Lecture 5a:

Migration and FDI in HO Model

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C181 – International Trade

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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

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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

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Rental rate and wages

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

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Clicker question

In the HO framework *without full specialization*, suppose that the world prices do not change, but the **supply of labor** in the Home economy increases.

a) Wages "W" decrease and the rental rate "R" increases
b) Wages "W" increase and the rental rate "R" decreases
c) No effect on the rental rate and wages
d) It depends, it's ambiguous

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Answer

(to be given in class)

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

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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**

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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**

- Supply of $\overline{K}$ and $\overline{L}$ does not affect R and W:
  → **FDI and Migration do not affect R and W!!**

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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

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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?

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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)

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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?

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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?

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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***.

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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

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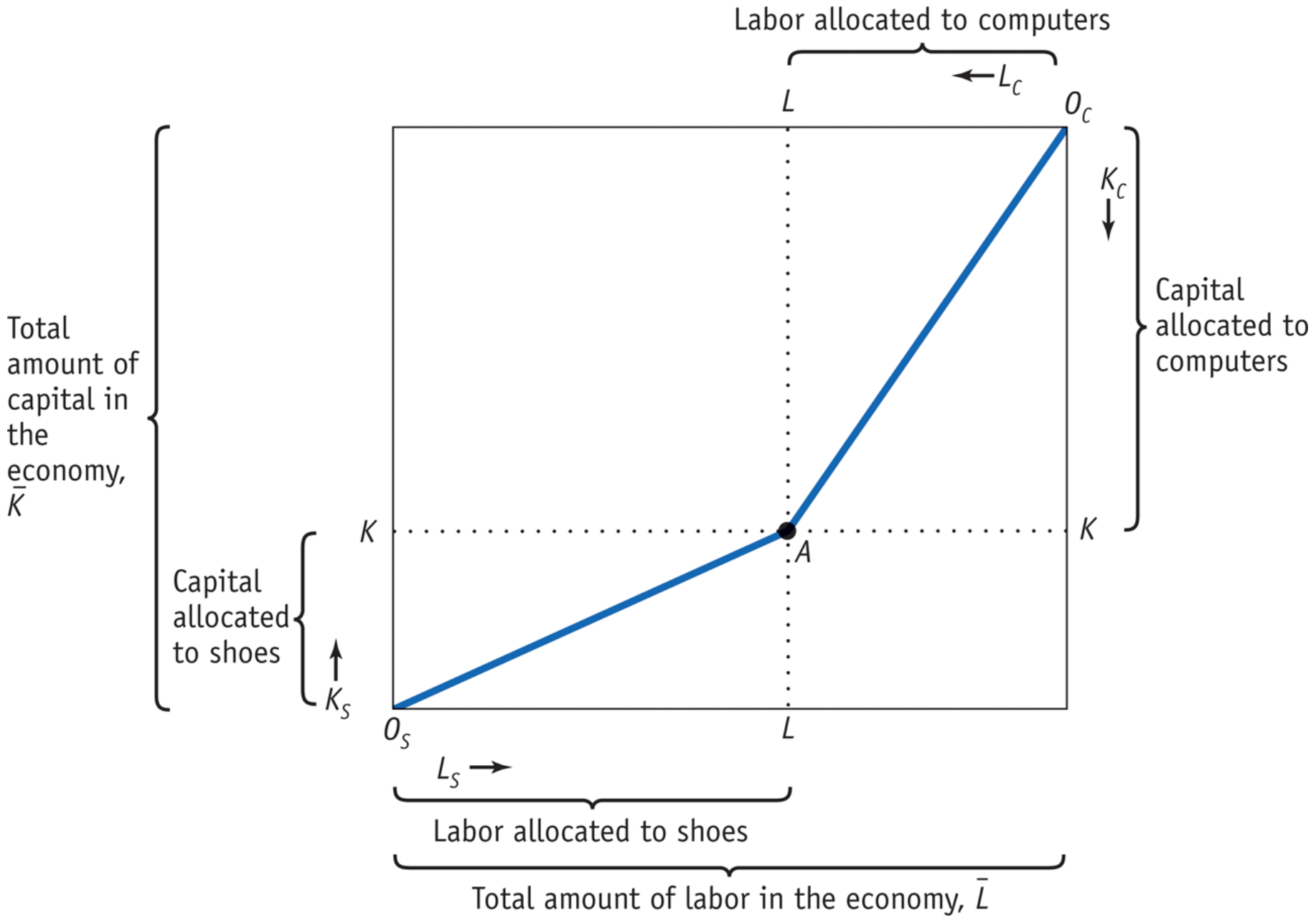
Effect on production

