

Answers to exercises 2-7, chapter 5, (The Heckscher-Ohlin model) International Economics, by Krugman, Obstfeld and Melitz.

2. The definition of cattle raising as land intensive depends on the ratio of land to labor used in production, not on the ratio of land or labor to output. The ratio of land to labor in cattle exceeds the ratio in wheat in the United States, implying that cattle raising is land intensive in the United States. Cattle raising would be land intensive in other countries as well, *if* the ratio of land to labor in cattle production exceeded this ratio in wheat production in *that* country. Comparisons between another country and the United States are not relevant for this purpose.

3. What matters is not the absolute abundance of factors, but their relative abundance. Poor countries have an abundance of labor relative to capital when compared to more developed countries. For example, consider a large, rich country like the United States and a small, poor country like Guatemala. Though the United States has more land, natural resources, capital, and labor than Guatemala, what matters for trade is the relative abundance of these factors. The ratio of labor to capital is likely to be much higher in Guatemala than in the United States, reflecting a relative scarcity of capital in Guatemala and abundance in the United States. This makes labor relatively cheaper and capital more expensive in Guatemala than in the United States. Notice that this difference in factor prices is not driven by how much labor Guatemala has compared to the United States, but by the proportion of labor to other factors within each country.

4. In the Ricardian model, labor gains from trade through an increase in its purchasing power. This result does not support labor union demands for limits on imports from less affluent countries. The *Heckscher-Ohlin model* directly addresses distribution effects by considering how trade impacts the owners of factors of production. In the context of this model, unskilled U.S. labor loses from trade because this group represents the relatively scarce factors in this country. The results from the *Heckscher-Ohlin model* support labor union demands for import limits. This is a rational policy as labor unions representing unskilled workers are hurt directly by trade that favors the export of skill intensive goods (and import of low-skill goods). However, the unions may be better served lobbying for resources to increase skill levels among its membership, given that the gains from trade overall will exceed the losses to a particular sector.

5. Specific programmers may face wage cuts due to the competition from India, but this is not inconsistent with skilled labor wages rising. By making programming more efficient in general, this development may have increased wages for others in the software industry or lowered the prices of the goods overall. In the short run, though, it has clearly hurt those with sector-specific skills who will face transition costs. There are many reasons to not block the imports of computer programming services (or outsourcing of these jobs). First, by allowing programming to be done more cheaply, it expands the production possibilities

frontier of the United States, making the entire country better off on average. Necessary redistribution can be done, but we should not stop trade that is making the nation as a whole better off. In addition, no one trade policy action exists in a vacuum, and if the United States blocked the programming imports, it could lead to broader trade restrictions in other countries.

6. The factor proportions theory states that countries export those goods whose production is intensive in factors with which they are abundantly endowed. One would expect the United States, which has a high capital/labor ratio relative to the rest of the world, to export capital-intensive goods if the *Heckscher-Ohlin theory* holds. Leontief found that the United States exported labor-intensive goods. Bowen, Leamer, and Sveikauskas found, for the world, the correlation between factor endowment and trade patterns to be tenuous. The data do not support the predictions of the theory that countries' exports and imports reflect the relative endowments of factors.

7. If the efficiency of the factors of production differs internationally, the lessons of the *Heckscher-Ohlin theory* would be applied to "effective factors," which adjust for the differences in technology or worker skills or land quality (for example). The adjusted model has been found to be more successful than the unadjusted model at explaining the pattern of trade between countries. Factor price equalization concepts would apply to the effective factors. A worker with more skills or in a country with better technology could be equal to two workers in another country. Thus, the single person would be two effective units of labor. Thus, the one high-skilled worker could earn twice what lower-skilled workers do, and the price of one effective unit of labor would still be equalized.