

# 1- Migration and FDI in the HO model

Now, we will study migration and FDI (foreign direct investment) using a trade perspective.

This new chapter is actually based on the H-O model

Migration = Increase in the supply of labor (L)

FDI = Increase in the supply of capital (K)

But let's begin by reviewing the basics...

# 1- Migration and FDI in the HO model

## Rental rate and wages

### With one good:

- an increase in “L” leads to a decrease in  $W/P = MPL$  and an increase in  $R/P = MPK$
- an increase in “K” leads to a decrease in  $R/P = MPK$  and an increase in  $W/P = MPL$

### Without trade:

- Same effects

# 1- Migration and FDI in the HO model

## Rental rate and wages

NOW: with trade, mobile factors and two goods?

These conclusions **do not hold** within the Heckscher-Ohlin framework when factors (K and L) are all **mobile across sectors** (i.e. in the long term) and with **free trade**.

# 1- Migration and FDI in the HO model

Within the Heckscher-Ohlin framework:

- **What happens when a factor becomes more abundant?**  
(i.e. what happens when we increase the supply of a factor?)

- Effect on earnings?
- Effect on factor intensity?
- Effect on production?
- Exports and imports?

Here we assume:

- Free trade
- World prices do not change

# 1- Migration and FDI in the HO model

## Rental rate and wages

Let's start with earning, i.e. the rental rate and wages

# 1- Migration and FDI in the HO model

## Rental rate and wages

- Suppose that the economy is not fully specialized (i.e. produces both Shoes and Computers)
- At equilibrium, prices should equal the cost of inputs (wages and rental rate) multiplied by how much labor and capital you need:

$$(K_S/Y_S) \cdot R + (L_S/Y_S) \cdot W = P_S$$

$$(K_C/Y_C) \cdot R + (L_C/Y_C) \cdot W = P_C$$

- Where  $(K_C/Y_C)$  is the unit requirements in K
- Where  $(L_C/Y_C)$  is the unit requirements in L:

**Note:  $(K_C/Y_C)$  and  $(L_C/Y_C)$  only depend on  $W/R$**

# 1- Migration and FDI in the HO model

## Rental rate and wages

- At equilibrium:

$$(K_S/Y_S) \cdot R + (L_S/Y_S) \cdot W = P_S$$

$$(K_C/Y_C) \cdot R + (L_C/Y_C) \cdot W = P_C$$

Where  $(K_S/Y_S)$  and  $(L_S/Y_S)$  are functions of  $R/W$   
 $(K_C/Y_C)$  and  $(L_C/Y_C)$  are functions of  $R/W$

- 2 unknowns, 2 equations:  
→ **Prices determine R and W**

# 1- Migration and FDI in the HO model

## Rental rate and wages

- At equilibrium:

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- 2 unknowns, 2 equations:  
→ **Prices determine R and W**
- Supply of  $\bar{K}$  and  $\bar{L}$  does not affect R and W:  
→ **FDI and Migration do not affect R and W!!**



# 1- Migration and FDI in the HO model

## Rental rate and wages

- Prices determine R and W
- R and W do not depend on K and L.
- No changes in prices → No change in R and W!!  
*(even if population or K stock in the economy change)*

This result is called the **factor price insensitivity**:

*With free trade and constant world prices (and without full specialization), the earnings from capital and labor do not depend on the supply of capital and labor*

# 1- Migration and FDI in the HO model

Effect on factor intensity?

Does migration or FDI affect capital intensity in each sector?

# 1- Migration and FDI in the HO model

## Effect on factor intensity?

Does migration or FDI affect capital intensity in each sector?

- Since there is no changes in rental rate and wages, there is no change in factor intensity

(factor intensity is determined by technology and  $w/r$ )

# 1- Migration and FDI in the HO model

No effect on K intensity: how is that possible?

Q: if the supply of a factor increases (FDI or migration), why the price of that factor does not decrease?

- With free trade, production in each industry adjusts and the demand for that factor also adjusts.

# 1- Migration and FDI in the HO model

Relative demand and supply of labor:

$$\frac{\bar{L}}{\bar{K}} = \frac{L_C}{K_C} \cdot \left( \frac{K_C}{\bar{K}} \right) + \frac{L_S}{K_S} \cdot \left( \frac{K_S}{\bar{K}} \right)$$

Imagine that either  $\bar{L}$  or  $\bar{K}$  changes. This could be due to migration or FDI.

**Question: is it possible for the economy to adjust WITHOUT a change in factor prices?**

# 1- Migration and FDI in the HO model

Relative demand and supply of labor:

$$\frac{\bar{L}}{\bar{K}} = \frac{L_C}{K_C} \cdot \left( \frac{K_C}{\bar{K}} \right) + \frac{L_S}{K_S} \cdot \left( \frac{K_S}{\bar{K}} \right)$$

If factor prices do not adjust then the labor-capital ratios do not change in either industry. How can relative demand (right-hand side) adjust to match adjustment in supply (left-hand side) caused by migration or FDI?

**By having a change in the size of the industries!**

Migration implies an increase in  $\bar{L} / \bar{K}$ . This can be matched on the right hand side by an increase in  $K_S / \bar{K}$  ***with no change in the labor to capital ratio in either industry.***

# 1- Migration and FDI in the HO model

Relative demand and supply of labor:

**Example: Migration:**

$$\frac{\bar{L}}{\bar{K}} = \frac{L_C}{K_C} \cdot \left( \frac{K_C}{\bar{K}} \right) + \frac{L_S}{K_S} \cdot \left( \frac{K_S}{\bar{K}} \right)$$

(+      (=)      (-)      (+)      (=)      (+)

- Increase in:  $\bar{L} / \bar{K}$ ,  $K_S / \bar{K}$
- Decrease in:  $K_C / \bar{K}$
- No change in:  $L_C / K_C$ ,  $L_S / K_S$

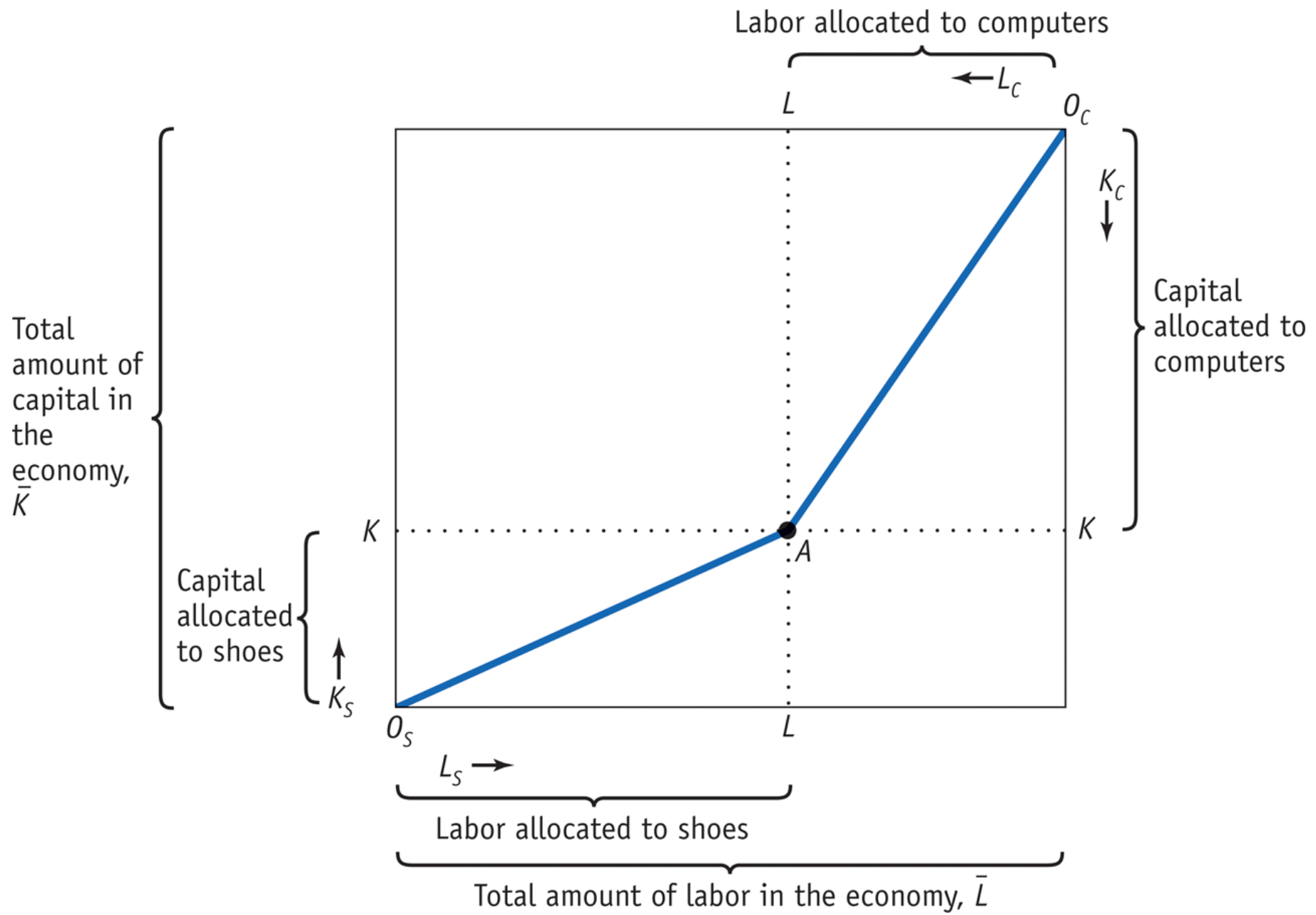
# 1- Migration and FDI in the HO model

## Effect on production

Next graph:

- K stock on Y-axis
- Labor force on X-axis

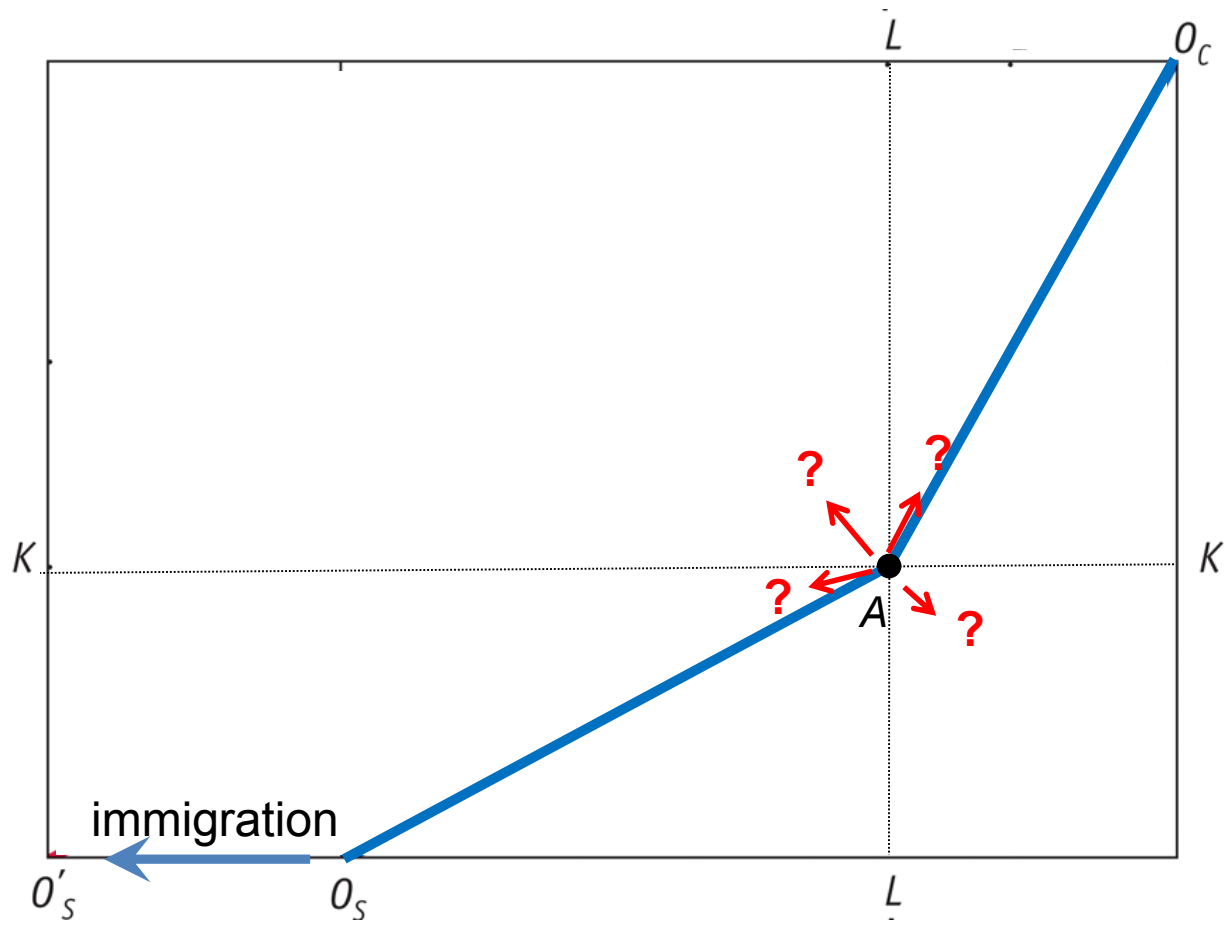




# 1- Migration and FDI in the HO model

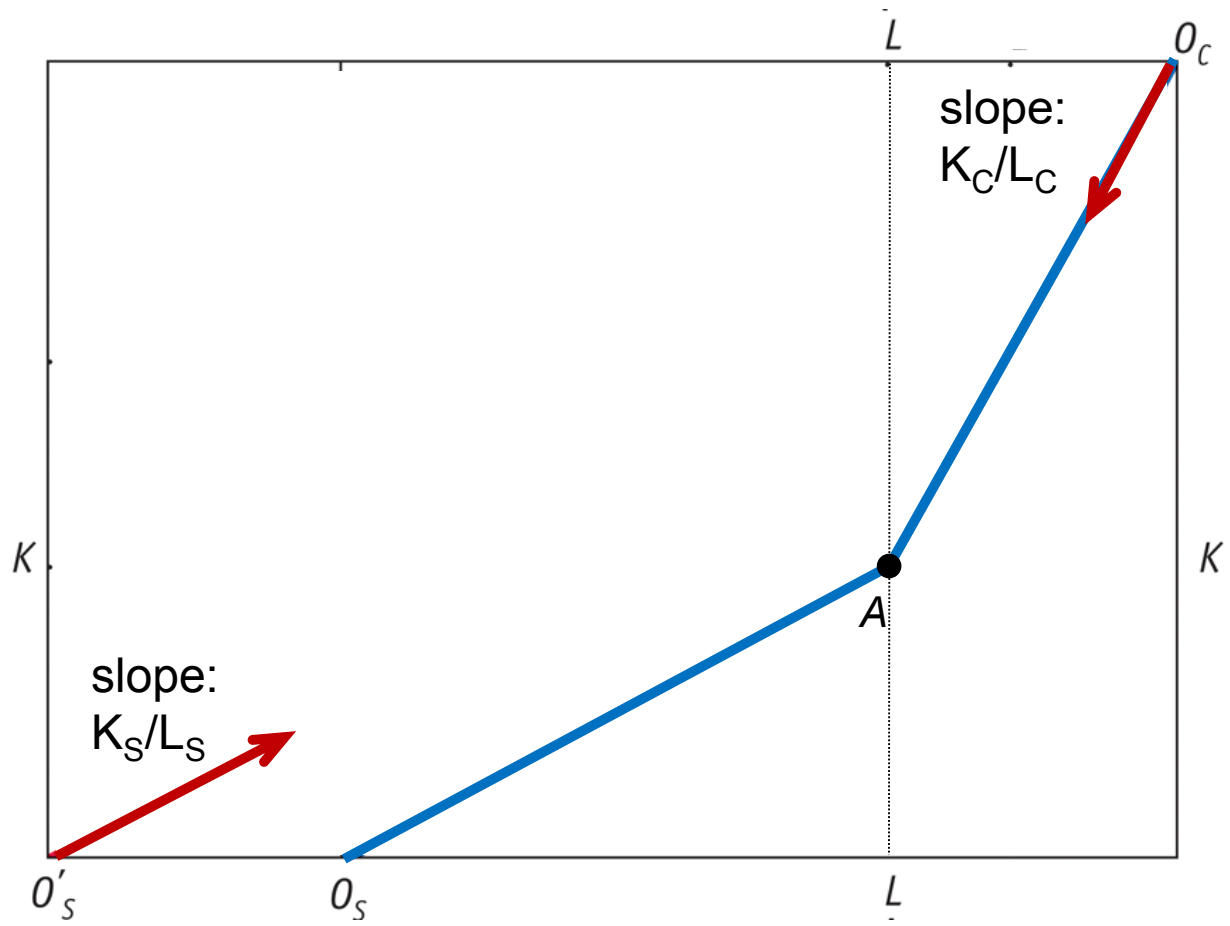
## Effect on production

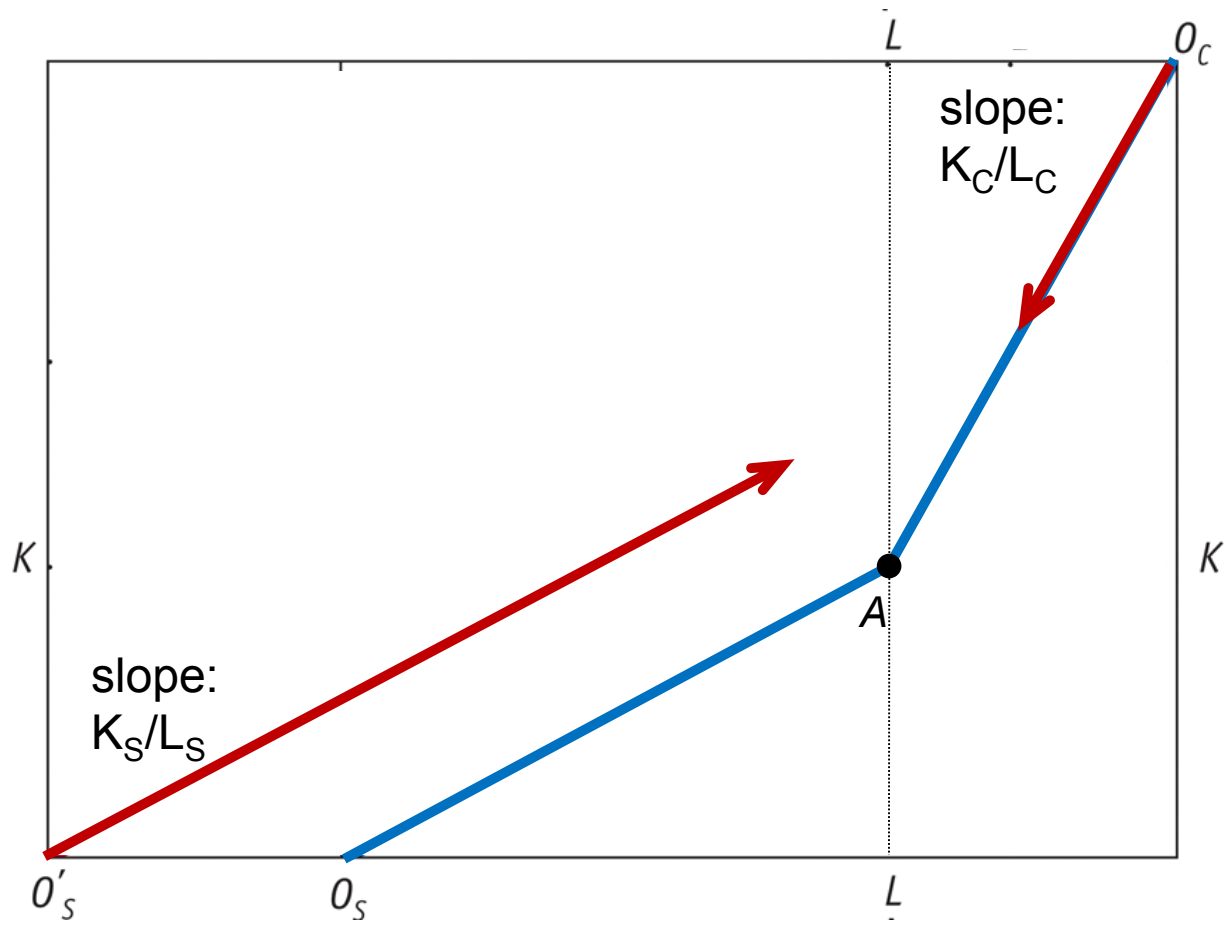
- Slope = capital intensity  
(the computer industry uses relatively more K than L)
  - Now, suppose that the **supply of labor increases**  
(i.e. migration, population increase)
- Graph: the box becomes wider but not taller



