# Structure and Functioning of the European and Global Economic System

## Basic Theories and Concepts in International Economics

## Lectures 2 and 3

# 1. Comparative Advantage and the Gains from Trade

- A brief presentation of the concepts of:

  *absolute advantage* (AA)

  *comparative advantage* (CA)
- How international trade impacts on real wages, and how it places limits on relative (domestic-to-foreign) wages
- How differential productivity developments in foreign countries may benefit or harm domestic workers

# Main Assumptions of the (Ricardian) Model

- 2 Countries: Denmark(D) and Greece (G)
- 2 Goods: Agricultural (A) and Manufacturing (M)
- Labour is the only factor of production, and all workers are identical within each country.
- Labour productivity differs across countries (possibly due to differences in technology).
- Labour productivity remains constant as output changes, i.e. both marginal and average cost are constant.
- Perfect competition prevails, and so prices are equal to marginal and average costs.

The Table below shows the units of labour required to produce 1 unit of each good in each country. Thus, to produce 1 unit of M in Greece (G) you need 4 units of labour, whereas in Denmark (D) you need 1 unit of labour. We observe that, for both goods, you need fewer units of labour in D than in G. We thus say that D has **absolute** advantage in the production of both goods over G (i.e. D it is more productive in both goods). However, the productivity advantage of D (over G) is four times as high in M, and "only" twice as high in A. Thus, D has **comparative** advantage in M. By same token, although G has absolute disadvantage in both goods , it has comparative advantage in A ( in A, Greece has 50% of Danish productivity, and in M, 25% of Danish productivity – thus Greece is comparatively better in A).

| | **LABOUR UNITS REQUIRED TO** | **PRODUCE 1 UNIT OF THE GOOD** |
|---|---|---|
| | **AGRICULTURAL GOODS (A)** | **MANUFACTURING GOODS (M)** |
| **GREECE (G)** | 2 | 4 |
| **DENMARK (D)** | 1 | 1 |

# Relative Prices in Autarky

Assuming perfect competition, the price of each good in autarky will be equal to the average cost of producing it. Thus:

$P^{A,G} = AC^{A,G} = 2\ (W^G)$

$P^{M,G} = AC^{M,G} = 4\ (W^G)$.

Therefore the relative price in Greece in autarky will be equal to :

$(P^{A,G}/P^{M,G}) = 0.5$. This makes sense, since it takes half as much labour to produce the A good in Greece as the amount required to produce the M good.

Applying the same logic, the relative price in Denmark in autarky will be equal to: $(P^{A,D}/P^{M,D}) = 1$.

NOTE: UNDER AUTARKY, THE RELATIVE PRICE OF GOOD *A* IS LOWER IN GREECE - COMPARATIVE ADVANTAGE **(CA)** IMPLIES THAT UNDER AUTARKY THE RELATIVE PRICE OF THE GOOD IN WHICH THE COUNTRY HAS **CA** WILL BE LOWER THAN IN THE OTHER COUNTRY.

(GOOD *M* WILL BE RELATIVELY CHEAP IN DENMARK.)

# Real Wages in Autarky

Workers within each country are identical, and earn the same wage.

Under autarky, the real wage in terms of A in Greece will be $W^G/P^{A,G} = W^G/2$ ($W^G$)=0.5.

This implies that a worker can acquire half a unit of A if he provides 1 unit of labour and devotes his entire income to acquire the A good; in other words, real wages are equal to labour productivity, since 1 unit of labour produces half a unit of A.

The real wage in terms of M goods in Greece will be

$W^G/P^{M,G} = W^G/4$($W^G$)=0.25. (This implies that a worker can acquire 0.25 units of M if he provides 1 unit of labour and devotes his entire income to acquire the M good.)

# Real Wages in Autarky

By similar reasoning, the real wage in Denmark will be:

$W^D/P^{A,D} = W^D/W^D = 1$ - in terms of A

$W^D/P^{M,D} = W^D/W^D = 1$ - in terms of M

Real wages will be higher in the more productive country.

# A Hypothetical Consumption Pattern in Autarky

- Given that in autarky in Greece

$W^G/P^{A,G}$=0.5, and $W^G/P^{M,G}$=0.25 , a worker could, for example, find it optimal to devote half her income (from supplying 1 unit of labour) to buy 0.25 units of A, and the other half to buy 0.125 units of M. We denote this as:

$C_a^{A,G}$=0.25, $C_a^{M,G}$=0.125. (subscript $a$ denotes autarky)

