

**EXERCISE ON TERM STRUCTURE DUE IN CLASS TUESDAY, OCTOBER 4, PLUS
PRECEPT DISCUSSION QUESTIONS**

Exercise

On the web at a US treasury site you can find the term structure of interest rates on US treasury debt of maturities ranging from one month to 30 years. This particular link gives daily yield curves for all of 2008. If you have data for the s -period rate and the v -period rate prevailing on a given date t , you can calculate the implied $(v - s)$ -period rate at date $t + s$ (assuming $v > s$) from the fact that the v -period rate at t should be a weighted average of the s -period rate at time t and the $(v - s)$ -period rate at time s . That is, using the simple “expectational” theory of the term structure

$$r_t^v = \frac{sr_t^s + (v - s)r_{t+s}^{v-s}}{v}.$$

This equation, with r_t^v and r_t^s known, can be solved for r_{t+s}^{v-s} . The equation holds because one can obtain the same return over the interval $(t, t + v)$ by holding the v -period bond as by holding a s -period bond, then using the proceeds to buy a $(v - s)$ -period bond at $t + s$, under the naive assumption that the future $(v - s)$ -period rate is known at t .

- (i) Using this formula and the data for 1/10/2008, calculate the one month rate, the two-month rate expected to prevail one month from now, the three-month rate expected to prevail three months from now, etc. Plot the results as a step function, with time on the horizontal axis. The step function will have short steps at the beginning, where the maturities are close together, and long steps at the right-hand side of the graph.
- (ii) Do the same thing for the 12/19/2008 data.
- (iii) Note that the actual one-month rate was above longer rates in January — an inverted yield curve — suggesting that the market anticipated the later fall in short rates. Comment on whether your calculated future rates based on January data turned out to be a good forecast of actual future rates in 2008.
- (iv) The 30-year rate dropped substantially over the course of 2008. 30-year bonds are not consols, but they behave a lot like consols. If the drop in 30-year rates were actually the drop in consol rates, what would have been the percentage change by the end of the year in the value of a consol bought at the beginning of 2008?

Discussion questions

- (a) Questions raised by students.
- (b) Common mistakes or misunderstandings on the first exercise.
- (c) The Fed’s current policy initiative attempts to lower long-term interest rates by the Fed’s purchasing large amounts of long-term Treasury bonds, financing this by selling short-term bonds from its portfolio. Suppose the policy succeeds, or at least keeps long-term interest rates low while the purchases of long bonds continue. Suppose that later on, after the purchasing-long-bonds policy ends, long interest rates return to the levels that prevailed in early 2008. What will be the effect on the Fed’s balance sheet?