

Macroeconomics Comprehensive Exam
August 2008

ID Number _____

You will receive four bluebooks, numbered 1 through 4. Put your ID Number (not your name) on the line above and on the cover of each bluebook.

You must answer all questions below. Each question is worth 25%. Use a separate bluebook for each question.

You have four hours to complete your exam.

Question 1 (Answer in Bluebook #1).

Assume the Solow model of economic growth. Now consider the following changes:

- a. a fall in the rate of depreciation.
- b. a rise in the saving rate
- c. a fall in the rate of growth of population
- d. a fall in the rate of technical progress

For each of the four changes above,

- (i) explain and illustrate graphically the effects on the capital stock per unit of effective labor and on output per unit of effective labor and
- (ii) indicate whether it affects the rate of growth of income per person and, if so, how.

Question 2 (Answer in Bluebook #2).

Explain the “dynamic inconsistency” problem that arises when the monetary authorities attempt to boost the level of income above its “flexible price” level. Why, according to the dynamic inconsistency hypothesis, does this policy end up being self-defeating?

Question 3 (Answer in Bluebook #3).

Consider the following household optimization problem:

$$\begin{aligned} \max_{\{i_t\}} \sum_1^{\infty} \beta^{t-1} \log(c_t) \\ \text{s.t. } y_t = k_t^\alpha \\ y_t = c_t + i_t \\ k_{t+1} = (1 - \delta)k_t + i_t \end{aligned}$$

where c is consumption, β is the discount factor, y is output, k is capital, i is investment, and α and δ are parameters.

- a) List and briefly describe various solution methods for this problem. Explain the advantages and disadvantages of each method.
- b) Explain in detail the value function iteration approach. Make sure to clearly describe each step in this approach.

Question 4 (Answer in Bluebook #4).

Answer the following questions:

- a) One of the key elements of the real business cycle models is the endogenous labor supply. Write down the complete household optimization problem when the supply of labor is endogenous. Explain the trade-offs that a household faces in this case.
- b) What is a bequest function? Write down a household optimization problem that includes a bequest function.
- c) What is learning by doing? How would you incorporate it into an economic model (i.e. how would you express it mathematically)?
- d) What is a spillover of technology? How would you incorporate it into an economic model (i.e. how would you express it mathematically)?