Public Affairs 856
Trade, Competition, and Governance in a Global Economy

Lecture 22

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Outline

Topic: The movement of labor across countries and investigate when immigration leads to a fall in wages, as we normally expect.

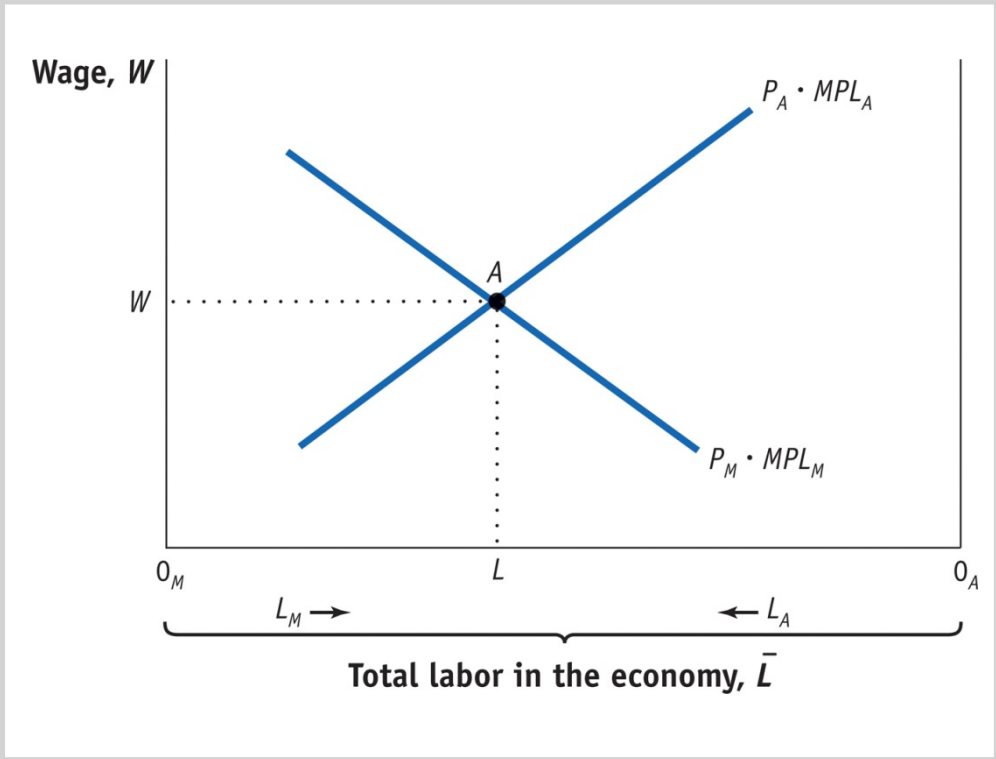
- First, use the **specific-factors model**, the short-run model from Chapter 3.
- Second use the long-run Heckscher-Ohlin model, from Chapter 4, in which capital and land can also move between industries.
- In the long run, an increase in labor *will not* lower the wage, as industries have more time to respond to the inflow of workers.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Short Run: Specific-Factors Model

Determining the Wage

FIGURE 5-1 Home Labor Market



$$L_M + L_A = \bar{L}$$

The Home wage is determined at point *A*, the intersection of the marginal product of labor curves $P_M \cdot MPL_M$ and $P_A \cdot MPL_A$ in manufacturing and agriculture, respectively.

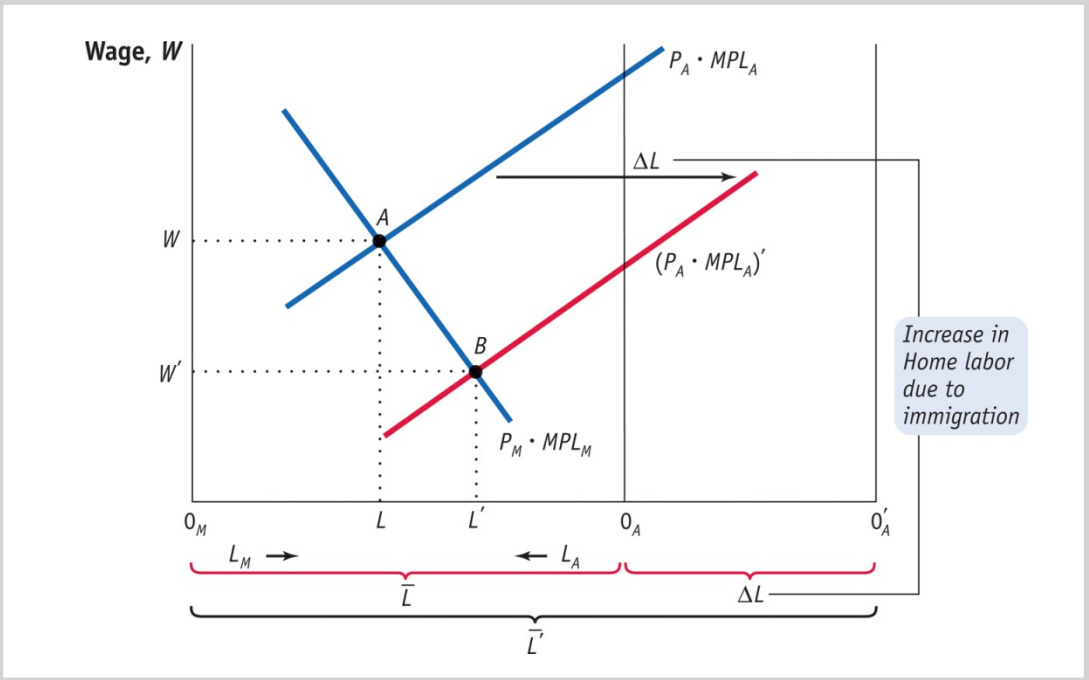
The amount of labor used in manufacturing is measured from left to right, starting at the origin 0_M, and the amount of labor used in agriculture is measured from right to left, starting at the origin 0_A. At point *A*, $0_M L$ units of labor are used in manufacturing and $0_A L$ units of labor are used in agriculture.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Short Run: Specific-Factors Model

Effect of Immigration on the Wage in Home

FIGURE 5-2 Increase in Home Labor



When the amount of labor at Home increases by the amount ΔL, the origin for agriculture shifts to the right by that amount, from 0_A *to* $0_A'$.

The marginal product of labor curve in agriculture also shifts right by the amount ΔL.

Equilibrium in the Home labor market is now at point *B*: wages have fallen to W' and the amount of labor has increased in manufacturing (to $0_M L'$) and in agriculture (to $0'_A L'$).

