

Lecture 2

The Hecksher-Ohlin Model

The Basic Idea

This model relaxes the assumption that there is a single factor of production. It assumes that there are two (or more) factors of production and that different countries have different endowments of these factors. For example, one country may be 'capital-abundant' and the other country may be 'labour-abundant'. The commodities produced also differ in terms of the intensity with which they use the two factors. For example, one commodity (say, computers) may be capital-intensive, while the other (say, textiles) may be labour-intensive.

This gives the capital-abundant country a comparative advantage in producing the capital-intensive commodity the labour-abundant country a comparative advantage in producing the labour-intensive commodity. So the prediction of the theory is that:

Each country will export that commodity which uses most intensively its most abundant factor of production: the capital-abundant country will export the capital-intensive commodity and the labour-abundant country will export the labour-intensive commodity.

The Assumptions

1. There are two countries: home (H) and foreign (F).
2. There are two factors, capital and labour such that H is capital-abundant and F is labour-abundant. If K, L, L^*, K^* are the (fixed) amounts of capital

and labour in H and F, this means: $\frac{K}{L} > \frac{K^*}{L^*}$. Note that if H is K-abundant,

then F is L-abundant.

3. There are two commodities: computers (C) and textiles (T) such that computers are capital-intensive and textiles are labour-intensive. This means that if α_C and α_T are amount of capital required to produce one computer and one metre of cloth and β_C and β_T are amount of labour required to produce one computer and one metre of cloth then:

$\frac{\alpha_C}{\beta_C} > \frac{\alpha_T}{\beta_T}$ or, equivalently, $\frac{\alpha_C}{\alpha_T} > \frac{\beta_C}{\beta_T}$. Note that if computers are capital-

intensive, then textiles are labour-intensive.

Production Possibilities

The production possibilities in each country are defined by:

$$\alpha_C Y_C + \alpha_T Y_T \leq K, \beta_C Y_C + \beta_T Y_T \leq L$$

$$\alpha_C^* Y_C^* + \alpha_T^* Y_T^* \leq K^*, \beta_C^* Y_C^* + \beta_T^* Y_T^* \leq L^*$$

Rearranging the terms, we have:

$$Y_C \leq \frac{1}{\alpha_C} K - \frac{\alpha_T}{\alpha_C} Y_T \quad \text{and} \quad Y_C \leq \frac{1}{\beta_C} L - \frac{\beta_T}{\beta_C} Y_T$$

$$Y_T \leq \frac{1}{\alpha_T} K - \frac{\alpha_C}{\alpha_T} Y_C \quad \text{and} \quad Y_T \leq \frac{1}{\beta_T} L - \frac{\beta_C}{\beta_T} Y_C$$

If all the capital were used to produce computers ($Y_T = 0$), the maximum number of computers that could be produced is $\frac{K}{\alpha_C}$ while if all the labour were used to produce computers ($Y_T = 0$), the maximum number of computers that could be produced is $\frac{L}{\beta_C}$

If all the capital were used to produce textiles the maximum metres of textiles that could be produced is $\frac{K}{\alpha_T}$ while if all the labour were used to produce

textiles ($Y_T = 0$), the maximum metres of textiles that could be produced is $\frac{L}{\beta_T}$

Note that in the Figure 2.1 below, the capital-constraint curve is steeper than the labour-constraint curve.

The slope of the capital constraint and the labour constraint curves are,

respectively: $\frac{\alpha_C}{\alpha_T} > \frac{\beta_C}{\beta_T}$

At 1, the economy is producing a high ratio of textiles to computers **and the binding constraint is labour**, while at 2, the economy is producing a high ratio of to computers **and the binding constraint is capital**.

An increase in labour supply is biased towards the expansion of textiles (the labour-intensive commodity) while an increase in capital supply is biased towards the expansion of computers (the capital-intensive commodity).

Prices

P_C, P_T, w, r are the prices of computers, textiles, labour and capital. We assume that the markets for computers and textiles are **competitive**, so:

$$P_C = \alpha_C r + \beta_C w$$

$$P_T = \alpha_T r + \beta_T w$$

In Figure 2.2, the factor price ratio curve is steeper for computers

(slope = $\frac{w}{r} = \frac{\alpha_C}{\beta_C}$) than it is for textiles (slope = $\frac{w}{r} = \frac{\alpha_T}{\beta_T}$) since computers are

more capital-intensive than textiles: $\frac{\alpha_C}{\beta_C} > \frac{\alpha_T}{\beta_T}$

In equilibrium, profits are zero in both markets, and: $w = \hat{w}, r = \hat{r}$

An increased demand for computers will raise P_C and shift the factor-price ratio curve for computers outwards: this will raise the price of capital relative to labour (that is, lower the equilibrium w/r ratio). An increased demand for textiles will raise P_T and shift the factor-price ratio curve for textiles outwards: this will raise the price of labour relative to capital (that is, raise the equilibrium w/r ratio).

So changes in relative demand have very strong effects on income distribution between the factors of production.

Trade

Since H is K-abundant, H will produce a lower ratio of textiles-to-computers than F (Figure 2.3): the relative price of textiles will be higher in H than in F (Figure 2.4). After trade, there will be a common relative price: both countries will consume the same relative quantities, but they will produce different relative quantities: H will produce more computers than it consumes (export computers); F will produce more textiles than it consumes (export textiles).

Factor Price Equalisation

After trade, the relative price of textiles to computers, P_T / P_C is the same in both countries (this does not mean that P_T and P_C are the same in both countries). A consequence of this is that the relative price of labour to capital (w/r) is the same in both countries (this does not mean that w and r is the same in both countries). This is known as the **Factor Price Equalisation Theorem**.

When H and F trade, they are in effect trading factors of production: H lets F have some of its abundant capital by exporting to it computers, F lets H have some of its abundant labour by exporting to it textiles. The process which equalises relative commodity prices also equalises relative factor prices.



