

SOLUTIONS

a) The **Rybczynski theorem** states that in the HO framework, “an increase in the amount of a factor found in an economy will increase the output of the industry using that factor intensively and decrease the output of the other industry”. According to that theorem, given that $\bar{K}_A > \bar{K}_B$ and $\bar{L}_A = \bar{L}_B$, we expect to have $Q_{1A}^{AU} > Q_{1B}^{AU}$ and $Q_{2A}^{AU} < Q_{2B}^{AU}$.

Note that the Rybczynski theorem assumes that output prices are constant, which is not realistic for a closed economy, as discussed in the next question. Strictly speaking, the theorem therefore does not apply. We assume that the price effect is small enough that the theorem still holds.

b) Given that country A produces more of good 1 and less of good 2, good 1 is relatively scarcer than good 2 in country B than country A which implies that its relative price must be higher in country B than in country A, i.e., $p_{1A}^{AU}/p_{2A}^{AU} < p_{1B}^{AU}/p_{2B}^{AU}$. Note that this assumes identical preferences in both countries.

c) We expect the real rental rate of capital to be lower in country A than country B and conversely for the labor real wages. This corresponds to the **Stolper-Samuelson theorem** which states that “an increase in the relative price of a good will increase the real earnings of the factor used intensively in the production of that good and decrease the real earnings of the other factor.” The equilibrium labor intensities and wage/rental rates ratios are illustrated in figure 1 below, where

$$RD_A = \frac{L_1}{K_1} \left(\frac{K_{1A}^{AU}}{\bar{K}_A} \right) + \frac{L_2}{K_2} \left(\frac{K_{2A}^{AU}}{\bar{K}_A} \right) < \frac{L_1}{K_1} \left(\frac{K_{1B}^{AU}}{\bar{K}_B} \right) + \frac{L_2}{K_2} \left(\frac{K_{2B}^{AU}}{\bar{K}_B} \right) = RD_B.$$

The above inequality is due to the fact that $Q_{2A}^{AU} < Q_{2B}^{AU}$ implies that $K_{2A}^{AU} < K_{2B}^{AU}$ which, combined with $\bar{K}_A > \bar{K}_B$, implies that $K_{2B}^{AU}/\bar{K}_B > K_{2A}^{AU}/\bar{K}_A$. Hence, RD_B puts a larger weight on curve L_2/K_2 than RD_A , as illustrated in figure 1.

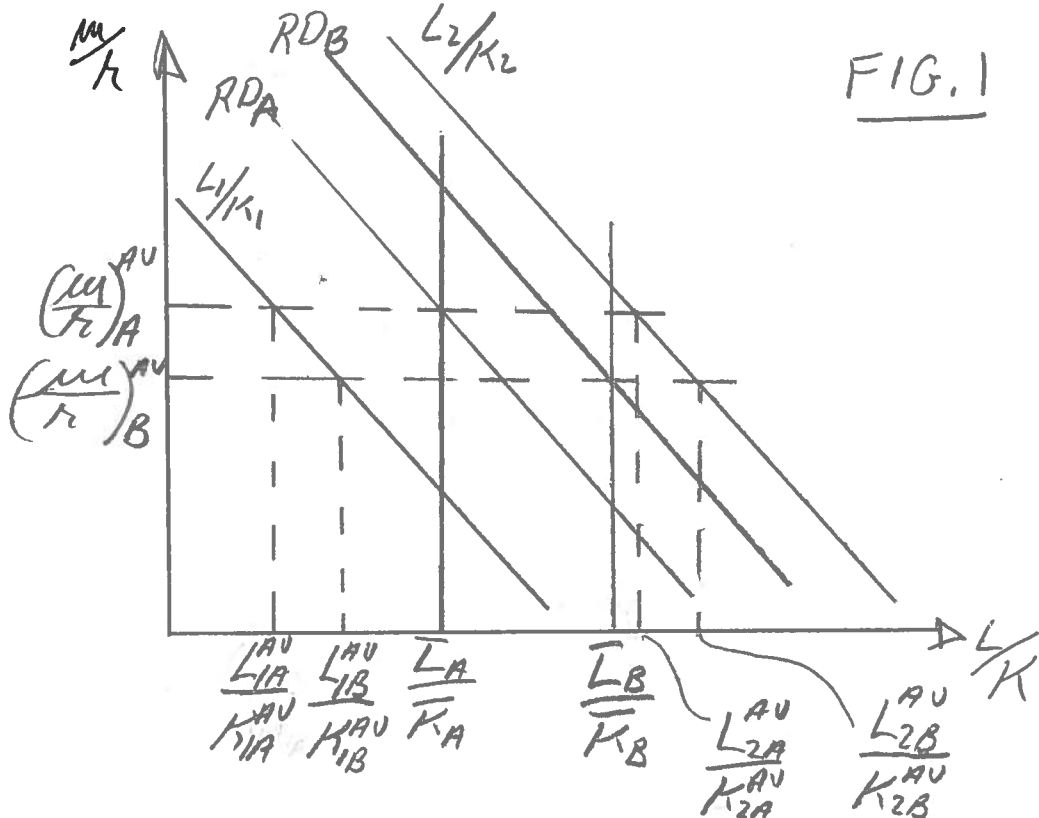
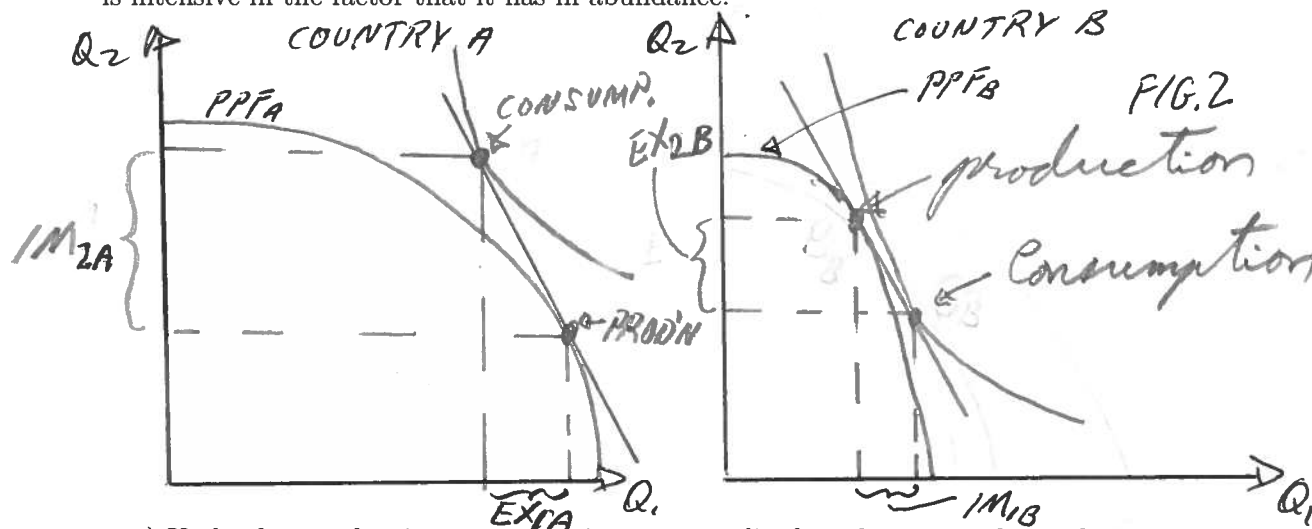


