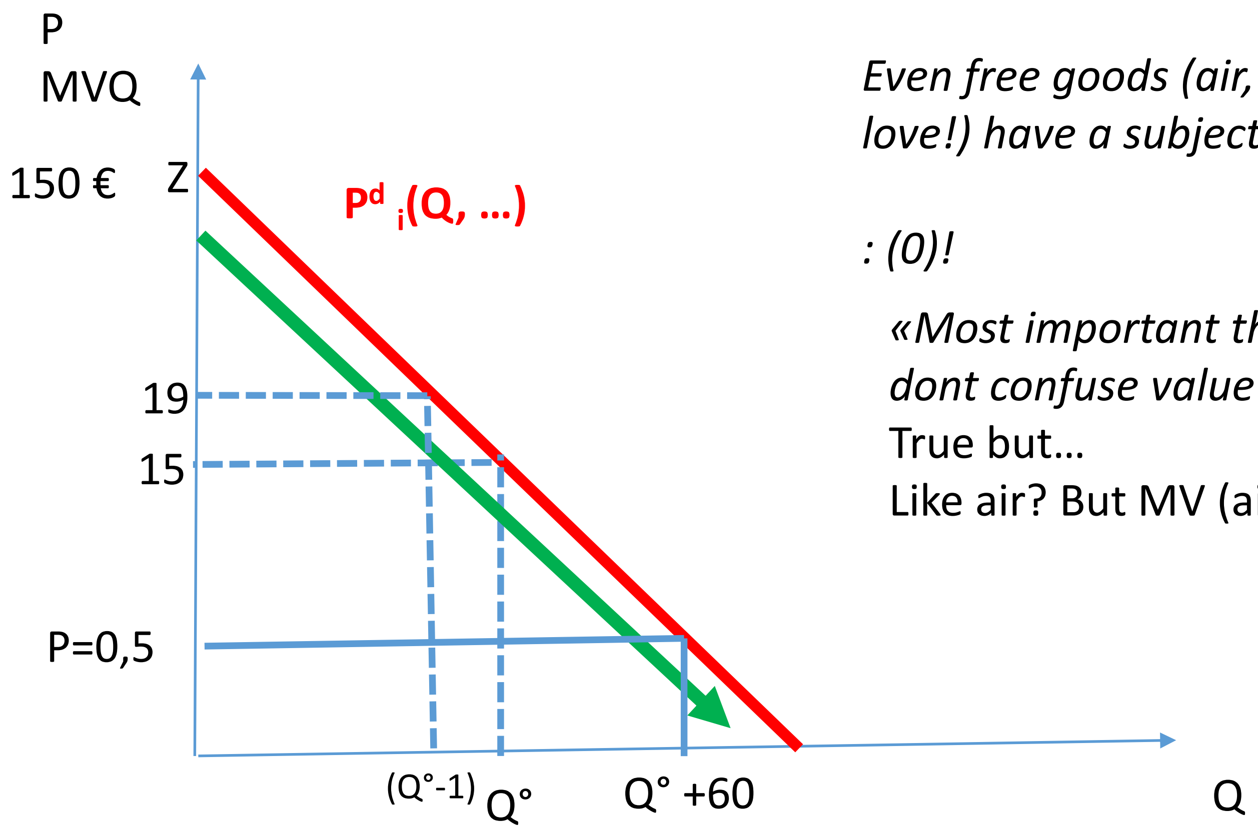
Decreasing demand curves



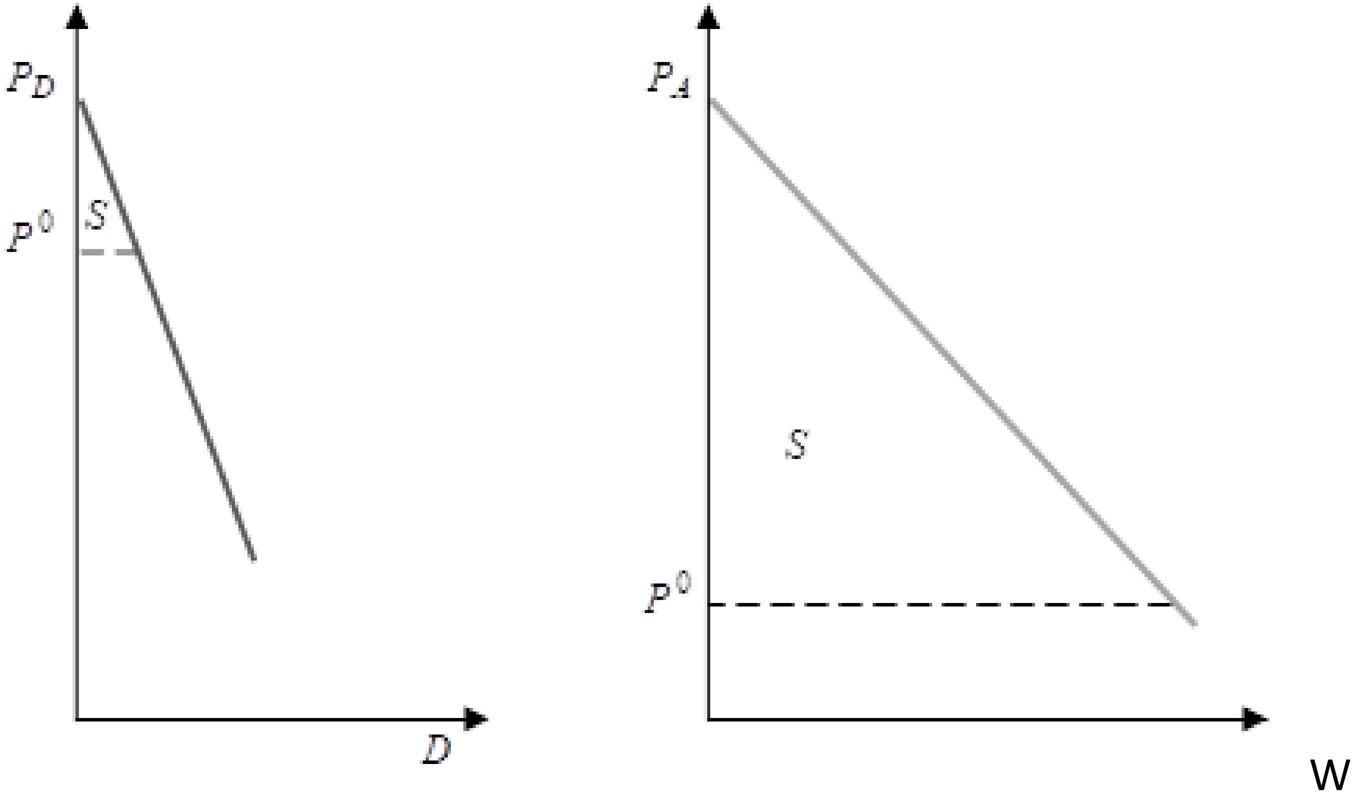
Even free goods (air, company-cleaned car, not love!) have a subjective Marginal Value = price …

: (0)!

«Most important things in life have no price: dont confuse value and price»
True but…
Like air? But MV (air) = … zero

Q°th

The surplus practice: Diamonds and Water



Chapter 4

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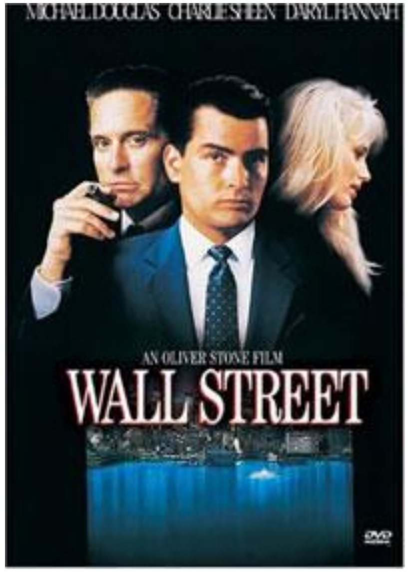
The profit's math