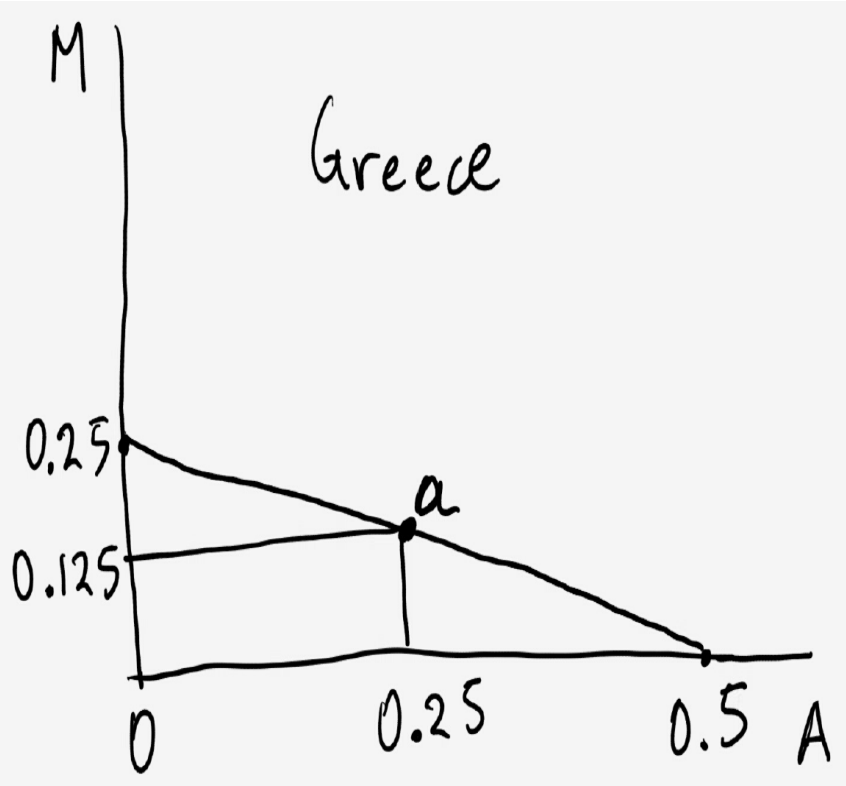
- Given that in autarky in Denmark

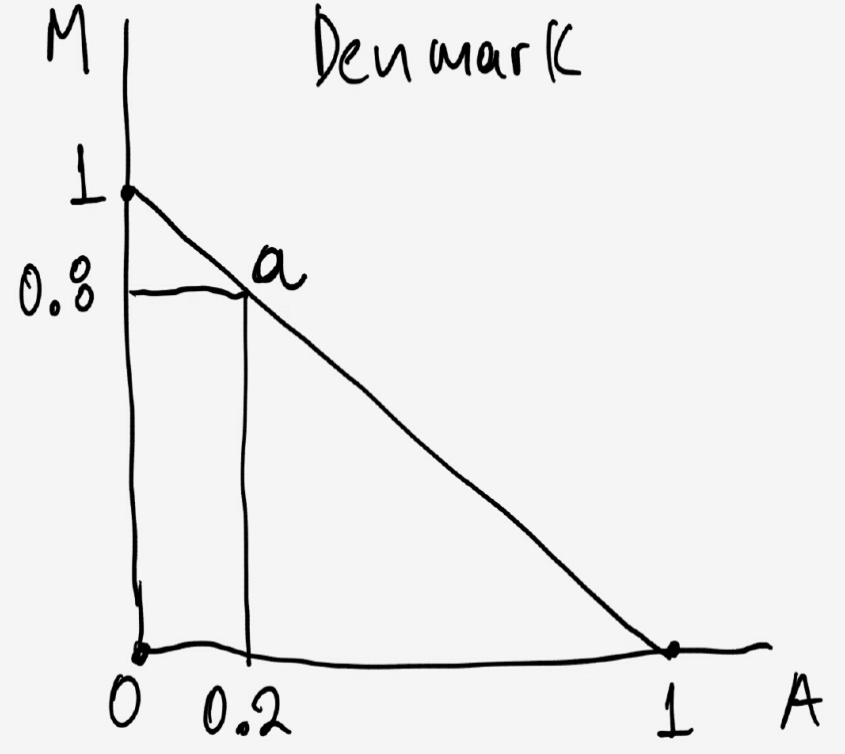
$W^D/P^{A,D}$=1, and $W^D/P^{M,D}$=1 , a worker could, for example, find it optimal to devote 80% of her income (from supplying 1 unit of labour) to buy 0.8 units of M and the rest 20% to buy 0.2 units of A. We denote this as:

$C_a^{A,D}$=0.2, $C_a^{M,D}$=0.8

**Consumption Pattern in Autarky:**

Under Autarky, point α (in both diagrams) is the production **and** consumption point, since consumption of each good can not differ from the production of each good in the absence of international trade.



# Free Trade

- Under autarky we found that that the relative prices will be different in the two countries: $(P^{A,G}/P^{M,G})$= 0.5 , $(P^{A,D}/P^{M,D})$=1.
- Free trade (and the absence of any regulations or taxes) will equalize the prices, and a common relative price will prevail, denoted as $(P^{A}/P^{M})$.
- We expect that free trade will result in a relative price that will be in-between the autarkic relative prices, i.e. 0.5<$(P^{A}/P^{M})$<1. (The case that the relative price under free trade will be equal to either 0.5 or 1 cannot a-priori be excluded, but we ignore it here.)
- For purposes of illustration, let's assume that the free-trade relative price is: $(P^{A}/P^{M})$=0.8.