Figure 1 illustrate a case where the equilibrium labor intensity in country A is lower than in country B for both sectors. This implies that the marginal product of labor is higher in country A than country B for both sectors. Since the labor market competitive equilibrium requires that $w = p_1 MPL_1 = p_2 MPL_2$, we have that $MPL_{1A} > MPL_{1B}$ and $MPL_{2A} > MPL_{2B}$ implies $w_A^{AU}/p_{1A}^{AU} > w_B^{AU}/p_{1B}^{AU}$ and $w_A^{AU}/p_{2A}^{AU} > w_B^{AU}/p_{2B}^{AU}$, i.e., real labor wages are higher in country A.

Similarly, since the equilibrium capital intensity in country A is higher than in country B for both sectors, we have $MPK_{1A} < MPK_{1B}$ and $MPK_{2A} < MPK_{2B}$ which implies $r_A^{AU}/p_{1A}^{AU} < r_B^{AU}/p_{1B}^{AU}$ and $r_A^{AU}/p_{2A}^{AU} < r_B^{AU}/p_{2B}^{AU}$, i.e., real capital rental rates are higher in country B.

d) In part (b), we found that in autarky, the relative price of good 1 was higher in country B than country A. This suggests that country A will export good 1 and import good 2, and conversely for country B. This result is consistent with the **Hecksher-Ohlin Theorem** which states that a country will export the good whose production is intensive in the factor that it has in abundance.



e) Under free trade, since output prices are equalized, real wages and rental rates will also be equalized, which corresponds to the concept of **factor price insensitivity**. This result is referred to as the **factor price equalization** effect of trade.

f) Since the trade price must fall in-between each country's autarky price, the relative price of good 1 increases in country A and decreases in country B. According to the **Stolper-Samuelson theorem**, the increase in the price of the capital-intensive good will increase the rental rate of capital in country A and decrease its wage rate. In country B, the increase in the relative price of the labor-intensive good causes an increase in the wage rate while the drop in the relative price of the capital-intensive good causes the capital rental rate to decrease.

N.B. FIG. 2 is not to scale. We should have: $IM_{2A} = EX_{2B}$ and $IM_{1B} = EX_{1A}$.

We therefore have that workers gain from trade in country B but lose in country A. Conversely, capital owners gain from trade in country A and lose in country B.

g) Immigration is often thought as having a wage equalizing effect. Indeed, as workers in low-wage countries move to high-wage countries, the wage drops in the latter and increases in the former. (This argument corresponds to the short-run model of trade.) The results of part (e) suggest that free trade in goods has the same wage equalizing effect. Put differently, the export of labor-intensive goods is equivalent to exporting labor services.

The above result is not very realistic as we do not observe that wages are equalized between trading countries. This could be due to some unrealistic assumptions of the Heckscher-Ohlin model. Indeed, in reality, countries may have different technological levels, some may be less efficient, some goods are non-tradeable, some countries may be fully specialized in the production of some goods and, finally, there may be some tariff barriers.