HEADLINES

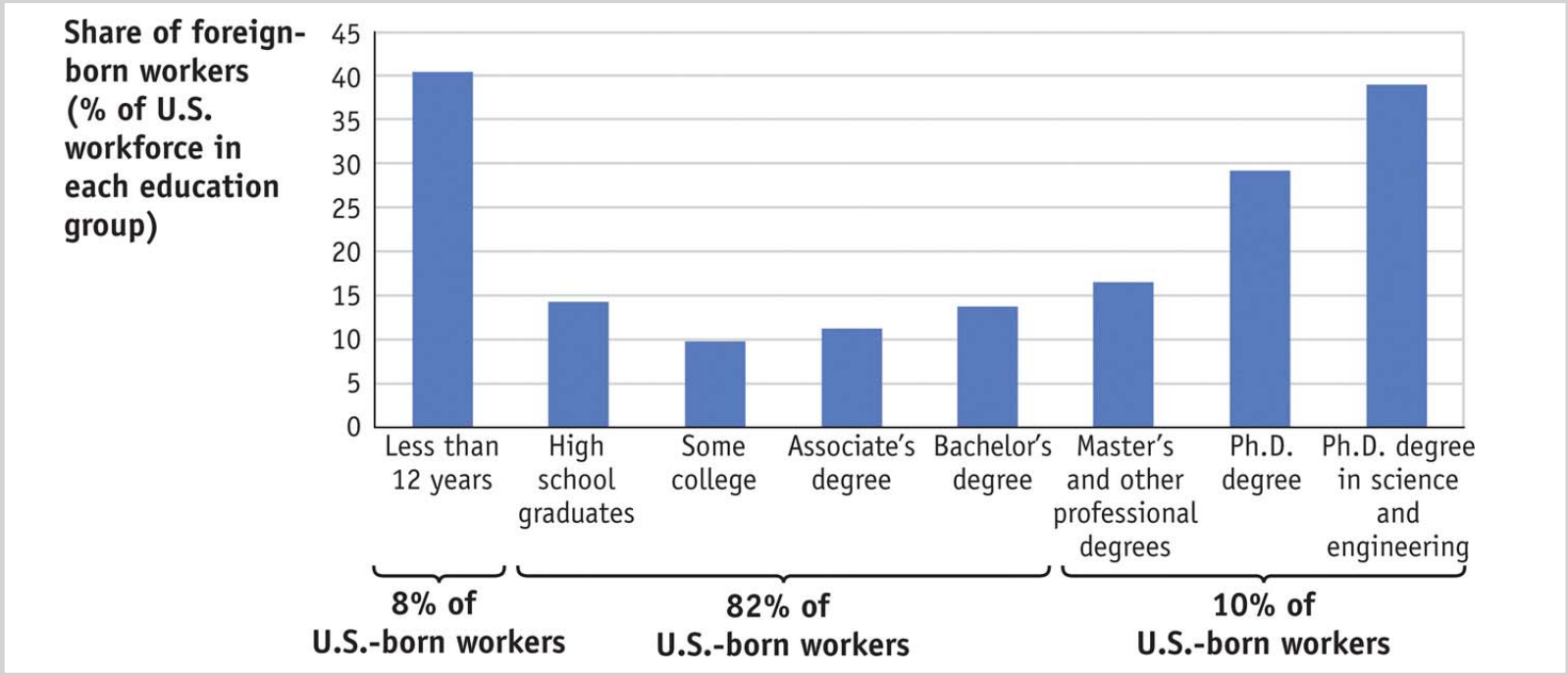
The Economic Windfall of Immigration Reform

- Professor Giovanni Peri discusses three principles that reform should follow. He argues that there are large gains from increasing the supply of highly skilled immigrants to the United States, by allowing firms to bid for temporary work permits.
- He found that foreign scientists and engineers brought into this country under the H1B visa program have contributed to 10-20% of the yearly productivity growth in the U.S. during the period 1990-2010.
- This allowed the GDP per capita to be 4% higher than it would have been without them—that's an aggregate increase of output of $615 billion as of 2010.

APPLICATION

Immigration to the United States and Europe Today

FIGURE 5-4 (3 of 3) Share of Foreign-Born Workers in U.S. Workforce, 2010 (continued)



In the middle educational levels (high school and college graduates), there are much smaller shares of foreign-born workers, ranging from 10% to 15%. In contrast, only about 10% of U.S.-born workers are categorized in each of the low-education and high-education groups.

Other Effects of Immigration in the Short Run

Rentals on Capital and Land

- U.S. and Europe have both welcomed foreign workers in specific industries: agriculture and high-tech.
- They do this even though those foreign workers compete with domestic workers in those industries.
- Therefore there must be benefits to the industries.
- We can measure these potential benefits by the payments to capital and land, called rentals.
- We use the same two measurements for rentals as in Chapter 3.

Other Effects of Immigration in the Short Run

Rentals on Capital and Land

- Under the first method for computing the rentals, we take the revenue earned in either manufacturing or agriculture and subtract the payments to labor.
- If wages fall, then there is more left over as earnings of capital and land, so these rentals are higher.

Other Effects of Immigration in the Short Run

Rentals on Capital and Land

- Under the second method for computing rentals, capital and land earn their marginal product in each industry times the price of the industry's good.
- As more labor is hired in each industry (because wages are lower), the marginal products of capital and land both increase. The increase in the marginal product occurs because each machine or acre of land has more workers available to it, and that machine or acre of land is therefore more productive.
- So under the second method, too, the marginal products of capital and land rise and so do their rentals.