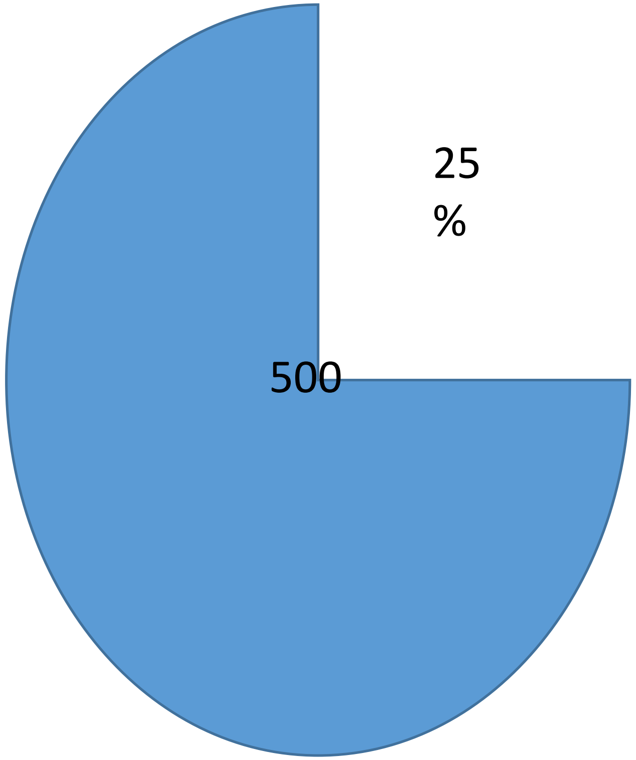
Q* such that:

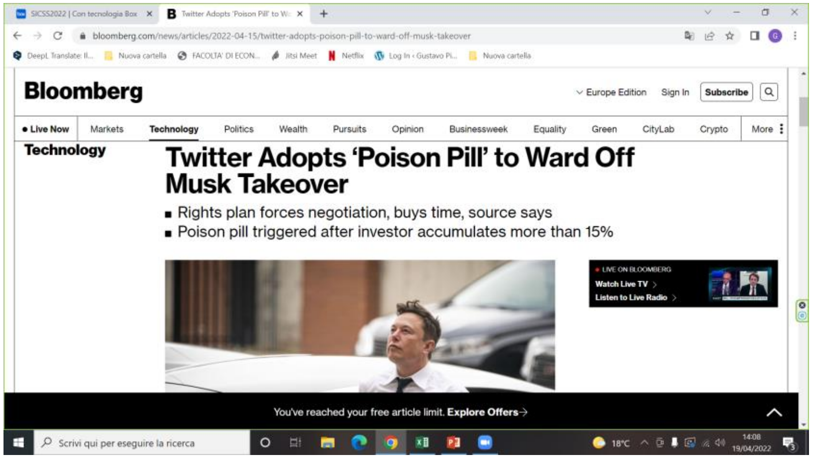
Max Π (Q) = P(Q) **Q** – TC (**Q**)

Really?

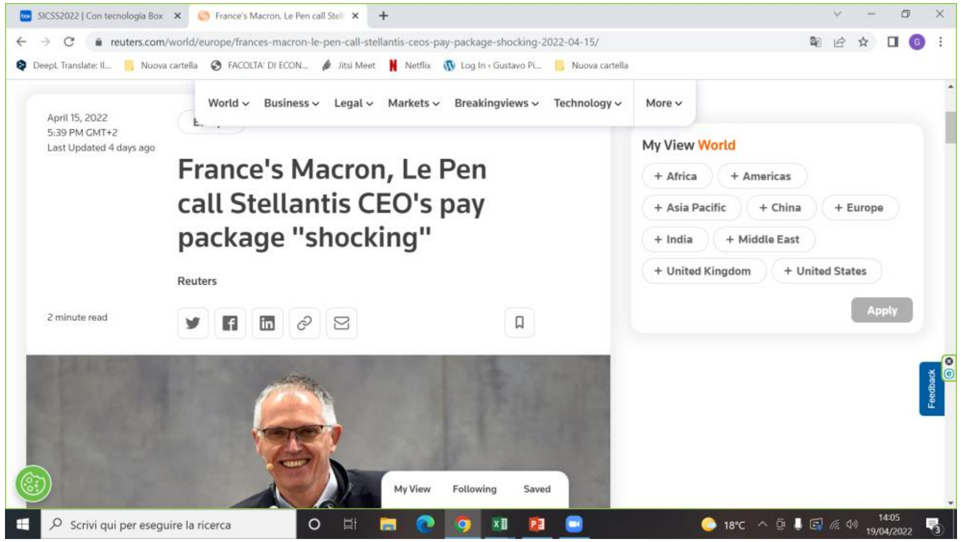
Managers and firms







Mr. Stock Option,
Sundar Pichai



Math and the profit function

$$\underset{Q}{\mathrm{Max}}\,\Pi(Q) = TR(Q) - TC(Q)$$

Q* such that $$\frac{\delta TR(Q^*)}{\delta Q} - \frac{\delta TC(Q^*)}{\delta Q} = 0$$

MgR (Q*) = MgC (Q*)

TC(Q) ≡ min TC(Q)

The math of profits

If MgR (13) = 240 € and MgC (13) = 200 € and
Π (13) = 3450 € …

Π (14) = …. ?
= 3490 €

If MgR (100) = 10 € and MgC (100) = 12 € and
Π (100) = 3450 € …

Π (99) = …. ?
= 3452 €

Costs? No, opportunity costs

The value of everything that the entrepreneur has to give up to, for the production of that specific quantity, i.e. for gauging whether to be an entrepreneur.