# Are There Gains from Trade?

- With free trade it makes sense for each country to specialize in producing only the good in which it has comparative advantage (i.e., G in A, and D in M). For simplicity, assume that there is only 1 worker in each country, who supplies 1 unit of labour.
- Suppose that the Greek worker, who produces 0.5 units of A, wishes to maintain her consumption of 0.25 units of A (as in autarky), and trade (i.e. export) her remaining 0.25 units of A in order to acquire, thru imports, some units of M.
- How many units of imports can she receive in exchange?
- In the absence of gifts (i.e. assuming trade balance), the value of imports must be equal to the value of exports, i.e.

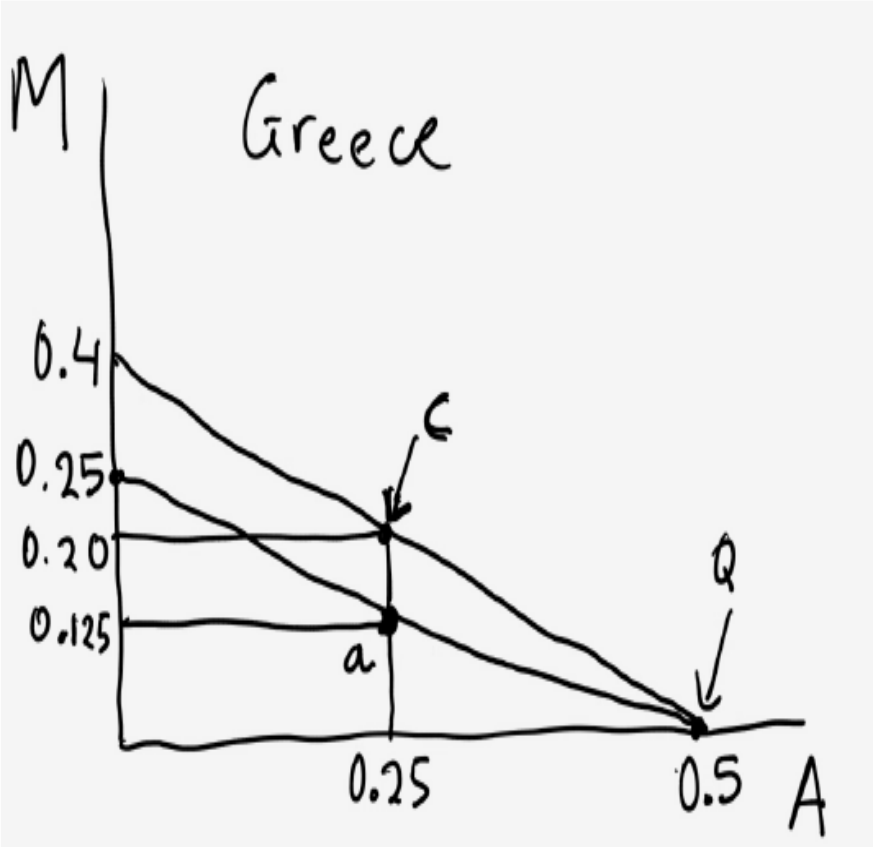
  $(P^A)(X^A)=(P^M)(IM^M)$ , or $IM^M = (P^A/P^M)(X^A)$,

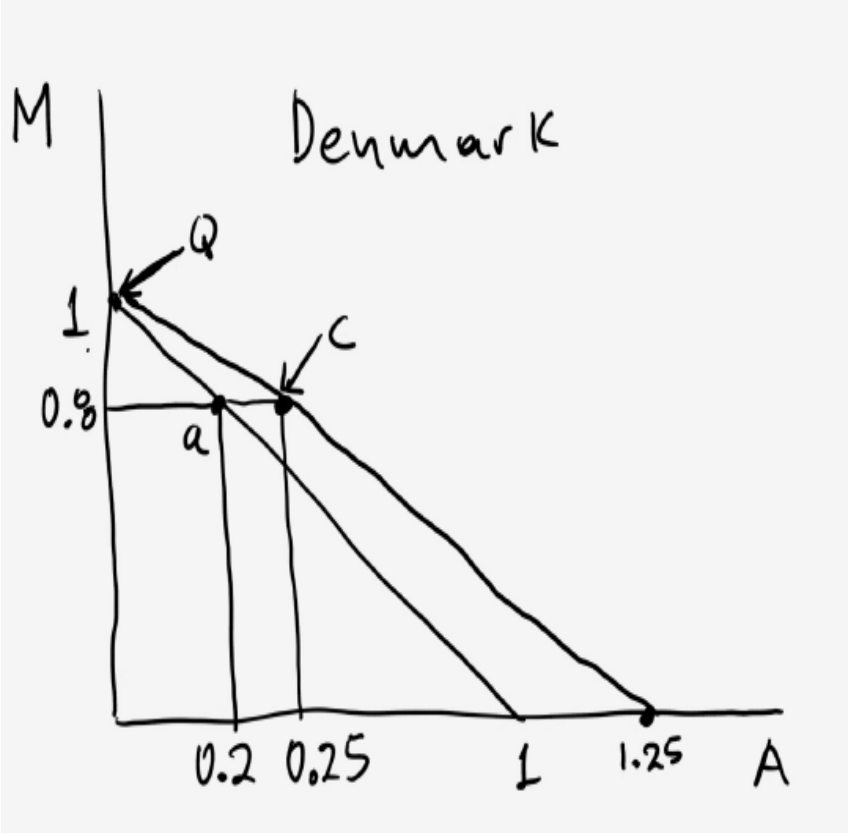
  where X denotes exports, and IM denotes imports. Since $X^A$=0.25, and $(P^A/P^M)$=0.8 , we find that $IM^M$=20.

