Harvard University
Department of Economics

General Examination in Macroeconomic Theory

Fall 2002

You have **FOUR** hours.

Solve all questions.

The Exam has 5 parts. Each part has it's own sheet. Please spend the following time on each part.

I. 40 minutes
II. 40 minutes
III. 40 minutes
IV. 60 minutes
V. 60 minutes

PLEASE USE A SEPARATE BLUE BOOK FOR EACH QUESTION AND WRITE THE QUESTION NUMBER ON THE FRONT OF THE BLUE BOOK.

PLEASE PUT YOUR EXAM NUMBER ON EACH BOOK.

PLEASE DO NOT WRITE YOUR NAME ON YOUR BLUE BOOKS.

Economics 2010c
Examination

Fall 2002

Part I (40 minutes)

Consider the following sticky-wage model of aggregate economic activity:

$$m_t + v_t = p_t + y_t \qquad \text{aggregate demand}$$

$$(2) \qquad p_t = w_t - u_t + \alpha e_t \qquad \text{price setting}$$

$$y_t = e_t + u_t \qquad \text{production function}$$

$$w_t = E_{t-1}(p_t + u_t) \qquad \text{wage setting}$$

where m is the log of the money supply, v is a random shock to aggregate demand, p is the log of the price level, e is the log of employment, y is the log of output, w is the log of the nominal wage, u is a random shock to productivity, E_{t-1} is the expectations operator conditional on information available at time t-1, and α is a parameter that reflects the cyclical behavior of the markup. Expectations are rational.

Assume that u and v are random walks. That is,

$$v_t = v_{t-1} + \epsilon_t$$
$$u_t = u_{t-1} + \eta_t$$

Assume that monetary policy m_t is set in period t-1. Thus, the central bank does NOT have access to information about period t when setting m_t.

(a) Solve for employment e in terms of the exogenous variables (m, u, v, ϵ, and η)

(b) What policy rule would minimize the variance of employment? Explain the intuition behind your result.

(c) Solve for the price level p in terms of the exogenous variables (m, u, v, ϵ, and η)

(d) What policy rule would minimize the variance of the price level? Explain the intuition behind your result.

General Exam Questions Fall 2002

Part IV (60 minutes)

) Consider a small open economy in which total spending is above non inflation tax revenues and the difference is covered partly by issuing debt denominated in domestic currency and partly by printing money. This country has a fixed exchange rate. You can answer the following questions either formally or in words.

a) Can you think of a situation in which this policy is appropriate?
b) If this policy is not appropriate, why would a country ever follow it?
c) What do you expect to happen to the exchange rate and why?
d) Why would this country ever consider adopting a fixed exchange rate?

2) The US economy is currently experiencing a period of sluggish growth. Some observers fear that it may turn into a recession (negative growth). Discuss the pros and cons of cutting tax rates or increasing public spending as a countercyclical measure. Please refer to models and empirical evidence discussed in class and in the readings.

Question for Fall 2002 Macro Theory Generals

Part II (40 minutes)

The Congressional Budget Office has just released a new forecast indicating that, under current tax and spending policies, the U.S. Government will be running a budget deficit for many years into the future. At the same time, the Federal Reserve System has made clear that it remains committed to a monetary policy that will deliver low and stable inflation.

Under what circumstances might a fiscal policy that involves continual deficits be inconsistent with a non-inflationary monetary policy? More specifically,

(a) under what conditions would a fiscal policy of government deficits lead, in the long run, to price inflation regardless of the policy preferences of the central bank?

and

(b) under what conditions would such a fiscal policy, once known, lead to price inflation even in the short run — perhaps even before the deficits actually occurred? (Note: This second part of the question is not intended to be relevant to the United States; the U.S. Government is already running a budget deficit.)

Be as explicit as you can in explaining your reasoning and in stating whatever assumptions underlie it.

Part III (40 minutes)

Questions for general exam (40 minutes).

Question 1 (True, False, or Uncertain; 5 minutes): If the economy is characterized by no uncertainty and complete markets then consumption should be constant over time.

Question 2 (True, False, or Uncertain; 5 minutes): The equity premium puzzle is explained by the fact that most households don't hold equities.

Question 3 (30 minutes): Assume that wealth is storable. Assume that production is characterized by a deterministic linear technology in wealth. So if x is wealth in the current period, c is consumption in the current period, and R is the gross rate of return, then wealth in the next period, x', is given by

$$x' = R \cdot (x - c)$$

Assume that preferences are characterized by a time-seperable, increasing, concave, differentiable felicity function, u, and by exponential discounting.

a. Set up the Bellman Equation for a consumer in this economy.

b. Using the Envelope Theorem, derive the Euler Equation.

Assume that the the utility function is logarithmic. Assume that the value function takes the form,

$$A + B\ln(x),$$

where A and B are constants. Solve for B and the marginal propensity to consume out of wealth.

d. Intuitively explain why the marginal propensity to consume out of wealth is not affected by the rate of return on the linear production technology.

e. Write down a continuous-time variant of this economy, including a continuous-time budget constraint (i.e., an identity for $\dot{x}$) and a continuous-time Bellman Equation.

Questions for Macro General Examination, September 2002)

Part V (60 minutes)

1. Forms of Technological Progress (60 minutes)

Suppose that the production function takes the form

$$Y = F(AK, BL),$$

where A represents capital-augmenting technology and B represents labor-augmenting technology. Assume that A and B are each growing exogenously at constant rates. The function F is a usual neoclassical one, so that output satisfies constant returns to scale in the two inputs, K and L.

1. Differentiate the production function with respect to time to work out a formula for the growth rate of output per worker, y=Y/L. Your solution should involve the growth rate of capital per worker, k=K/L, and the growth rates of A and B. Your answer should also include the term $(\partial Y / \partial K) \bullet (K / Y)$. What does this term represent?

Suppose that we are looking for a steady-state growth situation in which y is growing at a constant rate and k is growing at a constant rate, possibly different from the growth rate of y. Assume that the term $(\partial Y / \partial K) \bullet (K / Y)$ is not always constant—that is, it depends on the ratio of AK to BL. In this case,

2. What condition has to hold for the growth rate of k in order for the growth rate of y to be constant? What is the corresponding growth rate of y? Does it necessarily equal the growth rate of k?

3. Suppose that the two factors are paid their marginal products, so that the rental price is R= $\partial Y / \partial K$, and the wage rate is w= $\partial Y / \partial L$. Given the result in 2., how do the values of R and w evolve over time? If we are looking for a solution in which R is constant in the steady state, whereas w can be rising, what conditions have to hold for A and B?

4. If the term $(\partial Y / \partial K) \bullet (K / Y)$ is always constant, what form does the production function take? How do the results change in this case?