

Homework Assignment 5. This assignment does not have to be turned in.

1. (2 points) What would you expect to happen to ratings of different bonds during a recession?

Recession means the increased risk of default on all private bonds (although it can be argued that governments can also default on its obligations – there are recent examples, like Russia and Argentina – the increase in the default risk is probably fairly small compared to private bonds). You'll see a lot more rating downgrades than upgrades during recession years. Clearly, recession affects different companies differently. The recession is a systemic factor, however. It affects all companies to some degree.

2. (2 points) Suppose that government cuts the highest federal income tax rate from 36 to 30. What do you think would happen to the yields on municipal bonds?

Since the returns on municipal bonds are not taxed by the federal government, lower federal income tax means that municipal bonds have less advantage than before over all other securities (returns on which are taxed). Therefore, the municipal bonds would have to offer higher yields than before to compete with other bonds. So we'd expect the yields on municipal bonds to go up.

3. (4 points) Suppose that the yield on one-year bonds today is 5%. Also assume that the yield on one-year bonds next year it is going to be 7%, two years from now it is going to be 3%, three years from now it will be 4%, and four years from now it will be 6%.
 - a. Using the expectations hypothesis, determine the yields on the two-year bonds now, a year from now, and two years from now.

Expectation hypothesis says that the (yearly) interest rate on a two-year bond is the average of this year's interest rate on a one-year bond and the next year's interest rate on a one-year bond (the first part of the subscripts denotes the maturity of the instrument (1-year, 2-year, and 3-year, and so on), the second part in parentheses denotes the time period (t-today, t+1 – a year from today, t+2 – two years from today, and so on)):

Yield on a two-year bond today: $i_{2(t)} = (i_{1(t)} + i_{1(t+1)})/2 = (5+7)/2 = 6$;

Yield on a two-year bond a year from today: $i_{2(t+1)} = (i_{1(t+1)} + i_{1(t+2)})/2 = (7+3)/2 = 5$;

Yield on a two-year bond two-years from today: $i_{2(t+2)} = (i_{1(t+1)} + i_{1(t+2)})/2 = (3+4)/2 = 3.5$;

- b. Using the expectations hypothesis, determine the yields on the three-year bonds now, a year from now, and two years from now.

Similarly, the (yearly) yield on a three-year bond is the average of the yields on one-year bonds today, a year from today, and two years from today:

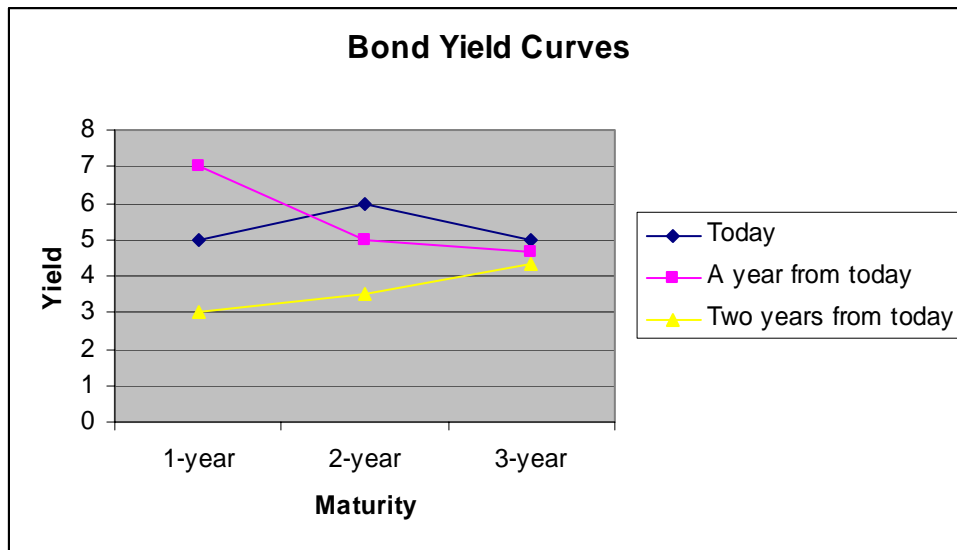
Yield on a three-year bond today: $i_{3(t)} = (i_{1(t)} + i_{1(t+1)} + i_{1(t+2)})/2 = (5+7+3)/3 = 5$;

Yield on a three-year bond a year from today: $i_{3(t+1)} = (i_{1(t+1)} + i_{1(t+2)} + i_{1(t+3)})/2 = (7+3+4)/3 = 4.67\%$;

Yield on a three-year bond two years from today: $i_{3(t+2)} = (i_{1(t+2)} + i_{1(t+3)} + i_{1(t+4)})/2 = (3+4+6)/3 = 4.33\%$;

- c. Using yields on one-year, two-year, and three-year bonds plot three yield curves – today, a year from now, and two years from now.