Migration:

In the HO framework, suppose that the world prices do not change, but the supply of workers increases:





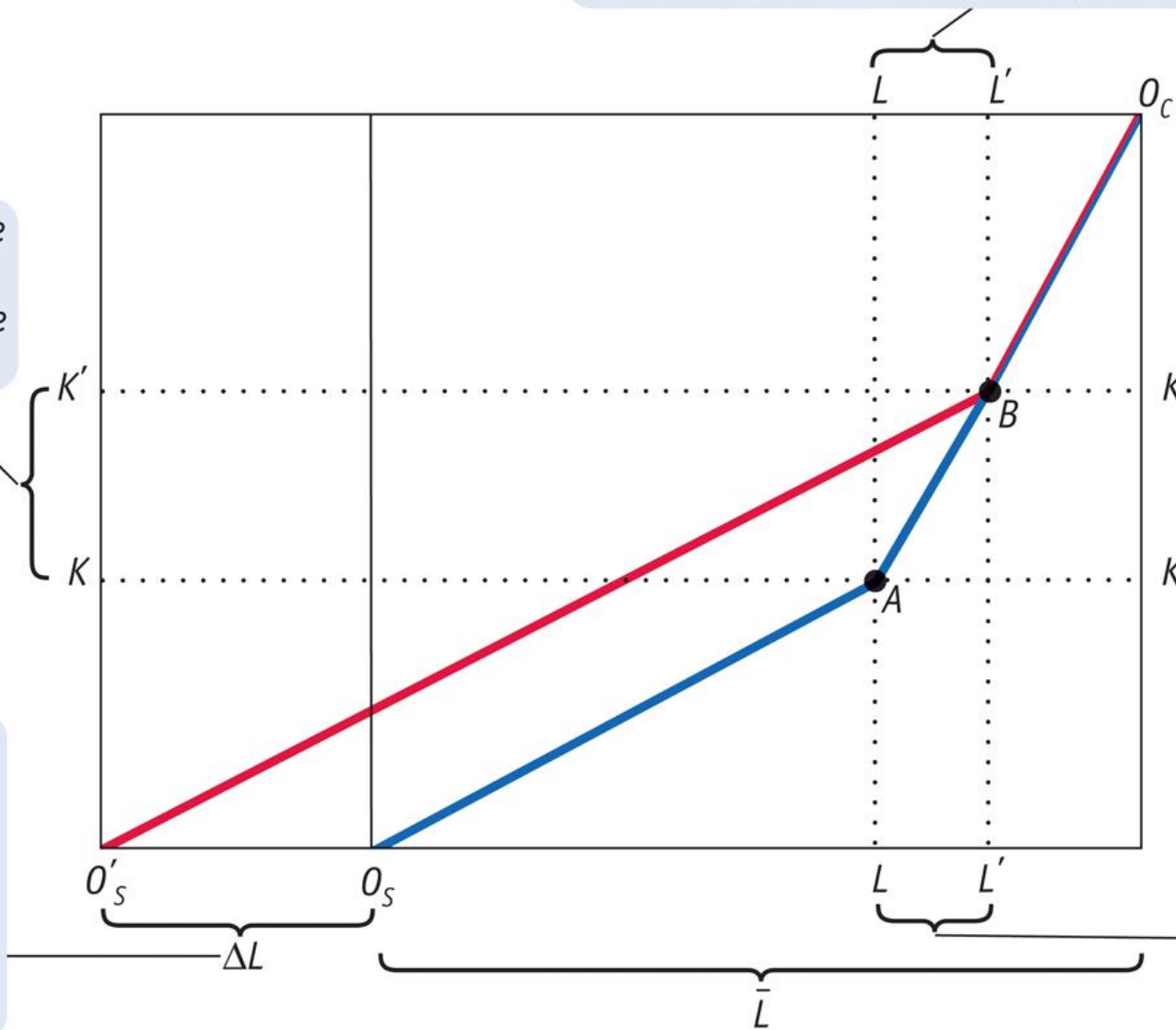
4. Decrease in labor in the computer industry

3. Increase in capital in the shoe industry

2. Decrease in capital in the computer industry

1. Increase in Home labor due to immigration; all additional labor ( $\Delta L$ ) allocated to shoes

5. Additional increase in labor in the shoe industry



# 1- Migration and FDI in the HO model

## Effect on production

- When the supply of labor increases (e.g. immigration):

→ Production in the shoe industry increases

→ Production in the computer industry **decreases**

*and the overall demand for  $K$  does not change*

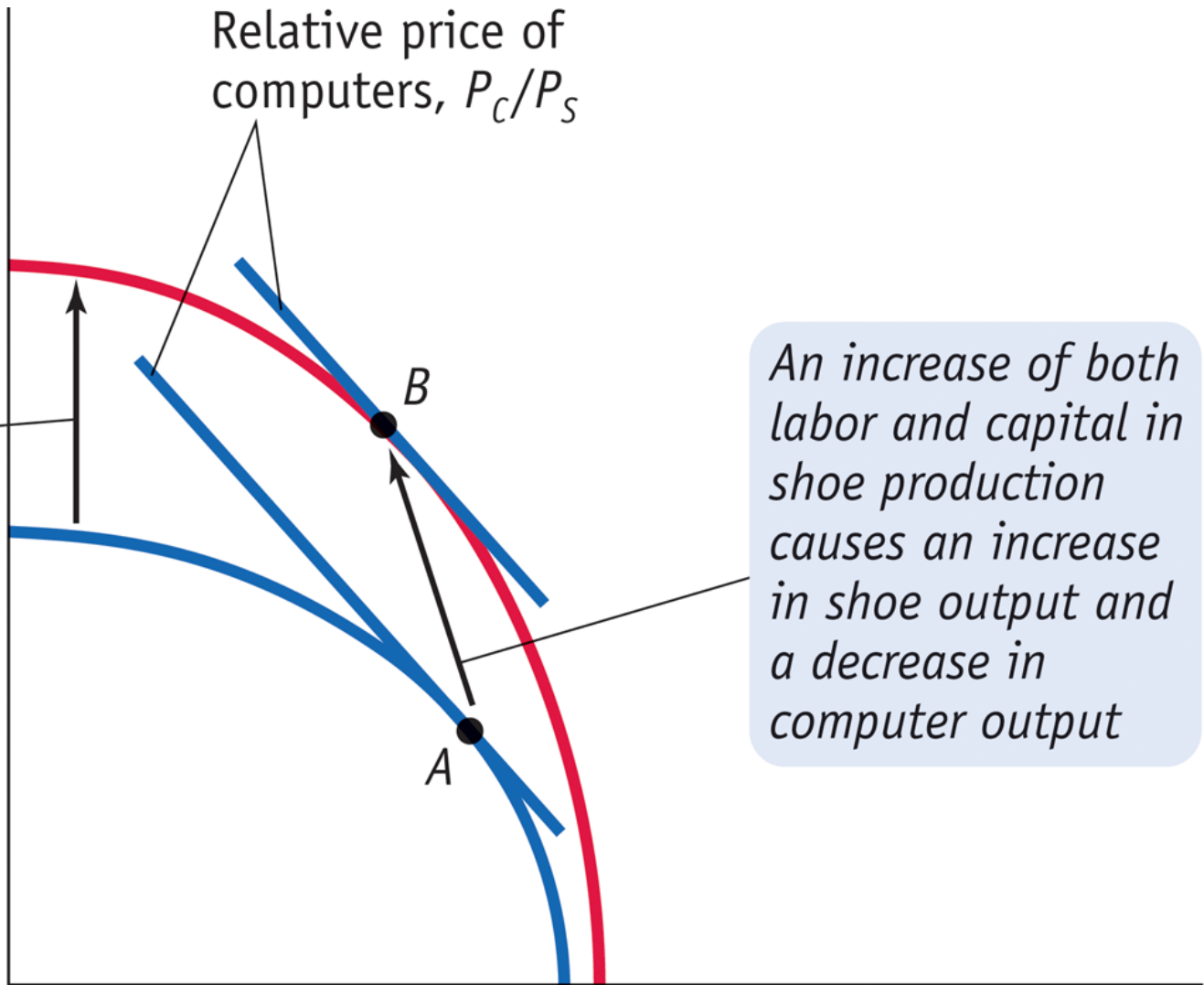


**Output of shoes,  $Q_S$**

Relative price of computers,  $P_C/P_S$

*Shift in Home PPF due to immigration*

*An increase of both labor and capital in shoe production causes an increase in shoe output and a decrease in computer output*



**Output of computers,  $Q_C$**

# 1- Migration and FDI in the HO model

## Effect on production

- When the supply of K increases (e.g. FDI):
  - ➔ Production in the computer industry increases
  - ➔ Production in the shoe industry decreases

