Heckscher and Ohlin Theorem (H-O):

- **"Each country benefits if it exports the commodity (good) that uses the relatively abundant (affluent) factor of production more intensively, for its production."**
- **Comparative advantage:** found in the sector that uses more intensively the relatively abundant factor of production.
- **The Model:**
  - 2 countries
  - 2 goods
  - 2 factors of production (inputs)

2x2x2 model: Hypotheses

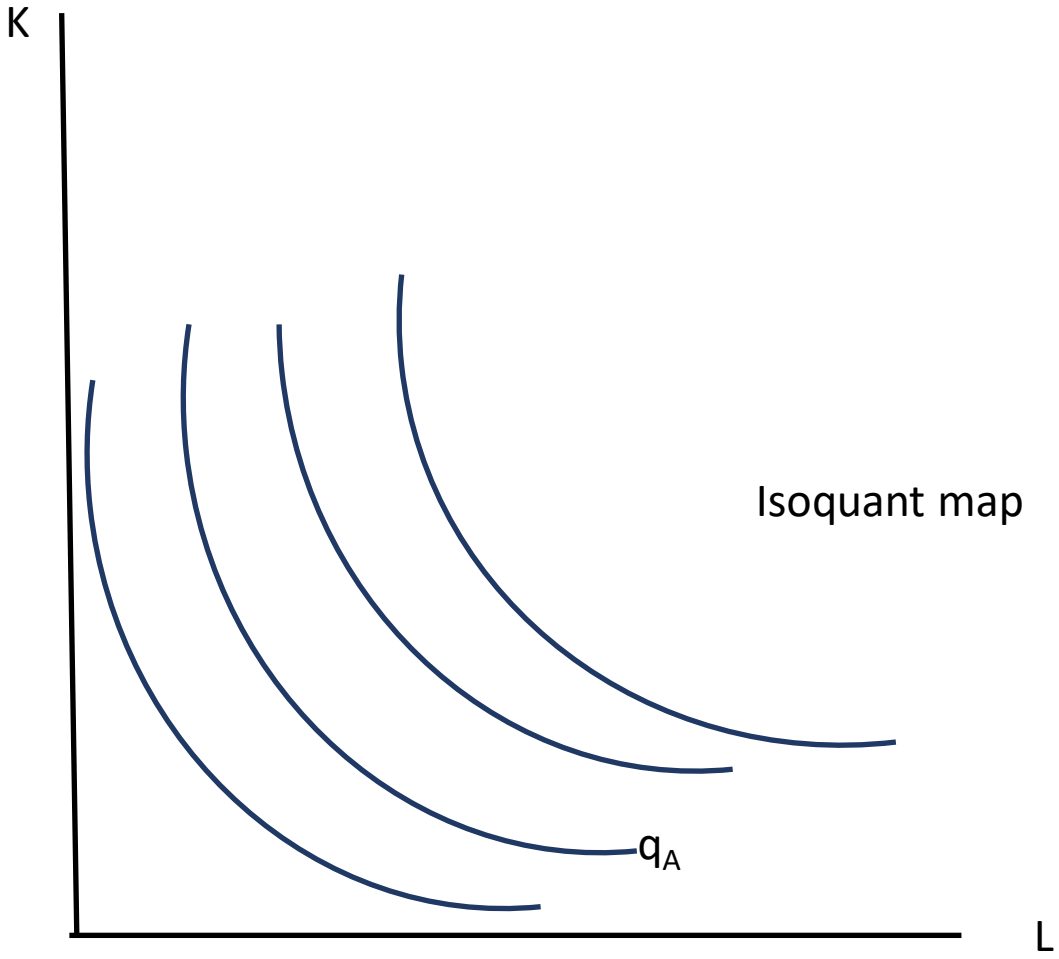
- Free international trade, no government intervention (no tariffs, no quotas…) no transportation costs.
- 2 countries, I and II.
- they both produce two goods, A,B
- with two factors of production, K, L.
- A is the labor intensive good
- B is the capital intensive good
- Production functions and available technology are the same for each good in both countries.
- The two countries differ only in terms of the abundance (affluency) of the factors of production.

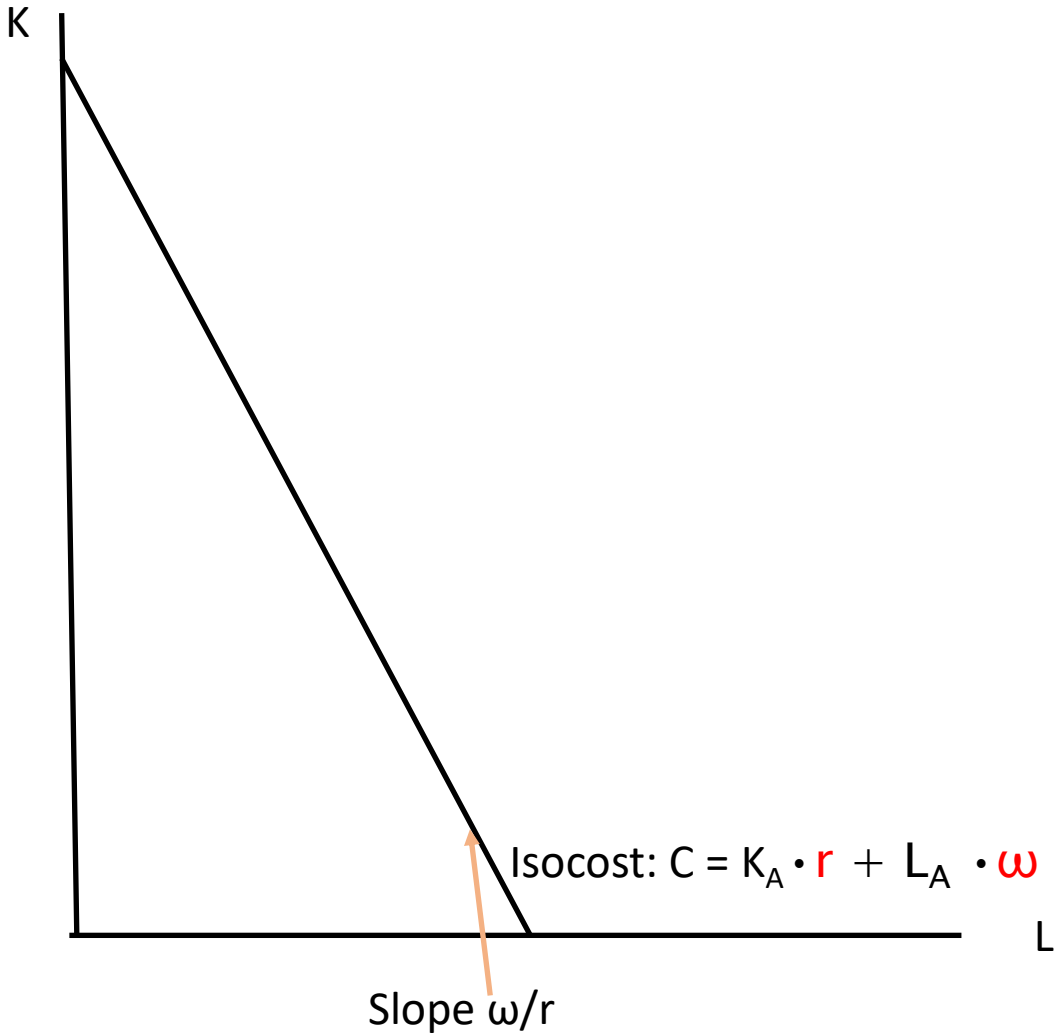
How do we define the labor intensive good? The capital intensive good?