Next graph:

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


Labor allocated to computers
L_C
L
O_C
K_C
Capital allocated to computers
Total amount of capital in the economy, $\bar{K}$
K
A
K
Capital allocated to shoes
K_S
O_S
L
L_S
Labor allocated to shoes
Total amount of labor in the economy, $\bar{L}$

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Effect on production

- Slope = capital intensity
  (the computer industry uses relatively more K than L)

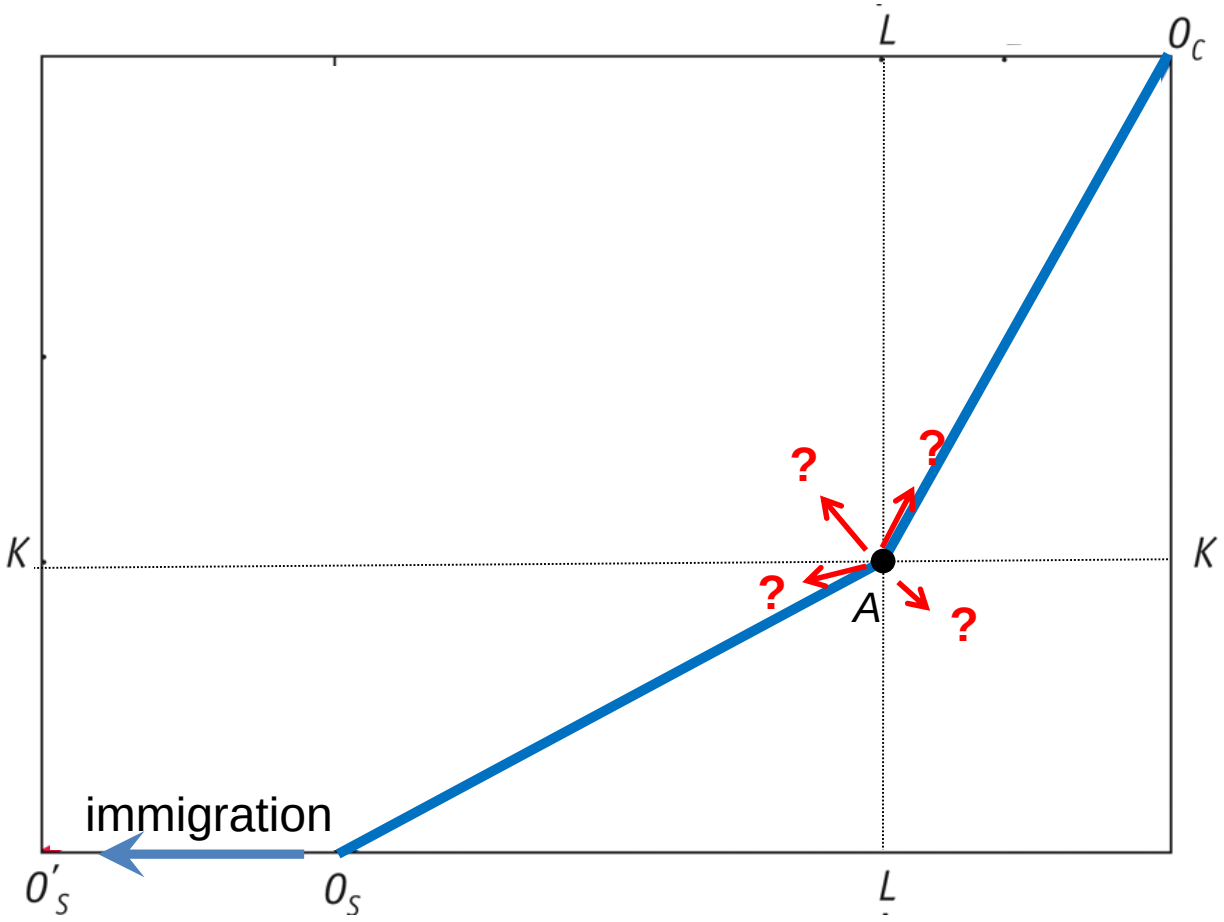
1- Migration and FDI in the HO model

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


L
O_C
K
K
?
?
?
?
A
immigration
O'_S
O_S
L

Clicker question

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

a) Both industries expand, the shoe industry expands more than the computer industry

