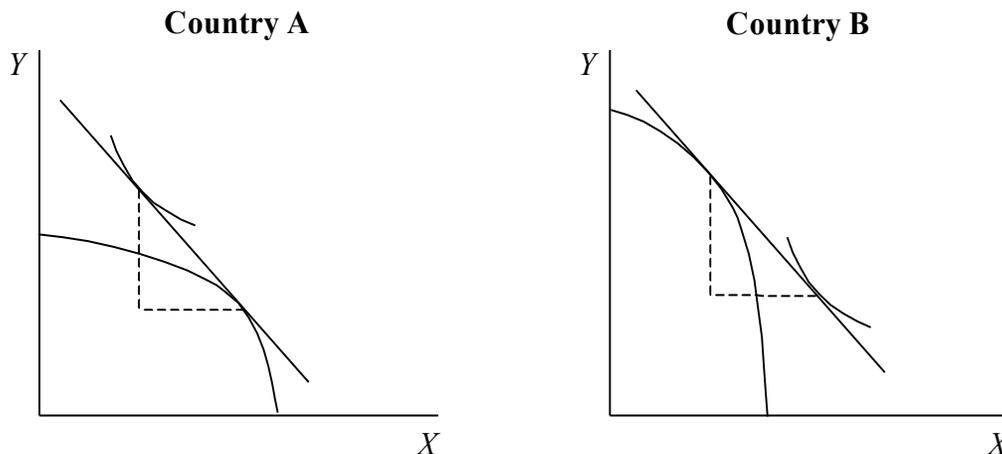


Problem Set #1

1. Use indifference curves and a curved transformation curve to illustrate a free trade equilibrium for a country facing an exogenous international price. Then show what happens if that exogenous price changes in the direction of raising the relative price of the country's exported good. Such a change is customarily called an "improvement" in the country's "terms of trade." Is this terminology necessarily appropriate?

2. The diagram below shows a free-trade equilibrium between two countries, A and B. Technological change now causes country A to be able to produce exactly 10% more output of good X than it could before, for any given input of resources.
 - a) Determine what this will do to the two countries' transformation curves, to their offer curves, and therefore to the world equilibrium prices.
 - b) Without further assumptions about preferences, are there any of these variables the direction of change in which *cannot* be determined unambiguously?
 - c) If you assume that preferences are homothetic, can any of these ambiguities be resolved?
 - d) Show the new equilibrium in both countries for the case of homothetic preferences.

