#44 PS

FALL 2001

MACROECONOMICS COMPREHENSIVE EXAM

JONES/BISCHOFF/BRITTO

DO PART A AND SELECT THREE ADDITIONAL QUESTIONS FROM PARTS B. C. D. & E, BUT NOT MORE THAN ONE FROM EACH PART.

A. Define and briefly explain the importance in macroeconomics of each of the following concepts:

(i) natural rate of unemployment;

(ii) The golden rule;

(iii) non-rival, increasing returns to scale, imperfect competition, endogenous growth;

(iv) Lucas critique;

(v) Time inconsistency;

(vi) total factor productivity;

(vii) Accelerationist Hypothesis;

(viii) classical dichotomy, neutrality, superneutrality;

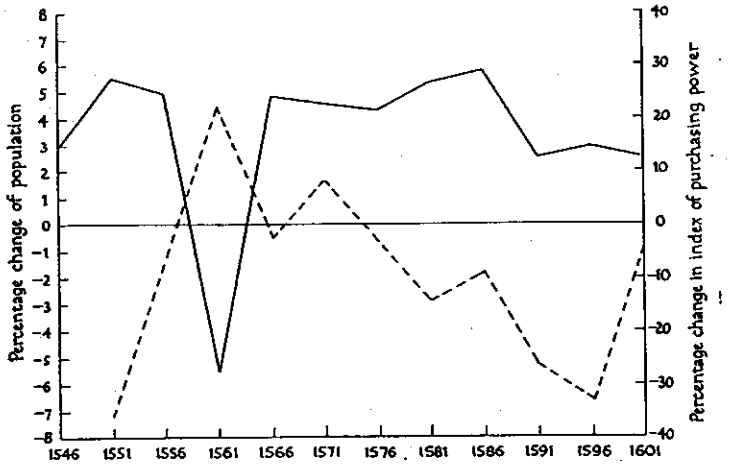
(ix) permanent income hypothesis;

(x) liquidity trap, Pigou effect.

B Choose either B1 or B2.

B1. In the Oxford History of Britain, John Guy provides the following graph of the percentage change of real wages versus the percentage change of the population in Tudor England (1546-1601).

Population Growth



—— Percentage change of population since last total (Source: E. A. Wrigley and R. S. Schofield, *The Population History of England, 1541–1871*, London, 1981)

---- Percentage change since last total (averaged over three years) in index of purchasing power of building craftsman's wages as compared to index of his purchasing power in 1510 (Source: E. H. Phelps Brown and S. V. Hopkins, *Economica*, no. 92, Nov. 1956, n.s. vol. xxiii)

He states, "The various data establish the most fundamental truth about the age of the Tudors. When the percentage change of English population in the sixteenth century is plotted against that of the index of purchasing power of ...wages [i.e. real wages], it is immediately plain that the two lines are opposite and commensurate."

Use growth theory to explain this empirical regularity, state all assumptions explicitly, and provide a complete argument.

B2. Many macroeconomic textbooks argue that the high rates of economic growth observed in Japan & Germany in the first two decades after World War II can be explained by the Solow-Swan model of economic growth.

(i) Outline their argument, using diagrams if convenient;

(ii) Suppose that the war resulted not just in the destruction of a significant portion of these countries' capital stocks, but also of a significant portion of their labor force. Would one still be able to use the Solow-Swan model to explain these high post-war rates of growth? Explain in detail. If your answer is "no", present an alternative explanation.

C. Choose either C1 or C2.

C1. Suppose a consumer solves the following decision problem:

$$\text{Max } V(0) = \int_0^{\infty} u(c_{1s}, c_{2s}) e^{-ps} ds$$

subject to two dynamic constraints

$$\frac{da_t}{dt} = R_t a_t + W_t - P_t^{c1} c_{1t} - P_t^{c2} i_t$$

$$\frac{dc_{2t}}{dt} = i_t - (n + \delta) c_{2t}$$

A is nominal wealth, W is the nominal wage, P^{c1} and P^{c2} are purchase prices of the two goods, R is the nominal interest rate.

(a) Explain how this decision differs from the standard Ramsey model. Specifically, what is te meaning of c_2?
(b) State the first-order conditions and interpret them.
(c) Derive a form of the Keynes-Ramsey rule and interpret it.
(d) Derive the relative price of the two goods. What is the relationship between this relative price and the user cost of capital?

C2. Suppose a consumer solves the following decision problem:

$$\text{Max } V(0) = \int_0^{\infty} u(c_{1s}, c_{2s}) e^{-ps} ds$$

subject to the following constraint

$$\frac{da_t}{dt} = r_t a_t + w_t - c_{1t} - c_{2t}$$

where w is the real wage, labor is supply is inelastic, r is the real interest rate, and a is wealth.

