

**AMERICAN UNIVERSITY**  
**Department of Economics**

**Comprehensive Examination**  
**Econ 01A – MA Theory**

**August 2006**  
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Instructions: You must answer both the microeconomic and macroeconomic sections of the exam. Each section receives equal weight in the grading. Plan to spend about two hours on each *section*. Make sure you follow the directions in each section carefully.

**MICROECONOMICS SECTION**

Directions: Answer all questions from part A (short-answer questions) and from part B (long-answer questions). Show all your work.

**Part A:** Answer ALL questions (20 minutes each – 60 minutes total)

1. A consumer buys a bundle of goods on the budget line for which

$$P_1 / P_2 > MRS, \text{ where } MRS = \Delta x_2 / \Delta x_1$$

- a. Should the consumer buy more or less of good 1? Should the consumer buy more or less of good 2? Explain.
  - b. Draw a graph and show the choice the consumer is making and the choice the consumer should be making.
- 2.
- a. Carefully explain the difference between law of diminishing returns, diminishing marginal technical rate of substitution, and decreasing returns to scale.
  - b. If the production function is  $Y = 10 L^{0.5} K^{0.3}$  does the law of diminishing returns hold? Does the diminishing marginal technical rate of substitution hold? Does the decreasing returns to scale hold? (In each case explain why or why not.)
3. “For a monopolist, marginal revenue is less than price.” Give two different explanations as to why this statement is true.

**Part B:** Answer ALL questions (30 minutes each – 60 minutes total)

1. Consider a monopoly with inverse demand function  $p = 16 - q$ . The production function of the firm is given by  $f(L, K) = 2^{0.5}K^{1/4}L^{1/4}$ , where  $K$  stands for capital and  $L$  stands for labor inputs. Suppose that the price of labor and capital are both equal to 1.
  - a. Determine whether the technology exhibits constant, increasing, or decreasing returns to scale.
  - b. Prove that the cost function of the firm is given by  $c(q) = q^2$ .
  - c. Find the profit maximizing output and price.

2. Consider a consumer with utility function

$$U(x_1, x_2) = 4x_1^{0.5}x_2^{0.5}.$$

Throughout this problem, consider only strictly positive prices ( $p_1$  and  $p_2$ ) and income ( $I$ ).

- a. What is the Lagrangian function for the consumer's utility maximization problem?
- b. Find the Marshallian demand functions.
- c. Find the indirect utility function.
- d. What's the Lagrangian for the consumer's expenditure minimization problem?
- e. Find the Hicksian demand functions.

### MACROECONOMICS SECTION

Directions: Answer 2 questions from part A (short-answer questions), 1 question from part B, and 1 question from part C (long-answer questions). Show all your work.

**Part A:** Answer TWO (2) of the following (answer in about 2 paragraphs EACH, with any necessary equations, graphs, or math).

1. What is a *liquidity trap*, and what are its implications for the effectiveness of (a) monetary policy and (b) fiscal policy? Consider in your answer the recent experience of Japan.
2. What is *monetary neutrality*? Discuss the Keynesian and classical views of monetary policy and its effects. Would you expect to find monetary neutrality in the short-run or long-run (or what Blanchard calls "medium-run")?
3. What is *Ricardian equivalence*? Discuss one of its strengths and one of its weaknesses.
4. What is the *sacrifice ratio*? How does it differ under adaptive expectations and rational expectations?

5. Define the concept known as *crowding out*. Use the IS-LM model for a closed economy and its building blocks (the Keynesian cross/45° line and liquidity preference/ money supply-and-demand models) as necessary to demonstrate this concept.
6. What is the new Keynesian or expectations-augmented Phillips curve? Explain what it implies for the natural rate of unemployment.
7. Explain consumption smoothing. Discuss the importance of consumption smoothing behavior in the following terms: (a) the effects on the business cycle; (b) the effects on the aggregate consumer's welfare.

