Heckscher Ohlin Model from Salvatore

7.2 Growth of Factors of Production:

As a nation's population grows, so does its labor force. Additionally, by dedicating resources to produce capital equipment, the nation increases its stock of capital, which encompasses machinery, factories, office buildings, transportation, communication, and the education and training of its labor force. This accumulation of capital greatly enhances the nation's capacity to produce goods and services. For simplicity, we consider labor and capital as homogeneous units, leaving us with two factors—labor (L) and capital (K). We assume that the nation experiencing growth produces two commodities: commodity X, which is labor-intensive, and commodity Y, which is capital-intensive, under constant returns to scale.

7.2A Labor Growth and Capital Accumulation over Time

When the endowment of labor and capital increases over time, the nation's production frontier shifts outward. The type and degree of this shift depend on the growth rates of L and K. If L and K grow at the same rate, the nation's production frontier shifts out evenly in all directions at the rate of factor growth, indicating balanced growth. In this scenario, the slope of the old and new production frontiers remains the same at any point where they are cut by a ray from the origin. If only the endowment of L grows, the output of both commodities increases because L is used in producing both, and L can be substituted for K to some extent. However, the output of commodity X grows faster than that of commodity Y. Conversely, if only the endowment of K grows, the output of commodity Y grows faster than that of commodity X.

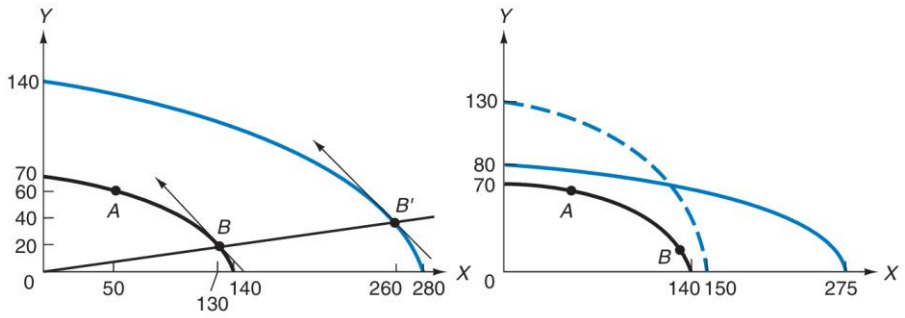

FIGURE 7.1. **Growth of Labor and Capital over Time.**
The left panel shows the case of balanced growth with *L* and *K* doubling under constant returns to scale. The two production frontiers have identical shapes and the same slope, or P_X/P_Y, along any ray from the origin. The right panel shows the case when only *L* or only *K* doubles. When only *L* doubles, the output of commodity X (the *L*-intensive commodity) grows proportionately more than the output of Y (but less than doubles). Similarly, when only *K* doubles, the output of Y grows proportionately more than that of X but less than doubles (see the dashed production frontier).

7.2B The Rybczynski Theorem

The Rybczynski theorem explains the effects of an increase in the endowment of one factor of production on the output of goods in a two-commodity and two-factor economy. Specifically, it states that if the amount of one factor of production increases, the output of

the commodity using that factor intensively will increase, while the output of the other commodity will decrease, assuming constant returns to scale and that commodity prices remain unchanged.

For example, consider an economy that produces two goods: commodity X, which is labor-intensive, and commodity Y, which is capital-intensive. If the endowment of labor (L) increases while the amount of capital (K) remains constant, the production frontier shifts outward unevenly. The increased labor endowment leads to a greater output of the labor-intensive commodity X. Since the amount of capital is unchanged, to maintain production efficiency and maximize output, resources will be reallocated from the capital-intensive commodity Y to the production of the labor-intensive commodity X. Consequently, the output of commodity Y decreases. This theorem illustrates the direct relationship between factor endowments and production outputs, showing how changes in the availability of factors can lead to significant shifts in an economy's production structure. It highlights the importance of factor endowments in determining the comparative advantage and production patterns of nations.

