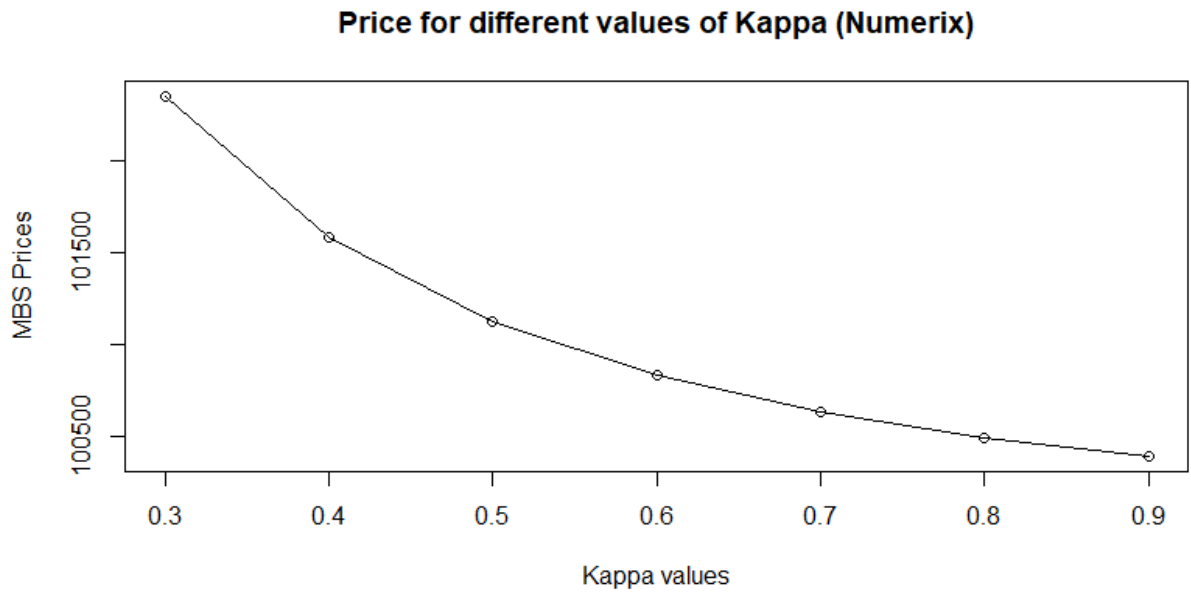


Project 9

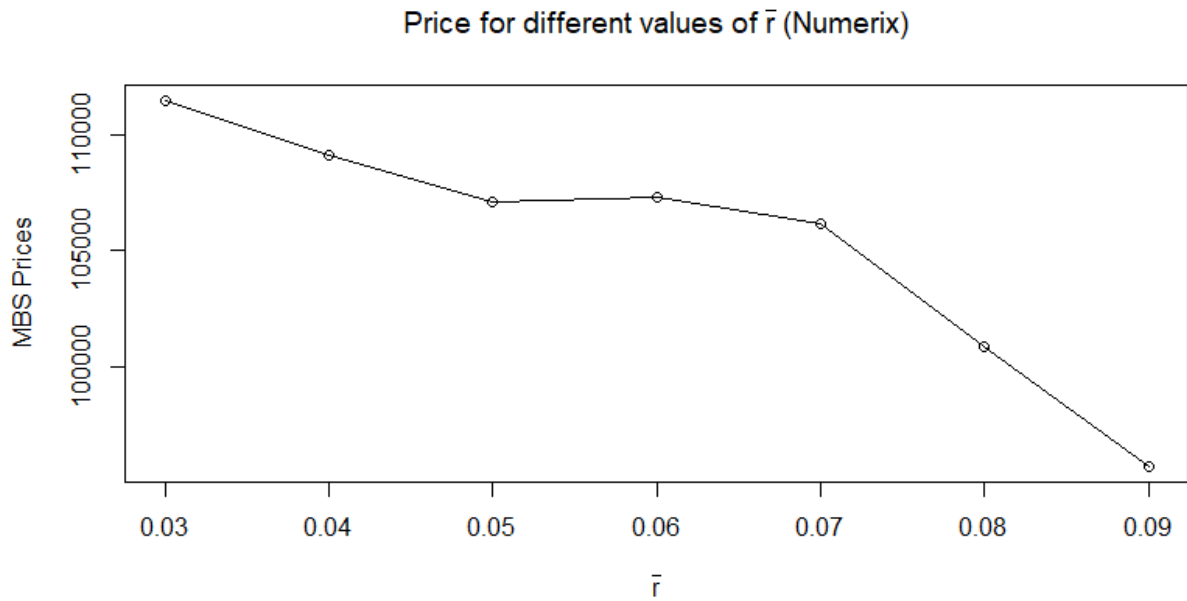
Nikhil Guruji

Q1-

- a) The value of the MBS for given input parameters using Numerix model for prepayments is **\$100834.96**
- b) The following graph is observed:



- c) The following graph is observed:



\bar{r} Values	0.03	0.04	0.05	0.06	0.07	0.08	0.09
Prices (\$)	111512.94	109147.95	107124.83	107303.67	106160.57	100834.79	95669.53

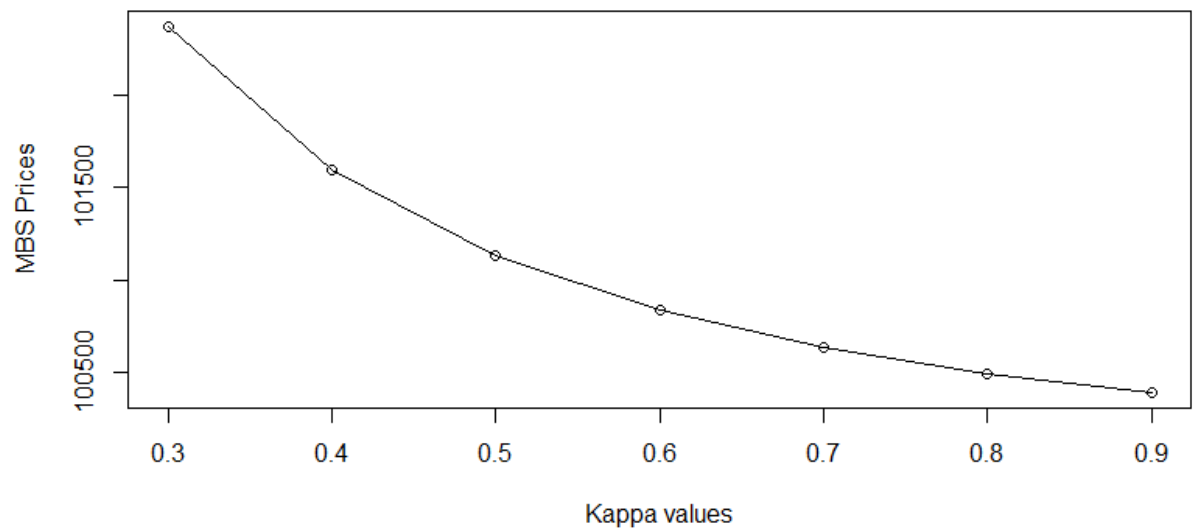
Comments: The Price decreases with increase in kappa (the speed of mean reversion). This is because as interest rates fluctuate more, there are more opportunities to borrowers to refinance which increases prepayment and thus decrease the value of the Mortgage Backed Security compared to the intrinsic value.

With the increase in the long-term interest rates, the price decreases on an average because of the increased incentive for prepayments. However, a slightly different pattern is observed in the middle of the graph. This is because there might be some hesitations with refinancing if the long-term rates are slightly less than the WAC that is promised.