- Suppose
- ω: price of labor (wage)
- r: price of capital (rent)
- If for any specific ratio, ω/r
  the inequality
- $(K/L)^B > (K/L)^A$ holds, $\Rightarrow$
- Good B is defined as the <u>capital intensive</u> good and
- A, is the <u>labor intensive</u> good.

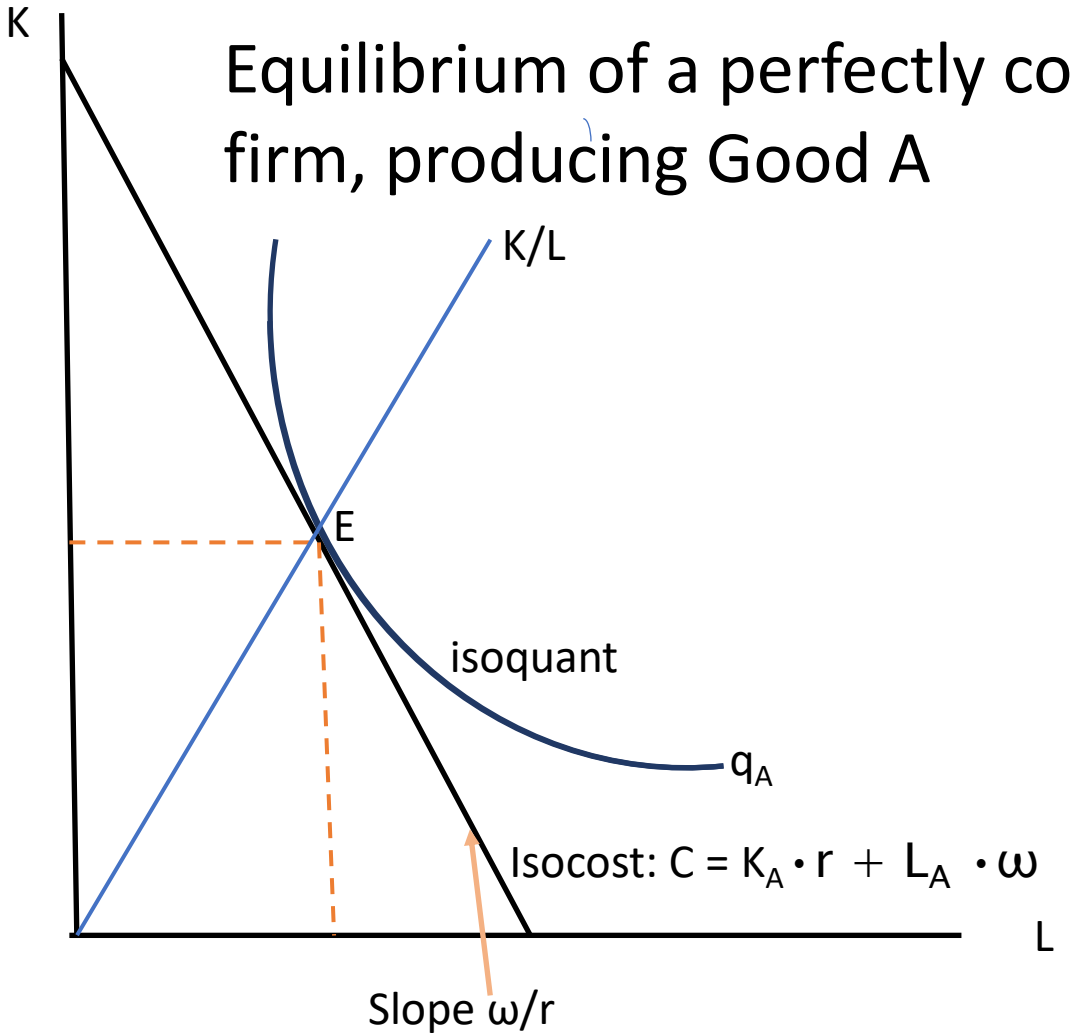
The relation between K/L και ω/r in the production of any of the two goods is positive

- As ω/r rises production becomes more capital intensive.
- production becomes more capital intensive as labour is substituted with capital (that now becomes relatively cheaper).
- Graffically

