

Final Examination

Econ 381, Prof. Evans

JSFB B060: April 22, 2009, 2:30-5:30 p.m.

INSTRUCTIONS:

- Please print your name in the upper left-hand corner.
 - Please read each question below carefully, and respond to the questions on a separate sheet of scratch paper. You must show your work.
 - When finished with the test, staple your scratch paper with your answers and your work to this test when you turn it in.
 - You may use a non-graphing (simple) calculator.
 - This final consists of the following two sections that total 100 points possible:
 - Part 1: Short answer, 40 points possible
 - Part 2: Analytical problems, 60 points possible
 - Good luck, and thanks for a great semester.
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Part 1: Short answer

(40 points possible, 2 points each)

1. What drives short-run changes in output Y according to Keynesian economic theory?
2. Give the expression for real GDP in terms of nominal GDP and the GDP deflator.
3. Define rational expectations.
4. Let an individual's utility function over consumption today C_1 and consumption tomorrow C_2 be the following form $u(C_1, C_2) = C_1^{0.6} + C_2^{0.4}$. What is the slope of the utility function at a given level of utility U (called the marginal rate of substitution, MRS)?
5. What are the three requirements for a good macro model?
6. What is the most debated of the three Keynesian conjectures about the consumption function? Why?
7. Behavioral economics, as exemplified by David Laibson's work on individual consumption and rationality, primarily combines economics with what other discipline?
8. Name the main strength of RBC/Classical macroeconomics that has been incorporated in New Keynesian models in recent years.

9. Which component of investment is the most stable?
10. Which of the three components of investment is the smallest and most volatile?
11. Define the efficient markets hypothesis. What are two possible interpretations about the source of your success if you make above average returns in the stock market?
12. How would the quantity theory of money explain the Federal Reserve increasing the money supply but nominal GDP decreasing?
13. What are the three main instruments that the Federal Reserve has traditionally used to conduct monetary policy?
14. Which would Fisher, Friedman, and Modigliani say is bigger, the variance in consumption over an individual's lifetime $var(c)$ or the variance in income over an individual's lifetime $var(y)$? Why?
15. Are estimated Solow residuals from aggregate production functions a strength or a weakness of Real Business Cycle (RBC) models? Explain.
16. List the three main characteristics of money?
17. If a firm has an *additive* production function given by $F(K, L) = 0.5(K^{0.5} + L^{0.5})$, what is the effect on the equilibrium level of capital K and investment I if the amount of labor increases $L \uparrow$?
18. Give one good reason why the huge increase in the money supply by the Federal Reserve over the last six months has not been inflationary.
19. Assume that Friedman's permanent income hypothesis holds. That is, total income is equal to permanent income plus transitory income $Y = Y^P + Y^T$ and consumption is a function of only permanent income $C = 0.7Y^P$. Show whether or not this consumption function satisfies Keynes' three hypothesized consumption function characteristics.
20. What is likely the biggest question that macroeconomist will be wrestling with over the next 15 years?

Part 2: Analytical problems

(60 points possible)

21. **Microfoundations of consumption problem (20 points):** Assume that an individual is born with wealth $W_1 = 5$, lives for three periods, and then dies. The individual will earn income in the first period of $Y_1 = 10$ and income in the second period of $Y_2 = 15$. The individual retires in the third (last) period of life and earns no income $Y_3 = 0$. Further, suppose that the individual can save his income at a zero interest rate. That is, $W_2 = Y_1 - C_1 + W_1$ and $W_3 = Y_2 - C_2 + W_2$.
- (a) Assume this individual wants to smooth lifetime consumption such that consumption is equal in all periods $C_1 = C_2 = C_3 = \bar{C}$ according to Modigliani's life cycle hypothesis. What is the optimal consumption level \bar{C} in each period?
 - (b) Demonstrate whether or not the consumption function from part (a) is in agreement with Keynes' second conjecture about consumption regarding the average propensity to consume?
 - (c) How would the constant consumption level \bar{C} change if the individual experienced a transitory income shock that increased first period income to $Y_1 = 11$ but decreased second period income to $Y_2 = 14$?
 - (d) Using the original income values of $Y_1 = 10$, $Y_2 = 15$, and $Y_3 = 0$, how would the constant consumption level \bar{C} change if the individual experienced a permanent income shock that increased first period income to $Y_1 = 11$ and increased second period income to $Y_2 = 16$?
 - (e) Using the original income values of $Y_1 = 10$, $Y_2 = 15$, and $Y_3 = 0$, let savings in each period be defined as the difference between income and consumption ($S_1 = Y_1 - C_1$ and $S_2 = Y_2 - C_2$). What happens to individual savings if the government institutes a program called social security that pays individuals an income of $Y_3 = 5$ in period 3?

