

## Final Exam

*Directions: Answer all questions; the questions are weighted equally. For full credit, you must provide **complete** explanations for your answers.*

1. Analyze the following statement, “The formula for the duration of a coupon bond is motivated by the fact that a coupon bond can be thought of as portfolio of pure discount bonds.” Be precise in your analysis.
2. Use the expectations hypothesis to answer the following questions:
  - (a) Suppose that the current two and three year bond rates are 5% and 7% respectively. What is the one year rate expected to be 2 years from now?
  - (b) Suppose that the current 2 year rate is 8% while the current one year rate is 6%. If you are planning to borrow next year to purchase a new car, what position in the future market should you take to hedge your interest rate risk exposure?
3. Agents have wealth of  $W$  but face the prospect of a loss,  $x$ , with probability  $p$ . Actuarially fair insurance is available with premium  $h$ . Let  $c$  denote the amount of insurance purchased (i.e.  $c = x$  implies full insurance). Let  $W_1$  denote wealth if the loss does not occur (i.e.  $W_1 = W - h$ ) and  $W_2$  denotes wealth if the loss does occur ( $W_2 = W - h - x + c$ ). Agents choose  $c$  in order to maximize  $E[U(W)]$ . Show that risk averse agents will purchase full insurance.
4. In the model of banks as providers of liquidity insurance, we examined four cases. Autarky, a market economy with borrowing and lending, the Pareto optimum and how banks can achieve the Pareto optimum. Discuss (1) Why the equilibrium in the market economy was preferred to autarky, (2) Why the market economy was NOT a Pareto optimum and (3) What feature of the model permitted the economy with banks to achieve the Pareto optimum.
5. In discussing the characteristics of their model of lending under uncertainty, Gertler and Hubbard state: “A second prediction is that investment fluctuations may exhibit asymmetries. Investment downswings in recessions may be sharper than upswings during booms.” Explain the features of the model that lead to this prediction. Be precise in your explanation; use graphs when relevant.
6. The Gertler and Hubbard model of lending under uncertainty included an additional constraint: the incentive compatibility constraint. This was given by:

$$\left(\pi^g + \pi^b \alpha\right) f(K) - \left(\pi^g P^g + \pi^b P^b\right) \geq \left(\alpha f(K) - P^b\right) + r v K$$

(In class, I used the notation  $\eta = v$ .) Explain in detail each term in this expression.

7. A critical component of the modern IS curve is the consumption Euler equation. Explain, in detail, what this is and where it comes from. What features of this equation help to distinguish consumption behavior in the modern macroeconomics policy model from that in the traditional IS curve?