Not just how much and how, but

IF

to produce: if [$Q^s(P) > 0$].

The normal profit and the economic one

a) 25.000 euro per year with no effort to teach my lectures.
b) As an entrepreneur I earn revenue equal to 50.000 euro from my business and need to pay 30.000 euro to my employees.

In our example 25.000 euro is the "normal profit" of the entrepreneur, i.e. the profit that can be obtained in the best available possible alternative (in this case the professor activity).

The normal profit is thus an opportunity cost for the entrepreneur that desires to launch a new activity.

Let us define economic profit (such that, **if positive**, leads to become an entrepreneur):

Economic Profit = Total Revenues – Total Opportunity Costs
= Total Revenues – (Normal Profits + All Other Opportunity Costs)

In our example, economic profit is equal to? And what if revenues were to equal 55.000 euro?
-5000;0

Economic Profit > 0 ?
Total Revenues –Total Remaining Opportunity Costs > Normal Profits

50.000 – 30.000 < 25.000 55.000 – 30.000 = 25.000

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Extra-profit and Economic Profit

Economic Profits > 0
Total Revenues– (Normal Profits + Total Remaining Opportunity Costs) > 0
Total Revenues– Total Remaining Opportunity Costs > Normal Profits

Economic Profits > 0 ⟷ Extraprofits!

Revenues = 100.000 euro
Employees Costs = 40.000 euro

Ownership of office building that could be rented at 10.000 euro. Normal profits baby-sitting friends' kids 50.000 euro.

Economic profits?

[100.000 – 40.000 – 10.000 – 50.000] = 0.

No extra-profits

Revenues = 200.000 euro.
Employees costs = 180.000 euro.
Renting of garage = 30.000 euro
SUNK COST
Indipendently of whether I stay in the market or not as an entrepreneur, having already subscribed a location contract.

Accounting profit?
-10.000 €
Economic Profit?
+20.000 € (lower losses compared to not being an entrepreneur)

The entrepreneur

1) How much to produce and 2) how to produce it

Always together, never separate: max Π and min TC (but be aware!)

We will separate them, ever so briefly.

How to Produce? The realm of engineers

Definitions

The production process consists on the use and combination of resources (also called **inputs** or production factors) aimed at creating a new resource (also called **output**).

Output (Y) has a temporal dimension: 10 units per hour, week, year, etc. That is, the output is a **flow**.

Similarly for the inputs (X, either K or L).
For the raw materials - consumed entirely in the production process - used in the production process, 100 tons of steel (or, in the future, polypropylene) are used per day to produce Y Fiat per day in that factory.

For capital (also called K) such as machines that are not consumed entirely in the production process, we will talk about the services per unit of time provided by the machine: a tractor is used for X machine-hours per day, per week, per year.
We will call the **production capacity** of a durable good the maximum amount of services for production that can potentially be obtained from it in each period.

Similarly, for labor (L) factor services we will talk about hours worked per day, per week, per month, etc.

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Technology, the «natural» constraint

