

Problem Set 2

August 14, 2013

Due: Wed, August 21, *before 11:00am*
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1 Heckscher-Ohlin Trade Theory and Wages

The relationship between the wage-rental rate ratio w/r and the relative price of cloth in terms of food P_C/P_F is

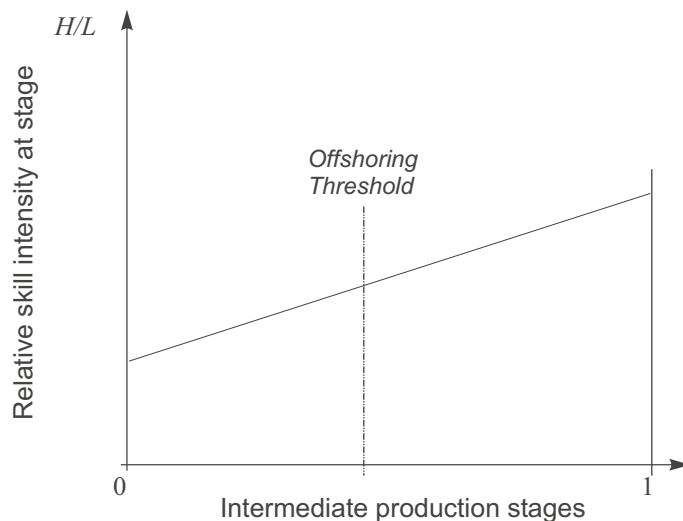
$$P_C/P_F = \sqrt{w/r}$$

in the Home economy. The optimal land-labor ratio choice is given by $T_F/L_F = 5 \cdot w/r$ in food production and by $T_C/L_C = \frac{1}{2} \cdot w/r$ in cloth production.

- *Factor price equalization.* Home opens up to free trade and experiences a doubling of the relative price of cloth. Use a goods-price-to-input-choice diagram to show how a doubling of the relative price of cloth affects wages and the choice of land-labor ratios in both industries.
- *Resource allocation.* How can it happen that both industries change land-labor ratios in the same direction, although total land and labor resources are given? [*Hint:* Describe the factor flows within the Home economy.]
- *Relative sector size.* Use an Edgeworth box to show the effect of a doubling in the relative price of cloth. [You may reuse the Edgeworth box from the preceding question for the initial state of the economy.]

2 Offshoring Intermediate Production Stages

There are two regions, North (no asterisk) and South (asterisk), and many intermediate production stages. The production stages are ordered by their skill intensity, H/L , as depicted along the horizontal axis in the graph below.



Offshoring tasks to the South is preferable below the threshold. Production in the North is preferable above the threshold.

- Depict the range of production stages offshored to the South, and depict the range of production stages located in the North under the shown threshold.
- Depict the average relative employment of H^S/L^S in the South and the average relative employment of H^N/L^N in the North.

Now suppose offshoring costs increase and fewer production stages are offshored to the South.

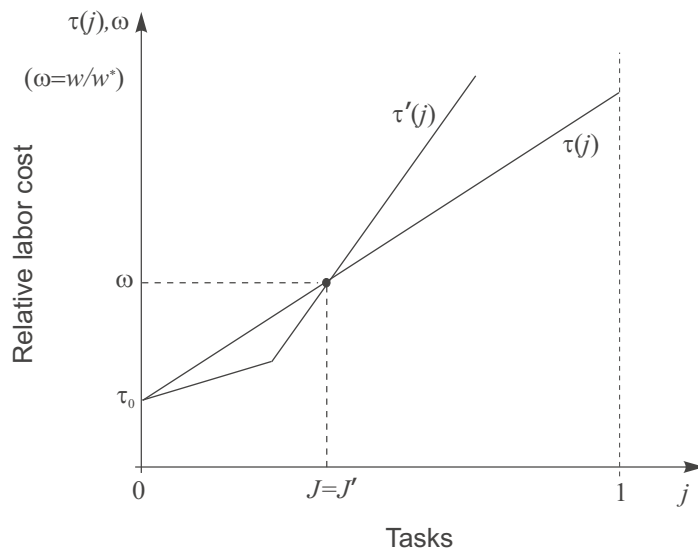
- Depict the position of the new threshold.
- Depict the average relative employment of $(H^S/L^S)'$ in the South and the average relative employment of $(H^N/L^N)'$ in the North under the new threshold.
- Does income inequality fall or increase in the South? Does income inequality fall or increase in the North?