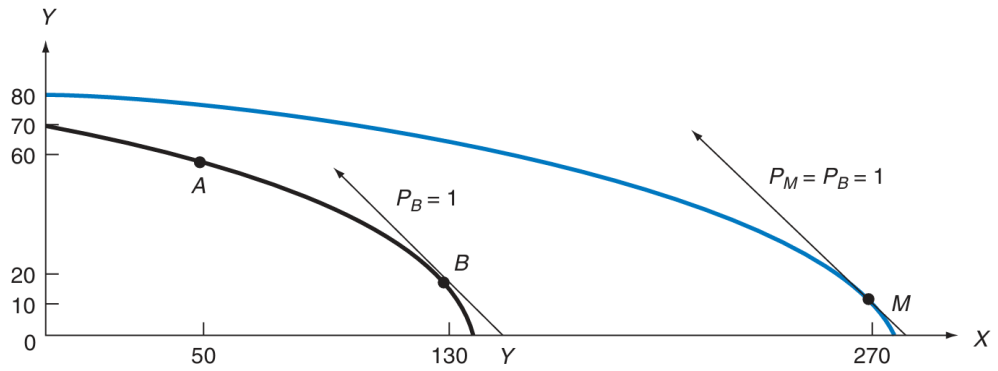

FIGURE 7.2. **The Growth of Labor Only and the Rybczynski Theorem.**
With trade but before growth, Nation 1 produces at point *B* (130X and 20Y) at $P_X/P_Y = P_B = 1$, as in previous chapters. After only *L* doubles and with P_X/P_Y remaining at $P_B = 1$, Nation 1 produces at point *M* (270X and 10Y) on its new and expanded production frontier. Thus, the output of X (the *L*-intensive commodity) expanded, and the output of Y (the *K*-intensive commodity) declined, as postulated by the Rybczynski theorem.

7.5 Growth and Trade: The Large-Country Case

In the case of a large country, the nation is significant enough to influence international prices through its economic growth. This means that growth affects the nation's terms of trade, production, consumption, and overall welfare.

7.5B Immiserizing Growth

Immiserizing growth is a concept introduced by economist Jagdish Bhagwati, which occurs when economic growth could potentially lead to a country being worse off. This paradoxical situation can happen when the adverse effects on the terms of trade outweigh the gains from increased production capacity, resulting in a net loss of welfare for the country.

In the context of a large country, when economic growth leads to a substantial increase in the supply of export goods, the international prices of these goods may fall significantly. If the demand for these export goods is inelastic, the fall in prices could be steep enough to reduce the country's total export revenue. As a result, even though the country can produce and export more goods, the value it receives in return for these goods on the international market decreases disproportionately.

This deterioration in the terms of trade can offset the benefits of economic growth. The country may end up having to export a much larger volume of goods to import the same quantity of goods as before, leading to a reduction in the overall welfare. The increased production and export capacity do not translate into improved living standards or economic welfare for the country.

Immiserizing growth highlights the complexity of international trade and economic growth dynamics, showing that growth does not automatically lead to improved welfare. It underscores the importance of considering the terms of trade and the global demand elasticity for export goods when evaluating the potential benefits of economic growth for a country. This phenomenon is a critical consideration for policymakers aiming to balance growth with favorable trade conditions to ensure that economic progress translates into real welfare gains.

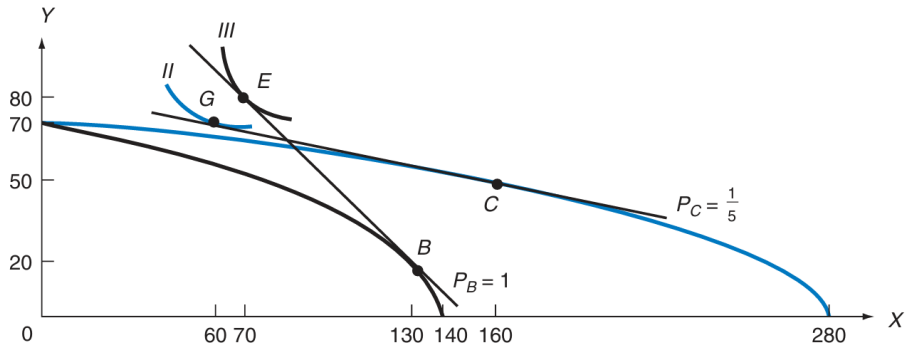

FIGURE 7.6. **Immiserizing Growth.**
This figure reproduces from Figure 7.3 the production frontier of Nation 1 before and after neutral technical progress increased the productivity of *L* and *K* in the production of commodity X only. With this type of technical progress, the wealth effect, by itself, would increase the welfare of Nation 1. However, Nation 1's terms of trade deteriorate drastically from $P_B = 1$ to $P_C = \frac{1}{5}$, so that Nation 1 produces at point *C*, exports 100X for only 20Y, and consumes at point *G* on indifference curve *II* (which is lower than indifference curve *III*, which Nation 1 reached with free trade *before* growth).