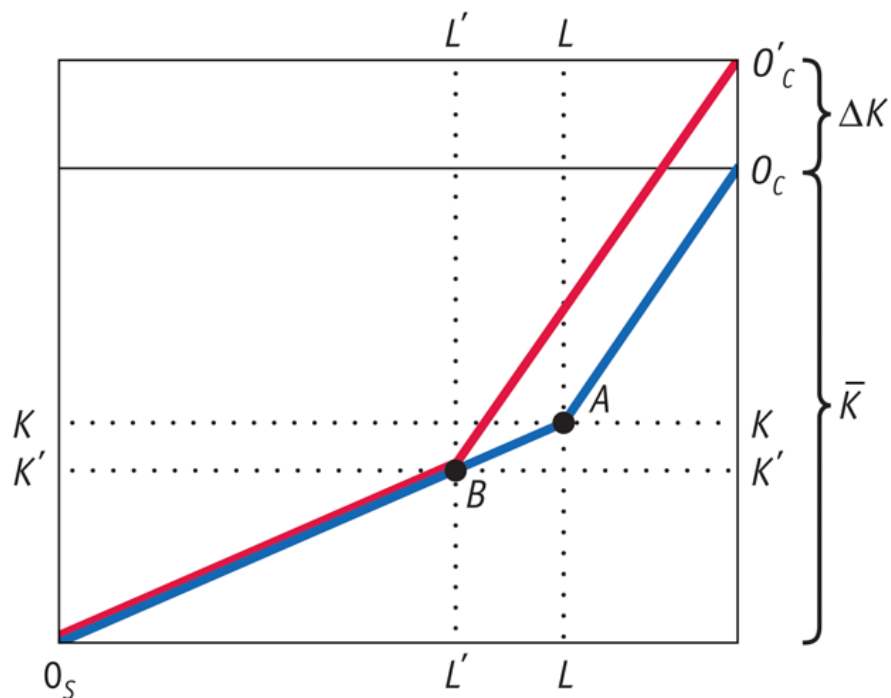
*and the overall demand for labor does not change*

# 1- Migration and FDI in the HO model

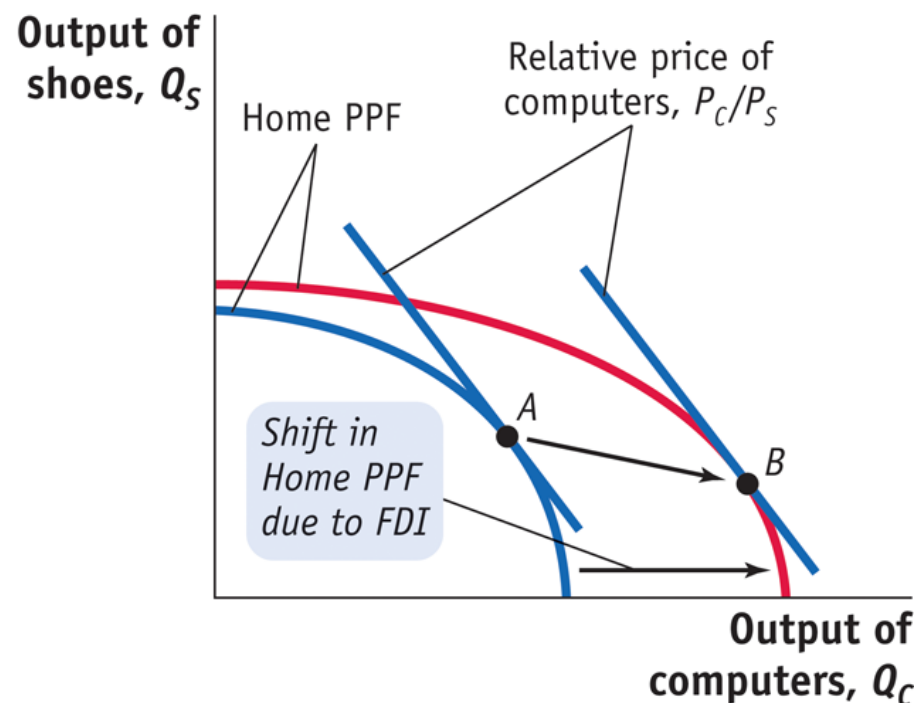
When the supply of  $K$  increases (e.g. FDI):

- Production in the computer industry increases
- Production in the shoe industry decreases

(a) Effect on the Allocation of Labor and Capital



(b) Effect on Industry Outputs



# 1- Migration and FDI in the HO model

## Rybczynski Theorem

In the Heckscher-Ohlin model with two goods and two factors:

- an increase in the supply of a factor will increase the output of the industry using that factor intensively
- and **decrease** the output of the other industry.

# 1- Migration and FDI in the HO model

**A key assumption: prices do not change**

Question: what would happen if prices change?

- As  $L$  increases there is an expansion in the shoe industry and a contraction in the computer industry.
- If the economy is large enough to have an effect on prices, then relative price of shoes would fall, which would hurt workers and benefit capitalists (Stolper-Samuelson theorem).
- This is the same conclusion as in autarky. This effect gets smaller as the economy becomes integrated in the world economy.

# Conclusion:

## FDI and migration in HO model

### Earnings:

- Factor prices (rental rates and wages) *do not change* as a result of a change in the supply of capital or labor (*factor prices insensitivity*) in HO model with trade.
- Hence, nominal and real earnings are not affected by a change in the supply of labor or capital

### Production:

- *Rybczynski Theorem*: an increase in the supply of a factor will increase the output of the industry using that factor intensively and decrease the output of the other industry.

## 2- Migration and FDI – data and facts

### **In the data**

- 1) Some facts on migration
- 2) Some facts on FDI

## 2- Migration and FDI – data and facts

### In the data

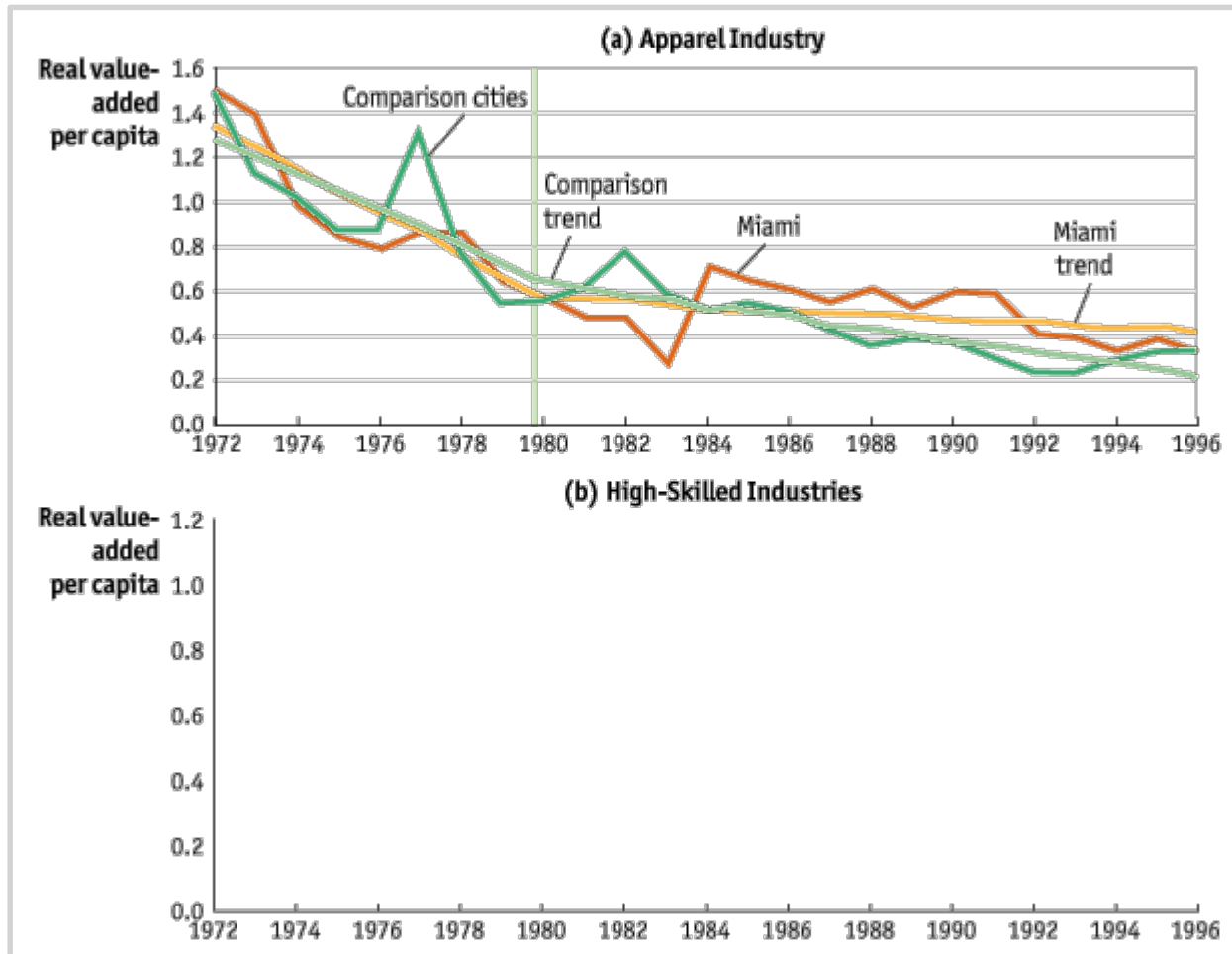
- Facts on migration
  - 1. Example: Mariel Boat lift and implications**
  2. Composition by skill
  3. Effect on wages