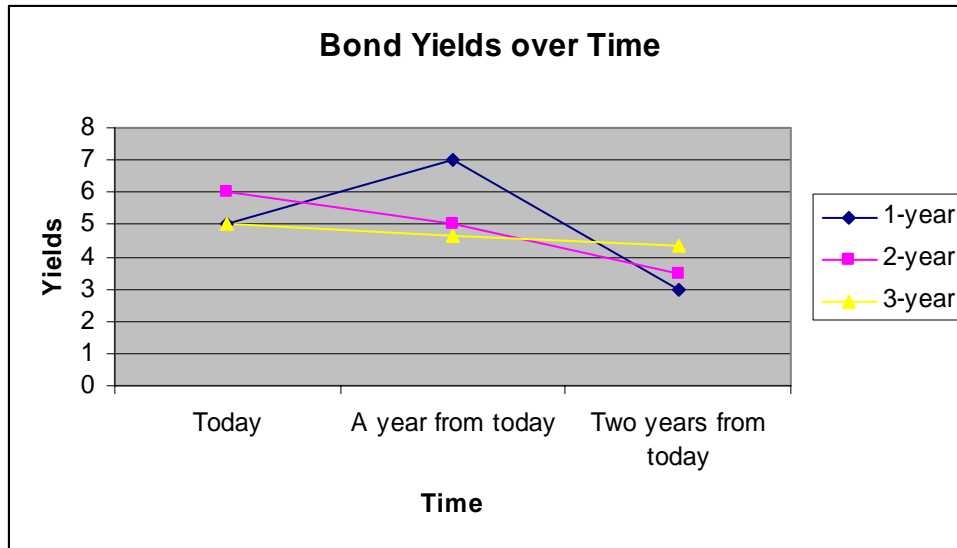
The yield curves are given below:



Clearly, yield curves change shapes over time.

- d. Do yields on bonds with different maturities move together? Are long-term yields more or less volatile than short-term yields? Is yield curve always upward sloping?

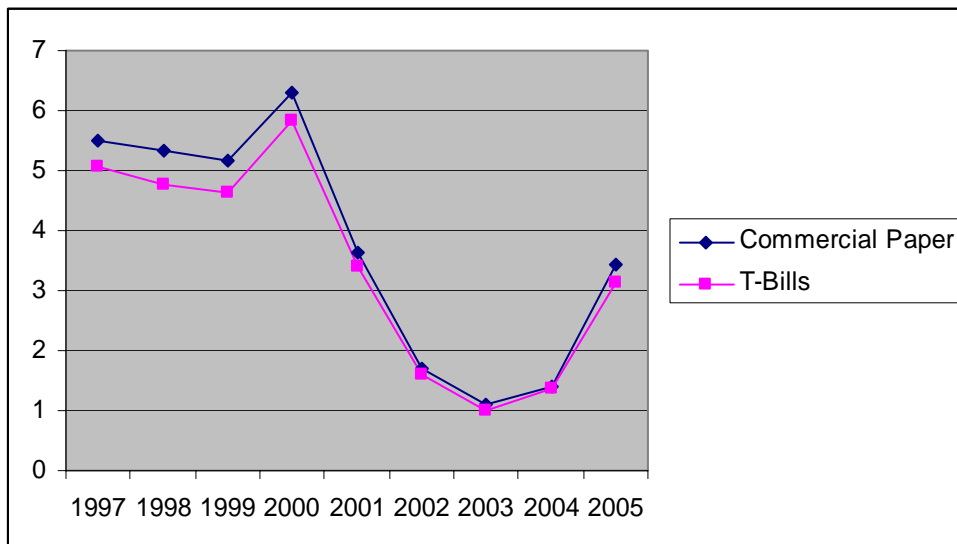
It is easier to answer these questions by plotting the evolution of interest rates on instruments with different maturities over time:



It is clear from the graph that short-term (1-year, blue line), medium-term (2 year, pink line), and long-term (3-year, yellow line) rates move together. It is also apparent that short-term rates are more volatile than long-term rates.

The yield curves from part (c) are not always upward sloping. If expectations hypothesis is true, upward sloping yield curve would mean that interest rates are expected to rise most of the time, which is not true.

- (2 points) Go to the Fed's historical interest rate data page (<http://www.federalreserve.gov/releases/h15/data.htm#fn3>) and download the annual interest rates on the 3-month non-financial commercial paper and on the 3-month Treasury Bills (secondary market) starting from 1997. Plot the two series and comment on the movements of the spread between interest rates on commercial paper and T-Bills.



The spread was the largest a year or two before recession, which began in 2000.