The Risk and Term Structure of Interest Rates
ECON 4673
Dr. Keen

Answers

1. *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?*

   After the announcement that the government would provide extraordinary assistance to support AIG and keep it from failing, the default risk on AIG's corporate debt would decline substantially which would lower the risk premium. As a result, the demand for its corporate debt would rise and the yield on its debt would fall.

2. *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 decline in demand for commercial paper from financial firms relative to the seemingly safer commercial paper from nonfinancial firms. This resulted in a spike in the yield spread between the two, reflecting the greater risk of investing in financial company or their bonds.

3. *If the federal income tax exemption on the interest from municipal bonds were abolished, what would happen to the interest rates on both municipal bonds and U.S. Treasury securities?*

   Abolishing the tax-exempt feature of municipal bonds would make municipal bonds less desirable relative to U.S. Treasury bonds. The resulting decline in the demand for municipal bonds and increase in demand for U.S. Treasury bonds would cause interest rates to rise on municipal bonds and fall on U.S. Treasury bonds.

4. *What is the yield curve? What is meant by the phrase an inverted yield curve? Is it normal for the yield curve to be inverted?*

   The yield curve is a plot of bond yields with different maturity dates but the same risk, liquidity, and tax considerations. The yield curve becomes inverted when short-term interest rates are higher than long-term interest rates. Normally, the yield curve is upward slopping, and not inverted, because short-term interest rates are usually lower than long-term interest rates.

5. *What are the three main facts of the term structure of nominal interest rates.*

   The three main facts are: 1) Interest rates on bonds of different maturities tend to move together; 2) The yield curve usually slopes upward (downward) when short-term interest rates are low (high); and 3) In most times, the yield curve is upward sloping.

6. *If bond investors decide that 30-year bonds are no longer as desirable an investment as they were previously, predict what will happen to the yield curve, assuming (a) the expectations theory of the term structure holds; and (b) the segmented markets theory of the term structure holds.*

   (a) Under the expectations theory of the term structure, if 30-year bonds become less desirable, this will increase the demand for bonds of other maturities, since they are viewed as perfect substitutes. The result is a higher price and a lower yield at all other maturities, and an increase in yield at the long end of the yield curve. In other words, the yield curve would steepen at the long end, and flatten somewhat along the rest of the curve. (b) Under the segmented markets theory, the assumption is that each type of bond maturity is an independent market, and therefore, not linked in any particular way. Thus, any change in long rates won't affect shorter- and medium-term bond yields. In this example, the yield curve under the segmented markets theory will result in a higher interest rate on the 30-year bond, with the remainder of the yield curve unchanged.

7. *If the yield curve suddenly became steeper, how would you revise your predictions of interest rates in the future?*

   You would raise your predictions of future interest rates, because the higher long-term rates imply that the average of the expected future short-term rates is higher.

8. *Assuming the expectations theory is the correct theory of the term structure, calculate the interest rates in the term structure for maturities of one to five years given the following paths of one-year interest rates over the next five years:*

   a. 5%, 6%, 7%, 6%, 5%
   b. 5%, 4%, 3%, 4%, 5%

   How would your yield curves change if people preferred shorter-term bonds over longer-term bonds?

   a. The yield to maturity is
      One-year bond: 0.05/1 = 5%
      Two-year bond: (0.05 + 0.06)/2 = 5.5%,
      Three-year bond: (0.05 + 0.06 + 0.07)/3 = 6.0%,
      Four-year bond: (0.05 + 0.06 + 0.07 +0.06)/4 = 6.0%,
      Five-year bond: (0.05 + 0.06 + 0.07 + 0.06 + 0.05)/5 = 5.8%.

b. The yield to maturity is
One-year bond: 0.05/1 = 5%,
Two-year bond: (0.05 + 0.04)/2 = 4.5%,
Three-year bond: (0.05 + 0.04 + 0.03)/3 = 4.0%,
Four-year bond: (0.05 + 0.04 + 0.03 +0.04)/4 = 4.0%,
Five-year bond: (0.05 + 0.04 + 0.03 + 0.04 + 0.05)/5 = 4.2%.

The upward sloping yield curve in (a) would be even steeper if people preferred short-term bonds over long-term bonds, because long-term bonds would then have a positive liquidity premium. The downward-sloping yield curve in (b) would be less steep and might have a slight positive upward slope if the long-term bonds have a positive liquidity premium.

9. *The table below shows current and expected future one-year interest rates, as well as current interest rates on multiyear bonds. Use the table to calculate the liquidity premium for each multiyear bond.*

Year	***One-Year Bond Rate***	***Multiyear Bond Rate***
1	*2%*	*2%*
2	*3%*	*3%*
3	*4%*	*5%*
4	*6%*	*6%*
5	*7%*	*8%*

The liquidity premium for a given year is the current rate on a multi-year horizon bond minus the average of expected one-year interest rates over that horizon. Thus, the liquidity premiums for each year are given as:

$l_{1,1}$, = 0.02 – 0.02/1 = 0%,
$l_{1,2}$, = 0.03 – (0.03 + 0.02)/2 = 0.5%,
$l_{1,3}$, = 0.05 – (0.04 + 0.03 + 0.02)/3 = 2%,
$l_{1,4}$, = 0.06 – (0.06 + 0.04 + 0.03 + 0.02)/4 = 2.25%,
$l_{1,5}$, = 0.08 – (0.07 + 0.06 + 0.04 + 0.03 + 0.02)/5 = 3.6%.