Other Effects of Immigration in the Short Run

Rentals on Capital and Land

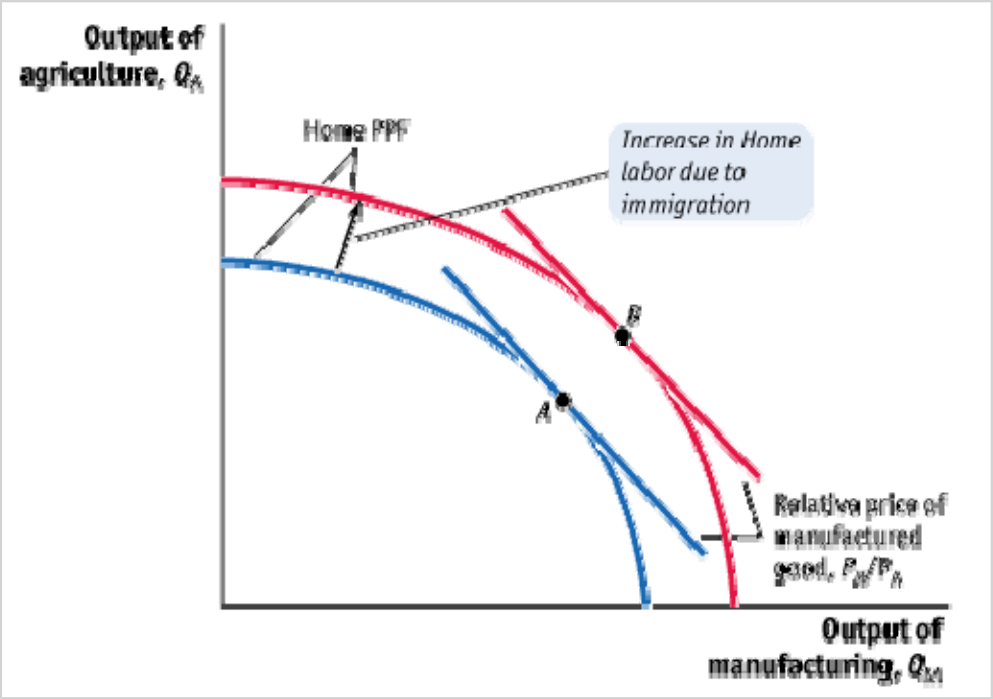
- We should not be surprised that owners of capital and land often support more open borders, which provides them with foreign workers that can be employed in their industries.
- The restriction on immigration in a country should be seen as a compromise between entrepreneurs and landowners who might welcome the foreign labor.
- Local unions and workers who view migrants as a potential source of competition leading to lower wages.
- Immigrant groups themselves, if they are large enough, might also have the ability to influence the political outcome on immigration policy.

1 Movement of Labor Between Countries: Migration

Other Effects of Immigration in the Short Run

Effect of Immigration on Industry Output

FIGURE 5-5 Shift in Home Production Possibilities Curve



With the increase in labor at Home from immigration, the production possibilities frontier shifts outward and the output of both industries increases, from point *A* to point *B*.

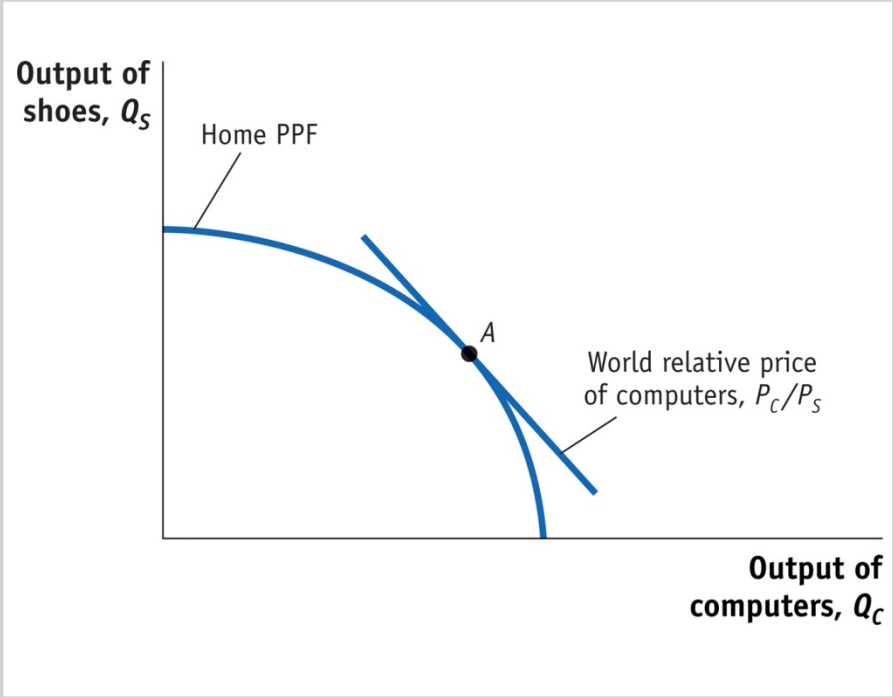
Output in both industries increases because of the short-run nature of the specific-factors model; in the short run, land and capital do not move between the industries, and the extra labor in the economy is shared between both industries.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Effect of Immigration on Industry Outputs

FIGURE 5-6 Production Possibilities Frontier



Shown here is the production possibilities frontier (PPF) between two manufactured goods, computers and shoes, with initial equilibrium at point *A*.

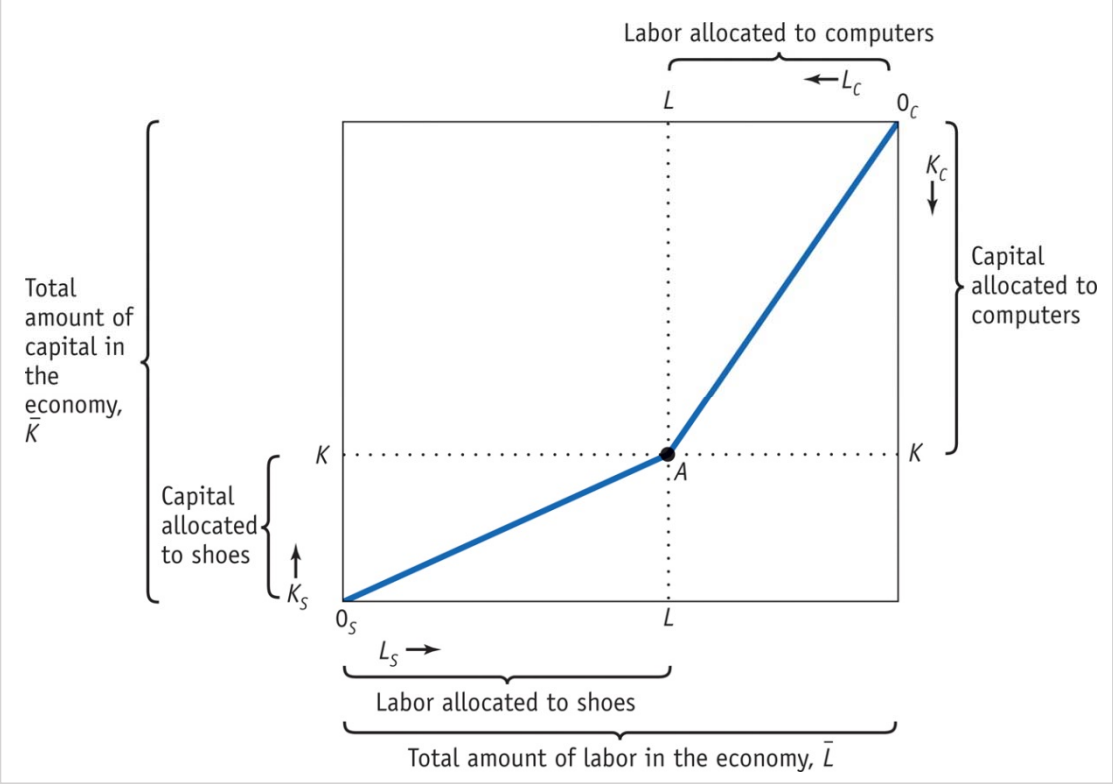
Domestic production takes place at point *A*, which is the point of tangency between the world price line and the PPF.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Effect of Immigration on Industry Output

FIGURE 5-7 Allocation of Labor and Capital in a Box Diagram



The top and bottom axes of the box diagram measure the amount of labor, $\bar{L}$, in the economy, and the side axes measure the amount of capital, $\bar{K}$.