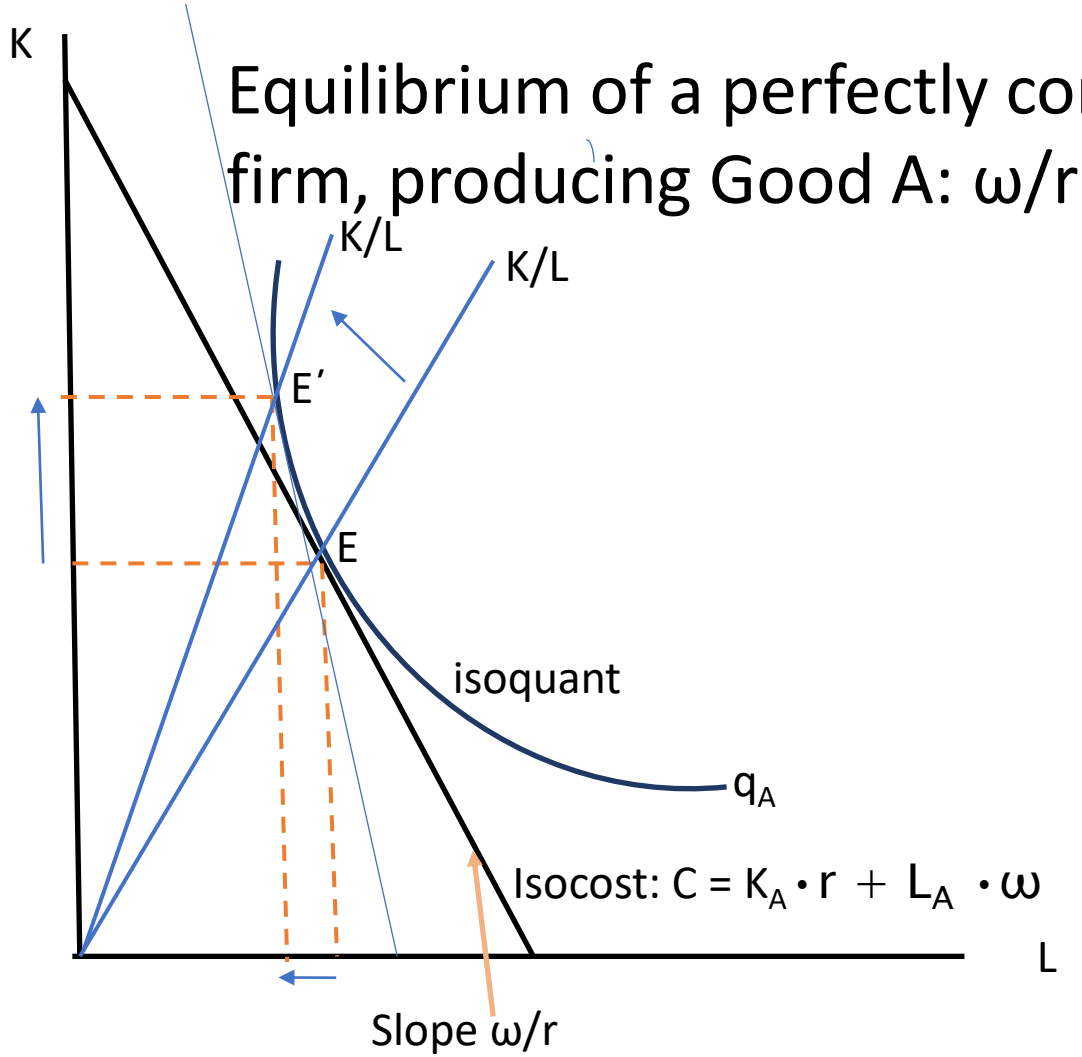

K
Isoquant map
q_A
L


K
Isocost: $C = K_A \cdot r + L_A \cdot \omega$
L
Slope ω/r

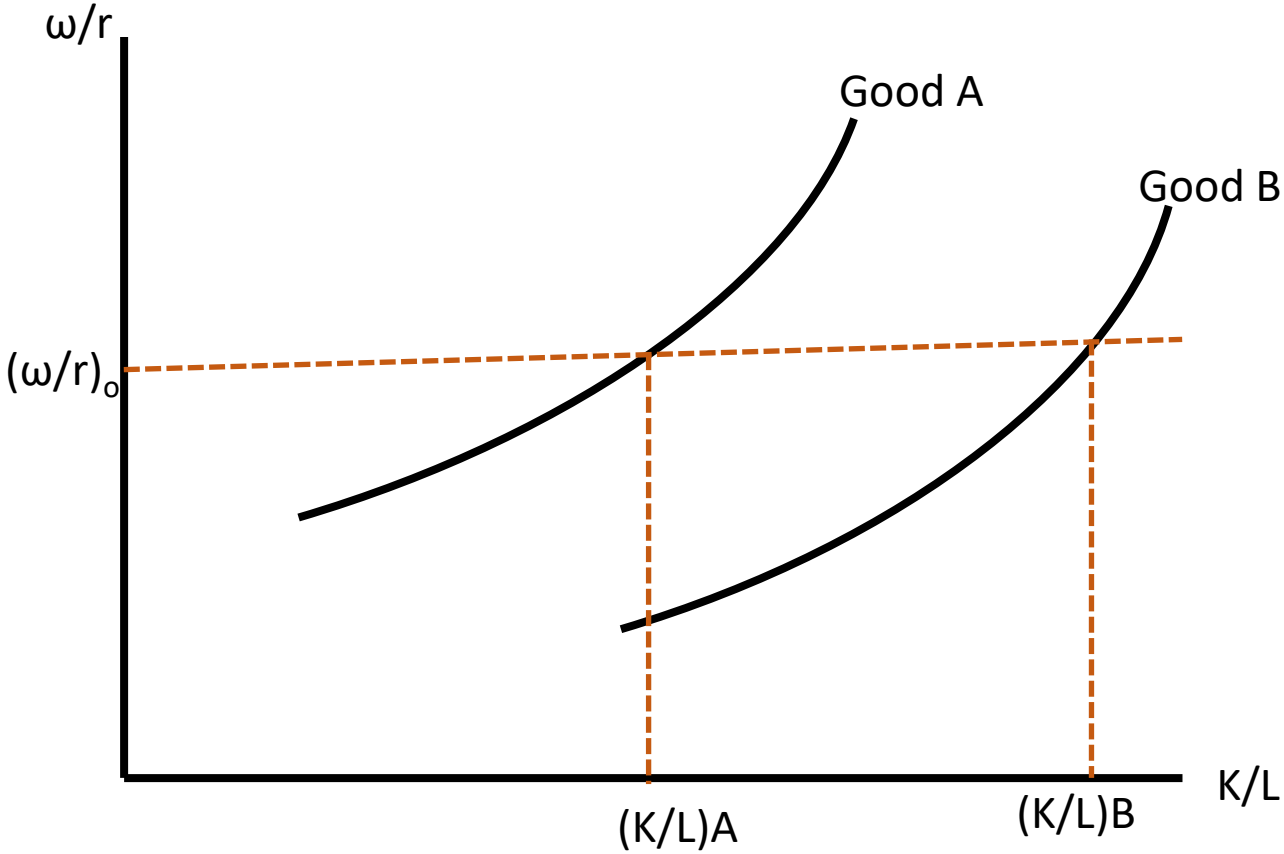
Equilibrium of a perfectly competitive firm, producing Good A



Equilibrium of a perfectly competitive firm, producing Good A: ω/r rises



Given the wage/rent ratio, **Good A** is always the Labor intensive good and **Good B** is the Capital Intensive Good



