

1. Consider the Vasicek model

$$dr = \beta(\mu - r)dt + \sigma dW^Q.$$

For the three parameter sets $[\beta, \mu, \sigma, r(0)]$ given by $[5.9, 0.2, 0.3, 0.1]$, $[3.9, 0.1, 0.3, 0.2]$ and $[0.1, 0.4, 0.11, 0.1]$, plot the term structure up to 10 time units. Now for each of the three parameter sets, plot yield curves versus maturity up to 500 time units for ten different values of $r(0)$. Put down your observations in the report.

2. Consider the CIR model

$$dr = \beta(\mu - r)dt + \sigma\sqrt{r}dW^Q.$$

For the three parameter sets $[\beta, \mu, \sigma, r(0)]$ given by $[0.02, 0.7, 0.02, 0.1]$, $[0.7, 0.1, 0.3, 0.2]$ and $[0.06, 0.09, 0.5, 0.02]$, plot the term structure up to 10 time units. For the parameter set $[\beta, \mu, \sigma]$ given by $[0.02, 0.7, 0.02]$ and with $r(0) = 0.1 : 0.1 : 1$, plot yield curves versus maturity for 600 time units. Put down your observations in the report.

Note that W_Q in the above models denotes the Brownian motion under the risk-neutral measure Q . For the term-structure results, you may refer to Bjork.