b) Both industries expand, the computer industry expands more than the shoe industry

c) Shoe industry expands, Computer industry shrinks

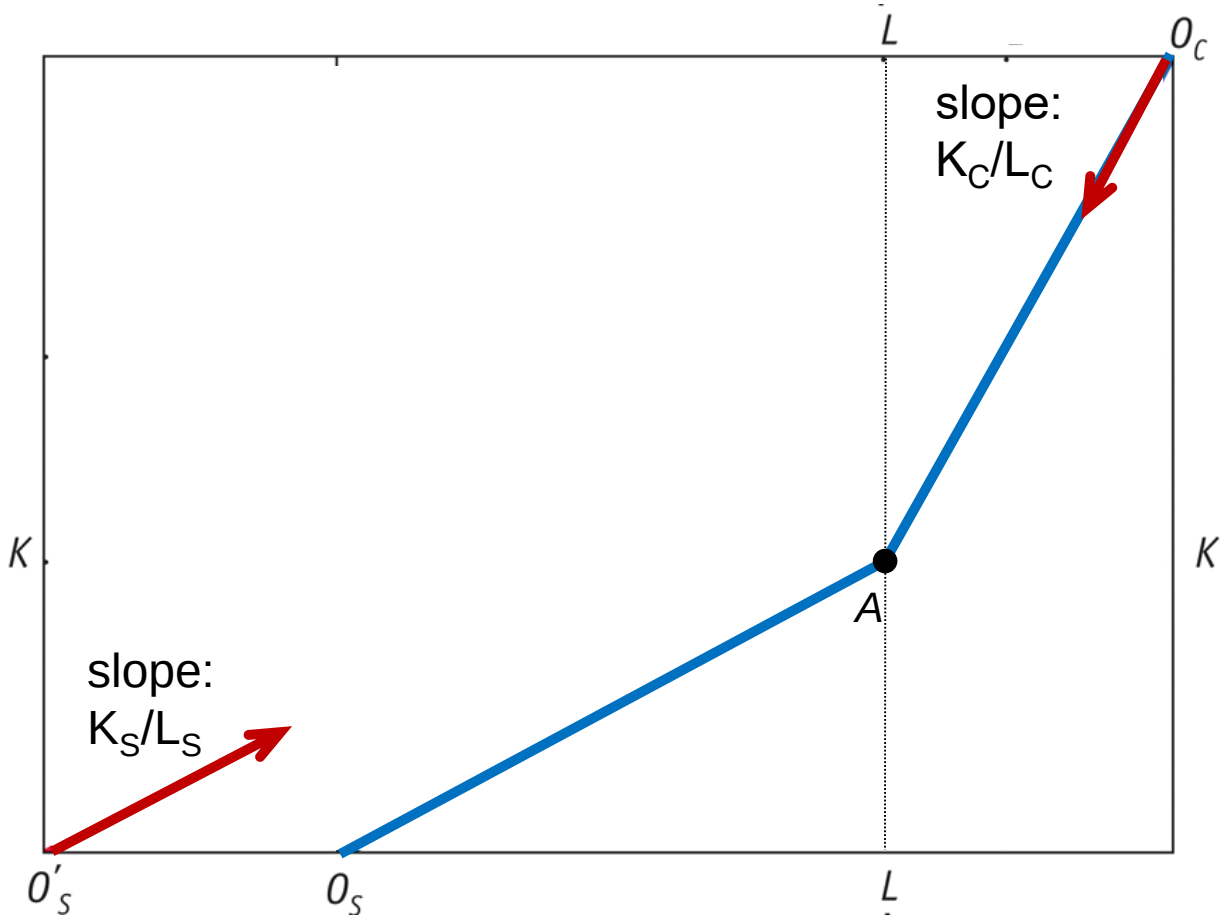
d) Computer industry expands, Shoe industry shrinks

