Chapter 3 – Krugman and Obstfeld

1. (a) The production possibility curve is a straight line that intercepts the apple axis at 400 (1200/3) and the banana axis at 600 (1200/2).

   (b) The opportunity cost of apples in terms of bananas is 3/2. It takes three units of labor to harvest an apple but only two units of labor to harvest a banana. If one foregoes harvesting an apple, this frees up three units of labor. These 3 units of labor could then be used to harvest 1.5 bananas.

   (c) Labor mobility ensures a common wage in each sector and competition ensures the price of goods equals their cost of production. Thus, the relative price equals the relative costs, which equals the wage times the unit labor requirement for apples divided by the wage times the unit labor requirement for bananas. Since wages are equal across sectors, the price ratio equals the ratio of the unit labor requirement, which is 3 apples per 2 bananas.

2. (a) The production possibility curve is linear, with the intercept on the apple axis equal to 160 (800/5) and the intercept on the banana axis equal to 800 (800/1).

   (b) The world relative supply curve is constructed by determining the supply of apples relative to the supply of bananas at each relative price. The lowest relative price at which apples are harvested is 3 apples per 2 bananas. The relative supply curve is flat at this price. The maximum number of apples supplied at the price of 3/2 is 400 supplied by Home while, at this price, Foreign harvests 800 bananas and no apples, giving a maximum relative supply at this price of 1/2. This relative supply holds for any price between 3/2 and 5. At the price of 5, both countries would harvest apples. The relative supply curve is again flat at 5. Thus, the relative supply curve is step shaped, flat at the price 3/2 from the relative supply of 0 to 1/2, vertical at the relative quantity 1/2 rising from 3/2 to 5, and then flat again from 1/2 to infinity.

3. (a) The relative demand curve includes the points (1/5, 5), (1/2, 2), (1, 1), (2, 1/2).

   (b) The equilibrium relative price of apples is found at the intersection of the relative demand and relative supply curves. This is the point (1/2, 2), where the relative demand curve intersects the vertical section of the relative supply curve. Thus the equilibrium relative price is 2.

   (c) Home produces only apples, Foreign produces only bananas, and each country trades some of its product for the product of the other country.

   (d) In the absence of trade, Home could gain three bananas by foregoing two apples, and Foreign could gain by one apple foregoing five bananas. Trade allows each country to trade two bananas for one apple. Home could then gain four bananas by foregoing two apples while Foreign could gain one apple by foregoing only two bananas. Each country is better off with trade.

4. The increase in the number of workers at Home shifts out the relative supply schedule such that the corner points are at (1, 3/2) and (1, 5) instead of (1/2, 3/2) and (1/2, 5). The intersection of the relative demand and relative supply curves is now in the lower horizontal section, at the point (2/3, 3/2). In this case, Foreign still gains from trade but the opportunity cost of bananas in terms of apples for Home is the same whether or not there is trade, so Home neither gains nor loses from trade.

5. This answer is identical to that in 3. The amount of "effective labor" has not changed since the doubling of the labor force is accompanied by a halving of the productivity of labor.

6. This statement is just an example of the pauper labor argument discussed in the chapter. The point is that relative wage rates do not come out of thin air; they are determined by comparative productivity and the relative demand for goods. The box in the chapter provides data which shows the strong connection between wages and productivity. China's low wage presumably reflects the fact that China is less productive than the United States in most industries. As the test example illustrated, a highly productive country that trades with a less productive, low-wage country will raise, not lower, its standard of living.

7. The problem with this argument is that it does not use all the information needed for determining comparative advantage in production: this calculation involves the four unit labor requirements (for both the industry and service sectors, not just the two for the service sector). It is not enough to compare only service's unit labor requirements. If $a_{ls} < a^*_{ls}$, Home labor is more efficient than foreign labor in services. While this demonstrates that the United States has an absolute advantage in services, this is neither a necessary nor a sufficient condition for determining comparative advantage. For this determination, the industry ratios are also required. The competitive advantage of any industry depends on both the relative productivities of the industries and the relative wages across industries.

