EE431: Economics of financial market and institutions

Semester 2/2017

Assignment 4: Risk and Term structure of interest rate (Due on March 1st)

Instruction: Attempt all the ***odd-numbered*** **questions**. (All the even-numbered questions are given as your own practice problem set. No need to turn them in.)

1. Assuming the pure expectations theory is correct, an upward-sloping yield curve implies: (why?)

   a. Interest rates are expected to increase in the future.
   b. Longer-term bonds are riskier than short-term bonds.
   c. Interest rates are expected to decline in the future.

   The answer is "a".

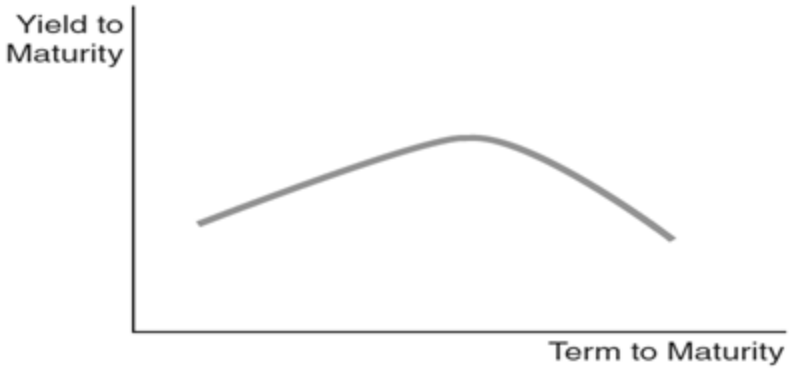
Under the pure expectations theory, long-term interest rate is equal to the average of future short-term interest rates. So, if the interest rates are expected to increase, future interest rates will be higher than the current one. This implies that the average of future short-term rates will higher than current one. Thus, long-term interest rate is higher than current short-term interest rate. The yield curve is then upward-slopping.

"c" is wrong as it is clearly opposite to the statement "a".

Under the pure expectation theory, investors fell indifferent between long-term and short-term bonds. The theory does not take into account the differences in the level of risks associated.

2. Following the Liquidity premium theory, if yield curve has become flat, what do you think it could be inferred from the movement the yield curve?

3. If a yield curve looks like the one shown in the figure below (humped shape), what is the market predicting about the movement of future short-term interest rates? What might the yield curve indicate about the market's predictions for the inflation rate in the future?



The steep upward-sloping yield curve at shorter maturities suggests that short-term interest rates are expected to rise moderately in the near future because the initial, steep upward slope indicates that the average of expected short-term interest rates in the near future are above the current short-term interest rate. The downward slope for longer maturities indicates that short-term interest rates are eventually expected to fall sharply. With a positive risk premium on long-term bonds, as in the preferred habitat theory, a downward slope of the yield curve occurs only if the average of expected short-term interest rates is declining, which occurs only if short-term interest rates are expected to fall far into the future. *Since interest rates and expected inflation move together, the yield curve suggests that the market expects inflation to rise moderately in the near future but fall later on.*

4. (Moderate) The following is a list of prices for zero-coupon bonds of various maturities. Calculate the yields to maturity of each bond and the implied sequence of forward rates using the expectation hypothesis theory.

Maturity (Years)	Price of Bond
1	$943.40
2	898.47
3	847.62
4	792.16

5. (Moderate) Consider the following $1,000 par value zero-coupon bonds:

Bond	Years to Maturity	YTM(%)
A	1	5%
B	2	6%
C	3	6.5%
D	4	7%

According to the expectations hypothesis, what is the expected 1-year interest rate 3 years from now?

Following the pure expectations hypothesis, we know that the following conditions hold.

$i4(t) = (i1(t) + i1(t+1) + i1(t+2) + it(t+3))/4$
$i3(t) = (i1(t) + i1(t+1) + i1(t+2))/3$
$i2(t) = (i1(t) + i1(t+1))/2$

wher i2(t), i3(t) and i4(t) are Yields of two to four years bonds. i1(t+j) is the expected one-year bond in j periods from now.
Iteratively solve for the i1(t+j) for each j, we yield that

$i1(t+1) = 7\%$
$i1(t+2) = 7.5\%$
$i1(t+3) = 8.5\%$

6. During the US subprime crisis, credit spread had been rising rapidly, and term spread had become so high. The US Federal Reserve has then responded to the situation by adopting many unconventional monetary policies. Under the policy, Federal Reserve expands the type of fixed instrument asset that it purchases under the open market operation program. That is, not only does the FED conventionally purchase short-term government bond, it has also purchased other forms of fixed instrument assets including long-term government bond and private credit bond during the crisis period. Use the analytical framework discussed in class to explain the plausible impact of the unconventional monetary policies on the movement of US yield curve and credit spread.

7. During 2008, the difference in yield (the yield spread) between three-month

AA-rated financial commercial paper and three-month AA-rated nonfinancial commercial paper steadily increased from its usual level of close to zero, spiking to over a full percentage point at its peak in October 2008. What explains this sudden increase?

The global financial crisis hit financial companies very suddenly and very hard, creating much uncertainty about the soundness of the financial system, and doubt about the soundness of even the most healthy banks and financial companies. As a result, there was a sharp decrease in demand for financial commercial paper relative to the seemingly safer nonfinancial commercial paper. This resulted in a spike in the yield spread between the two, reflecting the greater risk of financial company investments.

8. (Hard) The yield to maturity on 1-year zero-coupon bonds is currently 7%; the YTM on 2-year zeros is 8%. The Treasury plans to issue a 2-year maturity coupon bond, paying coupons once per year with a coupon rate of 9%. The face value of the bond is $100.

a. At what price will the bond sell?

b. What will the yield to maturity on the bond be?

c. If the expectations theory of the yield curve is correct, what is the market expectation of the price that the bond will sell for next year?

d. Recalculate your answer to (c) if you believe in the liquidity preference theory and you believe that the liquidity premium is 1%.

9. In the fall of 2008, AIG, the largest insurance company in the world at the time, was at risk of defaulting due to the severity of the global financial crisis. As a result, the U.S. government stepped in to support AIG with large capital injections and an ownership stake. How would this affect, if at all, the yield and risk premium on AIG corporate debt? (Hint: to ease your analysis, you're supposed to have two figures. One figure is for the US bond and the other is for the private bond. Then do the analysis step-by-step by explaining what had happened before and after the US government stepped in.)

The risk of default would significantly decrease demand for AIG corporate debt, resulting in a much higher yield. After the announcement that the government

would provide extraordinary assistance to support AIG and keep it from failing, demand for its corporate debt would rise, and yields would fall.