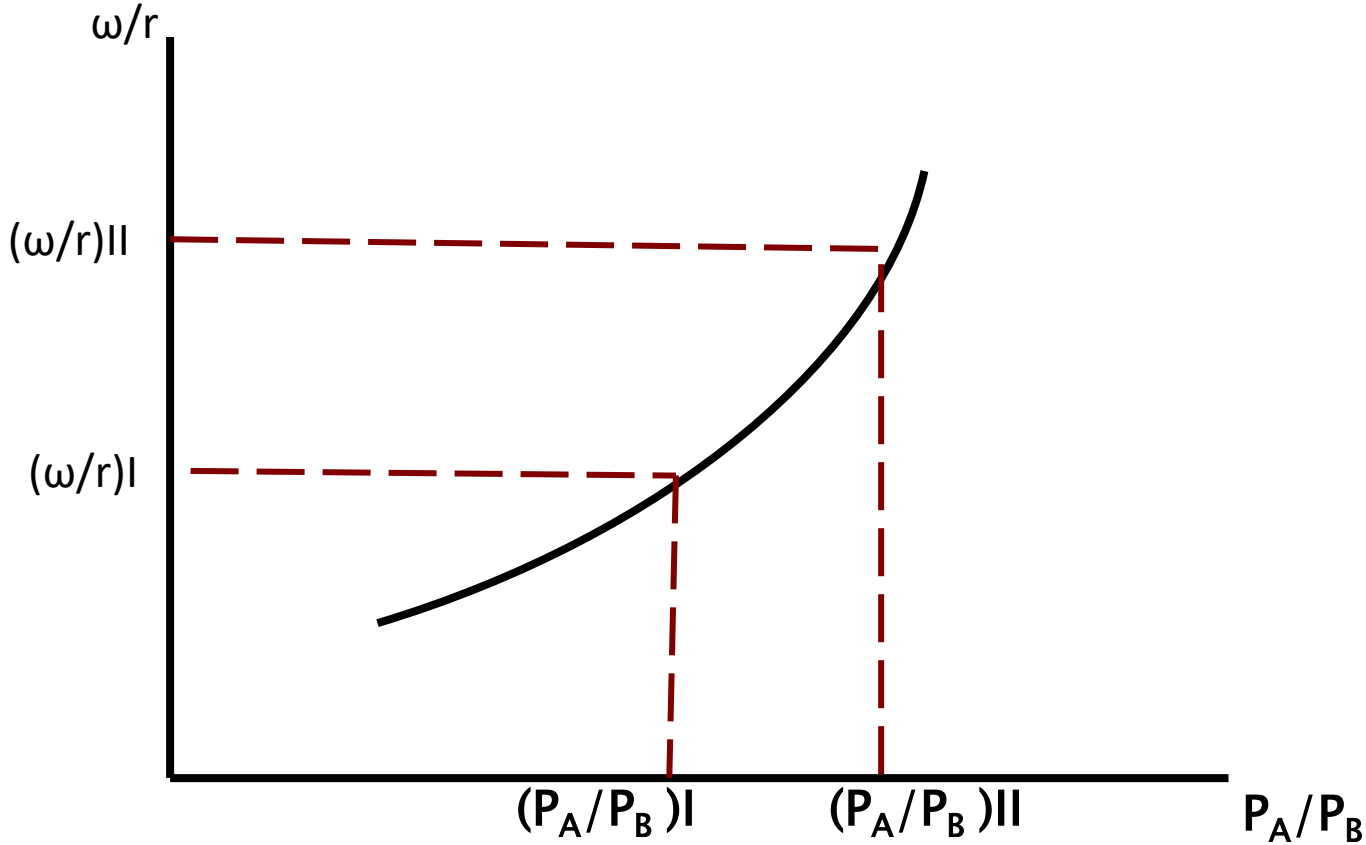
Which country has a relative affluency in Labor?

- **Two <u>definitions</u>: one related to prices of the factors of production, the other to quantities of the factors of production,**
- **In relation to the prices of the factors of production:**
- **if $(\omega/r)^{I} < (\omega/r)^{II}$**
- then: Country I has a relative abundance of labor and II has a relative abundance of capital.
- **In relation to the quantities of the factors of production:**
- **if $(L/K)^{I} > (L/K)^{II}$**
- then: Country I has a relative abundance of labor and II has a relative abundance of capital.

In country I, good A is the relatively cheaper good

- this is because ω/r and P_A/P_B are related positively.
- If ω/r rises it is implied that P_A/P_B rises too,
- as A is the labor intensive good, the price of A increases by more than the price of B, as the ratio ω/r gets higher and higher.
- There is a "one to one" connection between ω/r and P_A/P_B .

Unique positive relation between ω/r and P_A/P_B



In country I, good A is the relatively cheaper good

- ⇒ sector A has the comparative advantage.
- Country, I exports good A. Why?
- Because, in country I, A, is relatively cheaper.
- The relatively abundant factor (labor) is used more intensively in the production of A.

