Project 9

MGMTMFE 405
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You will need to write codes for all the parts of the project. Make sure the codes work properly and understand the ideas behind each problem below. You may be asked to demonstrate how the codes work, by running them, and interpret the results. Code clarity and accuracy will determine the grades.

Submit your codes and a PDF file of your answers to questions (including graphs, histograms, but no codes, in this PDF file) by 11:59PM PDT on Next Friday.

Consider a 30-year MBS with a fixed $WAC = 8\%$ (monthly cash flows starting in January of this year). The Notional Amount of the Loan is $100,000.

Use the CIR model of interest rates $dr_t = \kappa(\bar{r} - r_t)dt + \sigma\sqrt{r_t}dW_t$ with $r_0 = 0.078, k = 0.6, \bar{r} = 0.08, \sigma = 0.12$. Consider the ***Numerix Prepayment Model*** in all problems below.

1.

(a) Compute the price of the MBS. The code should be generic: the user is prompted for inputs and the program runs and gives the output.

(b) Compute the price of the MBS for the following ranges of the parameters: k in 0.3 to 0.9 (in increments of 0.1) and draw the graph of the price of MBS vs. k.

(c) Compute the price of the MBS for the following ranges of the parameters: $\bar{r}$ in 0.03 to 0.09 (in increments of 0.01) and draw the graph of MBS vs. $\bar{r}$.

2. Compute the Option-Adjusted-Spread (***OAS***) if the Market Price of MBS is $102,000.

3. Compute the ***OAS-Adjusted Duration and Convexity*** of the MBS, considered in the previous question.

4. Consider the MBS described above and the ***IO*** and ***PO*** tranches. Price the ***IO*** and ***PO*** tranches for: $\bar{r}$ in 0.03 to 0.09 range, in increments of 0.01.