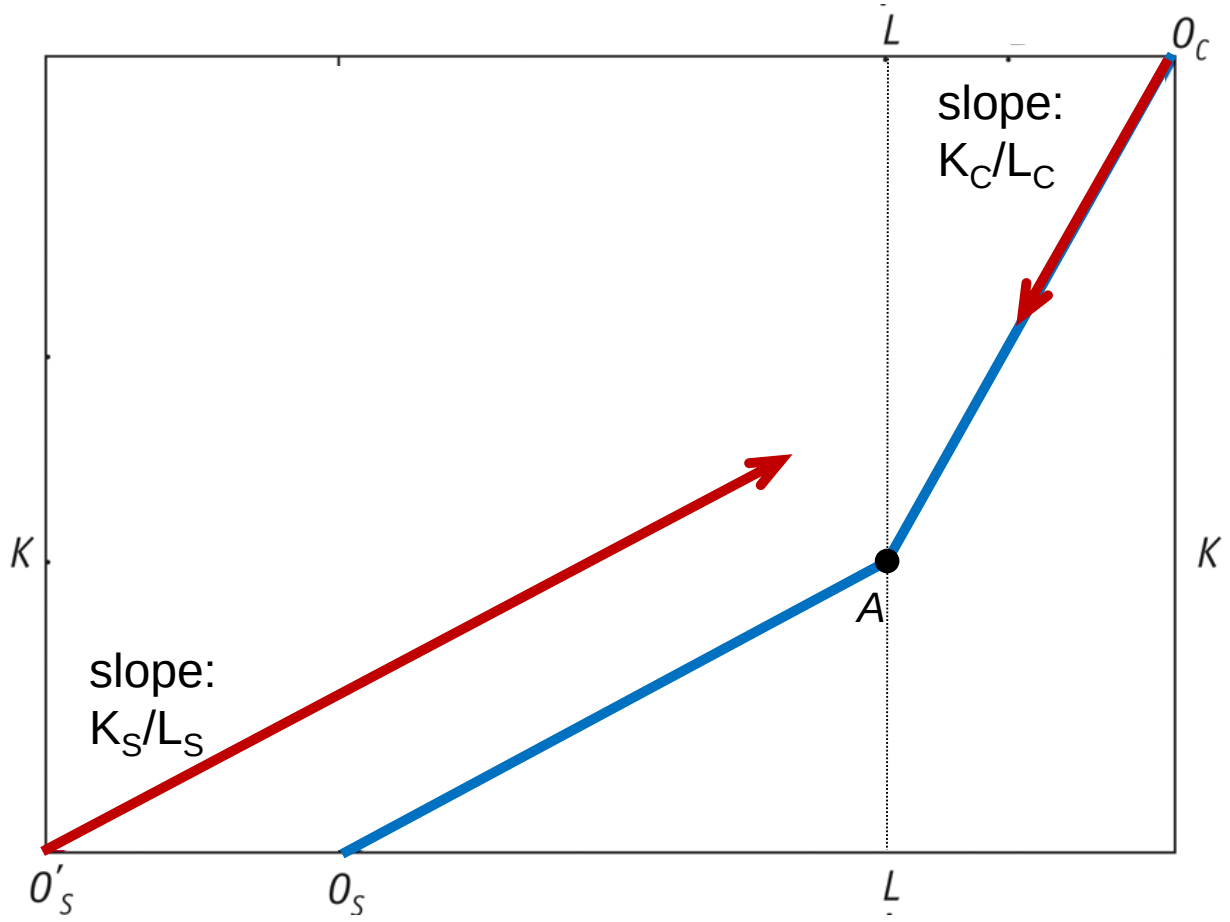
Answer

(given in class)

Migration:

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


L
O_C
slope:
K_C/L_C
K
K
A
slope:
K_S/L_S
O'_S
O_S
L


L
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slope:
K_C/L_C
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K
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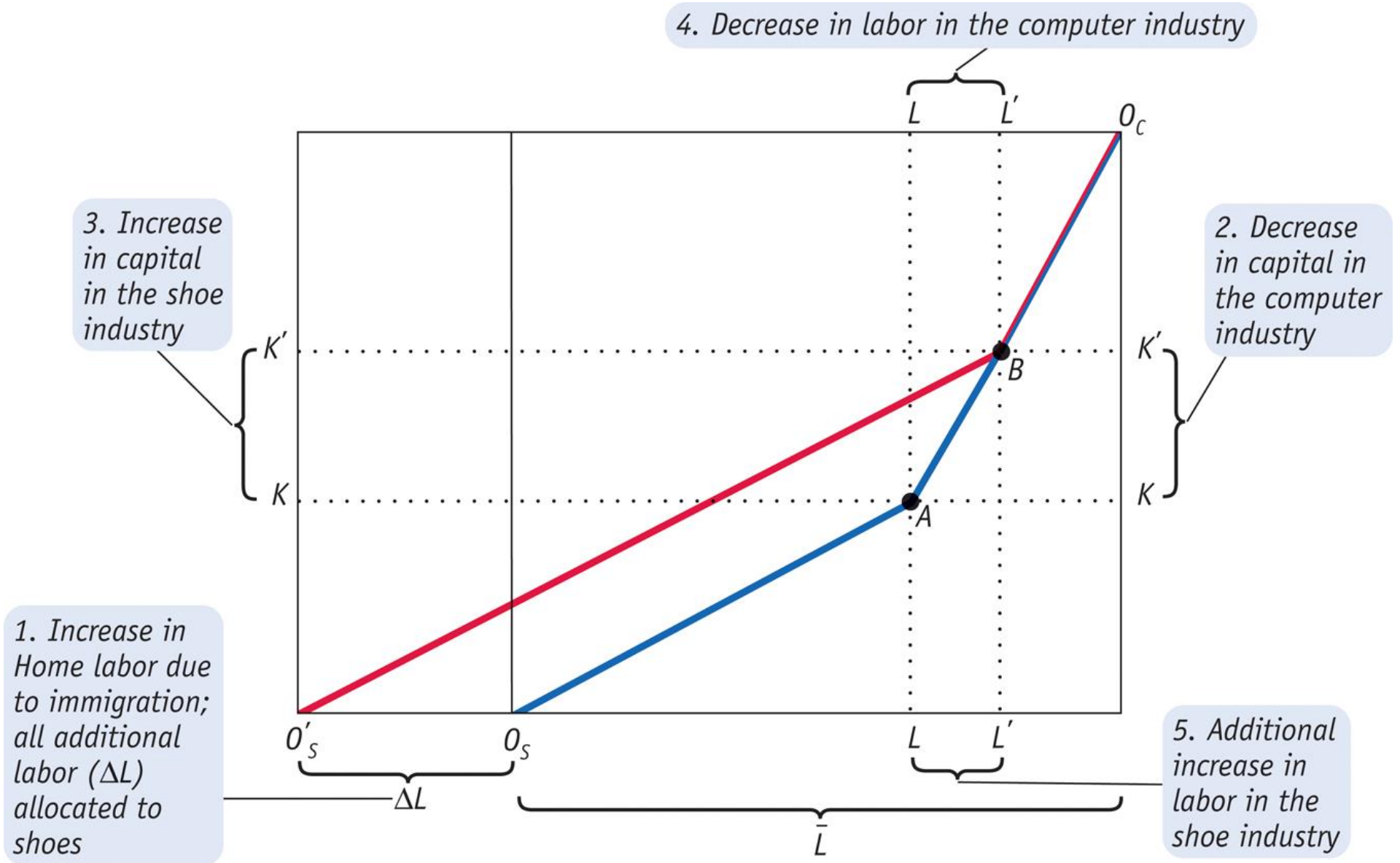
O'_S
O_S
L


4. Decrease in labor in the computer industry
L
L′
O_C
3. Increase in capital in the shoe industry
2. Decrease in capital in the computer industry
K′
K
B
A
1. Increase in Home labor due to immigration; all additional labor (ΔL) allocated to shoes
O'_S
O_S
ΔL
$\bar{L}$
5. Additional increase in labor in the shoe industry

