

AUGUST 2003

INTERNATIONAL COMPREHENSIVE EXAM

BRITTO/NISHIYAMA

PART I. Do two of the following three:

1. Consider the following three scenarios:

- (a) The world consists of two countries, America & Europe. Aircraft are produced only in America, which exports some of its production to Europe in exchange for other goods;
- (b) The world consists of the same two countries, but now aircraft are produced in both countries, by Boeing in American and by Airbus in Europe. However, some of Boeing's production is exported to Europe in exchange for other goods;
- (c) The world consists of three countries, America, Europe and R.O.W. Aircraft are produced by Boeing and Airbus, and some of Boeing's production is exported to both Europe and R.O.W.

For each scenario, discuss whether it is desirable for Europe to impose a tariff on its imports of aircraft from America. Are there any conditions under which the optimal tariff is a prohibitive tariff?

2. Factor-price Equalization

- (a) Present the theoretical argument for factor-price equalization.
- (b) If one considers a pair of countries like the U.S.A. and Mexico, it is evident that factor prices are not equalized. What has gone wrong with the theoretical argument in such a case?
- (c) Does your answer to (b) suggest that, given enough time, factor prices in Mexico and the U.S.A. will be equalized? Explain.

3. The winner of the 1999 Nobel Memorial Award in Economics was Robert Mundell. Select one of Mundell's contributions to international economics, and discuss

- (i) the nature of the contribution,
- (ii) its importance,
- (iii) any empirical implication it might have.

DO NOT SELECT THE MUNDELL-FLEMING MODEL HERE IF YOU ARE ANSWERING QUESTION 6 IN PART II.

PART II. Answer Question 4 (required), and then answer either Question 5 or Question 6.

4. (required): Balassa-Samuelson productivity differential theory

Consider a small country with the fixed exchange rate system. The country's labor is immobile internationally but mobile between two sectors within the economy (the tradable sector and the nontradable sector) insuring the same wage w in both sectors. Capital is internationally mobile. The world interest rate in terms of tradables is denoted by r . The price of tradables expressed in the domestic currency is normalized to be one. Outputs are produced according to the following constant-returns production functions: $Y_T = A_T F(K_T, L_T)$ and $Y_N = A_N G(K_N, L_N)$ where Y = output, A = total factor productivity, K = capital, L = labor, and "T" and "N" indicate the tradable sector and the nontradable sector, respectively. The price of nontradables in terms of tradables is $p = P_N / P_T = P_N$ where $P_T = 1$ is assumed above. No depreciation is assumed. Ignoring the time subscript, the first-order conditions for intertemporal profit maximization for tradable firms are (shown in the class)

- (1) $A_T f'(k_T) = r$
- (2) $A_T (f(k_T) - f'(k_T) k_T) = w$

where $f(k_T) = F(k_T, 1)$, $k_T = K_T / L_T$, and the prime (') indicates the derivative. The first-order conditions for nontradable firms are

- (3) $p A_N g'(k_N) = r$
- (4) $p A_N (g(k_N) - g'(k_N) k_N) = w$

where $g(k_N) = G(k_N, 1)$, $k_N = K_N / L_N$.

- (a) Now assume the following: $Y_T = A_T F(K_T, L_T) = A_T K_T^\alpha L_T^{1-\alpha}$, $Y_N = A_N G(K_N, L_N) = A_N K_N^\beta L_N^{1-\beta}$, and $\alpha > \beta$. Using this assumption and the first-order conditions above, solve for 4 endogenous variables k_T , k_N , w and p . Note that each solution needs to be expressed in terms of exogenous variables only. Using the solutions, find what variables, and an increase or a decrease in these variables, lead to (i) an increase in k_T , (ii) an increase in k_N , (iii) an increase in w , and (iv) an increase in p . Assume α and β are constant throughout. You do not have to convert the first-order conditions into growth equations (which we did in the class using variables such as \hat{w} , \hat{p} , etc.).
- (b) Additionally assume $r = \text{constant}$. Convert the solution equation for p into a growth equation (i.e., a percent-change equation) and then, using the growth equation, explain Balassa-Samuelson productivity differential theory.

5. Dornbusch overshooting model

Consider the Dornbusch overshooting model. The following notation is used: i = interest rate, E = expectations operator, Δ = change, e = exchange rate (units of the domestic currency per foreign currency), m = money supply, p = price level, y = output or income. * indicates the foreign variable, the bar " - " (on the top of the variable) indicates the long-run level, and the dot on the top of the variable indicates the time derivative.

Assume that assets markets (both the FX market and the money market) are always in equilibrium, characterized by the following.

- (1) UIP: $i - i^* = E\Delta e$.
- (2) Regressive expectations: $E\Delta e = -\theta (e - \bar{e})$ where $\theta > 0$.
- (3) Money market equilibrium: $m - p = \phi y - \lambda i$ where $\phi > 0$, $\lambda > 0$.
- (4) Assume: $i^* = \bar{i}^* = \bar{i}$; $y = \bar{y}$; $m = \bar{m}$; $p^* = \bar{p}^* = 0$.

The goods market is assumed to be described by the following price adjustment process (5) where the adjustment speed $\pi > 0$. Note that the left-hand side variable in equation (5) is p with a dot on the top of it.

- (5) $\dot{p} = \pi (e - p) = \pi [(e - p) - (\bar{e} - \bar{p})]$.
- (6) The long-run PPP holds: $\bar{e} - \bar{p} + \bar{p}^* = 0$.

- (a) Derive the rational expectations exchange-rate solution, and show explicitly why this solution contains a bubble (i.e., by showing the exact expression of a root and proving why it is an explosive root).
- (b) Draw a phase diagram based on (a) above (you have to explain how each curve/line is derived) and explain step-by-step how overshooting occurs.

6. Mundell-Fleming model

Using the Mundell-Fleming model, explain the adjustment process step-by-step arising from

- (a) a decrease (not an increase) in the money supply under the floating exchange rate system and low capital mobility, and
- (b) a decrease (not an increase) in government expenditures under the fixed exchange rate system and high capital mobility.

You have to explain the adjustment process clearly with a diagram and in detail, including (for example) $TB > 0$ or $TB = 0$ or $TB < 0$ (similarly for KA and BP) at each equilibrium and sterilization or nonsterilization. Before answering (a) and (b),

- (c) derive the equations (use the standard notation used in the class) for all the curves in the diagram.