# APPLICATION

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

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

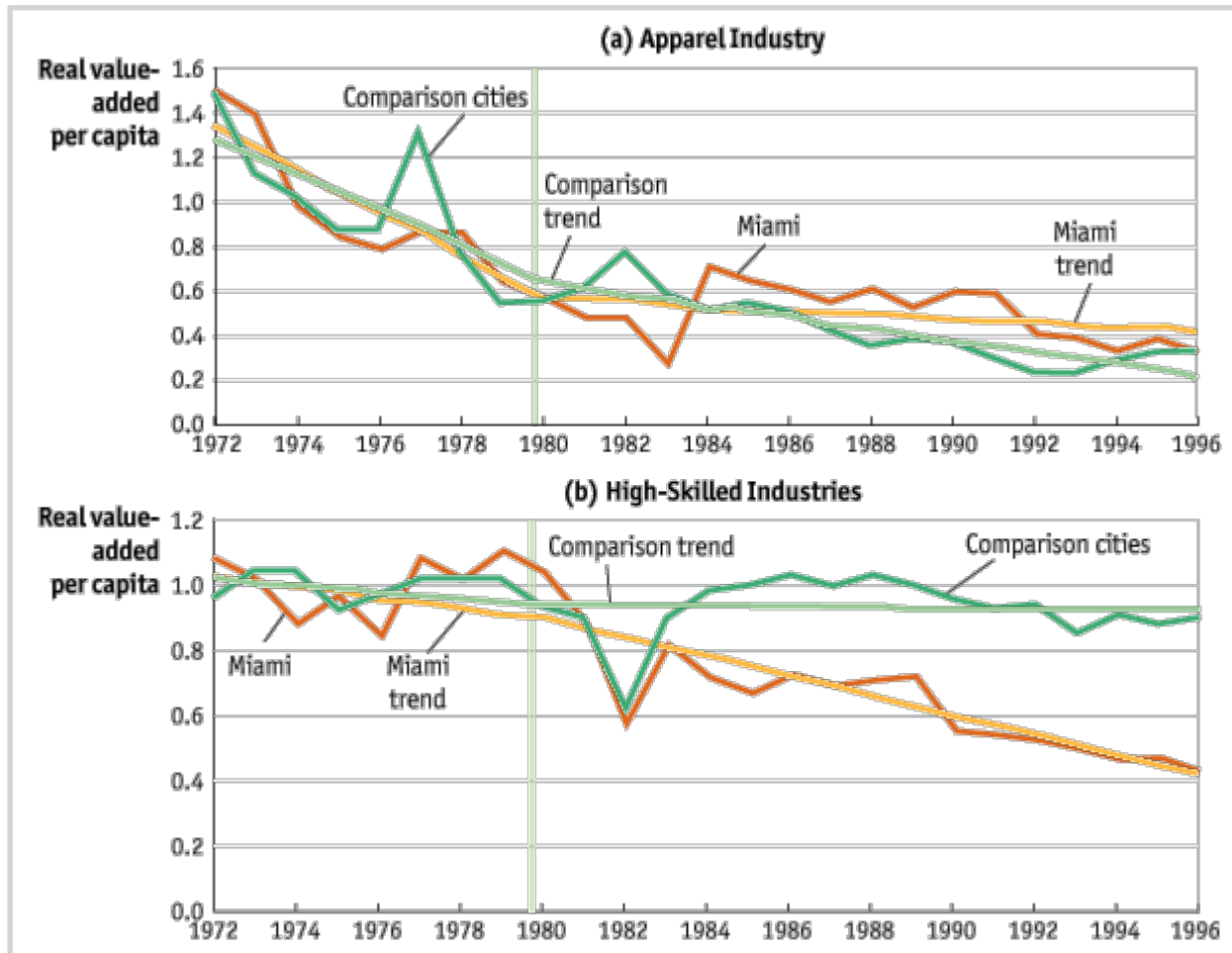


In panel (a), with the inflow of refugees from Cuba in 1980, real value-added in the apparel industry in Miami rose from 1983 to 1984, and the trend decline of this industry was slower than in the comparison cities.

## 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.

→ consistent with Rybczynski Theorem.

## 2- Migration and FDI – data and facts

### In the data

- Facts on migration
  1. Example: Mariel Boat lift and implications
  - 2. Composition by skill**
  3. Effect on wages

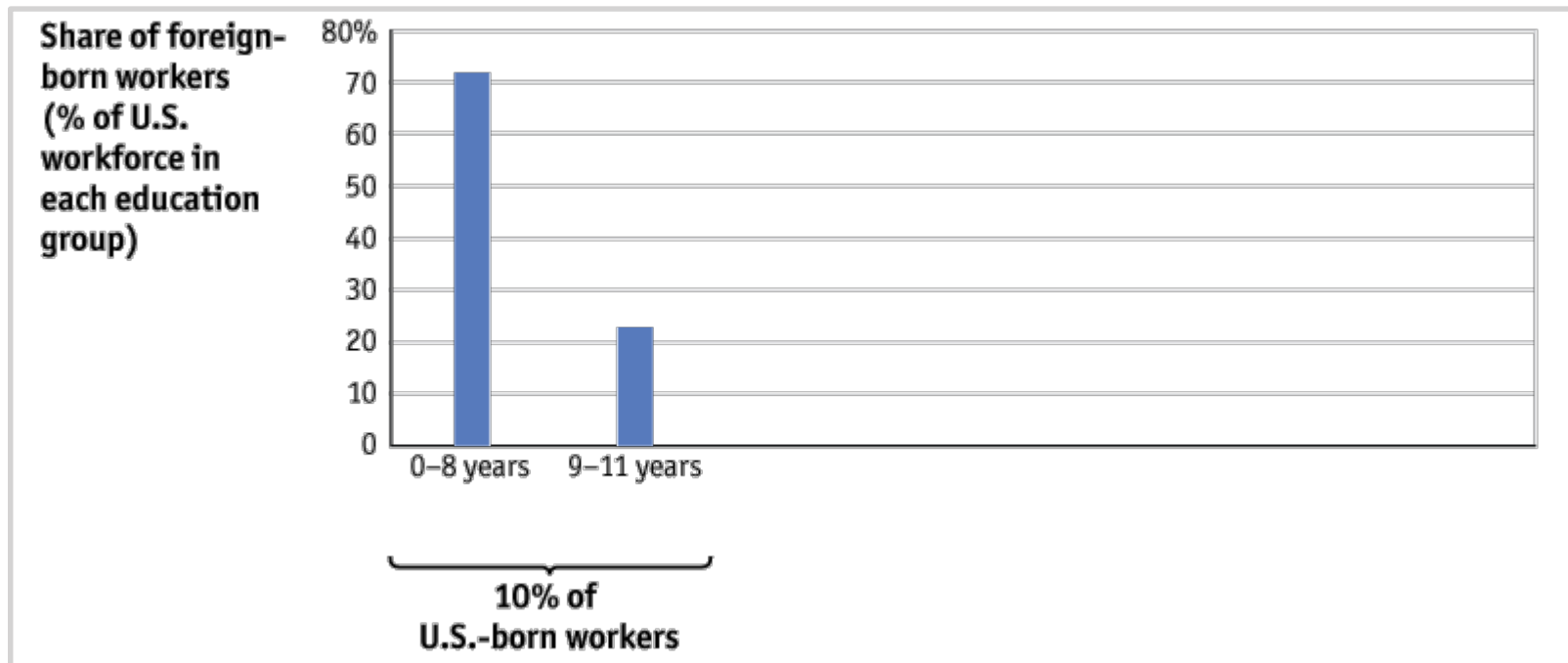
## 2- Migration and FDI – data and facts

### Migration in the data

- Share of foreign-born people in the US:
  - 6.2% in 1980
  - 12.9% in 2005
- Composition?
  - origin: see map
  - skills

# Immigration to the United States Today

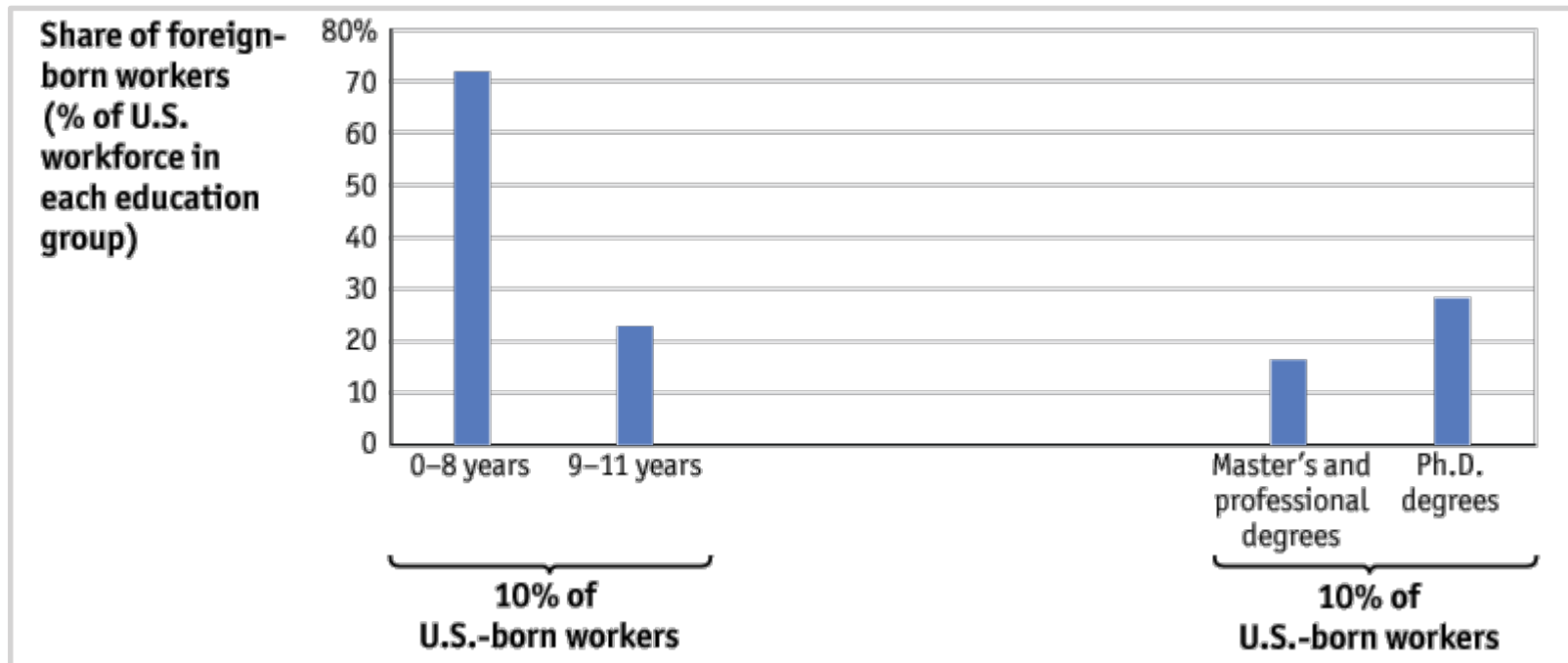
## Share of Foreign-Born Workers in U.S. Workforce, 2008



Among workers with only 0 to 8 years of education, more than 70% were foreign born; for those with 9 to 11 years of education, more than 20% were foreign born.

