Wages, Productivity, and Comparative Advantage

In Session #12 we saw that real wages are equal to labor productivity in a competitive economy. This implies that the advantage of a "low-wage" worker is offset by the fact that productivity is lower. So why go to low-wage environments in the first place? This point may confuse people, and this note will clarify the issue.

The answer, no surprise, lies in comparative advantage. Comparative advantage tells us that it really will be cheaper to produce a good in one country rather than another. To see this clearly, we can analyze what the wages will actually be and then see that competition will force production of certain goods to be located in certain countries.

Consider our example of Country A and Country B. Recall that Country A will specialize in textile production, while Country B will specialize in computer production.

In particular, we defined the production technologies so that

Country A: $Q_t = 2L_t$
$Q_c = L_c$

Country B: $Q_t = 5L_t$
$Q_c = 5L_c$

In the homework for Session #11 we assumed that the international prices were $P_c = 1.5P_t$, and we saw that with these prices Country A has a comparative advantage in textiles and Country B a comparative advantage in computers. Let's continue to use these international prices, but let's also push further and calculate what the relative wages will be in these two countries.

Firms in Country A all make textiles and earn zero profits:

$$Profit_t = P_tQ_t - w_AL_t = P_t(2L_t) - w_AL_t$$

$$\text{Zero profits} \Rightarrow \quad w_A = 2P_t \qquad (1)$$

as we saw in the homework and lecture. The wage of workers in Country A will be equal to twice the price of a unit of textiles.

Meanwhile, firms in Country B all make computers and earn zero profits:

$$Profit_c = P_cQ_c - w_BL_c = P_c(5L_c) - w_BL_c$$

$$\text{Zero profits} \Rightarrow w_B = 5P_c \qquad (2)$$

The wage of workers in Country B will be 5 times the price of a unit of computers.

What are the relative wages of workers in Country A and Country B? Assuming they specialize as above, we can combine (1) and (2) to see that

$$w_B/w_A = 5P_c/2P_t$$

or, noting that $P_c = 1.5P_t$,

$$w_B/w_A = 15/4$$

So if workers in Country A are earning \$4 per hour, workers in Country B must be earning \$15 per hour – the relative wages in these two countries must always be in a ratio of 15 to 4.

Now we can see how comparative advantage works from the perspective of these wages. In particular, at these relative wages, it will be cheaper to produce textiles in Country A than in Country B, and cheaper to produce computers in Country B than in Country A.

How much does it cost to produce one unit of textiles in Country A? You need ½ unit of labor at a wage of w_A. If w_A is \$4, then it costs \$2 to produce a unit of textiles.

To produce one unit of textiles in Country B would require $1/5^{th}$ a unit of labor, at a wage of w_B (\$15, if w_A is \$4). Therefore, one unit of textiles costs 1/5 * 15 = \$3 to produce. Textile production is cheaper in Country A.

We can follow the same reasoning for computer production. Producing one unit of computers in Country A would cost 1 unit of labor * \$4 = \$4 per unit of computers. In Country B it would cost $1/5^{th}$ unit of labor * \$15 = \$3 per unit of computers. Computer production is relatively cheap in Country B.

To summarize:

Cost of Producing 1 unit of	Country A	Country B
Textiles	\$2	\$3
Computers	\$4	\$3

So firms will produce textiles in A and computers in B.

Comparative advantage means that firms will locate certain kinds of production in certain countries – regardless of the fact that competitive firms always pay a real wage equal to labor productivity (which follows from the zero profit condition). Why doesn't the fact that low wages are offset by lower productivity mean that firms are indifferent to where they produce things? The answer is that the equality between wages and productivity is only established *given the international specialization*. Firms who produce textiles in Country A earn zero profits. Firms who tried to produce textiles in Country B would

earn *negative* profits. That is, it does matter where you produce, and the optimal location depends on comparative advantage.

Taking a wage-oriented perspective on comparative advantage, the key is that the wage adjusts in a country so that, by comparative advantage, that country will always be able to produce something for the world market more cheaply than any other country. To produce "cheaply" is *not* a statement about wages – this is where people get confused. How cheaply you can produce something is a statement about how much it costs to produce a unit of *output*, which depends not only on the wage but also on the productivity of the workforce. If you want to think about international trade patterns from this wage-oriented perspective, then the rule is as follows: a country will produce goods where its relative productivity in producing that good (compared to another country) is higher than its relative wages (compared to another country).

Note that to understand comparative advantage, as we did in Session #11 using the concept of opportunity cost and the production possibility frontier, we do not need to think so carefully about wages. I think the approach in Session #11 is clearer and simpler. The wage-oriented analysis doesn't show very clearly that every country must have a comparative advantage in something.

The lecture notes for Session #12 discuss, more deeply, where a country's comparative advantage comes from in the first place.