

MFE 408 Fixed Income Markets

Homework 2

Group #9 of Cohort #2

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Problem 1

Using the raw STRIPS data, graph the spot curve and the 3-month forward curve out to the longest maturity of the data.

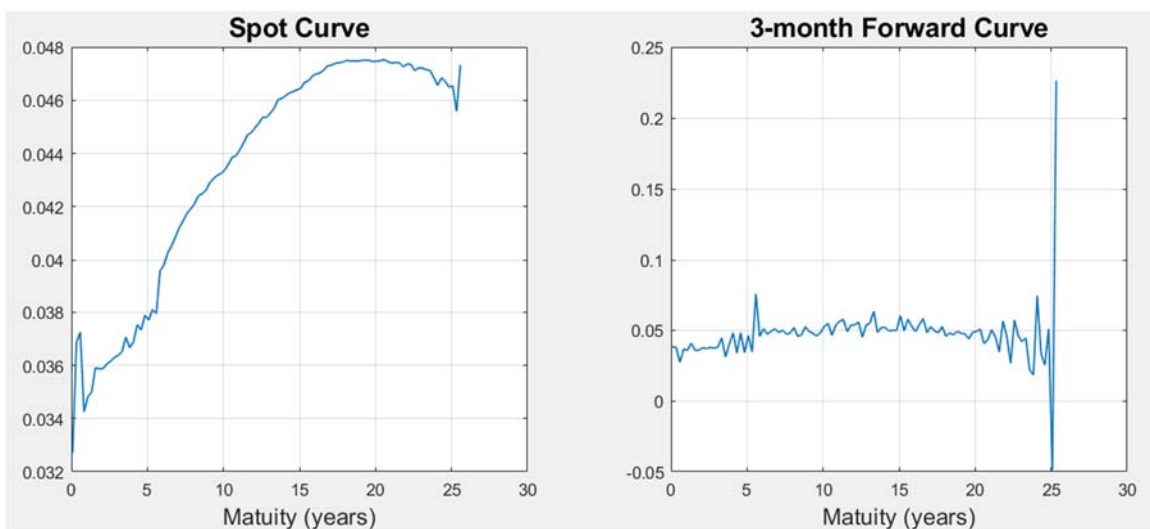
The spot rate can be calculated as

$$D(T) = \frac{1}{(1 + r/2)^{2T}} \Rightarrow r = \left[D(T)^{-\frac{1}{2T}} - 1 \right] \times 2$$

The 3-month forward rate can be calculated as

$$1 + m \times {}_n f_m = \frac{D(n)}{D(n+m)} \Rightarrow {}_n f_m = \frac{1}{m} \left[\frac{D(n)}{D(n+m)} - 1 \right]$$

where $m = 3/12 = 0.25$.

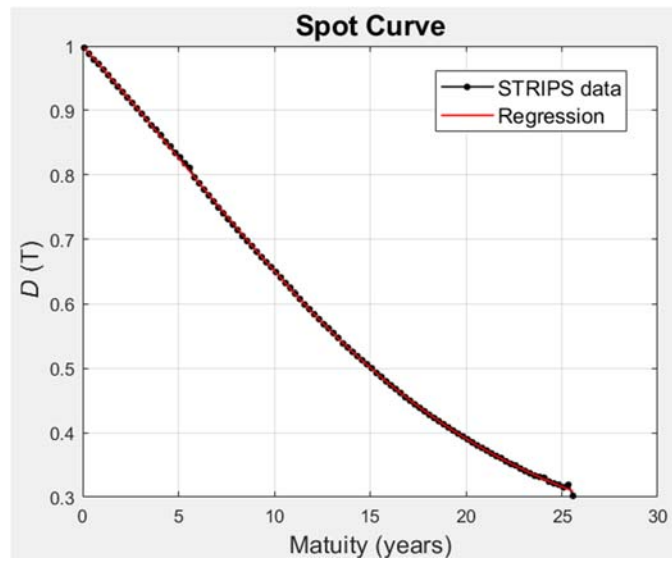


Problem 2

Assume that the discount function can be expressed by the following polynomial function