Q2-

- a) The price of the MBS for given input parameters using PSA model for prepayments is **\$100837.97**
- b) The following graph is observed:

Price for different values of Kappa (PSA)



Kappa Values	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Prices (\$)	102369.6	101590.1	101131.4	100838.0	100638.4	100496.0	100390.6

Q3-

The Option Adjusted Spread is calculated as the spread for discounting at which the market price of the MBS will be equal to the theoretical price. This value is **-1.24%**

Q4-

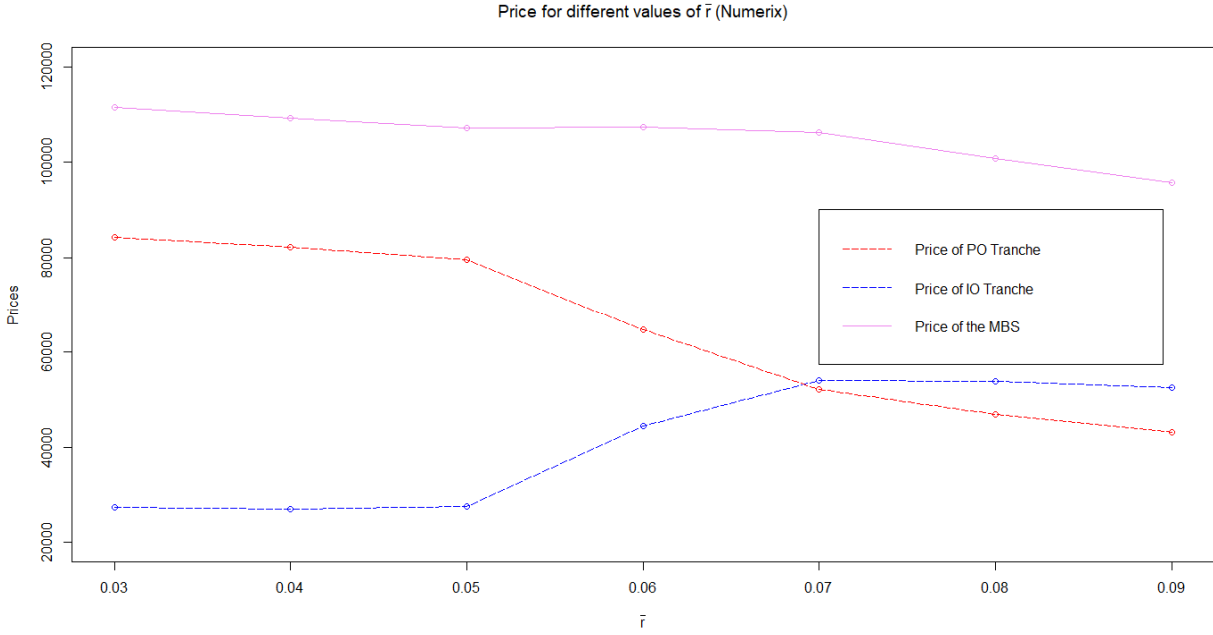
The OAS adjusted duration is **7.2487** and the OAS adjusted convexity is **46.126**

Q5-

The price of the Principal Only (PO) tranche using Numerix model for prepayments is **\$46992.43**

The price of the Interest Only (IO) tranche using Numerix model for prepayments is **\$53912.54**

r_bar	IO Prices	PO Prices	IO Prices + PO Prices	MBS Prices
0.03	27323.22	84190.61	111513.82	111513.82
0.04	27018.86	82130.79	109149.65	109149.65
0.05	27494.90	79636.75	107131.65	107131.65
0.06	44427.67	64649.05	109076.72	109076.72
0.07	53992.78	52172.24	106165.02	106165.02
0.08	53912.54	46992.43	100834.96	100834.96
0.09	52436.40	43232.59	95668.99	95668.99



Comments: It is observed that the sum of the IO Prices and the PO Prices is equal to the prices calculated earlier in Q1 (c). This is because the PO tranche receives only the principal payments (including the prepayments) and the IO tranche receives only the interest payments. The value of IO tranche moves with the prevailing long-term interest rates. This is because as the rates go below the specified contract rate, the prepayments increase, which causes future cash flows to reduce despite the discount factor being low. For PO tranches, however, the behavior is opposite because for lower rates, prepayments increase, and a larger amount is paid early.