EE431 Economics of Financial Markets and Institutions
Exercise 3: Debt Market and Structure of Interest Rate

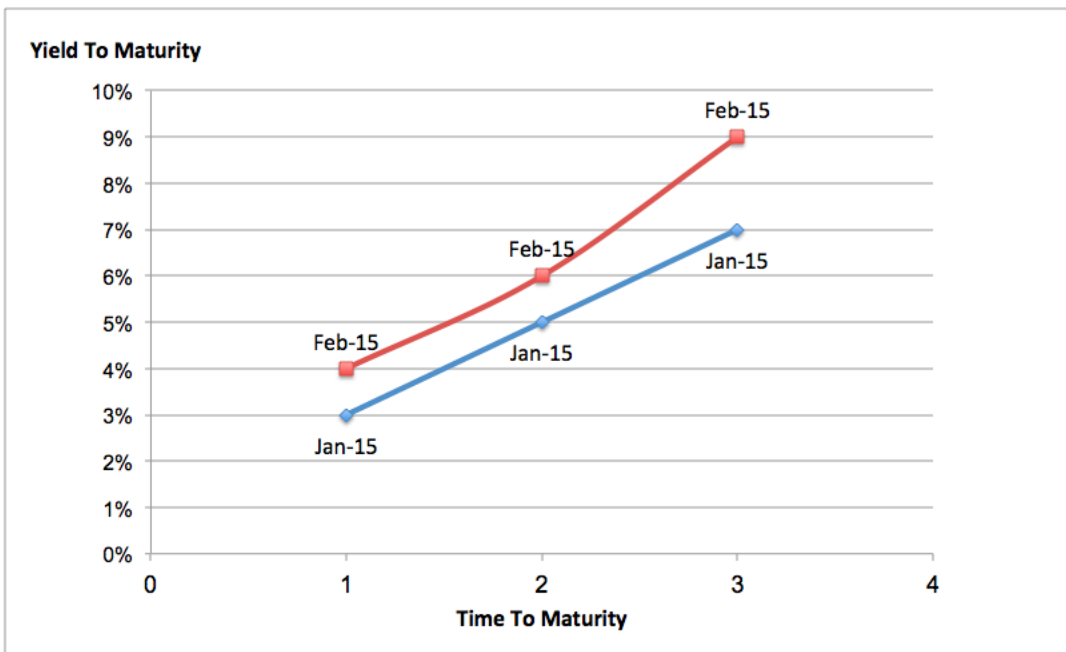
Solution

1. Use the following information. Answer all parts of this question.

Government Bond Yield

TTM (Time To Maturity)	January 2015	February 2015
1	3%	4%
2	5%	6%
3	7%	9%

(a) Sketch the yield curves in January 2015 and February 2015 in the same graph.



(b) Use the government bond yield data in January 2015. Suppose the expectation theory of the yield curve holds, what is the expected one-year government bond rate for 2016 and 2017?

ANSWER. According to expectation theory, $i_{n,t} = \dfrac{i_{1,t} + i^e_{1,t+1} + i^e_{1,t+2} + i^e_{1,t+3} + ... + i^e_{1,t+n-1}}{n}$.
In words, interest rate on long bond is equal to the average of short rates expected to occur over life of long bond.

$$i_{2,t} = \frac{i_{1,t} + i^e_{1,t+1}}{2}$$

$$i_{2,2015} = \frac{i_{1,2015} + i^e_{1,2016}}{2}$$

$$5\% = \frac{3\% + i^e_{1,2016}}{2}$$

$$i^e_{1,2016} = 7\%$$

$$i_{2,t} = \frac{i_{1,t} + i^e_{1,t+1}}{2}$$

$$i_{3,2015} = \frac{i_{1,2015} + i^e_{1,2016} + i^e_{1,2017}}{3}$$

$$7\% = \frac{3\% + 7\% + i^e_{1,2017}}{3}$$

$$i^e_{1,2017} = 11\%$$

The expected one-year government bond rate for 2016 and 2017 are 7% and 11%, respectively.

2. Use the government bond yield in January 2015. Suppose liquidity premium for 1 year and 2 years are 0% and 0.5% respectively. According to the liquidity premium theory of the yield curve, what is your prediction for the interest rate on one-year bonds in 2016?

   ANSWER. According to liquidity premium theory, $i_{n.t} = \dfrac{i_{1,t} + i^e_{1,t+1} + i^e_{1,t+2} + ... + +i^e_{1,t+n-1}}{n} + \eta_{n,t}$. In words, interest rate on long bond is equal to the average of short rates expected to occur over life of long bond plus term premium.

$$i_{2,t} = \frac{i_{1,t} + i^e_{1,t+1}}{2} + \eta_{2,t}$$

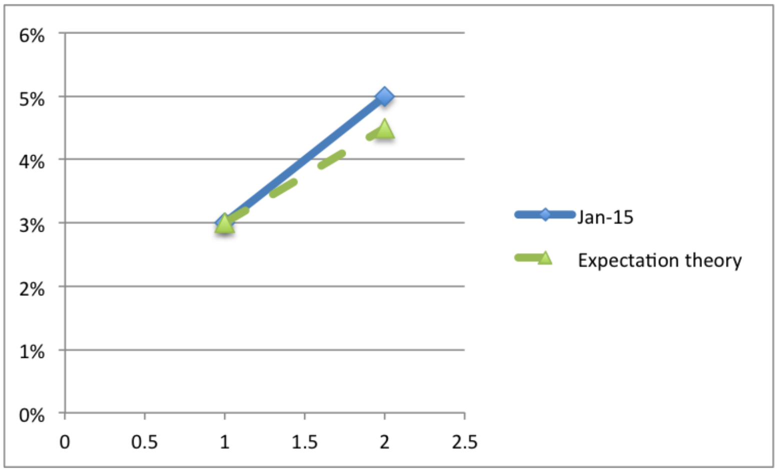
$$i_{2,2015} = \frac{i_{1,2015} + i^e_{1,2016}}{2} + \eta_{2,2015}$$

$$5\% = \frac{3\% + i^e_{1,2016}}{2} + 0.5\%$$

$$i^e_{1,2016} = 6\%$$

The interest rate on one-year bonds in 2016 is expected to be equal to 6%.

TTM (Time To Maturity)	January 2015	Expectation Theory
1	3.0%	3.0%
2	5.0%	4.5%


6%
5%
4%
3%
2%
1%
0%
0
0.5
1
1.5
2
2.5
Jan-15
Expectation theory