities. Prior to joining TCW in 2017, he was at Citigroup where he covered institutional investors specializing in money market securities, investment grade corporate bonds, and securitized products. Mr. Lim earned a BA in Economics from University of California, Berkeley. He is a CFA charterholder.

Which one will you choose for a mortgage prepayment estimate? A number appearing after shaking a Magic 8 Ball, or a number generated by an overly complex prepayment model? As a sophisticated investor, the latter may sound much more compelling. Besides, the complexity of these models may help you sound more intelligent in your analysis. The validity of the number, however, should still be questioned. The current state of the economy has been far from normal. We are still coming off of what was a Black Swan event known as COVID-19. The ripple effects of the pandemic and the ensuing policies have caused unprecedented market moves over the years, making it even more difficult to project the future. In fact, we are in an economy where not even the Fed or the top economists have a clear idea of where we are headed. The recent bank failures further solidify how difficult it is to foresee the future. To expect a prepayment model to be reliable in this environment may be a stretch. After all, we are very much out of sample as 98% of mortgage-backed securities (MBS) are out of the money by historic proportions. When the average borrower is still over 250 basis points (bps) out of the money, historical data utilized by prepayment models may not be useful. Despite being battle tested for years, prepayment models have a clear limitation, and the room for model error runs high. In this paper, we will go over the two main prepayment models used for agency MBS analysis and some of their limitations.

“Two” Many Cooks Spoil the Broth

The two major players in the prepayment model landscape are Yield Book (YB) and Bloomberg Agency Model (BAM). YB was first developed on the trading floor of Salomon Brothers and has been utilized in the market for many years. Its greatest strength lies in the fact that its metrics, such as Option-Adjusted Spread (OAS), are used by market participants to trade bonds. It is not unusual to see specified pools, Collateralized Mortgage Obligations (CMOs), and derivatives quoted in terms of OAS along with their prices. The BAM model on the other hand was a development from Bloomberg as it rebranded the Barclays Index and Barclays Risk Analytics businesses after acquiring them. The Bloomberg U.S. MBS Index runs off the BAM model so anyone benchmarked to the Index likely uses the model as well. We immediately see a problem here as there are two competing models in the marketplace. The issue emerges from the fact that these two models do not align in terms of their analytics. Depending on which model an investor chooses, the differences can be quite large. For example, the BAM model runs less negative convexity on MBS leading to attractive OAS relative to YB.