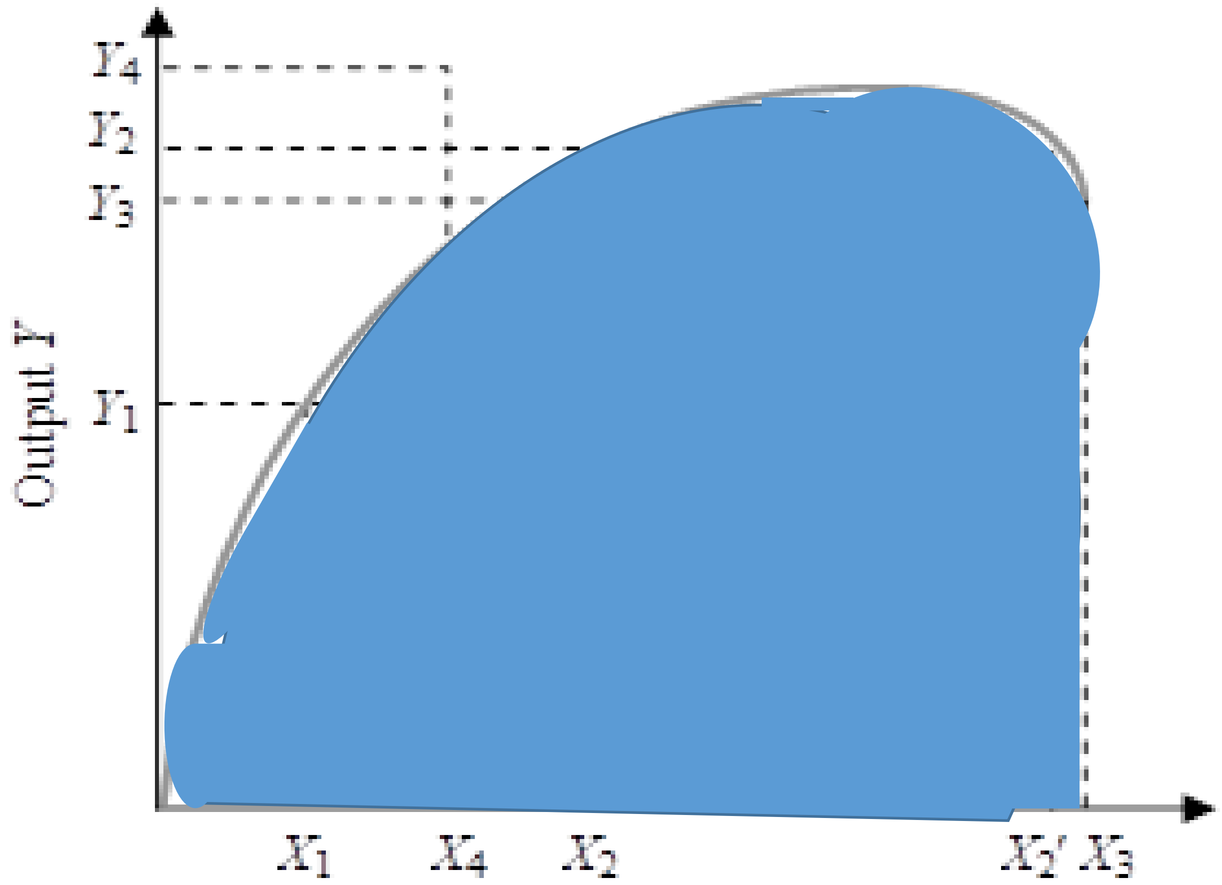
No guns!
Both against consumers and factors of production.
Constraint n. 1

There are different ways of transforming an input or a combination of inputs in an output: the relationship (between) all **available** input and output combinations to the entrepreneur is called "**technology**“, her/his “science” or … art.

Technological progress. We will call technological progress any change which allows the production of a certain quantity of output with a smaller quantity of input, or the production of new higher quantities of output - that were not previously producible - with a given amount of input.

The set of all achievable combinations of outputs and inputs deriving from the available technology (“**productive techniques**”) is defined as "**production set**“: the technological constraint.