# Are There Gains from Trade (continued)

- Thus, the worker can, thru trade, maintain her consumption of 0.25 units of A, and consume 0.20 units of M as well, which are higher than the consumption of 0.125 units of M which she would have in autarky.
- In such a case, since Greece's exports of A are 0.25 units, Denmark's imports of A will be 0.25 units, and that will be the Danish worker's consumption of A, which is higher than his consumption under autarky. Moreover, since the Danish worker produces 1 unit of M, and exports 0.20 units of it to Greece, his consumption of M would be 0.80 units – as much as her consumption during autarky.
- This case is depicted for both countries in the next slide, with α depicting the production and consumption point under autarky, and Q and C the production and consumption points (respectively) under free trade.

**Gains from Trade**: In the example presented, for both countries, free trade allows them, by fully specializing in the good in which they have **CA,** to consume as much of the good in which they have **CA,** and to increase the consumption of the other good thru imports. This obtains because world production of both goods rises under free trade relative to autarky.



# Gains from Trade (continued)

- Of course, the worker could enjoy, thru free trade, higher consumption of both goods relative to autarky.
- For example, the worker in Greece could consume 0.28 units of A, export 0.22 units of it, and import and consume 0.176 units of M – since $(P^A/P^M)(X^A)$=(0.8)(0.22)=17.6
- In that case, the consumption of the Danish worker will be equal to 0.5-0.28=0.22 units of A, and 1-0.176=0.824 units of the M good.
- The fact that workers can enjoy higher consumption of both goods under free trade relative to autarky signifies Gains from Trade. It also implies that the real incomes will be higher under free trade.

# Relative Wages

- Given the productivity differences between the two countries, how high could the Greek wage be relative to the Danish wage ($W^G/W^D$)?
- It is obvious that the Greek wage should be such that Greece can produce at least one of the goods at a lower cost – otherwise, with free trade, no Greek producer could survive.
- We need $AC^{A,G} \leq AC^{A,D}$, or (2)$W^G \leq W^G$, or ($W^G/W^D$) $\leq$1/2. This says that the Greek wage can be, at most, 50% of the Danish wage. Why? Because Greek workers have 50% of the productivity of Danish workers.
- How low could ($W^G/W^D$) be? By similar logic we can establish that if ($W^G/W^D$) <1/4, then even M could be produced in G at a lower cost than in D. Thus…

- How low could $(W^G/W^D)$ be? By similar logic we can establish that if $(W^G/W^D) < 1/4$, then even M could be produced in G at a lower cost than in D. Thus, the relationship:

$$1/4 \leq (W^G/W^D) \leq 1/2 \ ,$$

provides the range of the Greek wage relative to the Danish wage that allows both countries to produce at least one of the goods.

- For example, if $W^G = 0.4,\ W^D = 1,$ then $AC^{A,G} < AC^{A,D}$, and $AC^{M,G} > AC^{M,D}$, so G will produce the *A*, and D the *M*.
- The relative demand for the two goods determines whether $W^G/W^D$ should be closer to the lower or the higher value of the range (i.e. closer to 0.25 or to 0.5). For example, an exogenous increase in the (relative) demand for A will result in higher demand for labour in Greece, and a higher $W^G/W^D$.

# Changes in Foreign Productivity

- We have seen that in autarky real wages are equal to (labour) productivity, and that with free trade the real wage in terms of the imported good will be higher. Moreover, the rise in the real wage (and consumption possibilities) for Greece after free trade obtains even if the trading partner (**D**) is more productive in both goods.
- What if, starting from a situation of free trade, **D** becomes more productive? Will Greece become better-off?
- Consider that **D**'s productivity in agricultural goods rises, and that it now requires only 0.666 units of labour to produce 1 unit of A.
- Greece retains its **CA** in *A, s*ince it has 33% of D's productivity in it, and only 25% of D's productivity in M. Thus, Greece can continue to specialize in producing the *A*.

- The range of the Greek wage relative to the Danish wage now is $1/4 \leq (W^G/W^D) \leq 1/3$ ; i.e. Greek wages can now be up to 33% of Danish ones.
- Although we may care about *relative* wages (e.g. Harvard survey), what happens to real wages?
- If, as assumed earlier, $(W^G/W^D)$=0.4 before the rise in D's productivity, assume that after the rise in D's productivity $(W^G/W^D) = 0.3$. Let $W^D$=1, in both cases, so that $W^G = 0.4$ , and $W^G = 0.3$, respectively.
- Note that the price of each good under free trade is equal to the AC of producing, and that with full specialization G produces A and D produces M.

- Real wages (under FT) before the rise in D's productivity:

$$W^G/P^A = W^G/\,AC^{A,G} = \frac{0.4}{(2)(0.4)} = 0.5$$

$$W^G/P^M = W^G/AC^{M,D} = \frac{0.4}{(1)(1)} = 0.4$$

- Real wages (under FT) after the rise in D's productivity:

$$W^G/P^A = W^G/\,AC^{A,G} = \frac{0.3}{(2)(0.3)} = 0.5$$

$$W^G/P^M = W^G/AC^{M,D} = \frac{0.3}{(1)(1)} = 0.3$$

Thus, the rise in D's productivity in the good in which G has CA can lower the *overall* real wage in G.

