

Final Exam

Instructions: You have 3 hours to complete the exam. Please be concise and write legibly. There are two parts, each worth 50 points. Answer all questions in both parts, using a separate bluebook for each part.

Part A (True, false or uncertain)

Say whether the following statements are true, false or uncertain. Justify your answer in a couple of paragraphs (10 points per statement).

1. Because more capital allows more output to be produced, it is always better for a country to have more capital stock.
2. A market economy will generate the optimal growth rate.
3. Critics of the Bush Administration's tax cut are wrong when they say that increasing the budget deficit will reduce national saving.
4. If the federal government introduced an investment tax credit (a policy that effectively reduces the price of capital goods) immediately and kept it in place until the end of the year, the stock market would tend to rise between now and the end of the year, and there would be a long-run increase in productive capacity.
5. In a small, open economy like Venezuela, a temporary negative shock (such as a temporary drop in the price of oil) will have a bigger effect on consumption and long-run interest payments to foreigners than a permanent shock.

Part B (Real Business Cycles)

Suppose there are many firms in the economy, all with the following production function:

$$Y_t = K_t^\alpha (A_t L_t)^\beta$$

where Y_t is output, K_t is physical capital stock, L_t is employment, and α and β are parameters, with $\alpha + \beta = 1$. A_t represents the state of technology and follows a stochastic process. There is only one asset in the economy, physical capital. Physical capital is owned by households and rented to firms. It depreciates at rate δ . Throughout the problem, assume that this is a closed economy with no government sector (for simplicity).

1. Set up the typical firm's problem, find the first-order conditions, and provide an economic interpretation. (10 points)

For simplicity, suppose households live forever, have a rate of time preference of ρ , and have the following instantaneous utility function:

$$u(c_t, 1 - l_t) = \ln c_t + b \ln(1 - l_t)$$

where c_t is the household's consumption, l_t is the household's labor supply, and b is a parameter, $b > 0$.

2. Set up the typical household's intertemporal optimization problem including,
 - (a) The household's flow budget constraint (linking labor income $w_t l_t$, capital income $r_t k_t$, consumption c_t , today's capital k_t and tomorrow's capital k_{t+1}). (3 points)
 - (b) Provide a derivation of the intratemporal first-order condition relating contemporaneous consumption and labor supply. Give an economic interpretation. (3 points)
 - (c) Provide a derivation of the intertemporal first-order condition linking current consumption and consumption in the next period, i.e. the Euler equation (remember that there is uncertainty). Give an economic interpretation. (4 points)
3. Find the equations that describe labor supply and demand. For simplicity, you may work through the problem as if there were a single representative firm and a single representative household. (5 points)
4. Suppose that shocks to A are positively serially correlated. Use a combination of the firm's and household's optimality conditions and economic intuition to explain the effects on output, labor supply and demand, the wage rate, employment, the interest rate, consumption, savings, and the physical capital stock of a one-time shock that increases A . Where possible, explain the effect both in the initial period and later. (15 points)
5.
 - (a) How could you calibrate α and β ? What conditions would be required for this calibration to be valid? (5 points)
 - (b) Suppose $\alpha + \beta > 1$. Would the calibration you described in (a) still be valid? If $\alpha + \beta > 1$, how would this affect the interpretation of Solow residuals as technology shocks? (5 points)