$$D(T) = \exp(aT + bT^2 + cT^3 + dT^4 + eT^5)$$

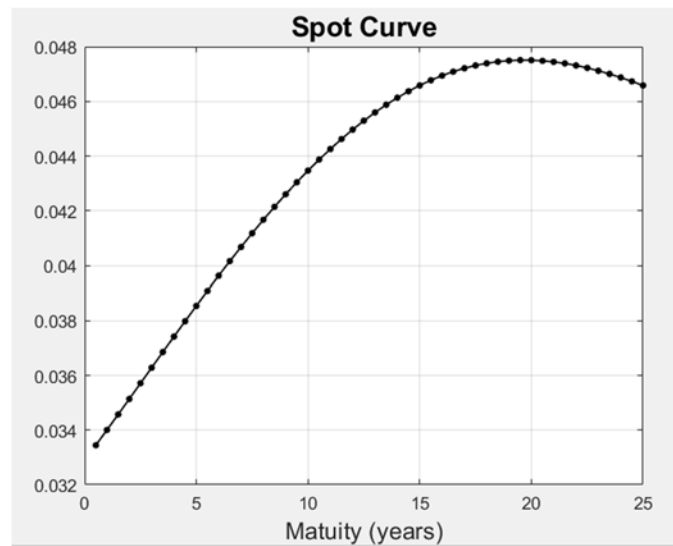
Using the STRIPS data, estimate the coefficients a , b , c , d , and e by regressing the log of $D(T)$ on the indicated powers of T .



$$(a, b, c, d, e) = (-0.0326, -0.0011, 0.0, 0.0, 0.0)$$

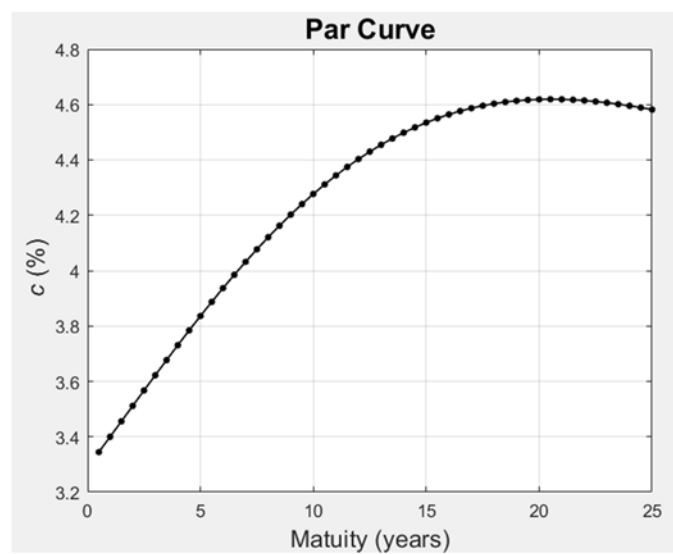
Problem 3

Plug the estimated coefficients back into the $D(T)$ function and graph the resulting spot curve at semiannual frequencies out to 25 years.



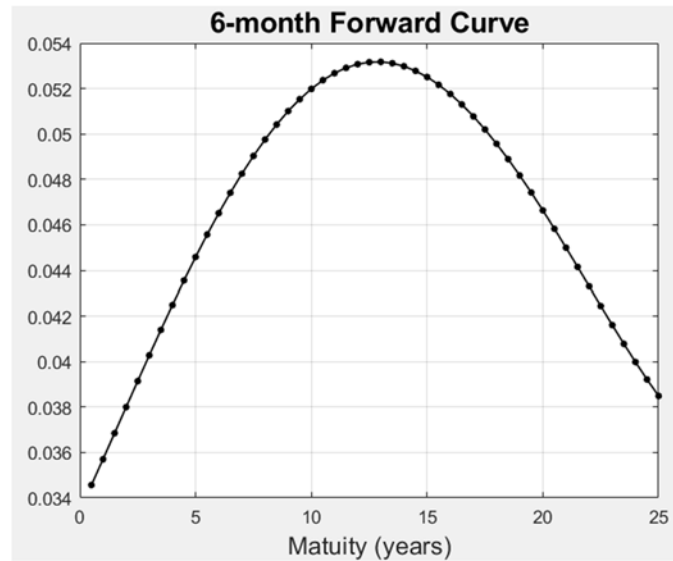
Problem 4

Using the estimated discount function, solve for the par rates at semiannual frequencies out to 25 years. Graph these rates.



Problem 5

Using the estimated discount function, solve for the 6-month forward rates at semiannual frequencies out to 25 years. Graph these rates.