- Could the same result obtain if D became more productive in M?

# Some Reservations Regarding the Ricardian Model

Despite the remarkable understanding offered by the Ricardian model, we should note that:

- It ignores the presence of other factors of production (i.e. capital, land), and thus it is silent on distributional issues.
- It is a long-run model, and it pays no attention to the (maybe long-lasting) transition period – during which workers previously employed in the comparative-disadvantage sector may be unemployed.
- It does not offer a very good description of actual trading patterns, since it predicts that a country either imports or exports a particular good, thus excluding the possibility that, e.g. France both exports and imports cars.

# 2. International Trade and Income Distribution: The *Specific Factors* Model

Opening a country to trade generates winners and losers. The Specific Factors model helps explain who gains and who loses.

It is called the specific-factors model because land is specific to the agriculture sector and capital is specific to the manufacturing sector; labor is used in both sectors.

From the Ricardian model, we learned that free trade increases relative prices in the export sector and decreases relative prices in the import sector, and this in turn affects the earnings of factors of production.

We'll continue to use two countries: Greece and Denmark.

To produce the Agricultural good (A) you need Labor and Capital.

To produce the Manufacturing good (M) you need Labor and Land.

Thus, Capital (K), and Land (T) are used in the production of one good only – they are the Specific Factors (SF)

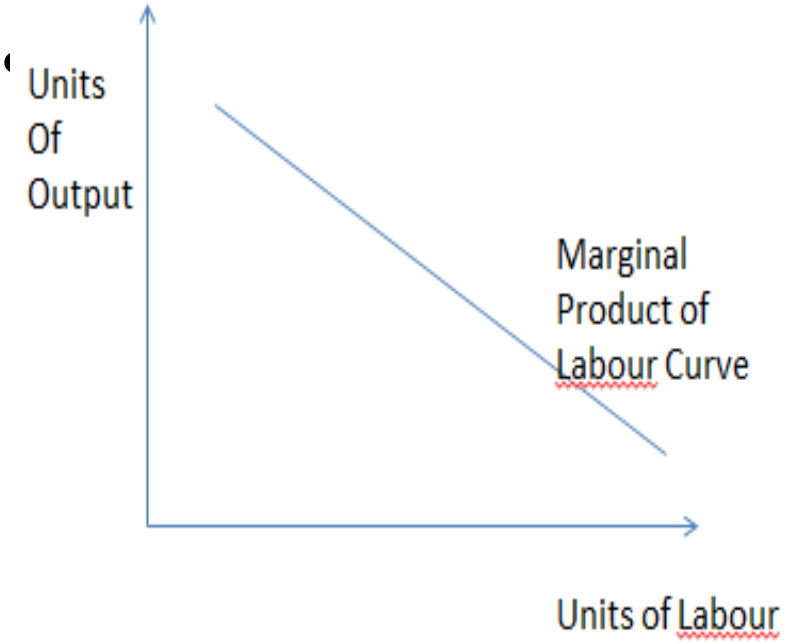
Labor (L) is used in the production of both goods – it is the mobile factor.

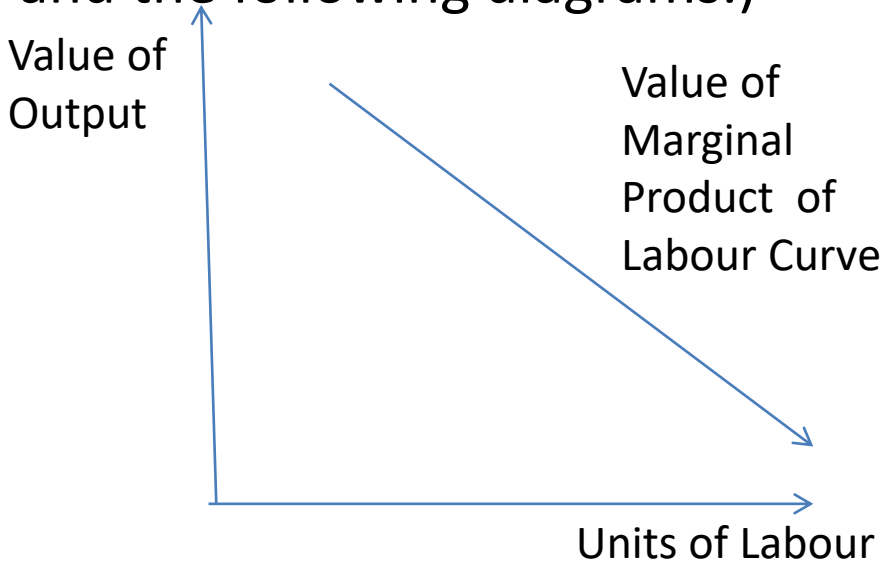
Employment of Labor in the production of A is denoted as $\boldsymbol{L_A}$ and employment in the production of M is denoted as $\boldsymbol{L_M}$.