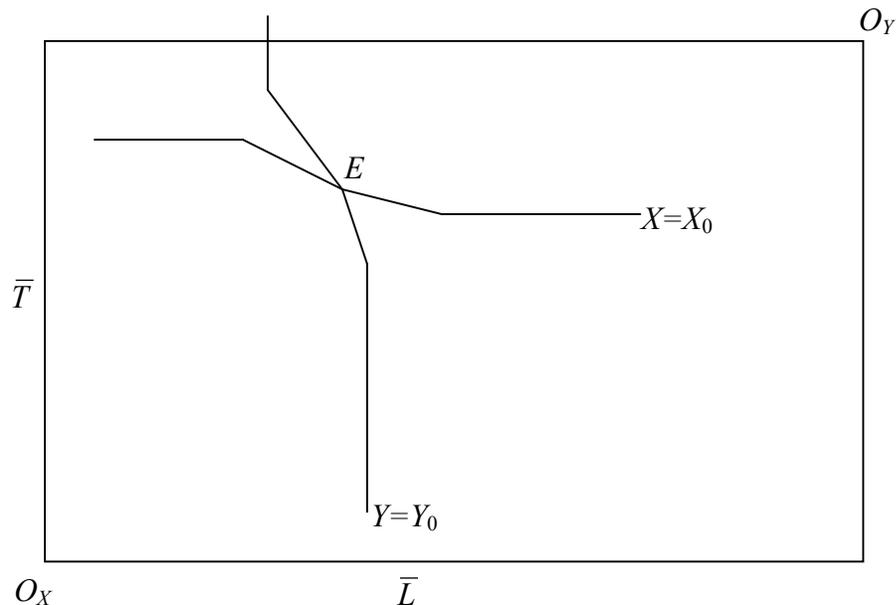


3. Consider a country engaged in production and trade of an arbitrary number of goods. Assume that there are no transport costs and that producers are competitive profit maximizers. Assuming that trade is free, show that if the vector of world prices, p_w , changes by a vector Δp_w , then the vector of the resulting changes in outputs, ΔX , will be nonnegatively correlated with Δp_w (assuming that p_w is always normalized to lie on the unit simplex).
4. a) Derive and draw the transformation curves of the two economies whose endowments and technologies are those described below. Each has a fixed endowment of labor – its only factor of production – and can produce two goods, X and Y , using the following constant amounts of labor per unit of output:

	Endowment of Labor	Per-unit labor requirement for producing	
		X	Y
Country A	60	1	2
Country B	120	2	3

- b) How much of goods X and Y will be produced and consumed in autarky in these two countries, and what will be their relative prices, assuming that demanders in both countries always insist on consuming them in fixed proportions of 1 unit of X for each unit of Y ?
- c) Derive and draw the world transformation curve.
- d) Derive the free trade equilibrium relative price of X and Y , plus the equilibrium quantities of the goods produced, consumed, and traded.
5. In the Dornbusch, Fischer, and Samuelson Ricardian model with transport costs, suppose that there is an increase in the cost of transportation, and suppose also that other conditions happen to be such that the wage ratio, ω , remains unchanged as a result. Determine the effects of this change on
- a) the pattern of trade and specialization (which goods each country produces, exports, and imports,
- b) the domestic prices of goods in both countries, and
- c) *real* wages (the ratio of the wage to an arbitrary index of domestic prices). Hint: for the real wage, see if you can show that the nominal wage either rises or falls relative to the prices of *all* goods. If so, then the exact price index does not matter.

6. In the Edgeworth Box below, point E is one point on the efficiency locus for the two industries, X and Y, whose representative isoquants are as shown. Assuming that the production functions for X and Y are linearly homogeneous, derive the rest of the efficiency locus.



7. The following are the equations used by Jones (1965) to determine factor-price changes from commodity-price changes:

$$\theta_{LX}\hat{w} + \theta_{TX}\hat{r} = \hat{p}_X$$

$$\theta_{LY}\hat{w} + \theta_{TY}\hat{r} = \hat{p}_Y$$

where $\theta_{Li} + \theta_{Ti} = 1$, $i = X, Y$. Solve these equations for \hat{w} and \hat{r} in terms of \hat{p}_X and \hat{p}_Y . From your solution, show that if good X is relatively labor intensive, so that $\theta_{LX} > \theta_{LY}$, then a rise in p_X relative to p_Y will raise w relative to both prices and reduce r relative to both prices.

8. Use the Lerner (unit-value-isoquant) diagram to work out the effects of a price change in the 2×2 Heckscher-Ohlin model as follows. Consider a small country that faces prices p_x^0 and p_y^0 for goods X and Y. Suppose that its endowments of labor and land are such that, at these prices, it produces exactly \$2 worth of each good. Work out what happens when the price of good X rises by 20%, to p_x^1 , the price of good Y remaining constant. Assume that good X is the relatively labor-intensive good. Determine, if possible, the direction of change in the following variables:

- i) The nominal wage.
- ii) The ratio of the nominal wage to the price of good X.
- iii) The rental price of land.
- iv) The ratio of land to labor used in producing good X.
- v) The ratio of land to labor used in producing good Y.
- vi) The average ratio of land to labor employed in both industries together.
- vii) The output of good X.
- viii) The output of good Y.

9. The Lerner diagram below shows an initial equilibrium, in the 2x2 Heckscher-Ohlin model, for a small-open economy facing fixed world prices of goods X and Y, p_X^0 and p_Y^0 . Its initial endowments of the two factors, unskilled labor U and skilled labor S , are shown by point E . Suppose now that some unskilled workers become skilled, moving the endowment point first to E' and then to E'' . Determine the effects of these changes on outputs of both goods and on factor prices.