**Part B:** Answer ONE (1) question.

1. Present the neoclassical or “Solow” (exogenous) growth model and derive (and explain) the general condition for a long-run, steady-state equilibrium. Next, suppose there are two countries described by such a model, and that they both have the same technology (aggregate production function) and the same rate of population (labor force) growth. Assume initially that population (labor force) growth is equal to zero for simplicity. Assume also that there is no technological progress. If one of these countries has a higher saving rate than the other, what does the model say about how these countries will compare in terms of their output per capita (per worker)? What does the model say about their long-run, steady-state growth rates? (Use equations and graphs to illustrate your answer.) Now modify the model to incorporate differences in population (labor force) growth rates between the two countries. How does this modify the comparison of the two countries? Finally, give at least one reason for dissatisfaction with the Solow model as a representation of real-world economic growth.
2. Discuss some reasons for developing endogenous growth models to replace the neoclassical (i.e., exogenous or Solow) growth models. Analyze the effects of an increase in a country's saving rate using an endogenous growth model. How are the effects of an increase in the saving rate different when you have a neoclassical growth model? (Explain your answer carefully and illustrate using graphs.) Can economic policy influence growth in the neoclassical growth model? What about in the endogenous growth model? Explain your answers.

**Part C:** Answer ONE (1) question.

1. The sustainability of a country's external sector is often judged by reference to the level of net international investment position as a share of GDP,  $b_t$ . Typically, economists talk in terms of stabilizing  $b_t$  at a particular value. Let  $d_t$  be the period  $t$  current account deficit (excluding interest payments) as a share of GDP,  $i$  the nominal interest rate, and  $g$  the growth rate of nominal GDP. Then the external debt ratio evolves according to the following equation:

$$b_{t+1} = [ (1 + i)/(1 + g) ] b_t + d_t$$

- a) In 2005, the U.S. net international investment position was about 25 percent of GDP ( $b_t = 0.25$ ), the U.S. current account deficit excluding interest payments was about 7 percent of GDP ( $d_t = 0.07$ ), interest rates were 4 percent ( $i = 0.04$ ), and nominal GDP growth was 6 percent ( $g = 0.06$ ). Given these values, what was the net international investment position as a share of GDP in 2006?
- b) What  $d_t$  would the U.S. need to stabilize its external debt ratio at 25 percent given the values for  $i$  and  $g$  above?
- c) What are the implications of having the rate of nominal GDP growth exceed the nominal interest rate? Discuss the implications if the circumstances change so that the nominal interest rate exceeds the growth rate of nominal GDP.
- d) What are the consequences if the U.S. net international investment position as a share of GDP continues to increase? What are the considerations from the perspective of financial market participants and U.S. policymakers?

2. Suppose that a country described by a standard model of aggregate supply and aggregate demand (AS-AD) experiences an unexpected increase in the price of oil.

- a) Define the AS and AD relationships and explain briefly how the slope of each equation is derived. For AS, be sure to distinguish between the short-run and long-run (or what Blanchard calls “medium-run”) relationships.
- b) What are the effects of this oil price shock both in the short-run and in the long-run (Blanchard’s “medium-run”)? Explain the process of adjustment between the short-run and the long-run (Blanchard’s “medium-run”). Assume that policies remain unchanged. Be sure to explain your answer intuitively as well as using graphs or equations.
- c) Why might the central bank want to adopt an easier monetary policy in response to the short-run effects of the oil price shock? How would such a policy affect the long-run (Blanchard’s “medium-run”) outcome? Discuss.
- d) How do you think the central bank would respond if it thought that the oil price shock was temporary? Why?

3. Consider the following IS-LM model:

$$C = 200 + 0.5Y_d$$

$$T = 200$$

$$I = 150 - 25r$$

$$G = 150$$

$$L = 2Y - 100r$$

$$M^s = 1200$$

$$P = 2$$

where  $C$  is consumption,  $Y_d$  is disposable income,  $Y$  is national income,  $T$  is taxes,  $I$  is investment,  $r$  is the interest rate,  $G$  is government spending,  $L$  is liquidity preference (real money demand),  $M^s$  is the money supply, and  $P$  is the price level.

Use the model to answer the following:

- a) Solve for the IS and LM equations.
- b) Using the IS and LM equations, find the equilibrium values of  $Y$  and  $r$ . Graph your solution, making sure to label everything appropriately.
- c) Now suppose that the central bank tightens monetary policy and reduces  $M^s$  from 1200 to 1000. Calculate the effects of this policy change on the equilibrium values of  $Y$  and  $r$ . Illustrate your answer in a graph.
- d) Now assume that the government is facing re-election and decides to reduce taxes in order to restore the original value of  $Y$  that you calculated in part b). Assume also that the central bank keeps the money supply at its new value ( $M^s = 1000$ ). Calculate the new values for  $T$  and  $r$ . Illustrate what has happened in a graph.