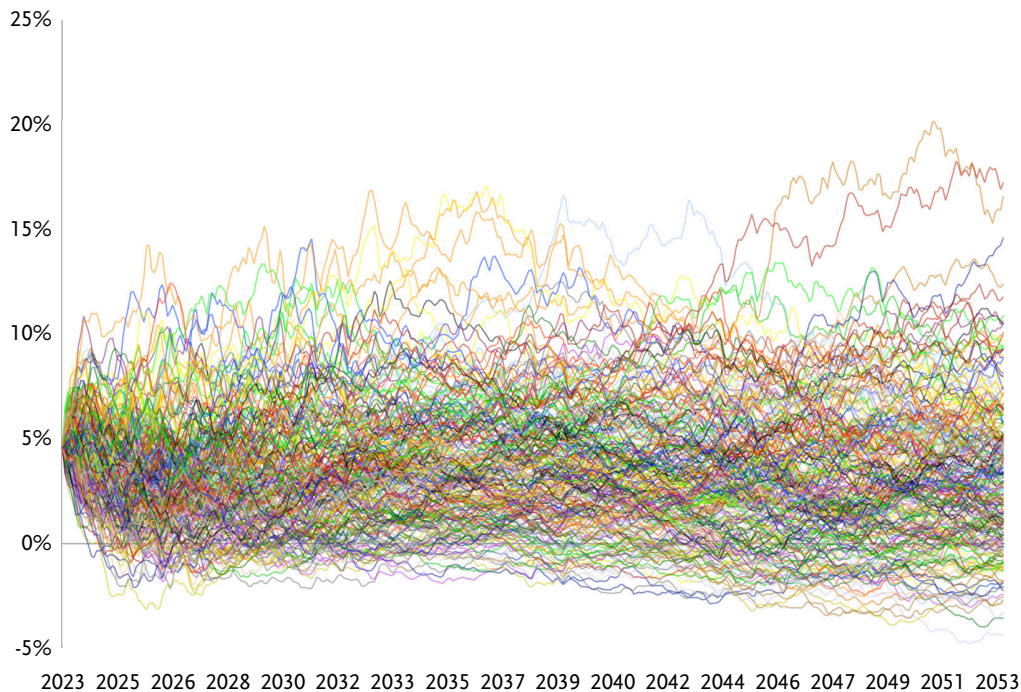


Source: TCW, Bloomberg, Yield Book

OAS Is No Oasis, It Is a Mirage in the Desert

One of the most common use cases of these models is running OAS. While market participants throw around the term quite often, investors should note that OAS is not a realizable spread. Unlike nominal yield spreads, which can be realized when non-callable bonds are held to maturity, OAS is a spread that only exists in theory. OAS is a measure of spread for a bond that has embedded options, such as agency MBS. It is an improvement for analyzing bonds with embedded options as it accounts for the possibility of changes in the bonds' cash flows due to changes in interest rates. In the background, these analytical models generate a series of future interest rate paths. The security is then modeled along each rate path, and OAS is the spread to all of the probability adjusted interest rate paths. This makes the number hypothetical because in reality, you have no idea which interest rate path, if any, will be realized. A bond's actual realized yield spread may wildly outperform or underperform the bond's OAS. Whenever you see an attractive OAS level on an MBS bond, it is simply a mirage in the desert – you can never get your hands on it. While the OAS framework can be useful, it should be considered as a spread that the future may hold and not what is promised. The framework can also be useful when comparing the relative value of two different callable bonds using the same model.

The BAM Model's Projection of 256 Different Interest Rate Paths for OAS Calculations



Source: TCW, Bloomberg

How Often Do We Need an Update?

In turbulent times, there are exogenous events that structurally change the economy. These so-called regime shifts have been quite common in the past few years: COVID-19 was one and so was the sudden rise in inflation. Thus, it is increasingly important for these prepayment models to go through regular updates. To relieve some issues with updating too often, both YB and BAM incorporate what is called an experimental model, where they can quickly push through updates without remaking the production model. In fact, YB even has a pre-experimental model which is the most widely used version by market participants. While YB updates around every other month, BAM updates tend to be scarcer at about once every six months. The real problem for BAM, however, lies in the fact that the Bloomberg Index runs off of the production model, which is only updated on a yearly basis. Until the latest update in January 2023, the Index ran off of what was essentially a dated model. Some assumptions from the dated model that were sticking out included a positive +5% Home Price Appreciation (HPA) number for 2023, which has now been adjusted to down to -5.4% after the January 2023 update. The use of a dated model can be problematic as it may distort some important risk metrics such as duration. While this can be a trivial issue to passive indexers, it poses multiple problems for active managers who buy assets outside of the Index and have different weightings.

Model Error and the Garbage-In Garbage-Out Dilemma

Despite being stress tested over several years, prepayment models find the current environment quite challenging. During COVID-19 and the Fed's Quantitative Easing (QE) program, the entire coupon stack traded at a premium, causing calculations for current coupons to get distorted, especially for models that use the par current coupon. Current coupon calculation is critical as it is used to derive other metrics including the primary-secondary mortgage spreads which are then used to project future mortgage rates. The inverted curve creates further headaches for interest rate and prepayment projections. To alleviate some of these model difficulties, prepayment models became highly customizable over the years, allowing multiple factors to be dialed in to meet investors' preferences. While dialing models may suit some sophisticated investors, this can easily be your way down the rabbit hole. One should ask the question, at what point does dialing models become simply too much? When the future is as unclear as ever, a few minor tweaks in the model may provide no real value. In other words, the information you may be putting in may simply be garbage information that will only lead to garbage results.

Concluding Thoughts

While we have discussed some potential issues and limitations of prepayment models, it is undeniable that these models played a crucial role in the development of the market. Without a reliable model, it would be impossible to run analytics, such as duration and convexity, on a portfolio that includes MBS bonds. While we acknowledge the importance of these models, we wanted to highlight and caution investors that today's environment can lead to high model risk and error. When nobody has a great idea of where we are headed, a Magic 8 Ball may not be too different from a complex prepayment model. As active managers, the real value has been in finding flaws in these models to take active views rather than blindly following model metrics. ■

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