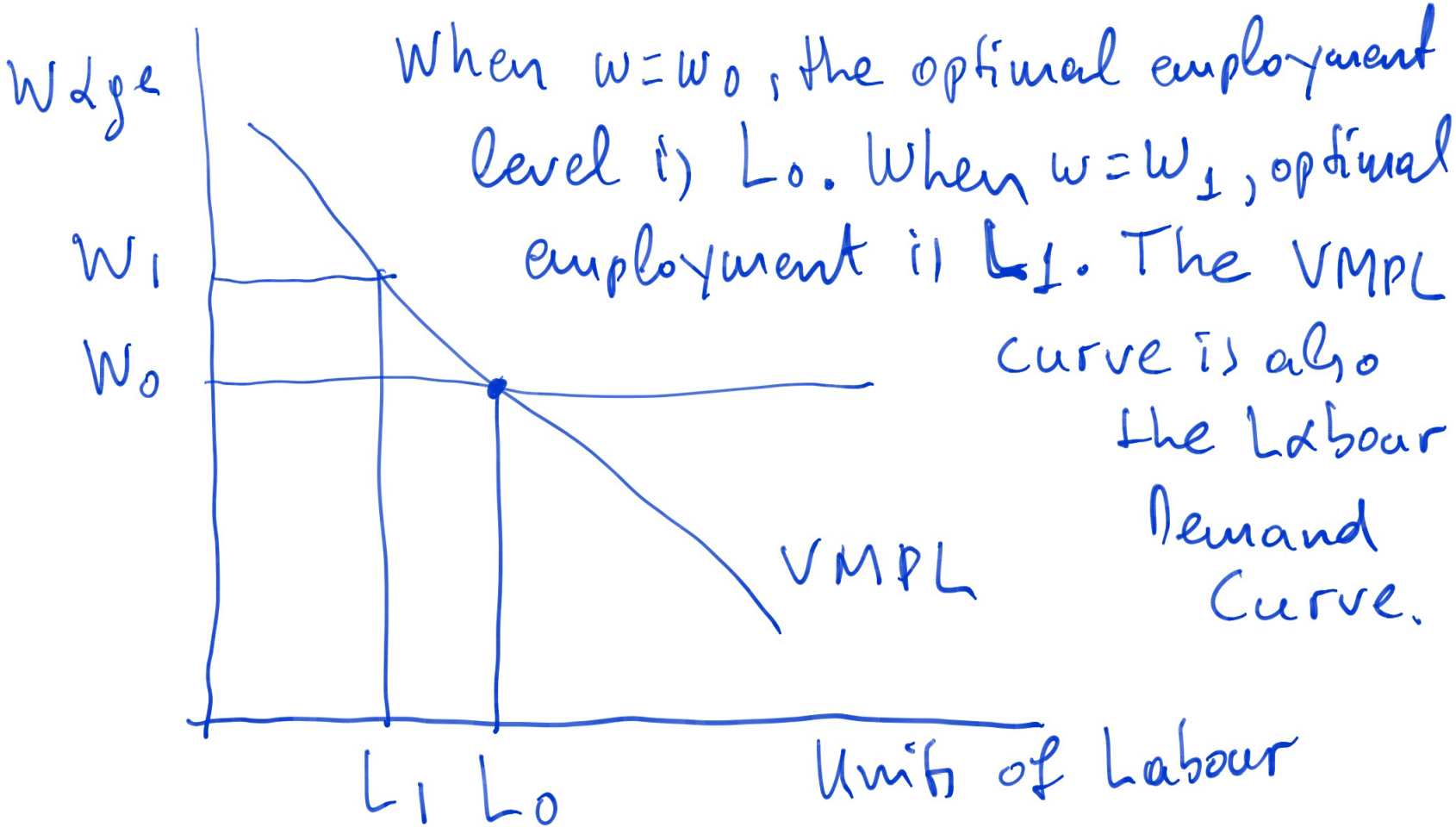
$\mathbf{L = L_A + L_M}$

**In the SF model, unlike the Ricardian model, a country produces both goods after FT, one of which it exports (exportable), while it imports the other (importable).**

We assume that as each unit of labour is added to production, the additional output is getting smaller and smaller, i.e. the marginal product of labour declines as the labour input increases., as depicted in the left-hand-side diagram below. The **value** of what is produced by each worker is equal to the marginal product of Labour (MPL) times the price of the product, i.e. VMPL= P x MPL, and is depicted in the right-hand-side diagram below. (See the appendix to lecture 2 for more details regarding this and the following diagrams.)