At point A, $0_S L$ units of labor and $0_S K$ units of capital are used in shoe production, and $0_C L$ units of labor and $0_C K$ units of capital are used in computers.

The K/L ratios in the two industries are measured by the slopes of $0_S A$ and $0_C A$, respectively.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Determination of the Real Wage and Real Rental

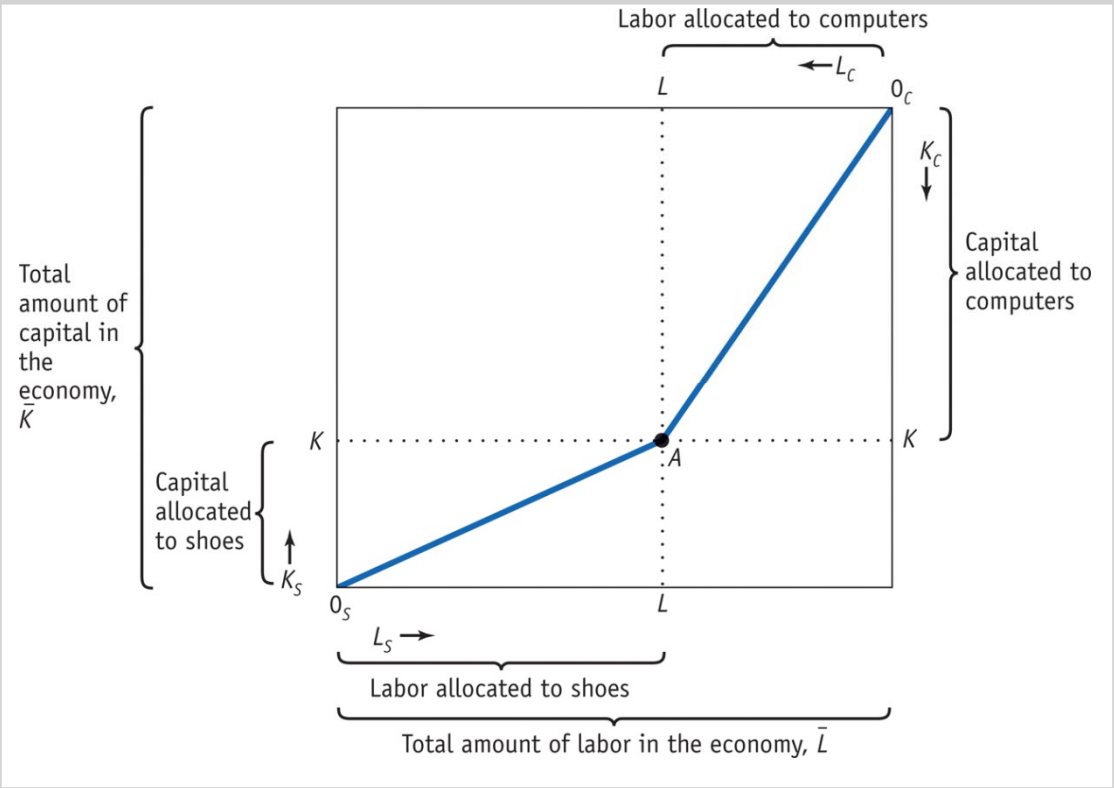
- To determine the wage and rental in the economy, we use the marginal products of labor and capital, *which are determined by the capital-labor ratio in either industry*.
- If there is a higher capital-labor ratio (more machines per worker), then by the law of diminishing returns, the marginal product of capital and the real rental must be lower.
- Having more machines per worker means that the marginal product of labor (and hence the real wage) is higher because each worker is more productive.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Determination of the Real Wage and Real Rental

FIGURE 5-7 (revisited)



Each amount of labor and capital used in Figure 5-7 along line $0_S A$ corresponds to a particular capital-labor ratio for shoe manufacture and therefore a particular real wage and real rental.

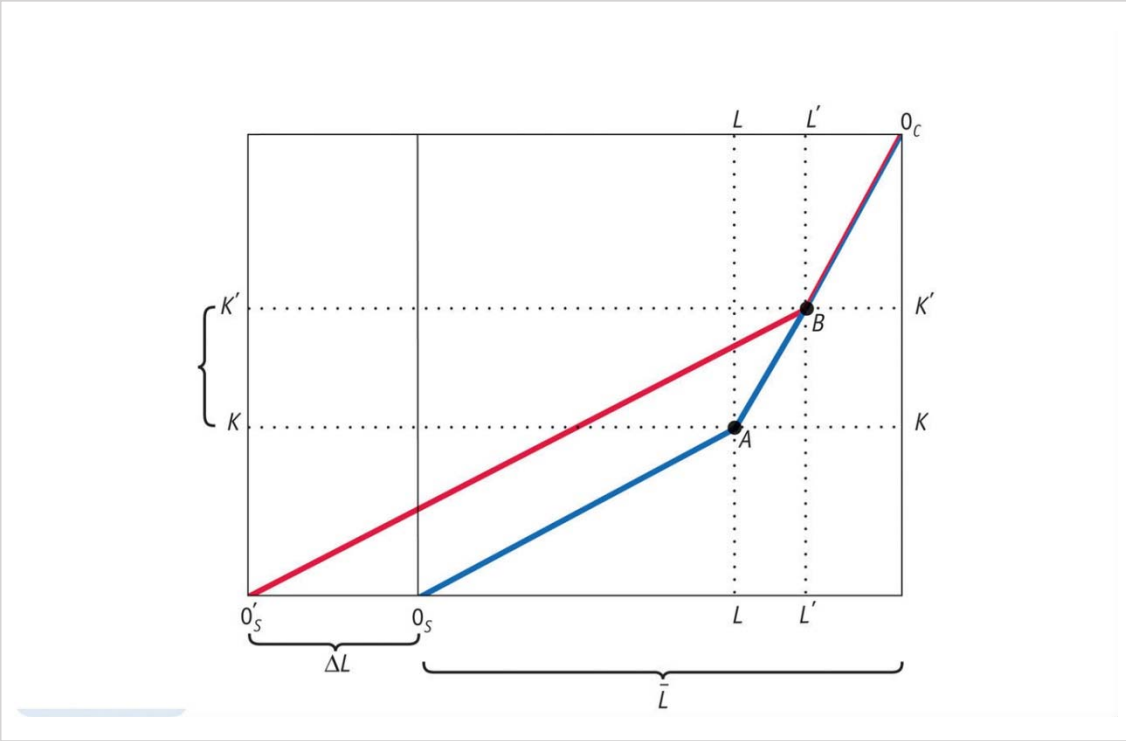
While the total amount of labor and capital used in each industry changes, the capital-labor ratios are unaffected by immigration, which means that the immigrants can be absorbed with no change at all in the real wage and real rental.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Increase in the Amount of Home Labor

FIGURE 5-8 (1 of 2) Increase in Home Labor



With an increase in Home labor from $\bar{L}$ to $\bar{L} + \Delta L$, the origin for the shoe industry shifts from 0_S *to* $0_S'$.