3 Trade in Tasks

There are two economies, Onshore (no asterisk) and Offshore (asterisk). Each economy has two industries, X and Y , and two factors of production: land T (earning a land rent r) and labor L (earning a wage w). Some labor tasks can be offshored. The T -factor (land) cannot be offshored. There is free trade in final goods as in the Heckscher–Ohlin model.

Suppose the onshore economy is more productive than the offshore economy by a factor of $A/A^* > 1$. When contracted offshore, a task j costs $\tau(j)$. The tasks are ordered by their offshoring costs $\tau(j)$ from $j = 0$ to $j = 1$ so that $\tau(j)$ increases with j . In the initial equilibrium, J tasks are being offshored.

- How does the wage w relate to $w^*\tau(j)$ for all j below J ?
- How does the wage w relate to $w^*\tau(J)$ for task J ?
- After offshoring, what are the producers' profits in industries X and Y ?



Now suppose the offshoring cost schedule changes to $\tau'(j)$ as depicted in the figure above. The cutoff task remains unchanged at $J' = J$.

- What are the profits of producers in industries X and Y now?
- After the change in offshoring costs, how do r , r^* , and w^* change if there is free trade in final goods?
- After the change in offshoring costs, how does w change if there is free trade in final goods? Why?

4 Intraindustry Trade

Consider car makers that operate under monopolistic competition in symmetric equilibrium. Each monopolistic car maker produces with a total cost function

$$TC = F + c \cdot Q_C,$$

where $F = 500,000$ and $c = 100$.

- What are the average and marginal cost functions of a car maker?

Each of n car makers faces residual demand of

$$Q_C^d = S \cdot [1/n - b \cdot (P_C - \bar{P}_C)],$$

where $S = 50,000$, $b = 1/1,000$ and \bar{P}_C is average equilibrium price.

- What are marginal revenues? [*Hint*: You may use the formula in the textbook. Otherwise, reformulate demand so that $P_M = P_M(Q_M^d)$ and derive total revenue; differentiate total revenue with respect to quantity.]
- Graph the average-cost-variety (*CC*) and the price-variety (*PP*) schedules for this industry in a diagram that shows price, average cost and the number of firms (varieties).
- Find the number of firms (varieties) in this industry in the absence of trade. What is price in a symmetric autarky equilibrium?
- Cars can be traded across countries at not cost. Using the average-cost-variety (*CC*) and the price-variety (*PP*) schedules above, show how equilibrium price and the equilibrium number of firms change after trade.
- How could you measure the gains from trade? Explain briefly.

5 Monopolistic Competition and Dumping

A machinery monopolist produces with a total cost function

$$TC = F + \frac{c}{2} \cdot (Q_M)^2,$$

where $c = 1/150$. You may suppose that $F = 0$.

- What are the monopolist's average and marginal cost functions?

Demand for machines at Home is

$$Q_M^d = S - Sb \cdot P_M,$$

where $S = 50,000$ and $b = 1/1,000$. World demand is perfectly elastic at a world-market price of $P_M^* = 500$.

- What are the monopolist's marginal revenues? [*Hint*: You may use the formula in the textbook. Otherwise, reformulate demand so that $P_M = P_M(Q_M^d)$ and derive total revenue; differentiate total revenue with respect to quantity.]
- The monopolist chooses to export at the world-market price $P_M^* = 500$. Determine total output, domestic sales and exports in a suitable graph and show that the monopolist's best strategy is dumping on the world market.
- Use the graph to show that domestic consumers suffer from high monopoly price. [*Hint*: Consumer surplus is the area below the demand curve. Draw it before and after dumping.]
- Free trade in machinery exposes the domestic monopolist to perfect competition at $P_M^* = 500$. Show that Home consumers are better off after trade, while the monopolist is worse off. [*Hint*: Consumer surplus is the area below the demand curve. Identify consumer rents before and after free trade.]
- Can the monopolist remain in business if $F > 0$?