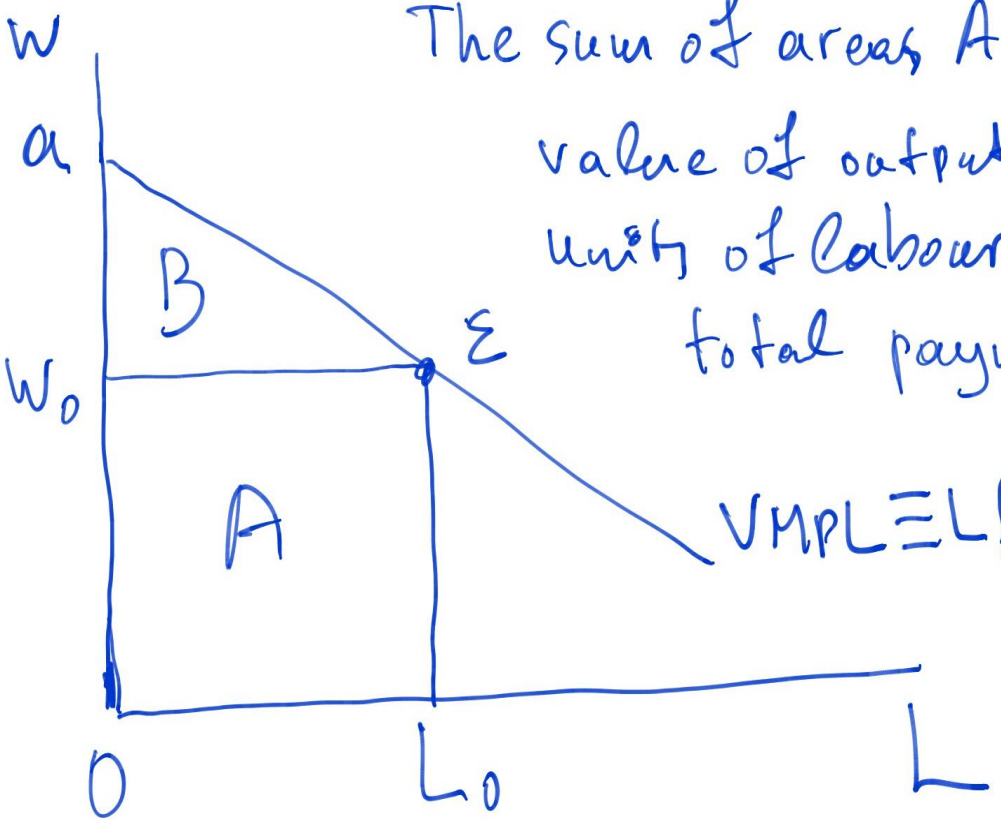





When $w = w_0$, the optimal employment level is $L_0$. When $w = w_1$, optimal employment is $L_1$. The VMPL curve is also the Labour Demand Curve.

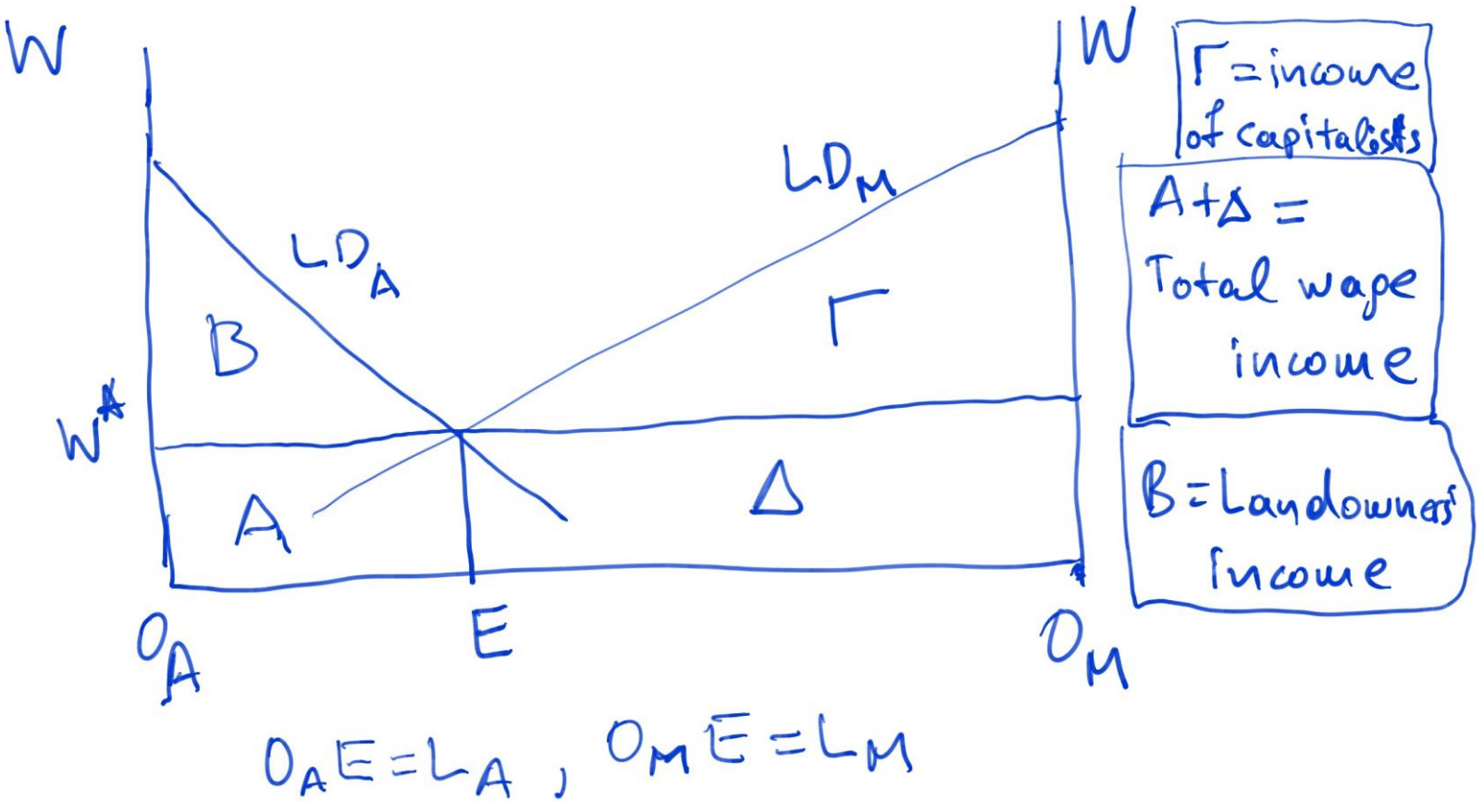
# The Distribution of Income between Wage Income and Profits



