

Final Exam

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

1. (10) Any coupon bond can be considered as a portfolio of pure discount bonds. Why is this relevant in understanding the concept of bond duration?

2. (25) Consider the following balance sheet for Acme bank:

Assets	Amount	Rate	Duration	Liabilities/Equity	Amount	Rate	Duration
Cash	\$500			Deposits	\$8,000	8%	0.3 years
Treasuries	\$3,000	8%	10 years	CD's	\$6,000	8%	4.2 years
Loans	\$15,500	8%	1 years	Equity	\$5,000		
Total	\$19,000			Total	\$19,000		

- (a) Calculate (using duration gap) the change in the market value of equity if all rates increase by 2%.
- (b) What position in the Treasury futures market should this institution take to hedge its interest rate risk exposure as implied by the DGAP analysis?
- (c) Define assets and liabilities with a maturity of greater than one year as fixed rate; all other assets and liabilities are considered variable rate. What is the funding gap for Acme bank?
- (d) What position in the Treasury futures market should this institution take to hedge its interest rate risk exposure as implied by the FGAP analysis?

3. (10) Suppose the current price level is 100 and the price level is forecast to be 125 at the end of five years. Investors believe that the rate of inflation over this period will be constant; in addition, the real interest rate associated with one- two- and three-year bonds is currently 2%, 4%, and 5% respectively. Using the implications of the Fisher relation and expectations hypothesis, what is the one-year nominal interest rate expected to be 2 years from now? (Note: for the calculations, you can use arithmetic approximations. For instance, $(1 + i)^2 \approx 1 + 2i$.)

4. (25) In the model of banks as providers of liquidity insurance, we first studied the economy in which no trade took place (i.e. the case of autarky). In this economy, agents divide their initial income (equal to one) between two assets: the safe asset of storage which has no net return and a productive asset which yields $R > 1$ units of consumption in period $t + 2$ but only $L < 1$ in period $t + 1$ (if liquidated early). Agents make this portfolio decision in order to maximize expected utility given by:

$$E[U(c)] = \pi_1 \ln c_1 + \pi_2 \rho \ln c_2$$

where π_i is the probability of consuming in period $t+i$ and $0 < \rho < 1$ is agent's discount factor applied to future utility.

- (a) Assume that $\pi_1 = \pi_2 = 0.5$; $\rho = 0.8$, $L = 0.5$, and $R = 2.0$. Solve for optimal (c_1, c_2) .
 - (b) How do the quantities in part (a) compare to those we derived for the market economy? Why?
5. (10) In approximately 18 months, the Fed's balance sheet has increased from around \$900 billion to roughly \$2.2 trillion. Why does this make some analysts concerned about inflation? Be precise in your answer.
6. (15) Name and describe (briefly!) three instruments of the money market.
7. (25) Suppose agents derive utility from income (denoted as y) as given by the function:

$$U(c) = \frac{y^{1-\gamma}}{1-\gamma}; \gamma > 0, \gamma \neq 1.$$

Answer the following:

- (a) Given this utility function, how does agents' absolute risk aversion vary with the level of income?
- (b) Suppose agents are faced with two possible income levels: $y_1 = 100$ and $y_2 = 50$ and assume that the probability of the low income state is 40%. If actuarially fair insurance was offered to an agent, what would the premium for insurance cost (assuming zero expected profits for insurance companies).
- (c) Assume that $\gamma = 2$. Show that the utility of agents from purchasing insurance is greater than the expected utility from no insurance (using the functional form for utility given above).

8. (10) In Brunnermeier's analysis of the credit crisis, the TED spread played a critical role. Why?
9. (20) In discussing the credit crisis, Brunnermeier states, "In summary, leading up to the crisis, commercial and investment banks were heavily exposed to maturity mismatch both through granting liquidity backstops to their off-balance sheet vehicles and through their increased reliance on repo financing." What does this mean and why did it contribute to the credit crunch?