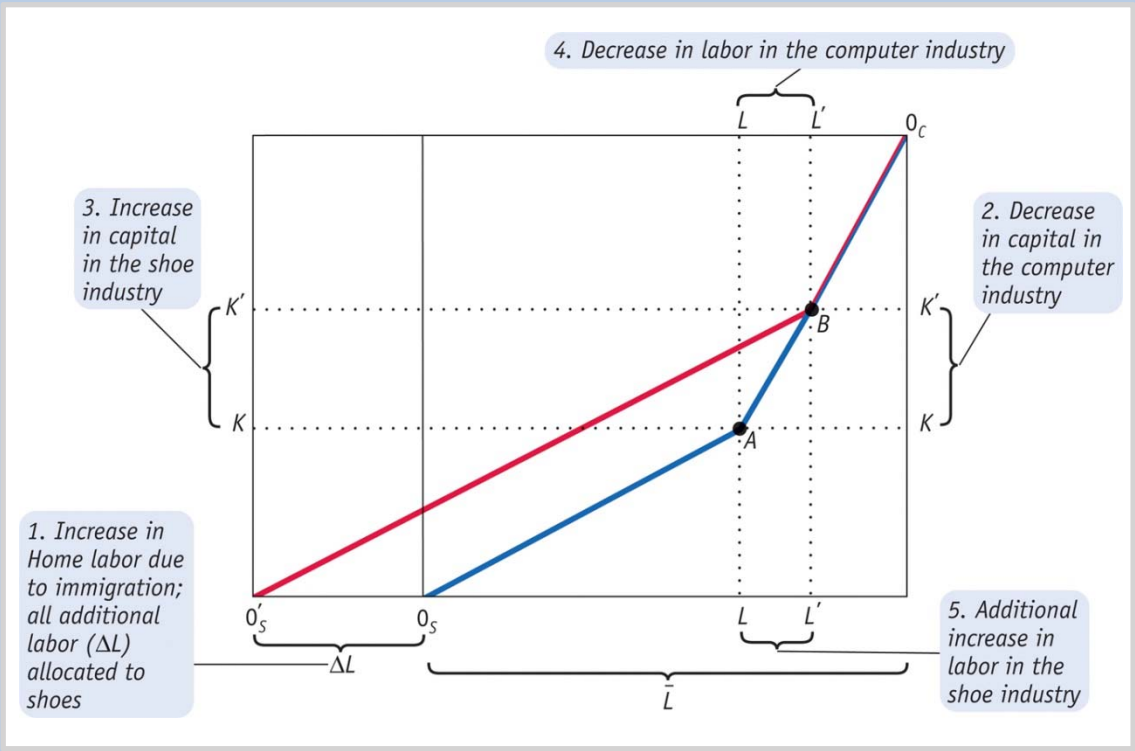
At point *B*, $0'_S L'$ units of labor and $0'_S K'$ units of capital are used in shoes, while $0_C L'$ units of labor and $0_C K'$ units of capital are used in computers.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Increase in the Amount of Home Labor

FIGURE 5-8 (2 of 2) Increase in Home Labor (continued)



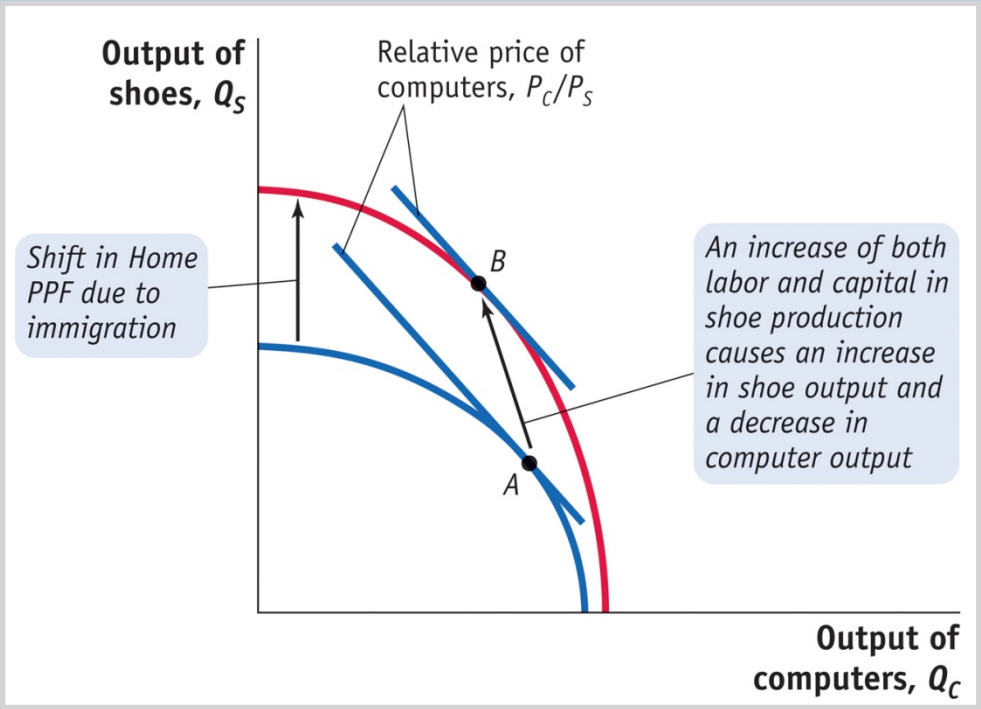
In the long run, industry outputs adjust so that the capital-labor ratios in each industry at point B (the slopes of $0'_S B$ and $0_C B$) are unchanged from the initial equilibrium at point A (the slopes of $0_S A$ and $0_C A$). To achieve this outcome, all new labor resulting from immigration is allocated to the shoe industry, and capital and *additional* labor are transferred from computers to shoes, keeping the capital-labor ratio in both industries unchanged.

1 Movement of Labor Between Countries: Migration

Effects of Immigration in the Long Run

Effect of Immigration on Industry Outputs

FIGURE 5-9 The Long-Run Effect on Industry Outputs of an Increase in Home Labor



With an increase in the amount of labor at Home, the PPF shifts outward.