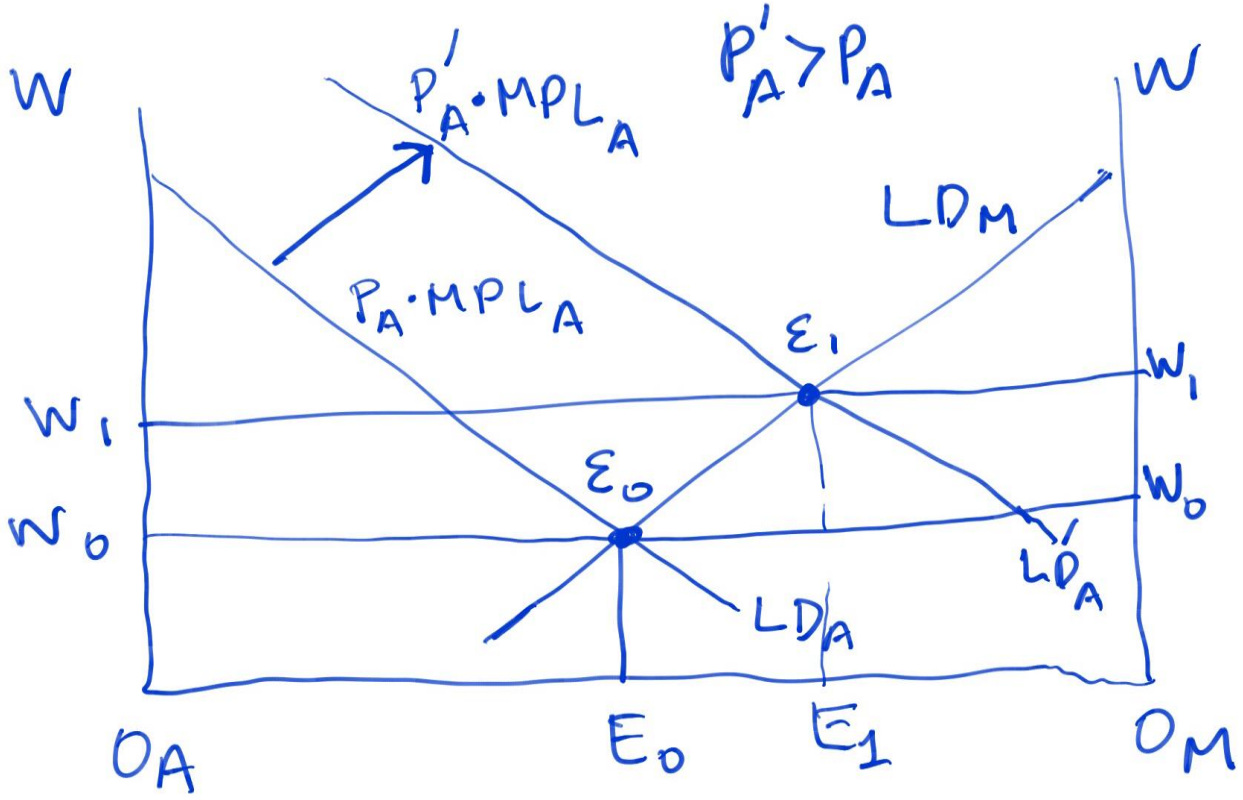

The sum of areas A and B is the total value of output produced by $L_0$ units of labour. Area A is the total payments made to the $L_0$ workers, thus area B represents the profits.

The equilibrium allocation of labour between sectors

Note: The size of the horizontal axis is equal to the total units of labour in the economy, i.e. $O_A O_M = L$



Opening an economy to international trade (IT) implies that the relative price of the exportable good (i.e. the good in which the country has CA) will rise. As a result the demand for labour curve in the exportable sector (assumed to be good A) will shift upwards as shown in the diagram below. Without loss of generality, we assume that the price of the M good remains constant. The new equilibrium involves a rise in the **(nominal)** wage rate and an increase (decrease) in employment in the exportable (importable) sector. As a result, the real income of capitalists declines, while the real income of landowners increases. Real wages may rise or fall. As a result, IT generates winners and losers.




Initially, the equilibrium is at point $E_0$, with $L_A = O_A E_0$, and $L_M = E_0 O_M$. After $P_A \uparrow$, $LD_A$ shifts outwards and the new equilibrium is at point $E_1$.