8. While Japanese workers may earn the equivalent wages of U.S. workers, the purchasing power of their income is one-third less. This implies that although $w = w^*$ (more or less), $p < p^*$ (since $3p = p^*$). Since the United States is considerably more productive in services, service prices are relatively low. This benefits and enhances U.S. purchasing power. However, many of these services cannot be transported and hence, are not traded. This implies that the Japanese may not benefit from the lower U.S. services costs, and do not face an international price which is lower than their domestic price. Likewise, the price of services in United States does not increase with the opening of trade since these services are non-traded. Consequently, U.S. purchasing power is higher than that of Japan due to its lower prices on non-traded goods.

9. Gains from trade still exist in the presence of nontraded goods. The gains from trade decline as the share of nontraded goods increases. In other words, the higher the portion of goods which do not enter international marketplace, the lower the potential gains from trade. If transport costs were high enough so that no goods were traded then, obviously, there would be no gains from trade.

10. The world relative supply curve in this case consists of a step function, with as many "steps" (horizontal portions) as there are countries with different unit labor requirement ratios. Any countries to the left of the intersection of the relative demand and relative supply curves export the good in which they have a comparative advantage relative to any country to the right of the intersection. If the intersection occurs in a horizontal portion then the country with that price ratio produces both goods.

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Answers to Problem Set #1

Chapter 4 – Krugman and Obstfeld

1. The definition of cattle growing 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 cattle is land intensive in the United States. Cattle is land intensive in other countries too *if* the ratio of land to labor in cattle production exceeds the ratio in wheat production in *that* country. Comparisons between another country and the United States are less relevant for this purpose.

2. (a) The box diagram has 600 as the length of two sides (representing labor) and 60 as the length of the other two sides (representing land). There will be a ray from each of the two corners representing the origins. To find the slopes of these rays we use the information from the question concerning the ratios of the production coefficients. The question states that $a_{LC}/a_{TC} = 20$ and $a_{LF}/a_{TF} = 5$.

   Since $a_{LC}/a_{TC} = (L_C/Q_C)/(T_C/Q_C) = L_C/T_C$ we have $L_C = 20T_C$. Using the same reasoning, $a_{LF}/a_{TF} = (L_F/Q_F)/(T_F/Q_F) = L_F/T_F$ and since this ratio equals 5, we have $L_F = 5T_F$. We can solve this algebraically since $L = L_C + L_F = 600$ and $T = T_C + T_F = 60$.

   The solution is $L_C = 400$, $T_C = 20$, $L_F = 200$ and $T_F = 40$.

   (b) The dimensions of the box change with each increase in available labor but the slopes of the rays from the origins remain the same. The solutions in the different cases are as follows.

   $L = 800$: $T_C = 33.33$, $L_C = 666.67$, $T_F = 26.67$, $L_F = 133.33$
   $L = 1000$: $T_C = 46.67$, $L_C = 933.33$, $T_F = 13.33$, $L_F = 66.67$
   $L = 1200$: $T_C = 60$, $L_C = 1200$, $T_F = 0$, $L_F = 0$. (complete specialization).

   (c) At constant factor prices, some labor would be unused, so factor prices would have to change, or there would be unemployment.

3. This question is similar to an issue discussed in Chapter 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.

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 by considering the effects of trade on the owners of factors of production. In the context of this model, unskilled U.S. labor loses from trade since this group represents the relatively scarce factors in this country. The results from the Heckscher-Ohlin model support labor union demands for import limits. In the short run, certain unskilled unions may gain or lose from trade depending on in which sector they work, but in theory, in the longer run, the conclusions of the Heckscher-Ohlin model will dominate.

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 US, making the entire country better off on average. Necessary redistribution can be done, but we should not stop trade which is making the nation as a whole better off. In addition, no one trade policy action exists in a vacuum and if the US 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 as a whole 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 differ 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 considered to 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.