University of California, Davis
Department of Economics
International Economics

Date: July 1, 2004
Time: 3 hours
Reading Time: 20 minutes

PRELIMINARY EXAMINATION FOR THE Ph.D. DEGREE

Instructions. You should answer a total of 4 questions, including at least one question from each of the parts (A, B, and C).

Part A

1. In this question you are asked to discuss the gravity equation *including prices.*

   (a) Briefly derive the demand equation that arises from a CES system. Use this to show how a gravity-type of equation is obtained, i.e., show how the value of exports from country i to country j depends on the number of varieties in country i, prices in country j and income in country j. (*Note:* for deriving the CES demand equation, assume there are only two goods. Then to discuss the gravity equation, let there be many goods).

   (b) Now using the results obtained in part (a), show how the gravity equation can be estimated using each of the following *two methods:* (i) the technique of Anderson and van Wincoop; and (ii) using fixed effects. In each case, indicate what the estimating equation is and the type of empirical results that have been found. Is there a sense in which these two methods are equivalent?

2. In this question you are asked to discuss the measurement of productivity.

   (a) For a single industry under constant returns to scale and perfect competition, suppose that the production function is $y_1 = A_1 f(L_1, K_1)$. Then show how you can empirically measure the *change* in A_1, which is TFP. Now suppose that there are *two* industries, and that A_1 increases in the first industry. Then show that the increase in output y_1 along the production possibility frontier *exceeds* the percentage increase in A_1.

   (b) Suppose instead that the firms in an industry operate under imperfect competition and non-constant returns to scale. The production function for firm i is $y_i = A_i f(L_i, K_i)$. Then derive the equation showing how the *change* in output is related to the *changes* in A_i, L_i and K_i, as well as the markups and the returns to scale. Discuss how this equation can be used to estimate the markups and returns to scale.

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Part B

Question 1: Dynamic Analysis

Take a short-run macro model where price is fixed, and assume perfect capital mobility and a floating exchange rate regime. The model is described by the three equations below. All variables are in log form, except for the interest rate which is expressed in fractional decimal (e.g. instead of 10 percent, we write 0.1). All coefficients are positive numbers

$$\dot{y} = \beta[a_1 g - a_2 r + a_3(e-p) - y]$$
$$m - p = l_o - l_1 r + l_2 y$$
$$r = r^* + \dot{e}$$

(a) Use algebraic analysis to show the comparative static results of an unexpected permanent increase in r*. Be sure to show the results in an e-y diagram.

(b) There is no need for you to solve for the eigenvalues of the system. Use phase arrows to show the dynamics around the equilibrium in the preceding e-y diagram. You have to first derive the slope of the $\dot{y}$ and $\dot{e}$ equations.

(c) Use the phase arrows in the e-y diagram to show the dynamic path of adjustment after an unexpected permanent increase in r*.

Question 2: Exchange rate management

Economists generally believe that prices should be determined by supply and demand without government intervention. But yet, there are quite a number of prominent economists who advocate that the government intervene actively in the foreign exchange market to set the price of its currency. Some would go as far to argue that, if necessary, capital controls should also be used to allow the government to set the exchange rate.

(a) Under what technical condition is capital control a necessary instrument for the central bank to set the exchange rate? State and evaluate the case for a fixed exchange rate regime. (Hint: It would be helpful to include a discussion of the optimum currency area literature, and the empirical evidence about its relevance.)

(b) Show analytically that speculative mania is compatible with rational expectations, if you can. Otherwise, an example from a specific model would also do.

(c) Provide one analytical explanation for why exchange rate movements for low inflation countries have tended to exhibit random walk characteristics.

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Part C

1. Multinational Firms and Trade

a) Use Helpman's model of vertical multinationals (two countries - home and foreign, two factors – skilled and unskilled labor, and two goods – a skill intensive differentiated goods sector and a low skill intensive homogenous good) to demonstrate how the ability to form vertical multinationals affects the size and shape of the factor price equalization set. Assume home is the skilled labor abundant country.

b) Start from an equilibrium with vertical multinationals and balanced trade in the differentiated good. Now modify your diagram by moving the endowment point to indicate a small increase in the home country's endowment of unskilled labor. For the new endowment point, describe how resources are utilized in home and foreign in the new trade equilibrium. What is the trade pattern for the new endowment point?

c) Describe economic factors that would give rise to horizontal, but not vertical foreign investment.

d) Discuss two potential explanations for the empirical observation that foreign investment rises when the currency in a target country declines in value. How could you empirically test which (or both) of the two hypotheses was at play?

2. Patent Protection and Trade

a) Under what circumstances would you predict that better patent protection would facilitate an expansion of trade?

b) Suppose that country selection of intellectual property rights IPR (high or low), is not exogenous. Will this cause you to over or underestimate the effect of IPR on trade? Discuss.

c) In Eaton and Kortum, EK, (1996) the international diffusion of ideas is proxied by cross country patents. What are the drawbacks of using patents as a measure of knowledge diffusion?

d) In EK, ideas in country i are generated at a rate α_i. However, only $\alpha_i \epsilon_{in}$ ideas generated in i arrive in country n. What factors do EK find are important in determining the apparent rate of knowledge diffusion, ϵ_{in}?