# Immigration to the United States Today

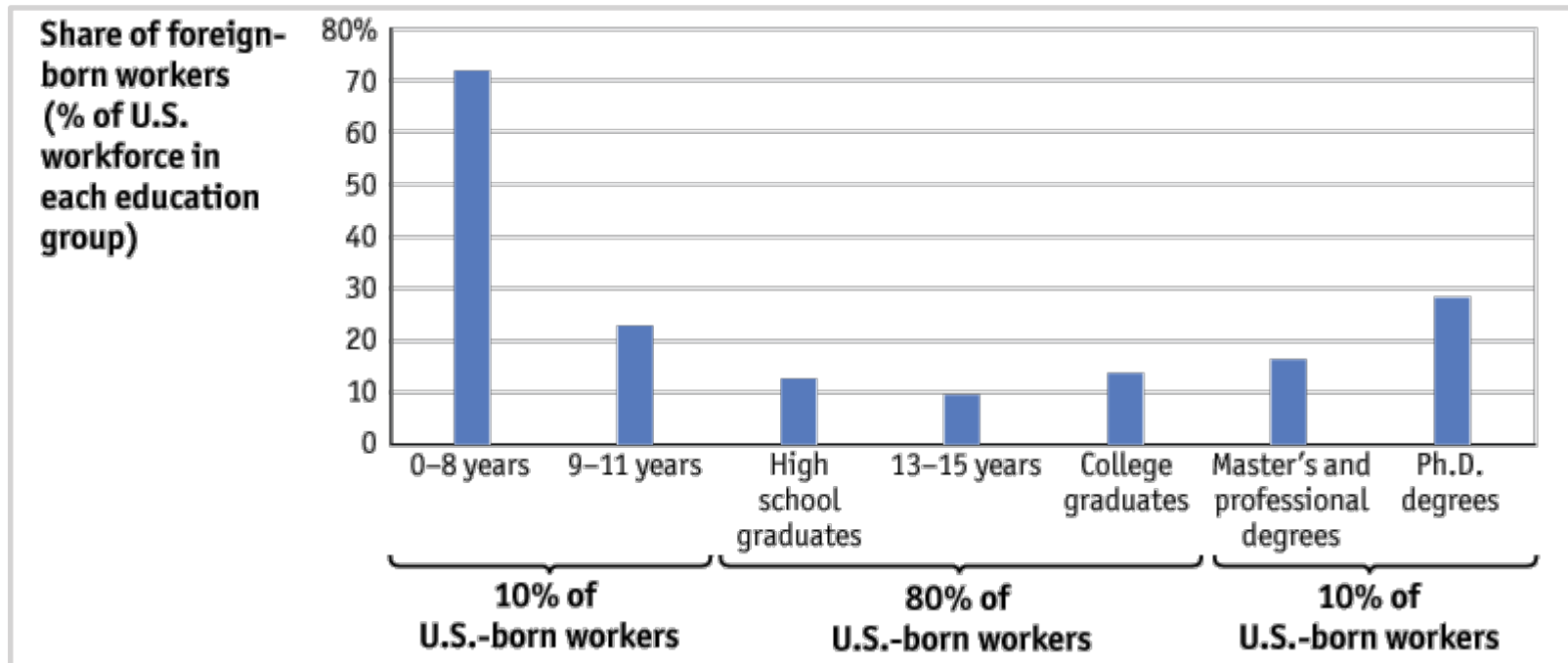
## Share of Foreign-Born Workers in U.S. Workforce, 2008



At the other end of the spectrum, the foreign born make up 16% of workers with master's and professional degrees and almost 30% of those with PhD's.

# Immigration to the United States Today

## Share of Foreign-Born Workers in U.S. Workforce, 2008



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; most U.S.-born workers are either high school graduates or college graduates.

## 2- Migration and FDI – data and facts

### In the data

- Facts on migration
  1. Example: Mariel Boat lift and implications
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## 2- Migration and FDI – data and facts

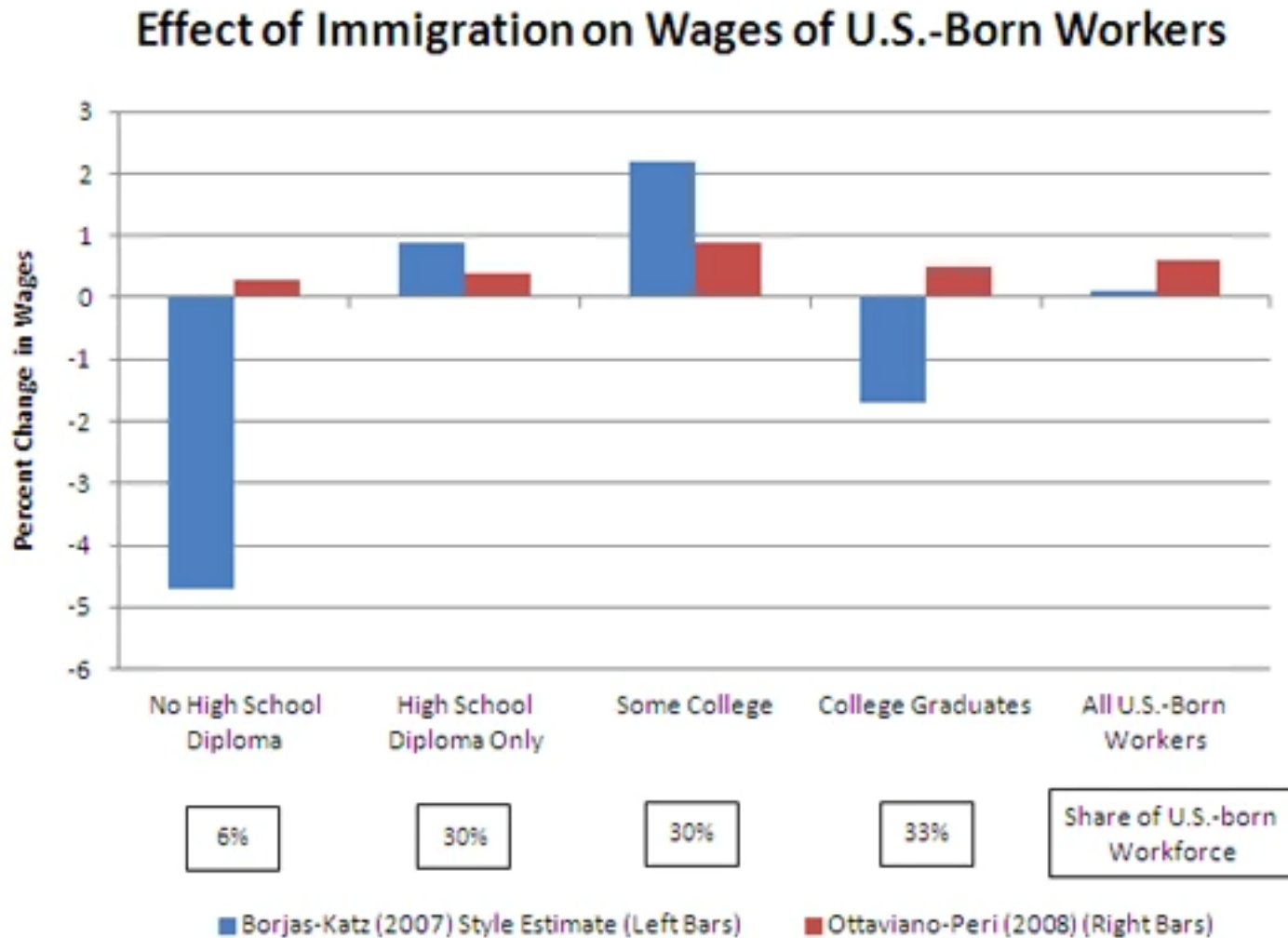
### Immigration and U.S. Wages, 1990–2004

**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.

	PERCENTAGE CHANGE IN THE WAGE OF WORKERS WITH EDUCATIONAL LEVEL:				
	Less Than 12 Years	12 Years	13–15 Years	16 Years or More	Overall Average
<b>Part A: Effect of Total Immigration, 1990–2004</b>					
<i>Method:</i>					
Capital and land fixed	-9.0%	-2.4%	-0.8%	-5.0%	-3.2%
Real return to capital fixed	-4.4	1.0	2.2	-0.2	0.3
<b>Part B: Effect of Illegal Immigration, 1990–2004</b>					
<i>Method:</i>					
Real return to capital fixed	-7.9	0.8	0.8	0.8	0.1

# 2- Migration and FDI – data and facts

## Effect of migration on wages



## 2- Migration and FDI – data and facts

### Other effects of Immigration:

- Higher productivity growth (Peri 2012) thanks to scientists and engineers under H1B visas.
  - Contributed to 10-20% higher growth during in 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.
- More firm creation and entrepreneurship

## 2- Migration and FDI – data and facts

### FDI in the data

- **Definitions**
- Example: Four Asian Tigers

## 2- Migration and FDI – data and facts

### FDI in the data

- Definition:
- “Foreign direct investment”: when a company in one country acquires and owns at least 10% of the capital of a firm in another country

Note: this definition varies sometimes: the threshold is often put at 15%.

