MA322 Financial Engineering II

LAB 11 Report
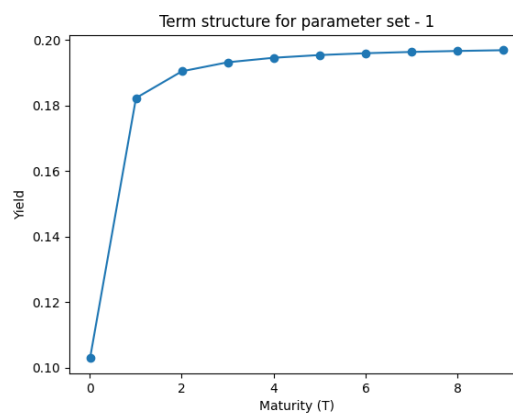
-Aman Kumar (200123007)

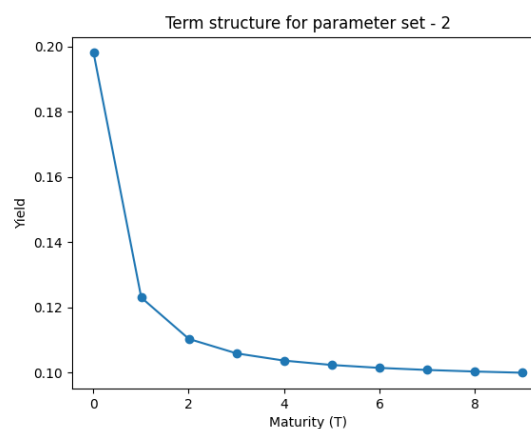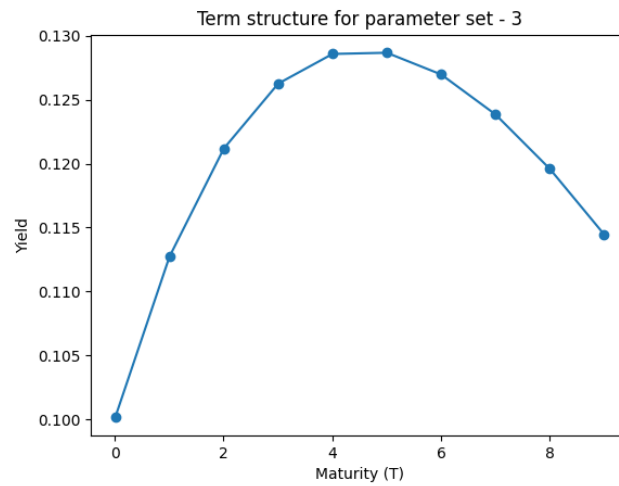---

Question 1

The term structure for the parameter set [5.9, 0.2, 0.3, 0.1] is:

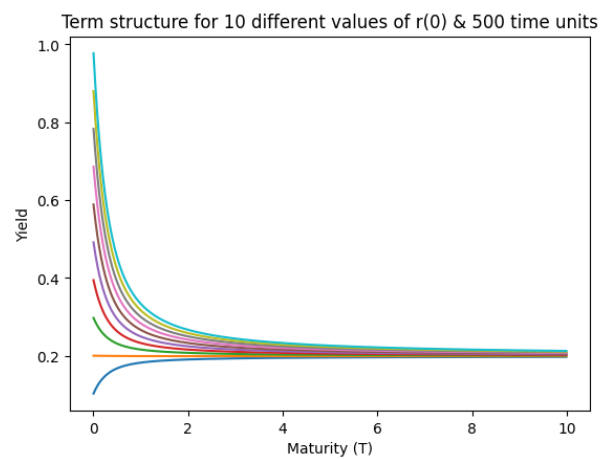The term structure for the parameter set [3.9, 0.1, 0.3, 0.2] is:

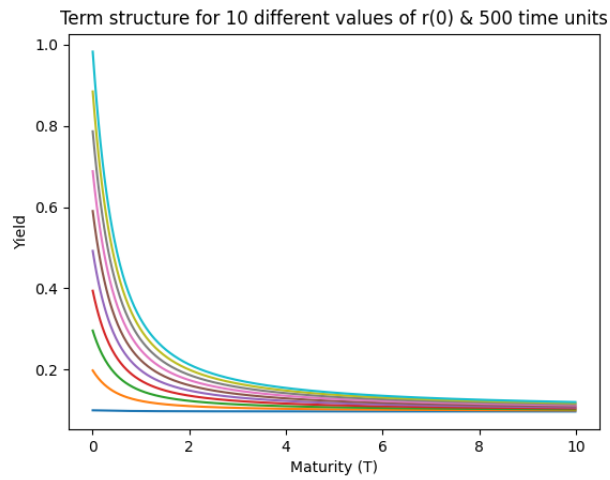The term structure for the parameter set [0.1, 0.4, 0.11, 0.1] is:

The yield curves vs maturity up to 500 time units for 10 different values of r(0) are:

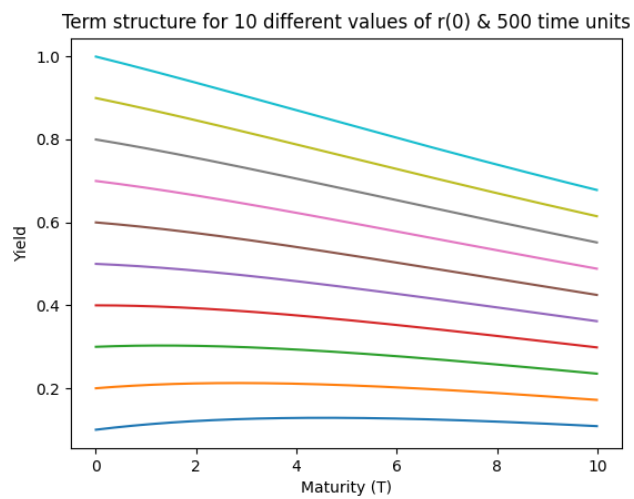i. Parameter set – [5.9, 0.2, 0.3, 0.1]

ii. Parameter set [3.9, 0.1, 0.3, 0.2]

Term structure for 10 different values of r(0) & 500 time units

iii. Parameter set – [3.9, 0.1, 0.3, 0.2]

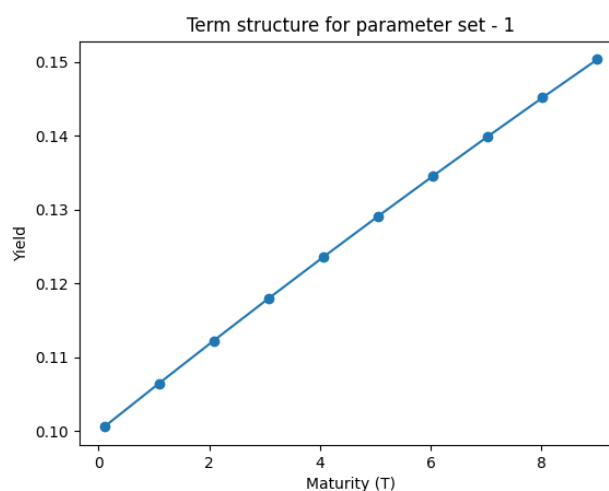Term structure for 10 different values of r(0) & 500 time units

Observation –

1. The yield of the bond price converges to a particular value as the maturity period is increased to sufficiently high value, irrespective of the value of r(0) taken.

2. The term structure of parameters set for 10-time units show strikingly different behavior. For the first parameter set, the yield increases and then converges. For the second one, the yield decreases and then converges, while for the last one, the yield curve has a "hump" in it.

