

## Mortgage rate volatility and prepayment model risk

It is well known that mortgage rates are tied to the basic rules of supply and demand. Several factors contribute to mortgage interest rate volatility such as inflation, economic growth, the Fed's monetary policy, and the state of the bond and housing markets, all come into play. Nowadays, all mortgage related aspects that banks manage such as mortgage servicing and mortgage hedging activities, and the market value of the mortgage's portfolio are dependent on decisions which stem from prepayment models used by the banks. In the US, the mortgage interest rate volatility this year has increased the uncertainty around prepayment models which are calibrated or fitted to historical data and therefore the hedging and balance-sheet risk that depend on these models.

Let's take a look at the mortgage interest rates in US throughout the years:

Figure 1: Mortgage interest rate in US



Source: Freddie Mac Primary Mortgage Market Survey, <https://www.freddiemac.com/pmms>

The mortgage and the housing market in the US went through a very significant change as a result of the financial crisis from 2008 to 2010. Consequently, the mortgage market originations, e.i., how loans are applied for and granted by landlords, have changed significantly since the crisis in the US, resulting in

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much more rigor in primary market mortgage originations. Due to these changes, the prepayment models in use today have been calibrated to data after the financial crisis.

If we juxtaposed that context to Figure 1 we can observe that over the last 10 years, going back to the end of 2008 – 2010 financial crisis, mortgage interest rates have been on a steady decline and reached very low levels at the COVID-19 pandemic obtaining 3% on the 30-year fixed-rate mortgage (30 FRM). In this low and declining interest rate environment, today's mortgage loans' outstanding has very low interest rates (3% or 4%). Most of the existing borrowers refinanced their mortgages and now carry low interest rates. If we look at the last 7 months of 2022, however, we can observe a very large spike in the mortgage rates going from nearly 2% to 6%. This is the fastest increase in mortgage rates since the early 1980s.

The current 6% interest rate environment is double the mortgage rate on the books for the 30-year fixed-rate mortgage (30 FRM). 98% of all the mortgages carry an interest rate that is below the prevailing rates available on newly originated mortgages. The value of the institutions' mortgage portfolio went down because the borrowers pay approximately 3% in a 6% environment. On the other hand, the value of servicing portfolios has increased as the low rates on mortgages extend the duration of the servicing fee income. The exposure to mortgage credit risk has also been extended as well. These trends may continue. Not only is the Federal Reserve raising interest rates, but they have also slowed their pace of buying mortgages. During the crisis and for many years afterwards, the Federal Reserve was buying these mortgages that were created, in effect, subsidising the market. This behavior of the Federal Reserve partly explains why mortgage rates got so low.

### ***Prepayment model risk and its implication for institutions***

Prepayment models are used to estimate the level of prepayments on a loan portfolio that will occur in a set period of time which involves the analysis of historical prepayment trends to predict what will happen in the future. Prepayment models are typically calibrated to historical experience; they are backward looking.

Considering the historical background discussed, we presently have prepayment models that have been calibrated to low and declining interest rates that affected the mortgage market. Calibrating prepayment models to this unprecedented environment has incremented risk. There is increasing risk when using prepayment models for forward projection since the US is in a different environment compared to that historical period. Nowadays, there is more uncertainty about that forward projection as it is hard to go back to that 3% mortgage interest rate environment.

The mortgage rate volatility has increased the prepayment model risk. All the related mortgage activities banks manage such as mortgage servicing, mortgage hedging activities, and the market value of the mortgages portfolio have been affected since they are dependent on decisions which stem from prepayment models. There is more model risk due to the way prepayment models were calibrated to that unprecedented environment. Calibrating a model in a certain way and then applying it outside the environment it was created poses risk as the performance of the model becomes uncertain.

## ***How KDOA's services can help your business***

KDOA is dedicated to working with you and developing the best solution for your organization's needs. Our staff's experience in model development, model validation, and MRM represents KDOA's continued investment in helping our clients grow their business, better serve customers and align more closely with today's financial market. We have decades of hand-on experience in prepayment models, servicing activities, mortgage valuation, and balance sheet risk management. We will work close with you to develop the best answers to your problem. Have our team develop a model which can generate the most effective and accurate results for your business.

## **Leonard Mills, Ph.D.**

### **Senior Quantitative Analyst**

**Leonard Mills** is a Senior Quantitative Analyst at KDOA. He has over 30 years' experience in model development and validation. Prior to joining KDOA, he worked at the Federal Reserve, Fannie Mae, Wells Fargo as well as consulting with a variety of financial institutions. He has a BS in Mathematics from Hamden-Sydney college and Ph.D in Econometrics from Tulane University.

Len has extensive experience with Credit Risk/CECL, ALM, Mortgage analytics and mortgage hedging validations as well as stress testing framework validations, including familiarity with ADCO, MCT, QRM, Moody's analytics.