## 2- Migration and FDI – data and facts

### FDI flows

- Definition:
- “FDI flows”: movement of capital from the parent company to its affiliate.
- example:

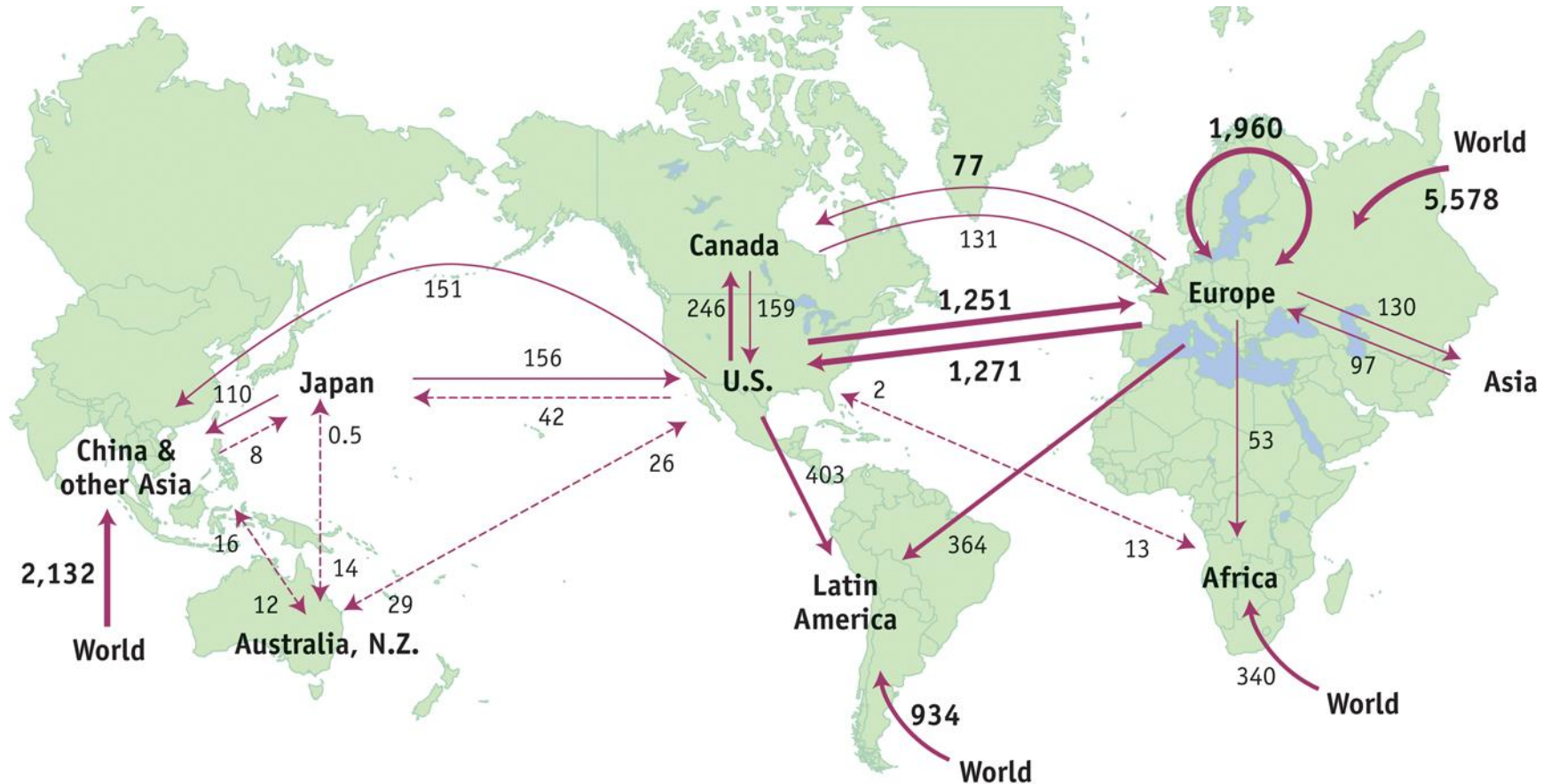
General Motors invest in Mexico:

= outward FDI flow for the US

= inward FDI flow for Mexico.

- “FDI stock”: discounted sum of inward FDI flows.

# Most FDI to and from US, Japan, Europe, Canada



Total world FDI in 2006: \$12,400 billion

## World FDI Stocks

- < \$50 billion
- \$50–200 billion
- \$200–1,000 billion
- > \$1,000 billion

## 2- Migration and FDI – data and facts

Also related to capital flows:

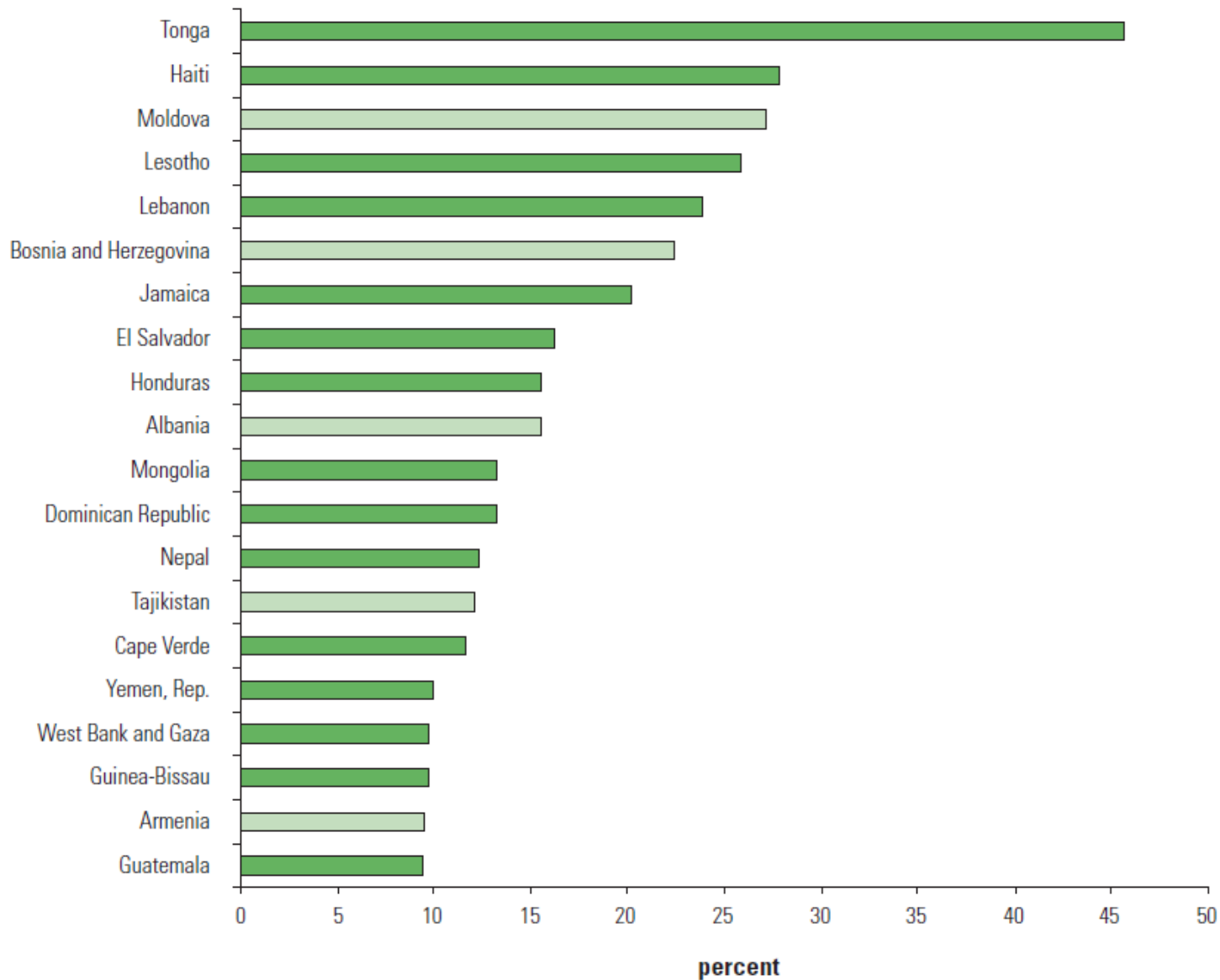
Remittances: Migration causing Capital flows

- Immigrants often send money back home.
- While small for the “host” country, these flows can be large for “home” country



## Leading 20 Remittance-Receiving Countries in the World

(percentage of GDP in 2004)



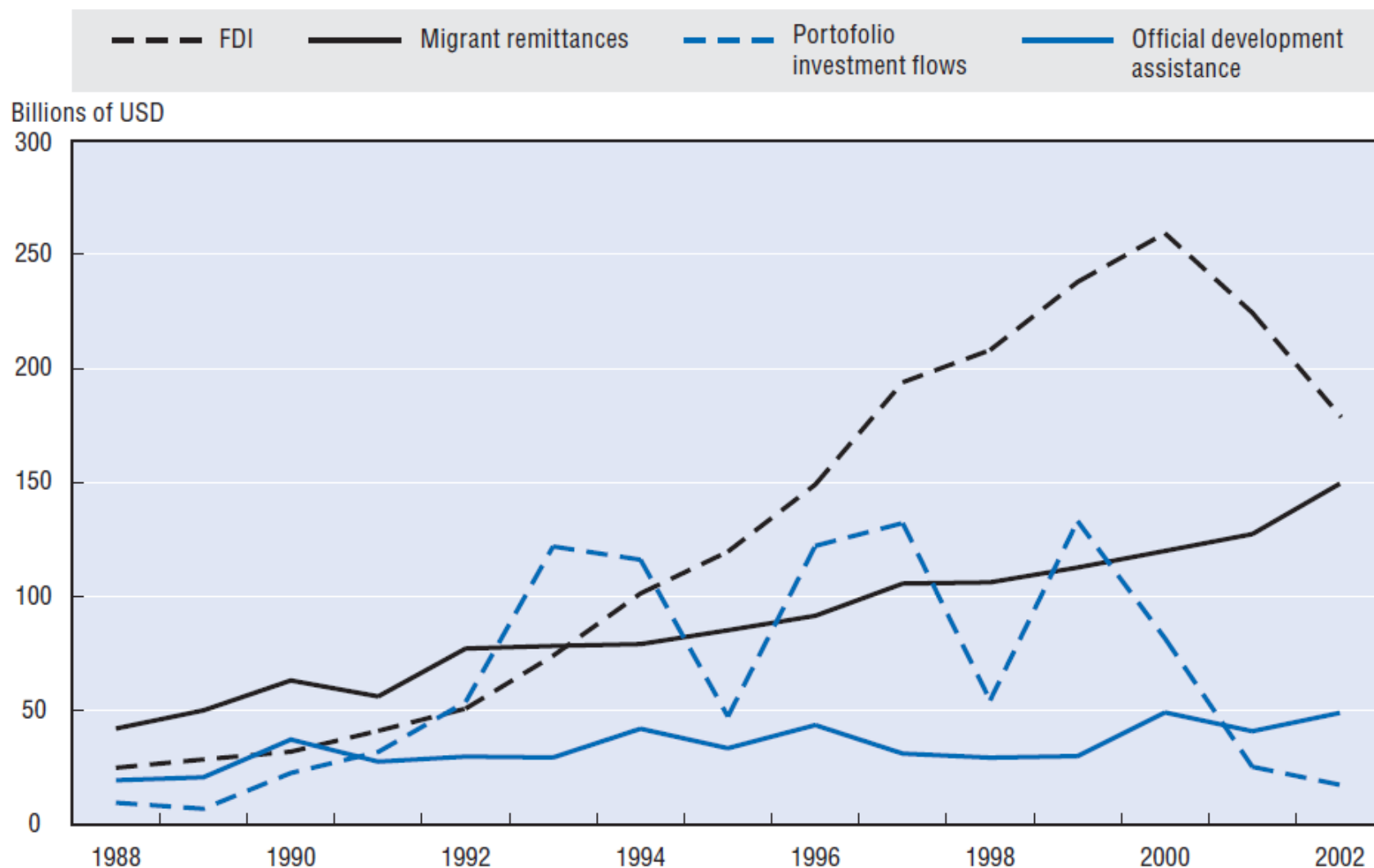
## 2- Migration and FDI – data and facts

### Migration causing Capital flows: Remittances

- Immigrants often send money back home.
- While small for the “host” country, these flows can be large for “home” country
  - Not larger than FDI
  - But larger than aid

Chart III.1. **Migrants' remittances and other capital flows to developing countries, 1988-2002**

Billions of US dollars



Note: "Remittances" refer to the sum of the "compensation of employees", "worker's remittances" and "other current transfers in other sectors"; "Official flows" include general government transfers both current and capital.