3. The phenomenon of mean reversion is observed since high interest rate has negative trend while the low interest rate has positive trend to the reversion level. This is due to the fact that the Vasicek Model incorporates mean reversion.
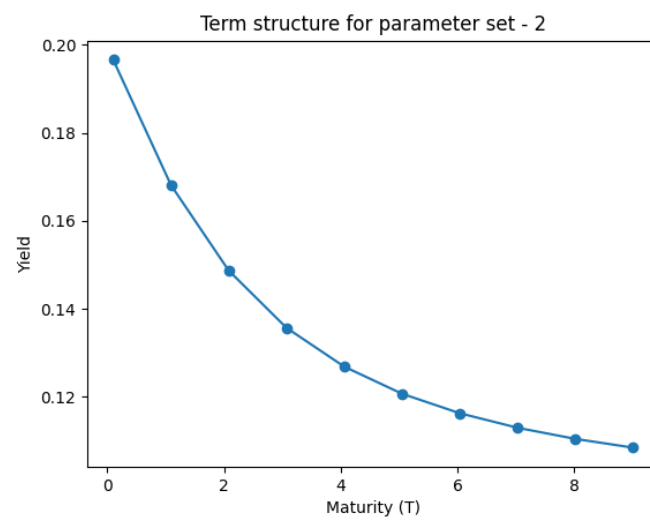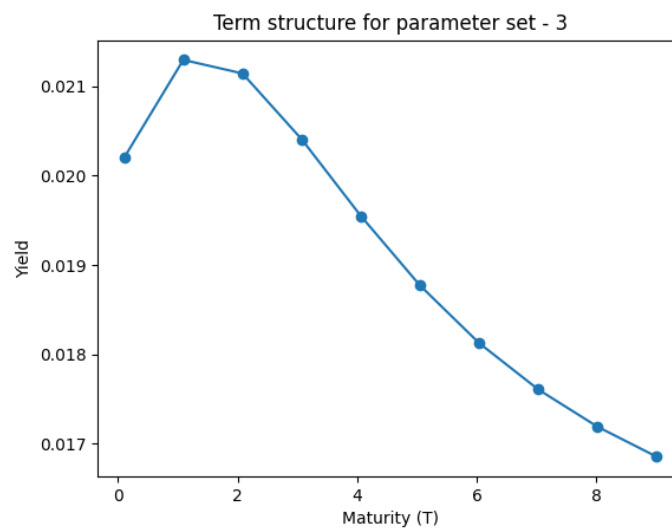
Question 2

The term structure for the parameter set [0.02 , 0.7 , 0.02 , 0.1] is:

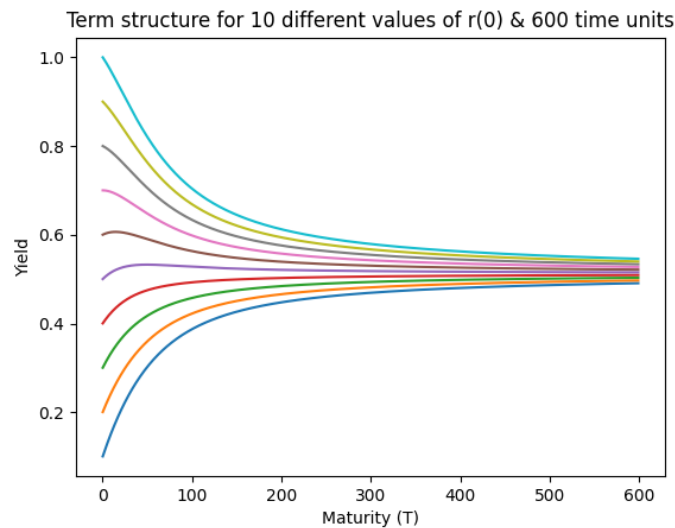Term structure for parameter set - 1

The term structure for the parameter set [0.7 , 0.1 , 0.3 , 0.2] is:

Term structure for parameter set - 2

The term structure for the parameter set [0.06 , 0.09 , 0.5 , 0.02] is:

Term structure for parameter set - 3

For the parameter set, [β, μ, σ] = [0.02, 0.7, 0.02], and r(0) varying from 0.1 to 1 size of 0.1, the yield curve vs maturity for 600 time units is

Term structure for 10 different values of r(0) & 600 time units

Observation –

1. The yield of the bond price converges to a particular value as the maturity step period is increased to sufficiently high value, irrespective of the value of r(0) taken.

2. The term structure of parameters set for 10-time units show strikingly different behavior. For the first parameter set, the yield increases and then converges. For the second one, the yield decreases and then converges, while for the last one, the yield curve has a "hump" in it.

3. The phenomenon of **mean reversion** from the plots is observed. This is due to the fact that the model assumes mean reversion towards a long-term normal interest rate level.