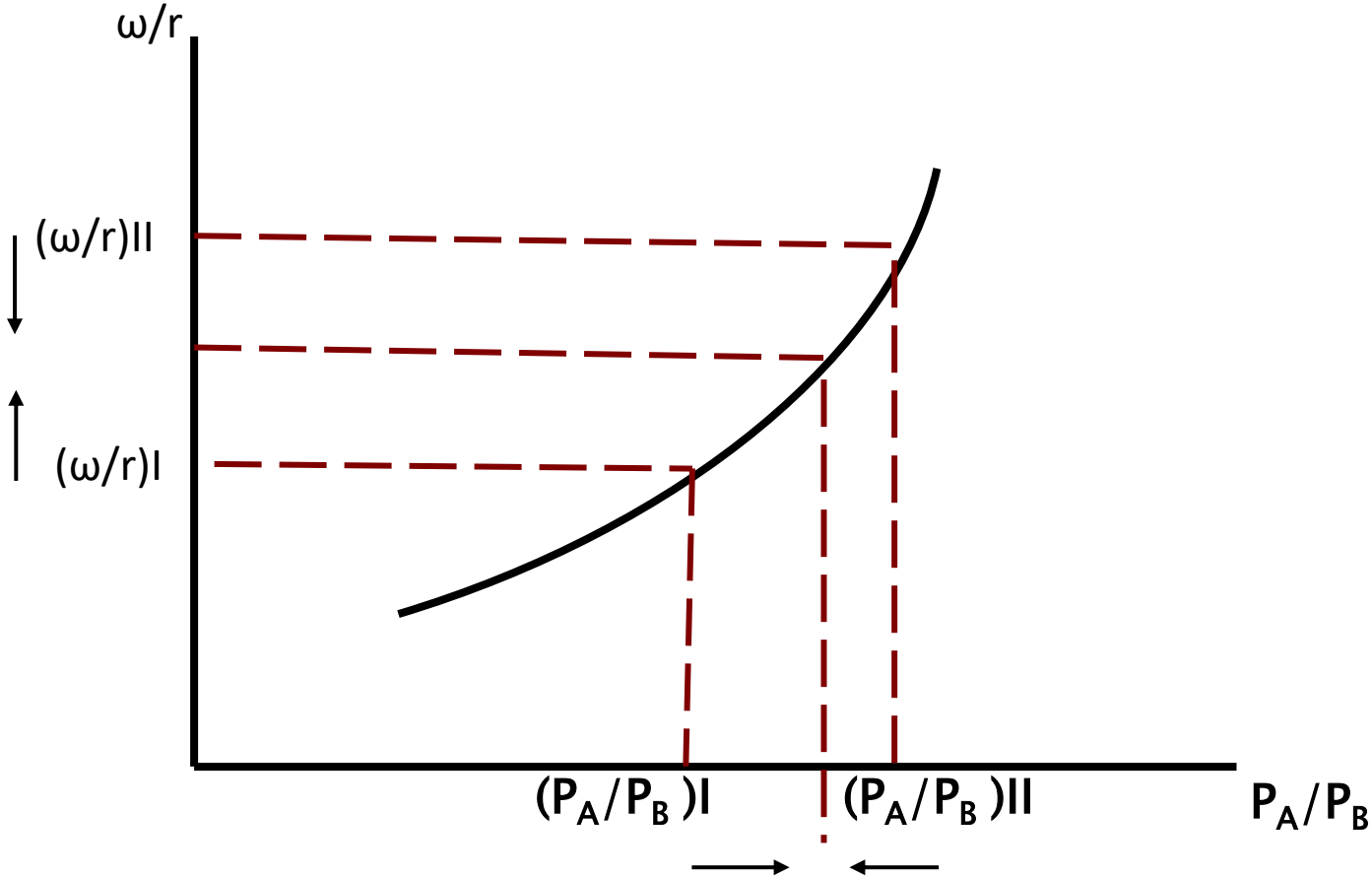
Impact of international trade on relative prices:

- **Convergence of relative prices of commodities between countries:**
- **In country I, P_A/P_B increases, ↓.**
- **In country II, P_A/P_B falls, ↓.**
- **Also**
- **Convergence of relative prices of the factors of production, between countries:**
- **In country I, ω/r increases.**
- **In country II, (ω/r) falls.**

Impact of international trade on relative prices:

- **Before trade has started:**
- $(P_A/P_B)^I < (P_A/P_B)^{II}$
- **After trade:**
- $(P_A/P_B)^I \uparrow < (P_A/P_B)^{International} < (P_A/P_B)^{II} \downarrow$
- **Before trade has started:**
- $(\omega/r)^I < (\omega/r)^{II}$
- **After trade :**
- $(\omega/r)^I \uparrow < (\omega/r)^{International} < (\omega/r)^{II} \downarrow$

Convergence of ω/r and P_A/P_B



Redistribution of income:

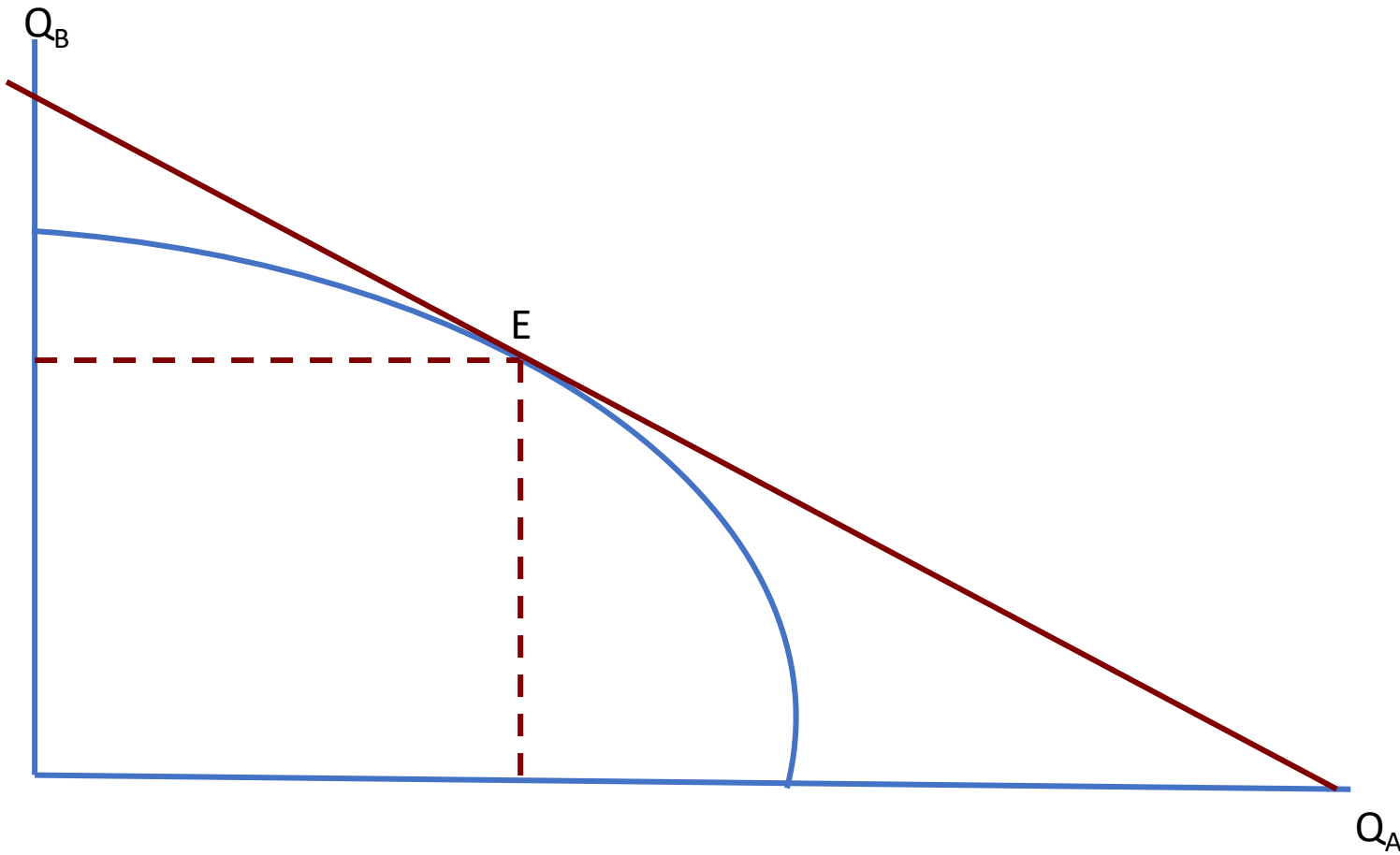
- In each country the relatively abundant factor of production benefits.