## 2- Migration and FDI – data and facts

### FDI in the data

- Definitions
- **Example: Four Asian Tigers**

## 2- Migration and FDI – data and facts

### Rybczynski in Action: FDI in Asia

- The capital stock in Asia has grown particularly fast over the past decades; FDI as a major source (e.g. “Asian Tigers”, especially Singapore)
- Factor price insensitivity? (skipped / see book)
- Rybczynski: Expansion of K-intensive sectors?

## 2- Migration and FDI – data and facts

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### Rybczynski in Action: FDI in Asia

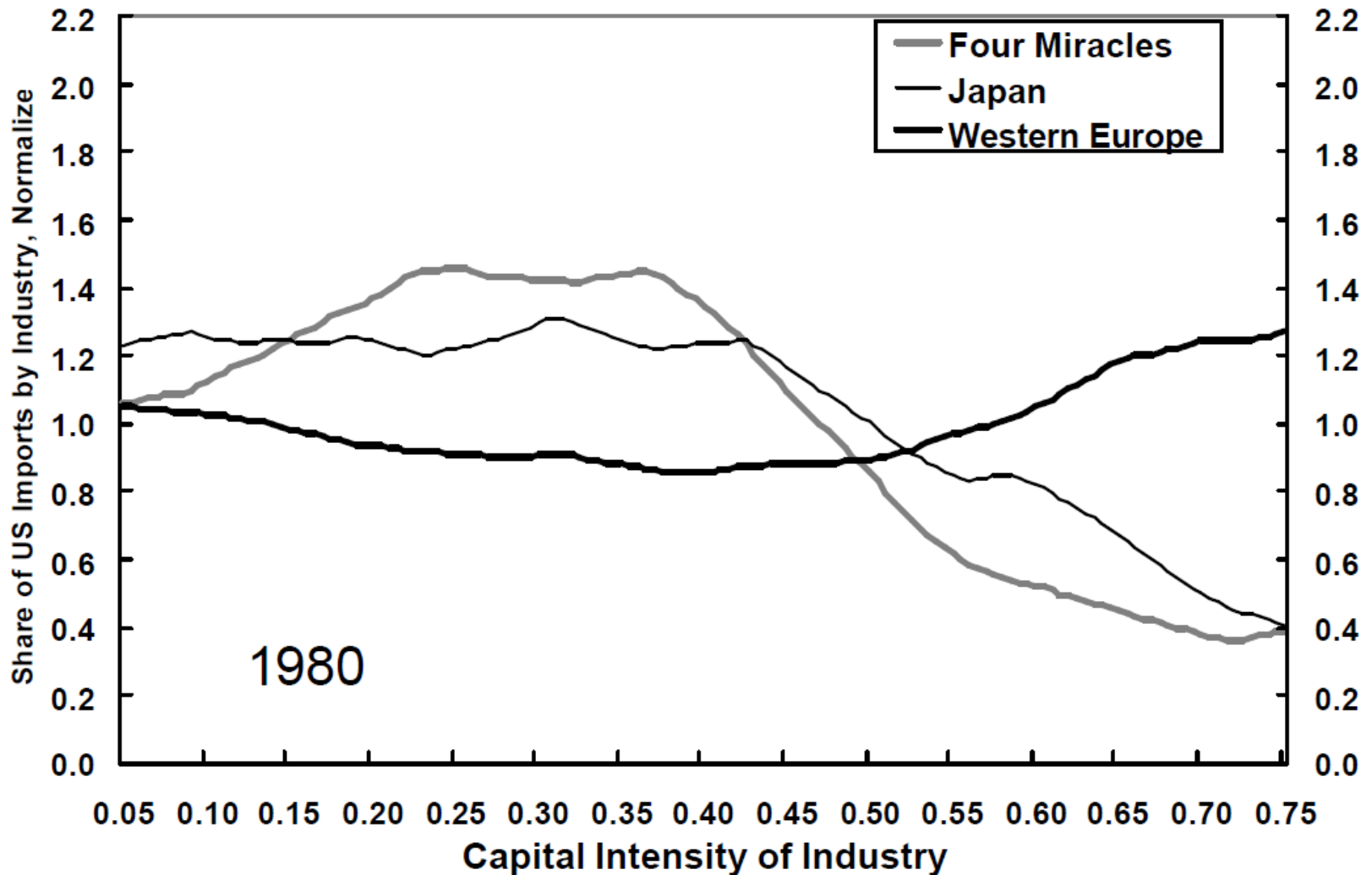
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#### **Data:**

Big increases in exports in capital intensive industries (comparing 1980 and 1998)

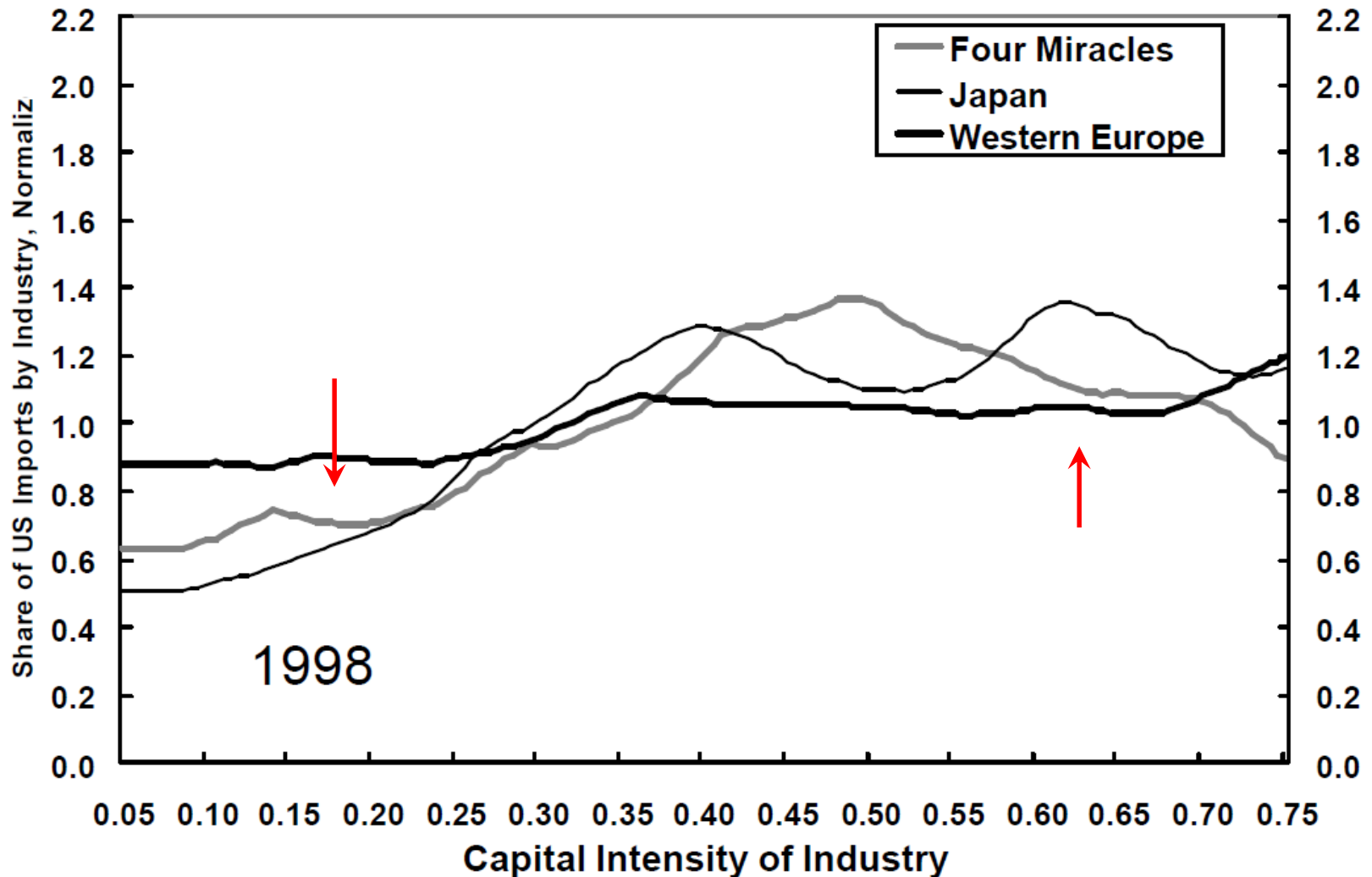
## 2- Migration and FDI – data and facts

US imports from Asia depending on K intensity:



## 2- Migration and FDI – data and facts

US imports from Asia depending on K intensity:





## 2- Migration and FDI – data and facts

- Patterns of trade in 4 Asian tigers:
  - Asia gained a comparative advantage in capital-intensive industries
  - Evidence of effects as in Heckscher-Ohlin model (comparative advantage + Rybczynski theorem)

## 2- Migration and FDI – data and facts

### Summary of Evidence

#### 1) Effect of migration:

- Effect on wages fairly consistent with factor price insensitivity (no large effect on native wages)
- Important to consider the skill composition of immigration

#### 2) Effect of FDI:

- Asia example: Consistent with Rybczynski theorem