# Midterm Exam No. 2
July 29, 2002

Answer all questions, in blue book. Plan ahead and budget your time. The questions are worth a total of 60 points, as indicated. You will have 80 minutes to complete the exam.

1. [19 points] In the diagram on page 2 are drawn unit-value isoquants for a world that produces three goods, X_1, X_2, and X_3, using two factors, K and L, at free trade prices p_1, p_2, and p_3 measured in dollars. To assist you, I have drawn two straight lines tangent to pairs of the isoquants, showing the points of tangency as open dots, and also drawing the rays from the origin through these points of tangency. Factor endowments are shown for seven countries, represented by the solid dots labeled E^1,…,E^7. Answer the following questions about these countries. Feel free to tear off this front page of the exam so that you can look at it and the diagram together.

    a. (4 points) Which country (or countries, if there are ties) has the largest absolute stock of capital? Which has the most labor? Which countries have the largest and the smallest *ratios* of capital to labor in their endowments?

    b. (4 points) Which country (or countries) has the highest rental price of capital? Which has the lowest? Which pairs or groups of countries, if any, have the same wage rate of labor?

    c. (2 points) Which country produces the most good 1? Which produces the most good 3?

    d. (4 points) What does country 6 produce, what does it export and import, and how do its factor prices compare to factor prices in the other countries?

    e. (2 points) In what industry does country 7 employ the largest fraction of its total labor force? Is country 7's output of good 1 worth more than $1, less than $1, or exactly $1?

    f.   (3 points) Which country or countries (if any) produce all three goods? In what direction would the price of good 2 have to change (holding the prices of goods 1 and 3 constant) in order to make it possible for some country that currently does not produce all three goods to do so? If that price change happened, would factor prices then be equal in all seven countries?
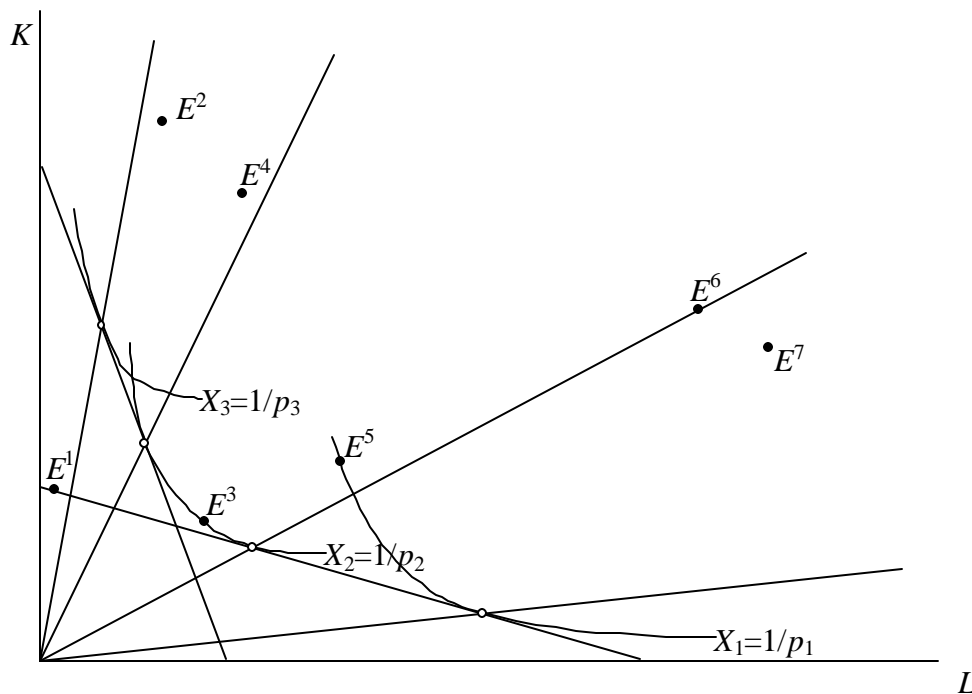
2. [8 points] As a start toward learning how economic development may affect the world economy, analyze the effect of capital accumulation in labor-abundant countries on world output of goods, as follows: Suppose that the world economy is characterized by free trade in either the 2-good-1-cone HO model or the 3-good-2-cone HO model, as indicated below, with the factor endowments of various countries ranging from least developed, with very little capital per worker, to most developed, with a lot of capital per worker. Then determine the effect, *at constant prices*, of a developing country in the stated situation increasing its capital stock while holding its labor force constant. What will happen, as a result, to that country's outputs (and therefore the world's outputs) of each of the goods in the model? (Assume that capital accumulation is not enough to change the country's pattern of specialization.)

   a. (2 points) The 2-good-1-cone HO model: capital accumulation in a country that produces both goods – labor-intensive X_1 and capital-intensive X_2 – and that exports X_1.

   b. (3 points) The 3-good-2-cone HO Model: capital accumulation in a country that specializes completely in producing the most labor-intensive good, X_1.

   c. (3 points) The 3-good-2-cone HO Model: capital accumulation in a country that produces both the most labor-intensive good, X_1, and the good of intermediate factor intensity, X_2, and that exports X_1.