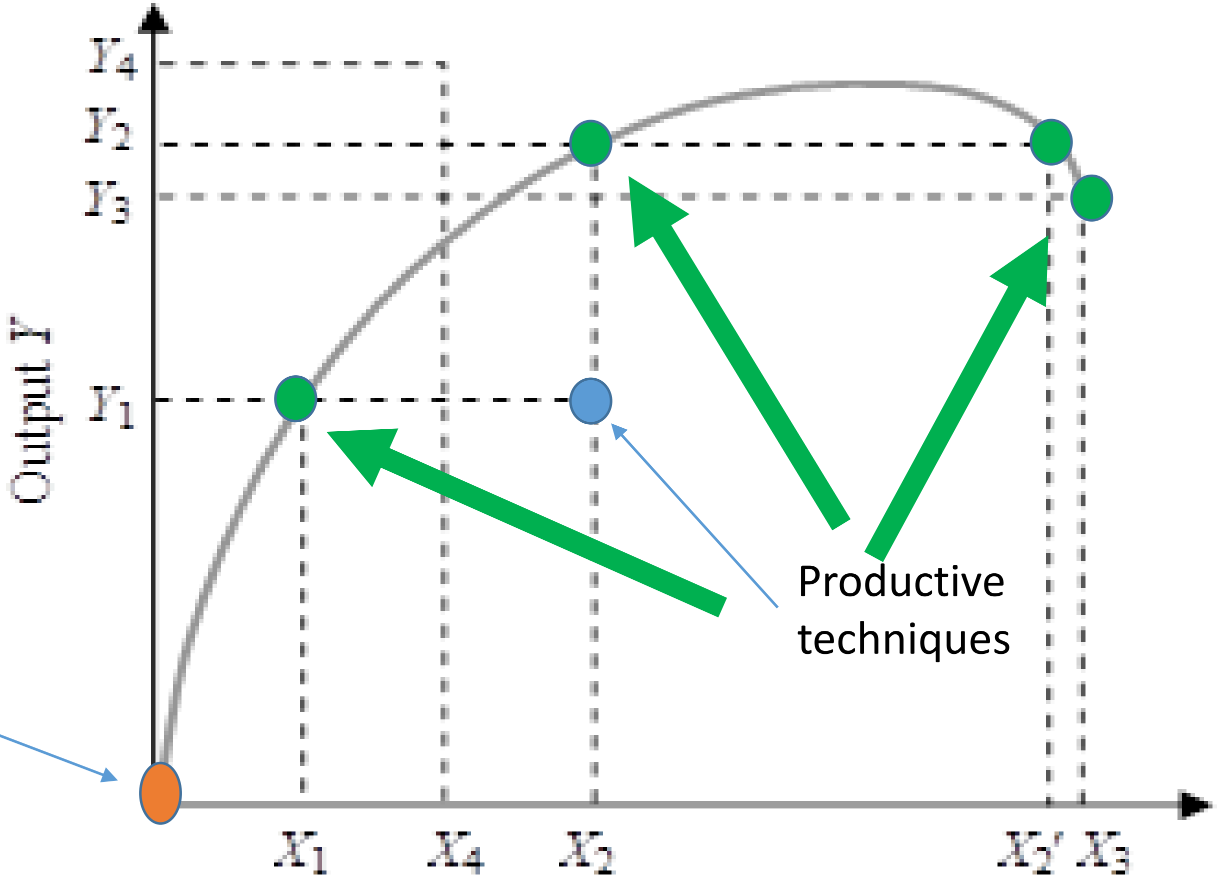
The production set



Input X

Productive techniques