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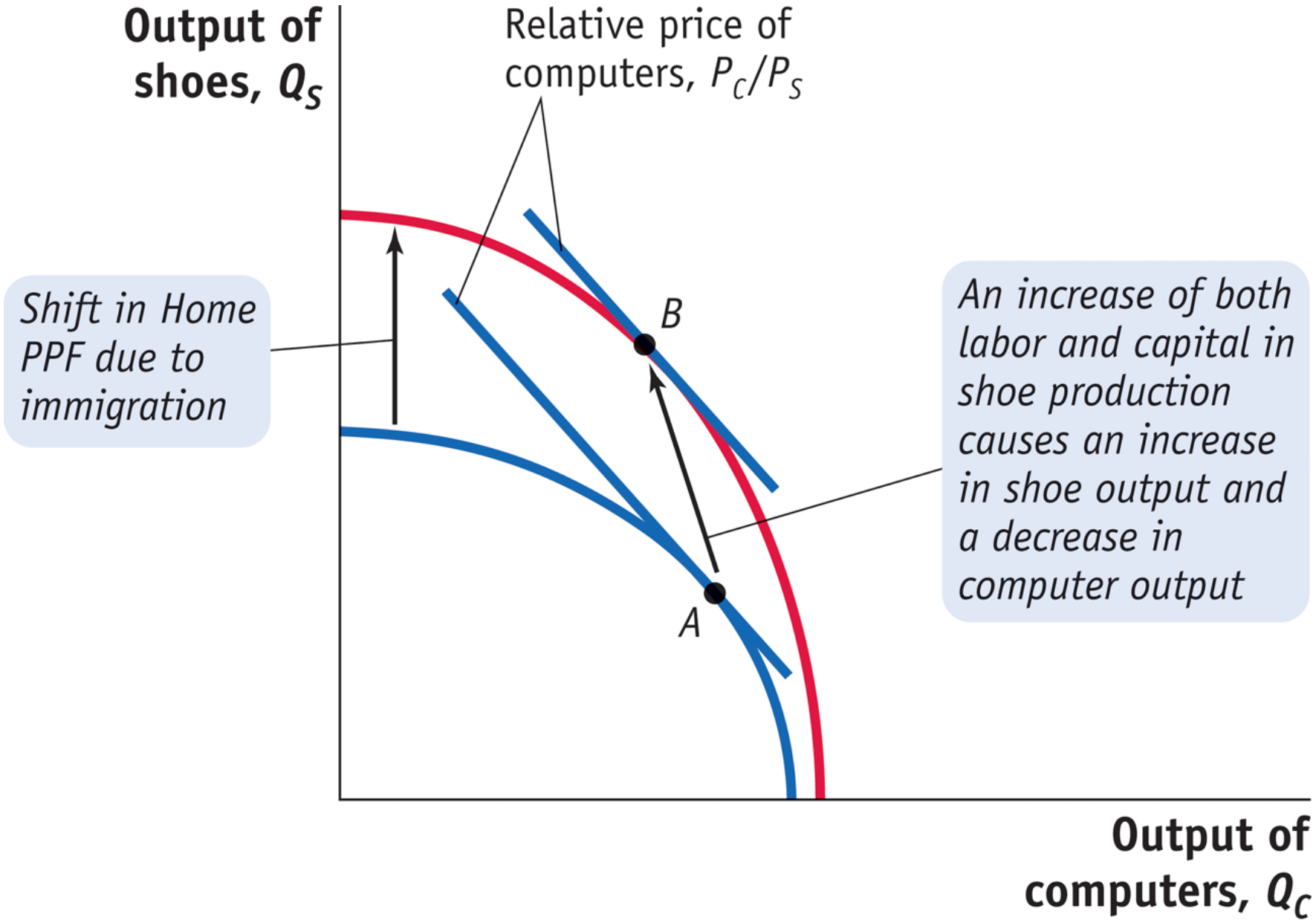
Effect on production

- 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
B
A
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

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Examples:

- Shoe industry:

Assume that each shoe requires 1 machine and 2 workers

- Computer industry:

Assume that each computer requires 2 machines and 1 worker

Production?

1- Migration and FDI in the HO model

Examples:

- Shoe industry:

Assume that each shoe requires 1 machine and 2 workers

- Computer industry:

Assume that each computer requires 2 machines and 1 worker

Production?

- Equilibrium imposes:

$$2Y_S + Y_C = \bar{L}$$
$$Y_S + 2Y_C = \bar{K}$$

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Examples:

- Shoe industry:

Assume that each shoe requires 1 machine and 2 workers

- Computer industry:

Assume that each computer requires 2 machines and 1 worker

Production?

- Equilibrium imposes:

$$\begin{cases} 2Y_S + Y_C = \bar{L} \\ Y_S + 2Y_C = \bar{K} \end{cases} \Rightarrow \begin{cases} Y_S = \frac{2}{3}\bar{L} - \frac{1}{3}\bar{K} \\ Y_C = \frac{2}{3}\bar{K} - \frac{1}{3}\bar{L} \end{cases}$$

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Examples:

- Shoe industry:

Assume that each shoe requires 1 machine and 2 workers

- Computer industry:

Assume that each computer requires 2 machines and 1 worker

Production?