22. **Microfoundations of investment problem (20 points):** Consider an economy in which the main source of capital is housing. Students rent the housing capital H from management companies at the nominal rental rate R . Students then work in their homes for L hours at nominal wage rate W in order to produce educated minds M that they sell at nominal price P . The production function for these students producing educated minds M takes the following Cobb-Douglas form.

$$M = 2H^{\frac{2}{3}}L^{\frac{1}{3}}$$

The key decision for student producers of educated minds is how much housing capital H to rent from management companies. On the other hand, management companies buy housing capital H and rent it to students for nominal price R . The nominal costs of management companies can be broken down into three parts—the opportunity cost ($iP_H H$), the appreciation value from the market ($-\Delta P_H H$), and the depreciation cost from use ($\delta P_H H$). The key decision of rental firms is how much housing capital H to supply at the market price P_H .

- Derive the function for demand for housing capital H^D on the part of students that maximizes their profits from selling their educated minds. That is, write out the nominal profit function for the student producers, and derive the demand for housing capital H^D from it. This will be a function of the real rental rate of capital. Show that H^D is a negative function of the real rental rate.
- Assuming that the rate of housing capital price increase equals the rate of aggregate price increase $\frac{\Delta P_H}{P_H} = \frac{\Delta P}{P}$, derive the real profit function for a management firm in terms of H , P_H , P , R , r , and δ , where $r = i - \pi$ is the real interest rate.
- Derive the function for supply of housing capital H^S (that management firms supply to students) that maximizes the real profits of management firms. [Note: This involves substituting the marginal productivity of housing capital relation from the student producer's problem into the management firm's profit maximization problem.]
- As was assumed in part (b) the price of housing capital P_H and aggregate prices P move together. Suppose that the nominal price of housing P_H was abnormally high (a housing bubble). What would happen to net investment in housing $I_n = \Delta H$ if the price of housing suddenly fell? What variable in the real profit function from part (b) would be evidence of this fall in nominal home prices?
- In this model, does a decrease in the nominal price of housing increase or decrease the production of educated minds M ?

23. **Microfoundations of money problem: supply and demand (20 points):**

Assume that banks in this economy act as financial intermediaries. They take deposits D , are required to hold *at least* the reserve requirement rr as reserves R , and loan out the rest of the money. Assume all individuals deposit half of their income in the bank and hold the other half of their income in currency C so that the currency-deposit ratio C/D (or cr) is $1/2$. Let the monetary base B be defined as $B = C + R$, and the money supply be defined as $M^S = C + D$.

- (a) If the reserve requirement (reserve-deposit ratio) is $rr = 0.10$, write an expression for the money supply in terms of the reserve-deposit ratio rr (reserve requirement), the currency-deposit ratio cr , and the monetary base B .
- (b) How much would the money supply M^S increase if the monetary authority injected \$1,000 of monetary base B into this economy?
- (c) What would the money supply be if the monetary base was \$1,000, but banks held 20% of their deposits as reserves rather than the required 10%?

Assume that the representative individual in this economy wants to spend all his income $Y = \$10,000$ evenly over the course of a year. The nominal interest rate that banks pay on deposits is $i = 0.04$. Let N be the number of trips an individual makes to the bank to withdraw money and the withdrawal amount is the same each time Y/N . The cost of each trip to the bank to make a withdrawal is $F = \$2$.

- (d) If each withdrawal is Y/N , give an expression for the average money holdings of the representative individual.
- (e) Given the expression for average money holdings, write down an expression for the total cost of holding money.
- (f) Derive the optimal number of trips N^* that an individual would choose to make to the bank in order to minimize the total cost of holding money.
- (g) If nominal money demand M^D is defined as the average money holdings of individuals making an optimal number of trips to the bank N^* , then what is the money demand M^D in this economy?