The output of shoes increases while the output of computers declines as the equilibrium moves from point *A* to *B*.

The prices of goods have not changed, so the slopes of the PPFs at points *A* and *B* (i.e., the relative price of computers) are equal.

The finding that an increase in labor will expand one industry but contract the other holds only in the long run; in the short run, as we saw in Figure 5-5, both industries will expand.

1 Movement of Labor Between Countries: Migration

Rybczynski Theorem

The **Rybczynski theorem** states that, in the Heckscher-Ohlin model with two goods and two factors, 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.

- We have proved the Rybczynski theorem for the case of immigration, where labor in the economy grows.
- Later we will show that the same theorem holds when capital in the economy grows: in this case, the industry using capital intensively expands and the other industry contracts.

1 Movement of Labor Between Countries: Migration

Effect of Immigration on Factor Prices

Factor prices do not need to change as a result of immigration.

- The reason that factor prices do not need to change is that the economy can absorb the extra amount of a factor by increasing the output of the industry using that factor intensively and reducing the output of the other industry.
- The finding that factor prices do not change is sometimes called the factor price insensitivity result.

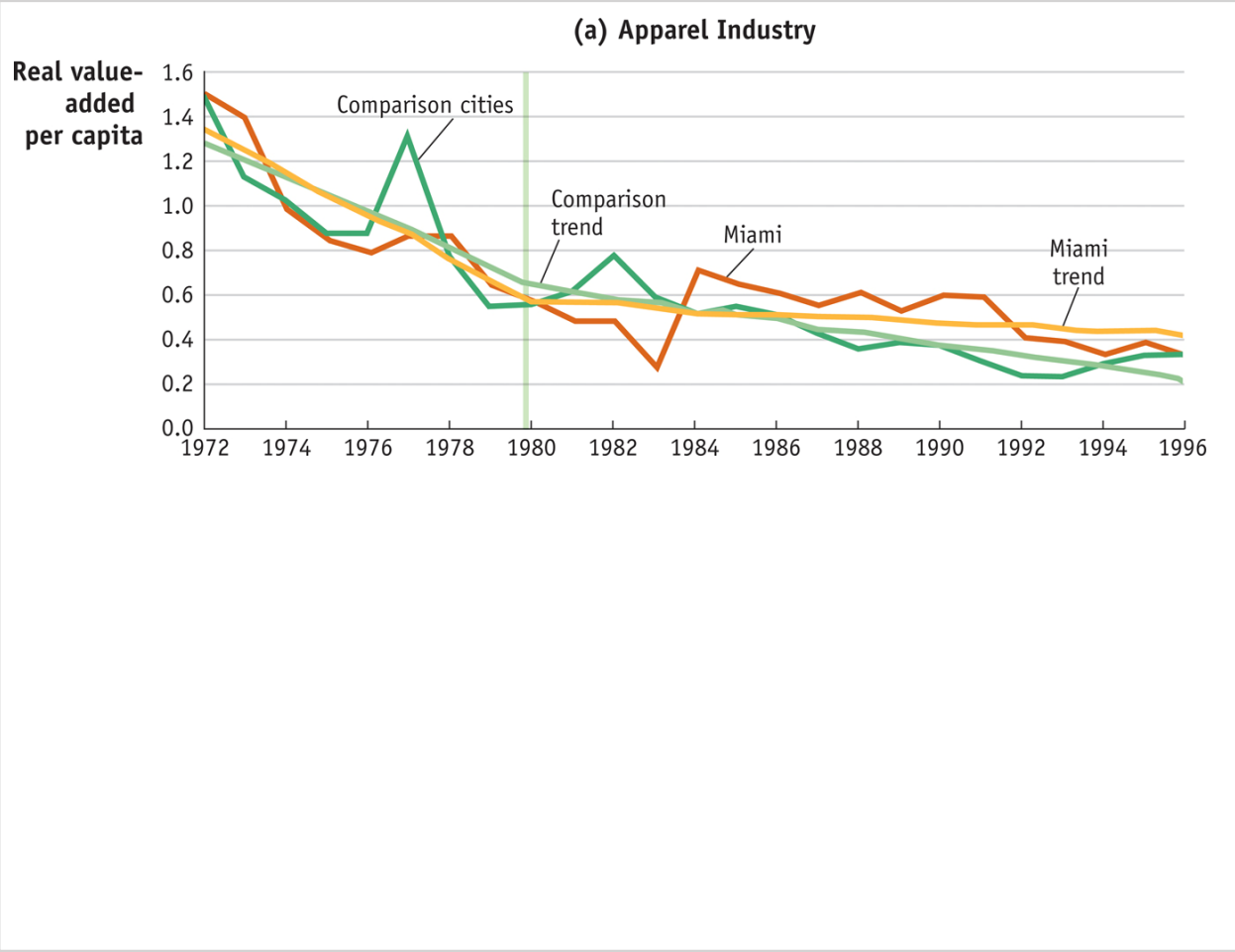
Factor Price Insensitivity Theorem

The **factor price insensitivity theorem** states that: in the HO model with two goods and two factors, an increase in the amount of a factor found in an economy can be absorbed by changing the outputs of the industries, without any change in the factor prices.