- That is, the factor of production that is used in the exporting sector more intensively, benefits from international trade.

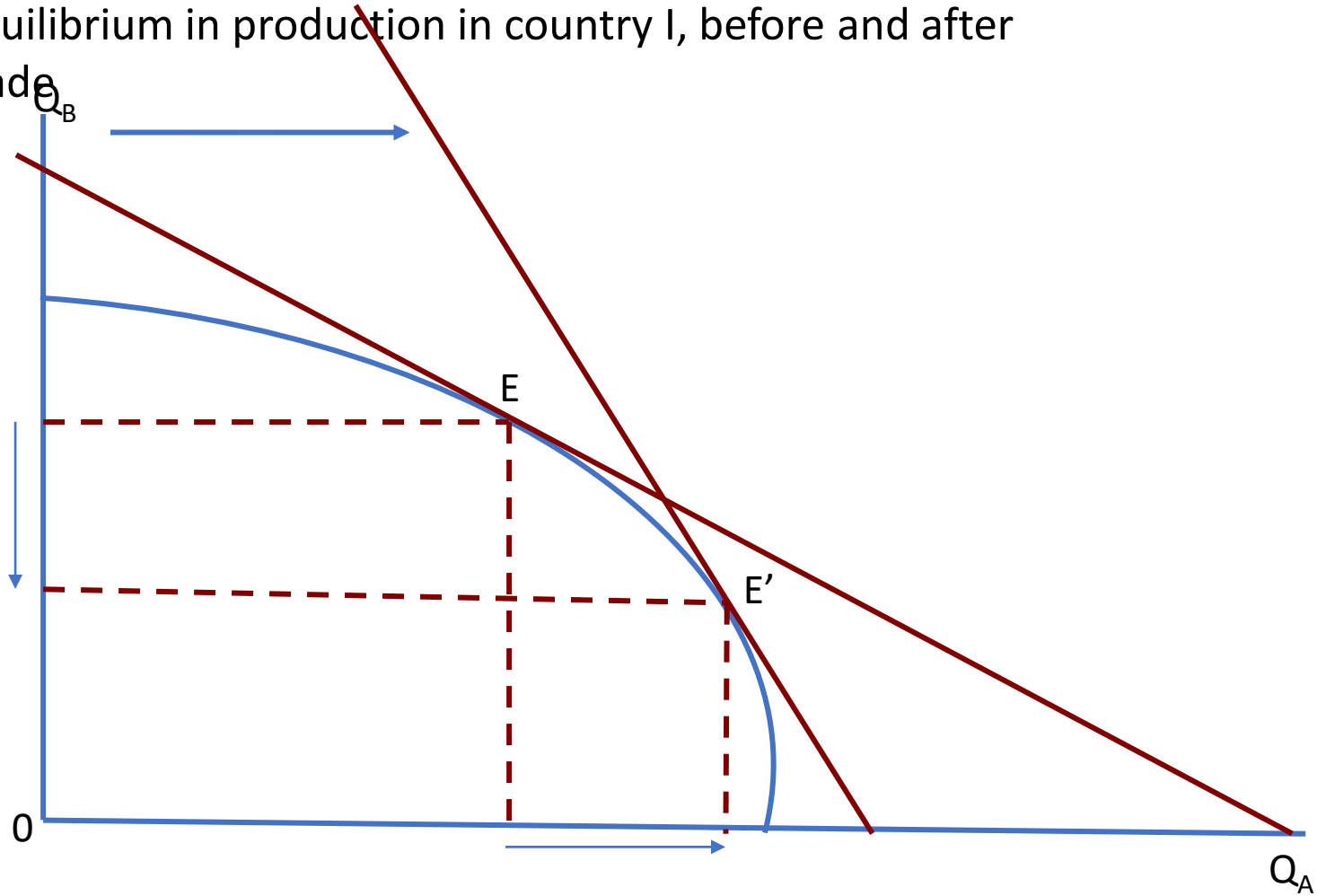
To summarize, after international trade:

- The relative price of the relatively abundant factor of production is raised .
- In each country, the sector that produces the exporting good grows, at the expense of the other sector. (specialization…but not complete)
- Relative prices of goods are equalized.
- Relative prices of factors of production are equalized.
- In each sector, the same technology (K/L), is used in both countries.

Equilibrium in country I, in a state of closed economy



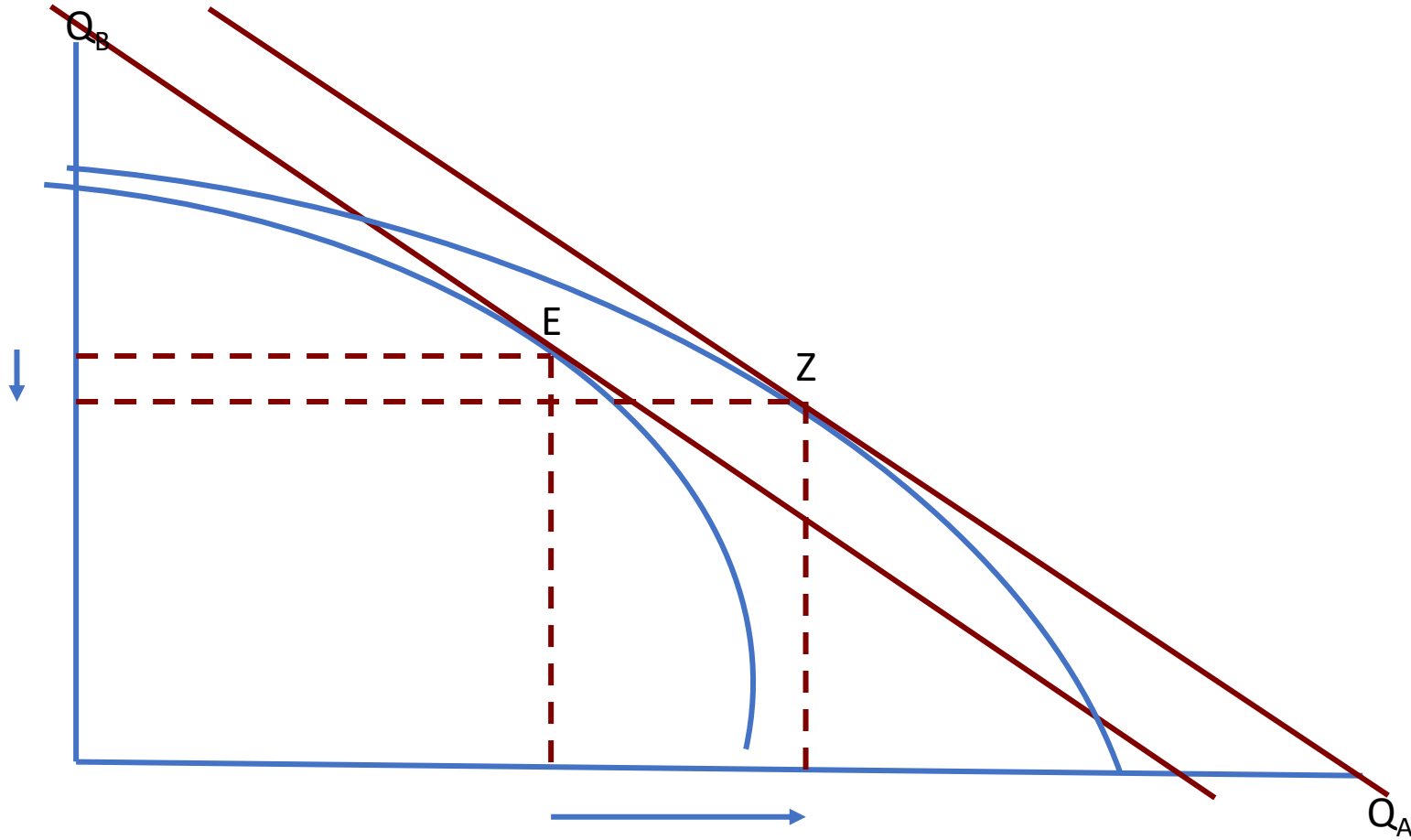
Equilibrium in production in country I, before and after trade



