14.54 International Economics
Handout 3

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Fall 2006

1 Sorting and Inequality

Consider two countries, Home and Foreign.

In the Home country there are two types of workers: english speaking guides, E, and drivers, D. There are 30 guides and 20 drivers.

Production requires a team of two workers.

The table shows the output in dollars you get from each team.

$$\begin{array}{rcl} (E,E) & \rightarrow & 12 \text{ (a Travel agency)} \\ (E,D) & \rightarrow & 10 \text{ (a Bus tour)} \\ (D,D) & \rightarrow & 3 \text{ (a Local bus service)} \end{array}$$

Let's first look at an efficient allocation in the Home country, when the country is closed.

1.1 Efficient allocation

We want to solve the problem:

$$\begin{array}{rl} \max & 12q_T + 10q_B + 3q_L \\ & 2q_T + q_B \leq 30 \\ & q_B + 2q_L \leq 20 \end{array}$$

Solution is: 20 teams produce bus tours and 5 teams produce travel agency services.

To see this notice that if we have two teams

$$(E,E) \text{ and } (D,D) \rightarrow 12 + 3 = 15$$

then you can rearrange them and get

$$(E,D) \text{ and } (E,D) \rightarrow 10 + 10 = 20 > 15$$

1.2 Market

A market can achieve the efficient allocation with wages

$$\begin{aligned} w_E^a &= 6 \\ w_D^a &= 4 \end{aligned}$$

Check that this way both teams break even and a team that produces local bus would not be viable

$$3 < 2w_D.$$

Excercise: Solve the linear programming problem above and show that the Lagrange multipliers on the two constraints are actually $\lambda_E = 6$ and $\lambda_C = 4$, they are the "shadow wages".

1.3 Globalization

Now suppose there is a Foreign country with 70 workers of type M (managers).

Now three types of new teams can be formed

$$\begin{aligned} (M, M) &\rightarrow 30 \text{ (a Something)} \\ (M, E) &\rightarrow 25 \text{ (a Call center)} \\ (M, D) &\rightarrow 0 \text{ (a Nothing)} \end{aligned}$$

In Autarky the Foreign country is producing only Somethings' and the wage of the managers is

$$w_M^a = 15.$$

Now we allow for world integration. You can write the big linear program.

The solution will be

$$\begin{aligned} &20 \ (M, M) \text{ teams} \\ &30 \ (M, E) \text{ teams} \\ &10 \ (D, D) \text{ teams} \end{aligned}$$

and world output is

$$20 * 30 + 30 * 25 + 10 * 3$$

Why the (M, E) teams make (E, D) teams split?

Suppose you start from three teams

$$(M, M), (E, D), (E, D) \rightarrow 30 + 10 + 10 = 50$$

now I can rearrange them and have

$$(M, E), (M, E), (D, D) \rightarrow 25 + 25 + 3 = 53 > 50$$

so more efficient allocation.

1.4 Wages and Inequality

Again we can achieve the efficient world allocation of resources by setting the appropriate wages. We have

$$\begin{aligned} w_E &= 10 \\ w_D &= 1.5 \\ w_M &= 15 \end{aligned}$$

and inequality increases in the Home country (stays the same in Foreign because all the same...)

$$\begin{aligned} w_E &= 10 > 6 = w_E^a, \\ w_D &= 1.5 < 4 = w_D^a. \end{aligned}$$