APPLICATION

The Effects of the Mariel Boat Lift on Industry Output in Miami

FIGURE 5-10 (1 of 2) Industry Value-Added in Miami

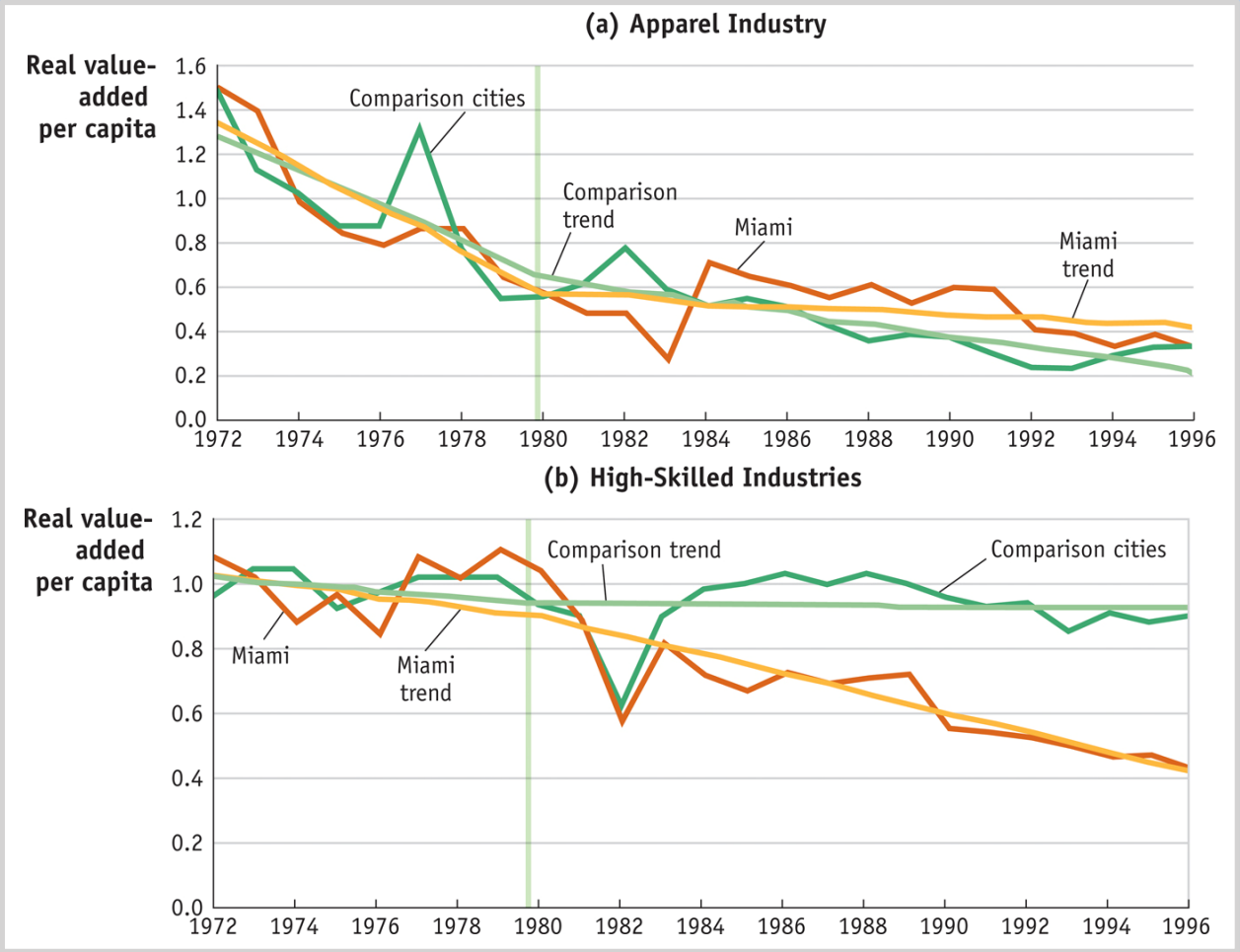


In panel (a), with the inflow of refugees from Cuba in 1980, **real value-added** in the apparel industry in Miami rose from 1983 to 1984, and the trend decline of this industry in Miami was slower (i.e., value-added did not fall as fast) after 1980 than in the comparison cities.

APPLICATION

The Effects of the Mariel Boat Lift on Industry Output in Miami

FIGURE 5-10 (2 of 2) Industry Value-Added in Miami (continued)



In panel (b), real value-added in Miami in high-skilled industries fell faster after 1980 than in the comparison cities. Both of these findings are consistent with the Rybczynski theorem.

APPLICATION

Immigration and U.S. Wages, 1990-2006

TABLE 5-1

Immigration and Wages in the United States This table shows the estimated effect of immigration on the wages of workers, depending on their educational level. Short-run estimates hold capital and land fixed, while long-run estimates allow capital to adjust so that the capital/labor ratio and real rental are constant in the economy. Immigration has the greatest impact on workers with very low or high levels of education and only a small impact on those workers with middle levels of education (12 to 15 years). The impact is even smaller in the long run.

	PERCENTAGE CHANGE IN THE WAGE OF WORKERS WITH EDUCATIONAL LEVEL				
	Less Than 12 Years	High School Graduate	Some College	College Graduates	Overall Average
Part A: Effect of Immigration on All U.S. Workers					
Method:					
Short run	−7.8	−2.2	−0.9	−4.7	−3.0
Long run	−4.7	0.9	2.2	−1.7	0.1
Part B: Long-Run Effect of Immigration, by Type of Worker					
Type of Worker:					
U.S. born	0.3	0.4	0.9	0.5	0.6
Foreign born	−4.9	−7.0	−4.0	−8.1	−6.4

2 Movement of Capital Between Countries: Foreign Direct Investment

Direct Investment

We continue our examination of what happens to wages and rentals when factors can move across borders by considering the effect of changes in the capital stock.

- We turn now to look at how capital can move from one country to another through foreign direct investment (FDI).
- FDI occurs when a firm from one country owns a company in another country.
- According to the Department of Commerce, if a foreign company acquires 10% or more of a U.S. firm, that is counted as an FDI inflow to the United States, and if a U.S. company acquires 10% or more of a foreign firm, that is counted as an FDI outflow for the United States.