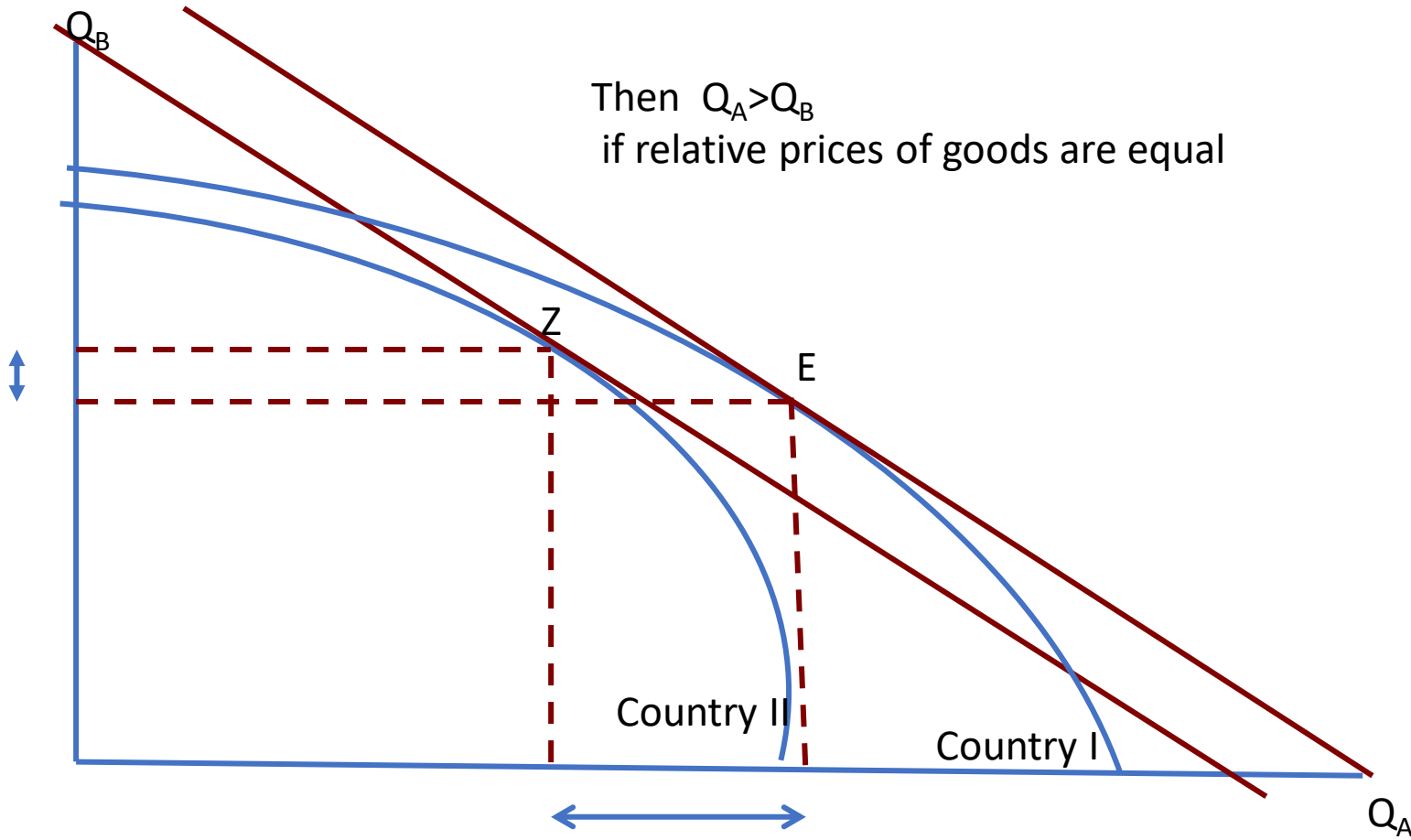
Rybczynki's Theorem

- In a country:
- Two goods(A, B)
- Two factors of production(K, L)
- A is the labor intensive good, B is the capital intensive good.
- Constant returns to scale.
- Constant relative prices of goods and factors of production.
- An increase in the quantity of a factor of production(L) will increase the production of the good that uses it more intensively (that is good, A) and will reduce the production of the other good (that is good B).