- Equilibrium imposes:

$$\begin{cases} 2Y_S + Y_C = \bar{L} \\ Y_S + 2Y_C = \bar{K} \end{cases} \Rightarrow \begin{cases} Y_S = \frac{2}{3}\bar{L} - \frac{1}{3}\bar{K} \\ Y_C = \frac{2}{3}\bar{K} - \frac{1}{3}\bar{L} \end{cases}$$

- Migration → increase in Y_S and decrease in Y_C

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Effect on production

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

➔ Production in the computer industry increases

➔ Production in the shoe industry decreases

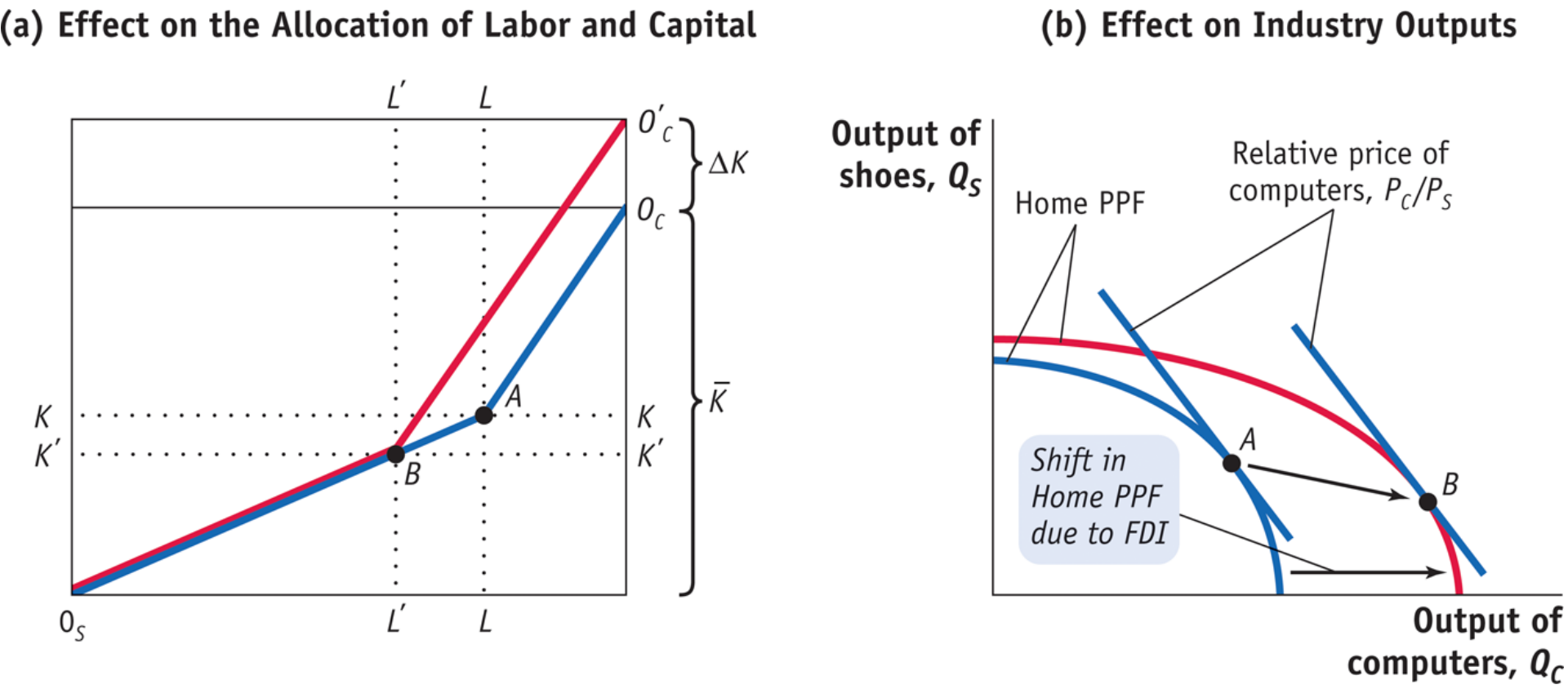
and the overall demand for labor does not change

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



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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.