(e) Derive the optimality conditions using the maximum principle.
(f) Derive a Keynes-Ramsey rule for the model and interpret this rule in economic terms.
(g) Suppose that $u(c_1, c_2) = \frac{(c_1^{\,a} c_2^{\,1-a})^{1-\theta}}{1-\theta}$. This model is equivalent to a model in which there is only one good Q, where $Q = c_1^{\,a} c_2^{\,1-a}$. Show this by proving that the Keynes-Ramsey rule can be rewritten in terms of Q, and reinterpret this rule.

D. Do one of the following:

D1. "Does a temporary output shock leave per capita domestic consumption unchanged in the long run? Can higher trend output growth raise private saving and the current account balance? Does the economy reach a steady state in per capita consumption when individuals' time-preference rate differs from the world interest rate? Can changes in the timing of lump-sum taxes have real effects? To all of these questions the overlapping generations model answers yes while the representative-agent model answers no." Explain.

D2. In the following equation, all variables are in logarithms:

A. $Y_t^d = N_t - P_t - v_t$ (aggregate demand)

(2) $Y_t^s = \frac{1}{2}\sum_{i=1}^{2}(P_t - E_{t-i}P_t) + u_t$ (aggregate supply)

(3) $Y_t^d = Y_t^s$

(4) $u_t = \rho_1 u_{t-1} + \varepsilon_t, |\rho_1| < 1$

(5) $v_t = \rho_2 v_{t-1} + \eta_{t-1}, |\rho_2| < 1$

(6) $M_t = \sum_{i=1}^{\infty} a_i u_{t-i} + \sum_{i=1}^{\infty} b_i v_{t-1}$ (money supply rule)

A. Using (1), (2), and (3), derive an equation for Y_t as a function of some or all of $M_t, E_{t-1}M_t, E_{t-2}M_t, u_t, v_t, E_{t-1}u_t, E_{t-1}v_t, E_{t-2}u_t$ *and* $E_{t-2}v_t$.

B. Using your answer to (a) and (4), (5), and (6), derive an equation for Y_t as a function of $\varepsilon_t, \eta_t, \varepsilon_{t-1}, \eta_{t-1}$ *and* u_{t-2}.

C. Using your answer to (b), derive an expression of the asymptotic variance of Y as a function of $\sigma_\varepsilon^2, \sigma_\eta^2, \rho_1, \rho_2, a_1$, *and* b_1. Then find the values of a_1 and b_1 which minimize this variance, and derive the minimized variance. Give an economic interpretation of your results.

E. Choose either E1 or E2.

E1. Recently some economies have tried to promote economic growth by raising taxes and at the same time lowering government spending.

a). Suppose that in a particular economy, full employment is guaranteed (say by using monetary policy). Would raising taxes increase or lower total saving in the economy? Explain. Also, does the way taxes are raised matter? Explain

b). Suppose that in a particular economy, full employment is again guaranteed. Would lowering government spending increase or lower total saving in the economy? Explain

c). Suppose full employment was not guaranteed. Would raising taxes and lowering government spending necessarily lead to higher total saving in the economy? Explain.

d). What would a follower of the "Ricardian" school say about raising taxes as a means to promote economic growth? Explain.

e). If an economy with guaranteed full employment managed to increase its total savings rate, would this increase the growth rate of output in the near future? Why or why not? Draw a diagram to help your explanation. Would it increase the growth rate of output in the long run, according to the neoclassical model? Why or why not? Would it increase the level of output? Draw a diagram to help your explanation.

f). If an economy with guaranteed full employment managed to increase its total savings rate, would this increase the level of consumption in the long run? Why or why not? Explain. On what quantity does your answer depend? Draw a diagram to help your explanation.

E2. Consider the two equations:

$Y = C(Y) + I(r) + G$
$M = L(r,Y)$

Y and r are considered endogenous variables, G and M are exogenous, and the price level is ignored.

Assume $0 < C_y < 1, I_r < 0,$

$L_y > 0$ *and* $L_r < 0.$

A. Derive an expression for dI/dG.

B. What is the sign of dI/dG?

C. Can you determine this sign without the use of the "correspondence" principle? Why or why not?

D. As the absolute value of L_y increases, does the absolute value of dI/dG increase or decrease? SHOW YOUR WORK.

E. Draw an IS-LM diagram and give a graphical argument which will give an answer to part D. (Whether the absolute value of dI/dG increases as L_y increases.) Which method gives the answer more simply?