If Labor increases $\Rightarrow$ Q_A/Q_B increases

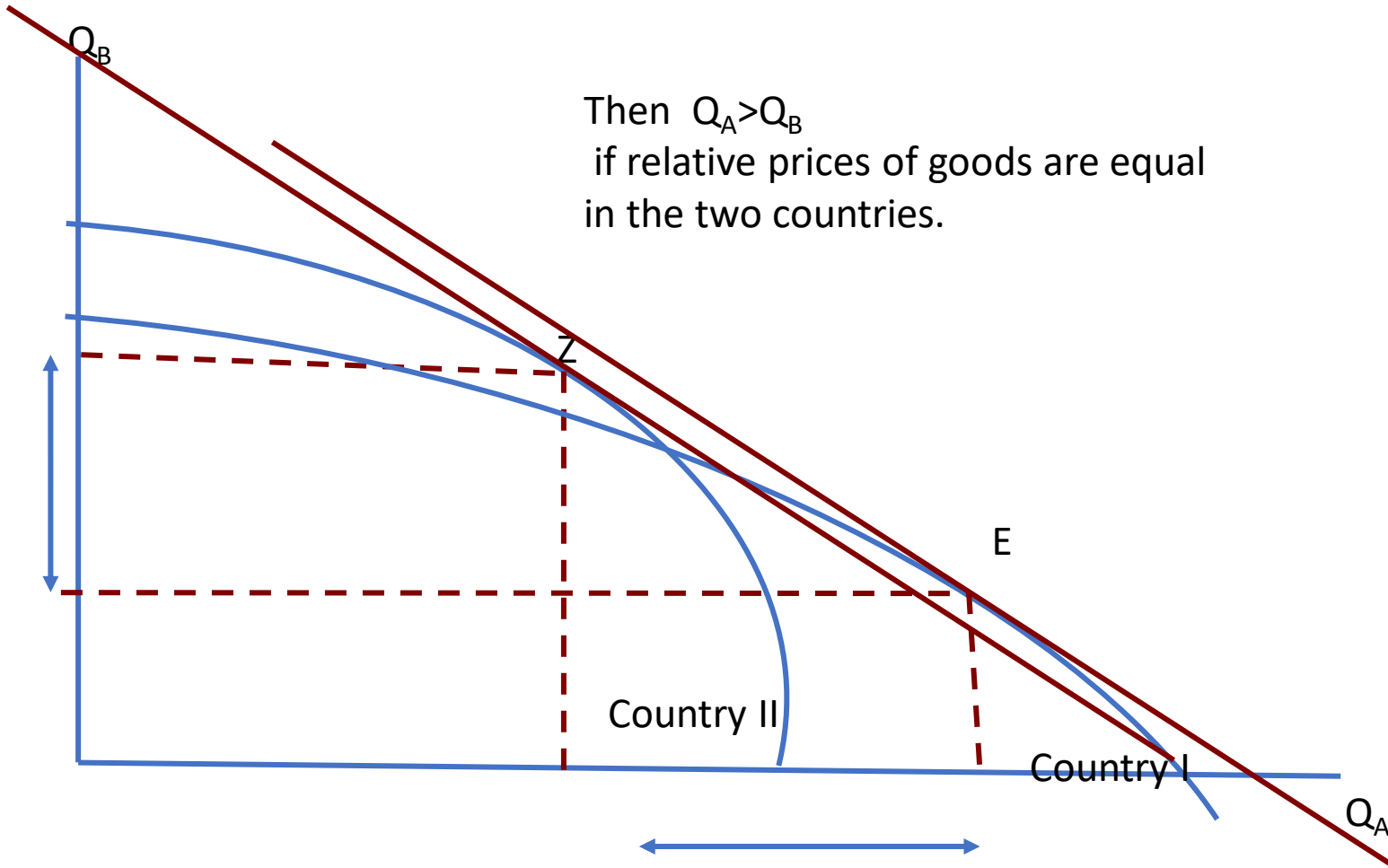


Suppose we consider two countries and $(L/K)^{I}>(L/K)^{II}$



Suppose we consider any two countries and $(L/K)^{I}>(L/K)^{II}$

We can apply the **Rybczynki's** theorem for the case of any two countries possessing different ratios of factors of production



H-O:redistribution of income

- **In the specific factor model:**
- **Trade benefits the specific factor of production used in the exporting sector.**
- **Case of skilled and unskilled work.**

H-O: suppose skilled labor, ω^s is the relatively abundant factor, used more intensively in the exporting sector.
Suppose ω^s/ω^{ns} increases.
There are transitory and permanent effects

- **Specific factor model:**
- **If a skilled job is used in the exporting sector then it benefits.**
- **Unskilled work is also affected(suffers a pure loss).**

H-O: Convergence of the remuneration of the factors of production across counties, through International Trade

- **Relative prices of the factors of production are equated.**
- **Absolute prices of the factors of production are equalized if :**
- **Absolute prices of goods are equalized,**
- **This can occur only in case we assume constant returns to scale.**

International trade: indirect way of exchanging factors of production

- **Equal pay does not actually occur in real life:**
- **Many countries specialize in the production of specific goods because their quantity of the factors of production they possess are different.**
- **In reality, there are different technologies across countries.**
- **In real world there exist barriers to international trade.**

Remark: In the USA (and in other developed countries) increased wage inequality between skilled and unskilled labor

during the period between1970 and1990

- **Question: is this the result of free international trade?**

If developed countries export goods that use skilled labor more intensively in their production, and import goods that use unskilled labor more intensively in their production,

- **then**
- **After international trade:**

  $\omega^s/\omega^{ns} \uparrow$
- **However:**

- Relative prices of P^s/P^{ns} did not increase.
- In countries with affluency of unskilled labor (China, S. Korea ,…) : (-70-90) the share of labor in GDP has remained constant.
- the relative USA wage of skilled/unskilled labor did not increase.
- **(on the contrary) $\omega^s/\omega^{ns} \downarrow$**
- **International trade is a small share of US GDP. (in Europe however, international trade has a larger share in GDP).**

Empirical testing of the Heckscher-Ohlin theorem

- **1) W. Leontief**
- **Leontief' paradox:**
- **He found: US exports are more intensive in labor relative to capital, than imports.**
- **However, if we accept that US is a country with a relative affluency in capital with respect to the rest of the world**
- **we would expect that the US would export goods intensive in the use of capital.**

How can we explain the Leontief's Paradox?

- **Labor in the USA is more productive. Hence the US is "rich" in skilled work.**
- **US imports are intensive in raw material.**
- **Different technologies used: in the US, production is more capital intensive in both the exporting sector and the sector that competes with imports.**
- **H-O theorem: theory of the life cycle of production perhaps more relevant in explaining the Leontief's paradox.**

- **2) Bowen, Leamer, Sveikauskas**
- **Exchange of goods is an indirect way of exchanging factors of production.**
- **Each country will export, along with its products , its relatively affluent factor of production.**
- **27 countries, 12 factors of production**
- **They compare the share of the income of the factor of production to the country's income, to the global share of this factor in global income.**