Technically impossible (today)



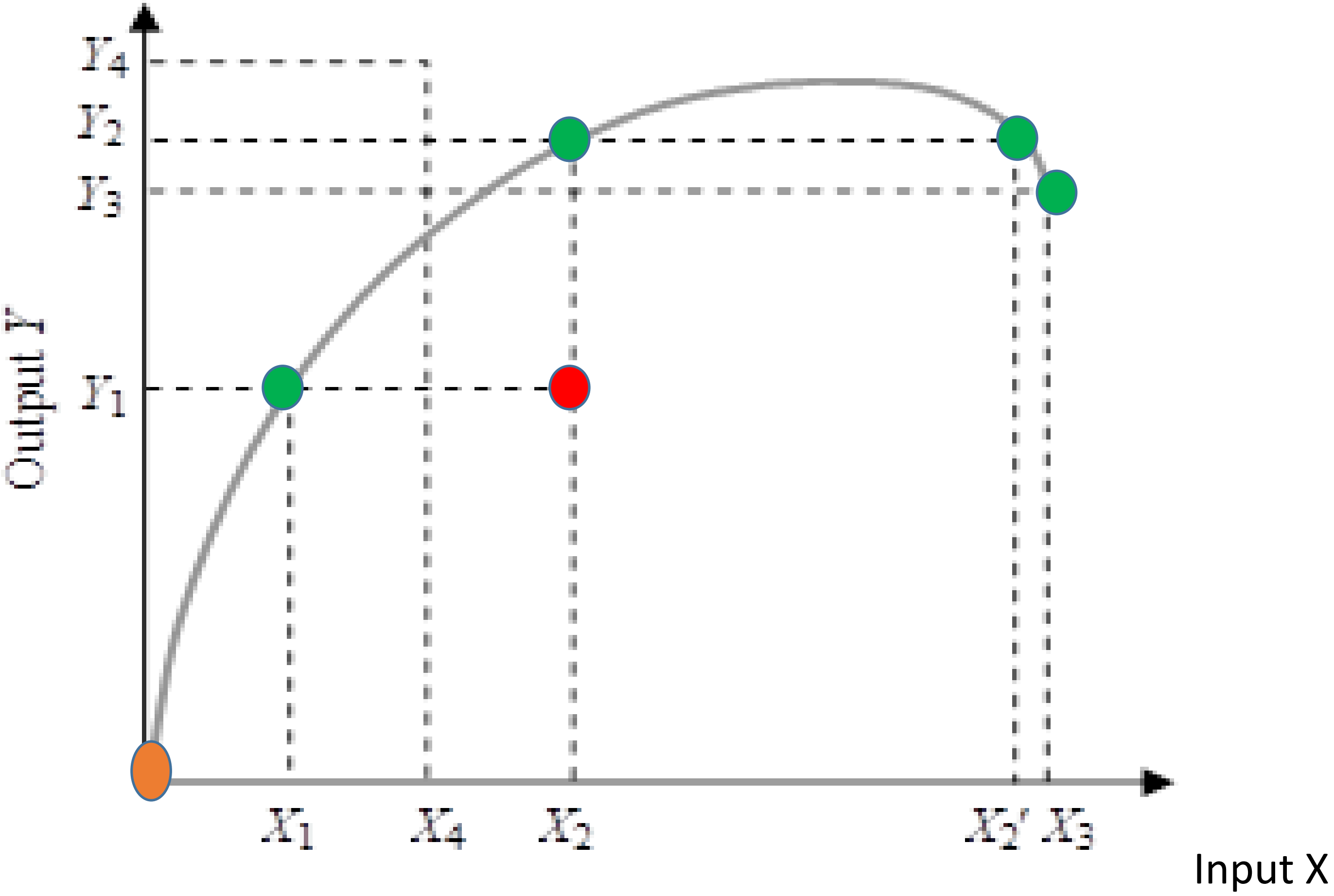
How to produce a given Y? X*?