3. [12 points] Use the Reciprocal Dumping Model to determine the effect of a fall in the cost of transportation on the *foreign* market, as follows. Find the changes in

    a. total sales in the foreign market,

    b. sales there by the Home-country firm,

    c. sales there by the Foreign-country firm,

    d. the well-being of foreign consumers,

It is enough that you determine the direction of each of these effects, not necessarily their size. Feel free to use either diagrams or equations for your analysis, or even a mixture of the two, so long as you do it carefully and completely.

4. [13 Points] In our partial-equilibrium model of monopolistic competition, we assumed that the two countries were of different sizes – that is, the market in the home country in autarky was larger than the market in the foreign country. We also assumed that the elasticity of demand faced by individual firms would increase with a rise in price and/or with an increase in the number of varieties. With these assumptions we showed that free trade between the two countries would cause a fall in price in both countries. Verify this result, and then determine whether it continues to be true if each of these assumptions is relaxed. That is:

    a. (4 points) Show, under the stated assumptions, that the price of the good falls in both countries due to trade.

    b. (3 points) Determine whether price still falls in both countries if they are the same size (with demand elasticity still an increasing function of price and number of varieties).

    c. (3 points) Determine whether price still falls in both countries if they are of different sizes but demand elasticity does not depend on price (but still does increase with the number of varieties).

    d. (3 points) Determine whether price still falls in both countries if they are of different sizes but demand elasticity does not depend on the number of varieties (but still does increase with price).

5. [8 points] The graph below shows the possible allocations of world factor
   endowments to two countries, Home measured from O and Foreign measured from
   O^*, together with rays from both of these points showing the capital-labor ratios
   employed in the economy's two sectors in the Integrated World Economy, k_F^I and
   k_C^I. Two allocations are singled out by the points labeled E_1 and E_2.

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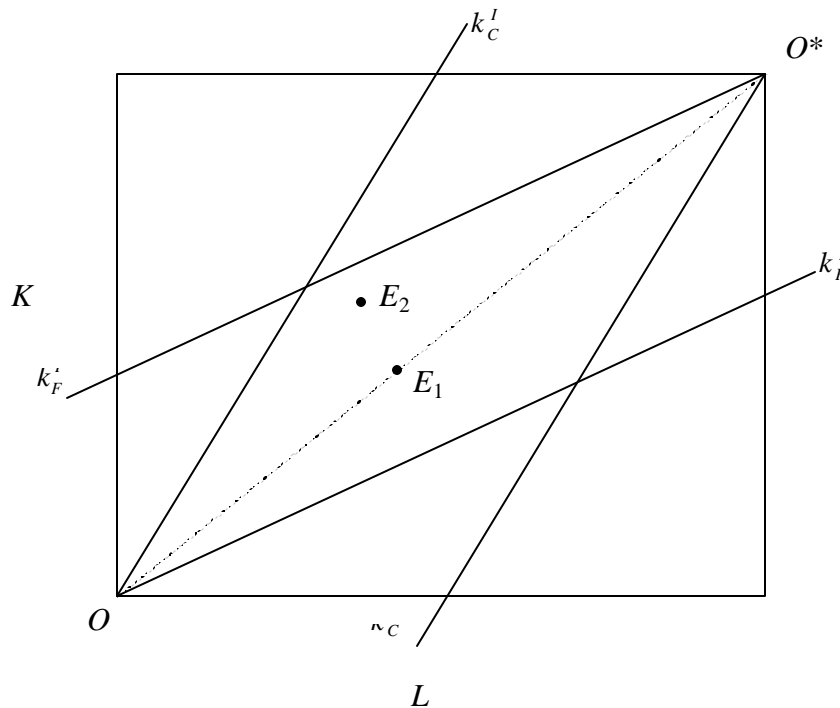
   a. (4 points) In the Heckscher-Ohlin (HO) Model, how do prices of factors in the
       two countries compare at allocation E_1? How do they compare at E_2, both across
       countries and compared to E_1?

   b. (4 points) For the allocation E_1 (on the diagonal of the box), compare the volume
       of trade in the HO Model with the volume of trade in the Helpman-Krugman
       (HK) Model with monopolistic competition in the cloth sector (C) only.