2 Movement of Capital Between Countries: Foreign Direct Investment

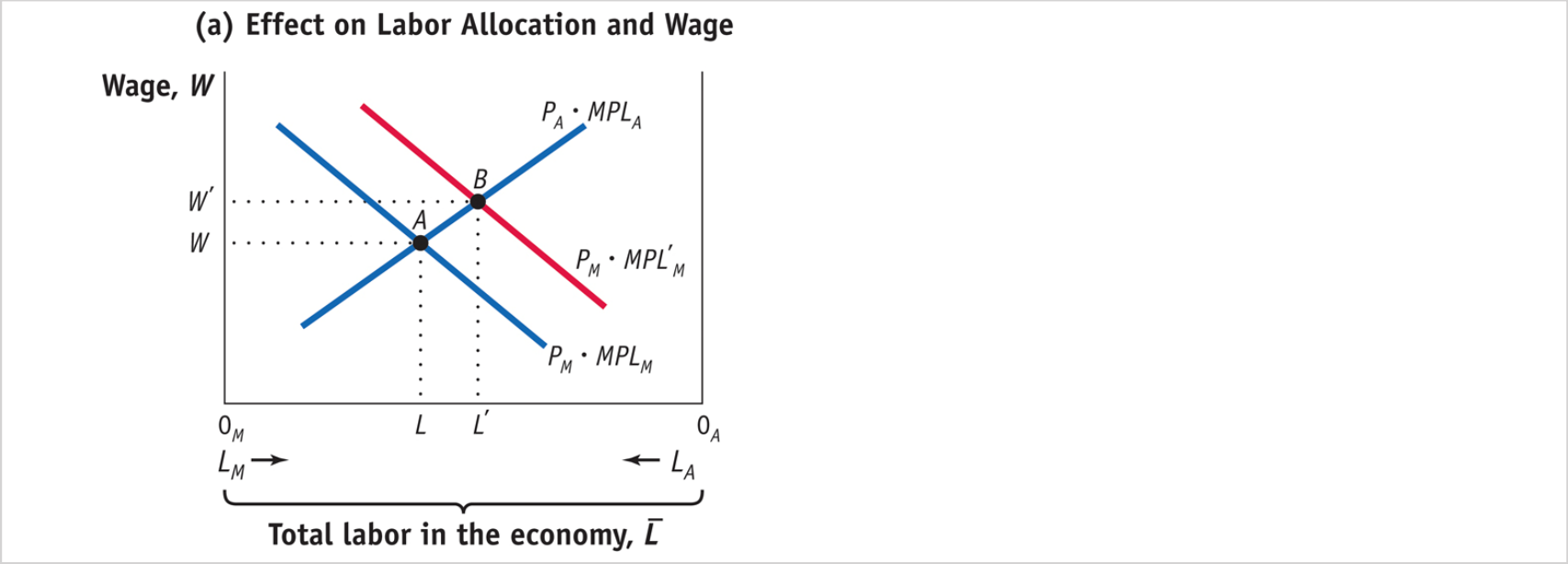
Greenfield Investment

- Our focus in this section will be on Greenfield investment, that is, the building of new plants abroad.
- We model FDI as a movement of capital between countries, just as we modeled the movement of labor between countries.
- The key question we ask is: How does the movement of capital into a country affect the earnings of labor and capital there?
- This question is similar to the one we asked for immigration, so the earlier graphs that we developed can be modified to address FDI.

2 Movement of Capital Between Countries: Foreign Direct Investment

FDI in the Short Run: Specific-Factors Model

FIGURE 5-11 (1 of 2) Increase in the Capital Stock in the Short Run



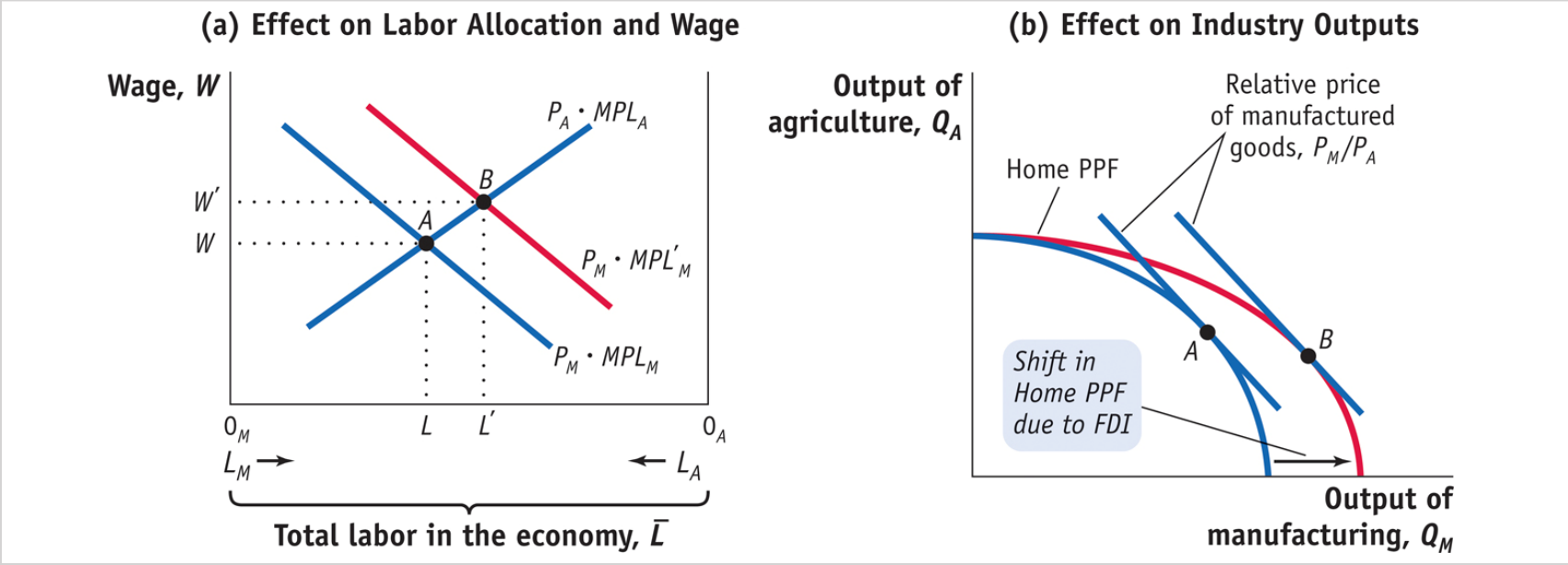
In panel (a), an inflow of capital into the manufacturing sector shifts out the marginal product of labor curve in that sector.

The equilibrium in the labor market moves from point *A* to *B*, and the wage increases from *W* to *W′*. Labor used in the manufacturing industry increases from $0_M L$ *to* $0_M L'$. These workers are pulled out of agriculture, so the labor used there shrinks from $0_A L$ *to* $0_A L'$.

2 Movement of Capital Between Countries: Foreign Direct Investment

FDI in the Short Run: Specific-Factors Model

FIGURE 5-11 (2 of 2) Increase in the Capital Stock in the Short Run (continued)



In panel (b), with the inflow of capital into manufacturing, and the extra labor used in that sector, the output of manufacturing increases.

Because labor has been drawn out of agriculture, the output of that sector falls. These changes in outputs are shown by the outward shift of the PPF (due to the increase in capital) and the movement from point *A* to point *B*.

2 Movement of Capital Between Countries: Foreign Direct Investment

FDI in the Short Run: Specific-Factors Model

Effect of FDI on the Wage

- As a result of the shift in $P_M \bullet MPL_M$, the equilibrium *wage increases*, from W to W'. More workers are drawn into the manufacturing industry, and the labor used there increases.

Effect of FDI on the Industry Outputs

- An FDI inflow and the shift in $P_M \bullet MPL_M$ will cause workers to be pulled out of agriculture, and since there is no change in the amount of land used there, *output of the agriculture industry must fall*.
- Since both capital and labor used in manufacturing increases, *output in manufacturing also increases*.

2 Movement of Capital Between Countries: Foreign Direct Investment

FDI in the Short Run: Specific-Factors Model

Effect of FDI on the Rentals

- With regard to the rental on land, we know that with an inflow of FDI, fewer workers are employed in agriculture, and each acre of land cannot be used as intensively.
- The value of marginal product of land, $R_K = P_A \bullet MPT_A$, falls.
- If MPT_A falls and P_A remains unchanged, then land rental must fall.
- One way to measure the impact of FDI on the rental of capital is by the value of the marginal product of capital, or $R_K = P_M \bullet MPK_M$. However, using this method is difficult to determine how the rental on capital changes.