**MFE 405 Project 9**

**Yong Jia (Justin) Tan**

***1. Numerix Prepayment Model, MBS Pricing***

Using the Numerix Prepayment Model, we can calculate the CPR, which ultimately helps us find the expected cash flows for each period, including prepayment. We then discount these cash flows and find the price of the mortgage-backed security. The interest rates are simulated using the CIR model. Using a total of 10,000 paths of interest rates, we can find the price of the mortgage using Monte Carlo Simulation. The result is around **$100716**.

We now price MBS with different ranges of parameters , , and . Using the specified ranges, we compute the price variations due to variations in these parameters. The relationships of price between these factors are shown in the plots below:

A screenshot of a cell phone

Description automatically generated

A screenshot of a cell phone

Description automatically generated

A screenshot of a cell phone

Description automatically generated

***2. Option-Adjusted-Spread (OAS) for MBS***

The Option Adjusted Spread, , makes it such that . We can estimate the value of  by using the bisection method, and find the value of  that would, under the previous Monte Carlo simulation, would price the MBS as equal to the market price. Here we choose to estimate  such that the precision of the price would be $0.01. With the given market price of $110,000, our OAS is computed to be around **-0.0126443**. This makes sense, as the computed MBS price previously is lower than the market price.

***3. OAS-Adjusted Duration and Convexity***

Using the formulas for OAS-adjusted duration and convexity, we find the duration to be **7.21** and the convexity to be **45.44**.