Midterm I Exam

Directions: Answer all questions; point totals for each question are given in parentheses. For full credit, you must provide complete explanations for your answers.

1. (20) What is the duration of a 3-year bond with 10% coupon rate that is currently selling at par? The coupon payments are made annually.

2. (30) A bank has two 3-year commercial loans with a present value of $70 million. The first is a $30 million loan that requires a single payment of $37.8 million in three years, with no payments until then. The second loan is for $40 million. It requires an annual interest payment of $3.6 million. The principal of $40 million is due in three years.

   (a) What is the duration of the bank’s commercial loan portfolio?
   
   (b) What will happen to the value of its portfolio if the general level of interest rates decreases from 8% to 7.0%?

3. (20) Assume that the expectations hypothesis is true for the following two questions:

   (a) Suppose you see the following bond prices: a 1-year $100 zero coupon bond selling for $90.10; a 3-year 10% coupon bond selling for par and a 2-year coupon bond with annual coupon payments of $100 and a face value of $1000 that is selling for $1000. What is the market forecast of the one year rate 2 years from now?

   (b) Suppose the current one-year rate is 5% and two year rate is 6%. If the forecast of the one-year rate a year from now (assumed to be accurate) is 7.25%, construct a trading arrangement that is guaranteed to make you money. (Assume the quoted interest rates are for both borrowing and lending.)

4. (30) The Bank of Dixon has assets totaling $180 million with a duration of 5 years and liabilities totaling $160 million with a duration of 2 years. If interest rates increase from 9% by 75 basis points, what is the change in the bank’s net worth? What is the change in the bank’s equity multiplier and what implication does this have?

5. (10) Use the Fisher relation to prove that if actual inflation rates are less than what was expected, then the ex-post real rate is greater than the ex-ante real rate.

6. (10) When hired as the manager of the Bank of Davis you were given explicit instructions that net interest margin should not vary more than 10% from the current level of 5%. If you think interest rates will change by at most 200 basis points in the next year, how large can your funding gap be (as a percentage of assets) in order for you to keep your job?