Problem 6

Assume that the par curve for maturity T is given by the following function

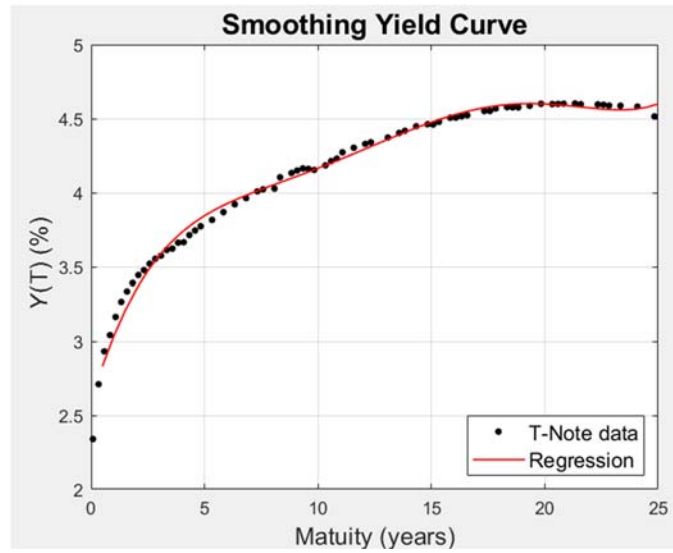
$$Y(T) = a + bT + cT^2 + dT^3 + eT^4 + fT^5$$

Using the Treasury note and bond data, bootstrap the spot curve.

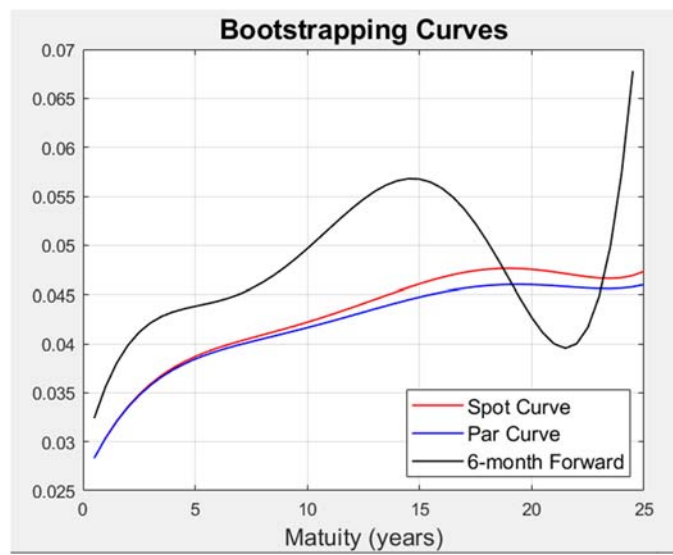
From this bootstrapped curve, graph the resulting spot curve, par curve, and 6-month forward curve out to 25 years.

The regression gives coefficients

$$(a, b, c, d, e, f) = (2.5944, 0.5127, -0.0794, 0.0065, 0.0, 0.0)$$



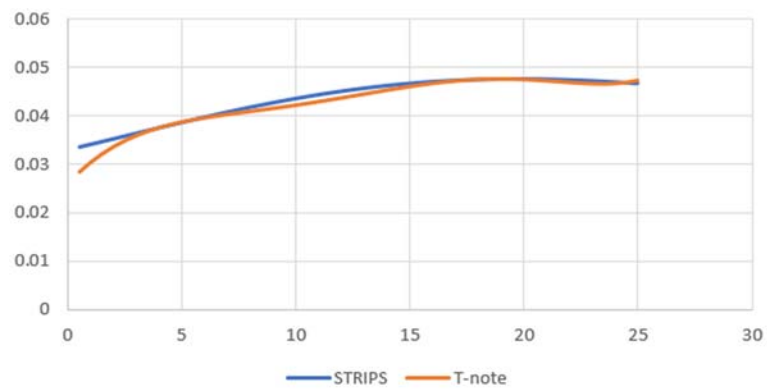
Using bootstrapping procedures, we can obtain the resulting curves



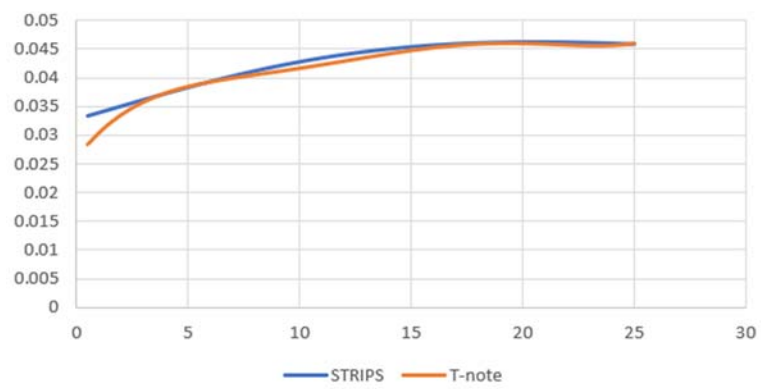
Problem 7

Compare the spot, par, and forward curves from fitting the STRIPS curve with those from fitting the Par Curve. What do you attribute the differences to?

Spot Curves



Par Curve



6-month Forward