The «no-land of plenty» assumption.

The perfect divisibility assumption of inputs and outputs.

Output-efficiency and the production function

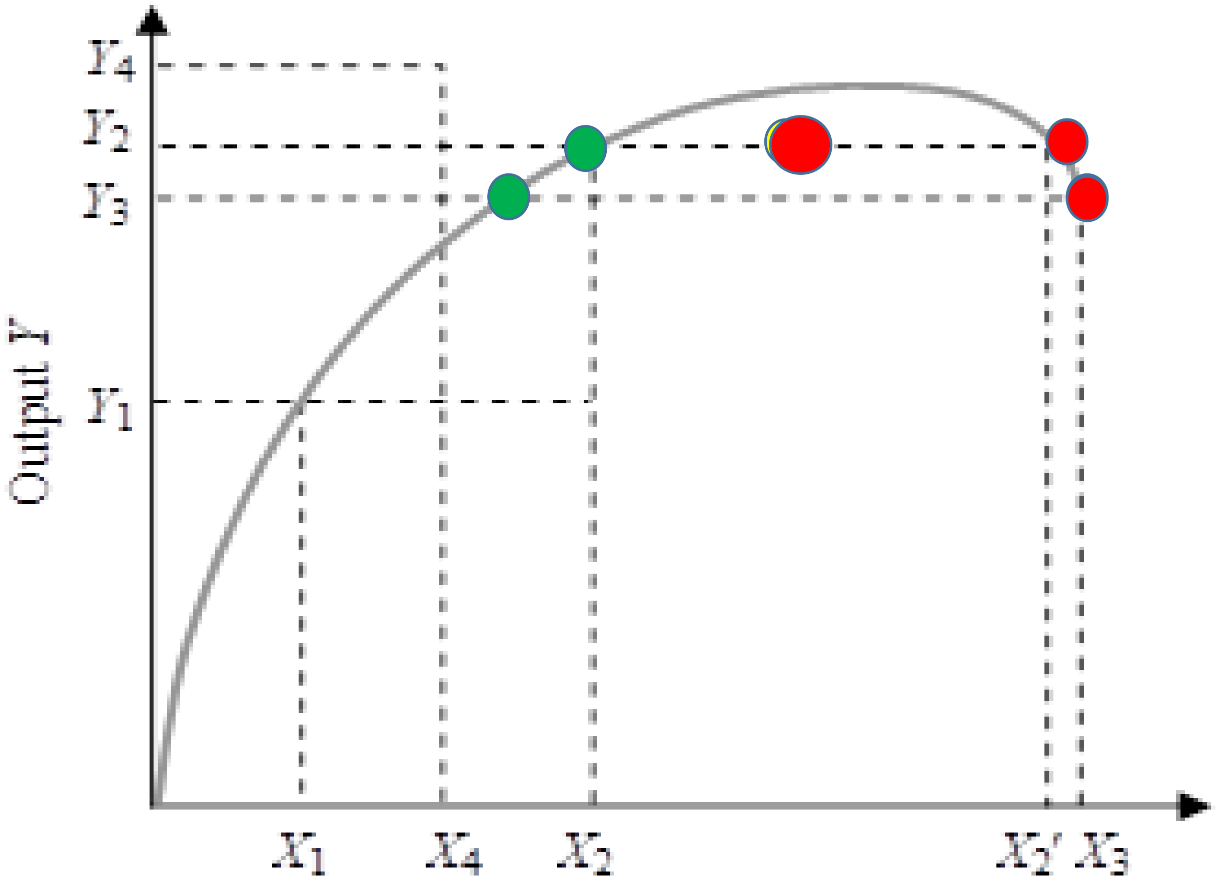
$Y^{max} = f\,(X)$



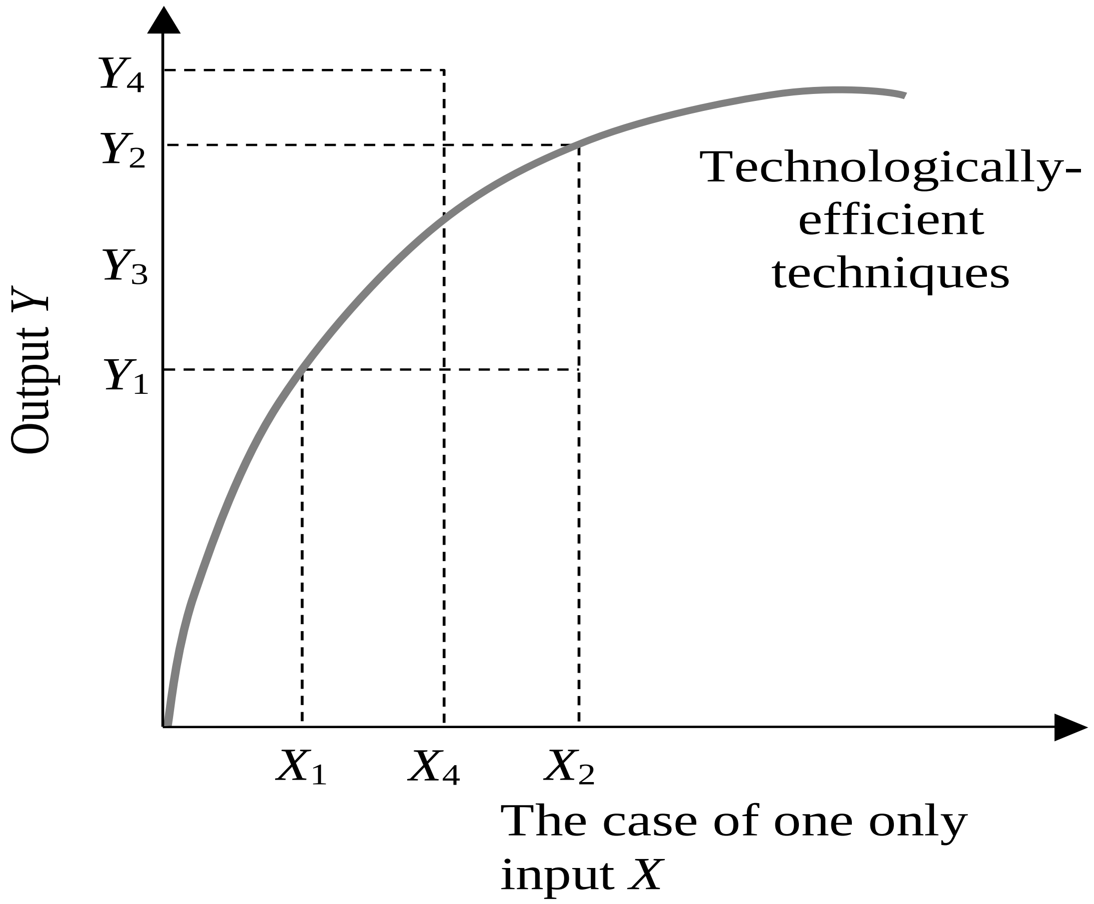
Interacting with … cost-cutters

Up in the Air (2009)

Technological efficiency

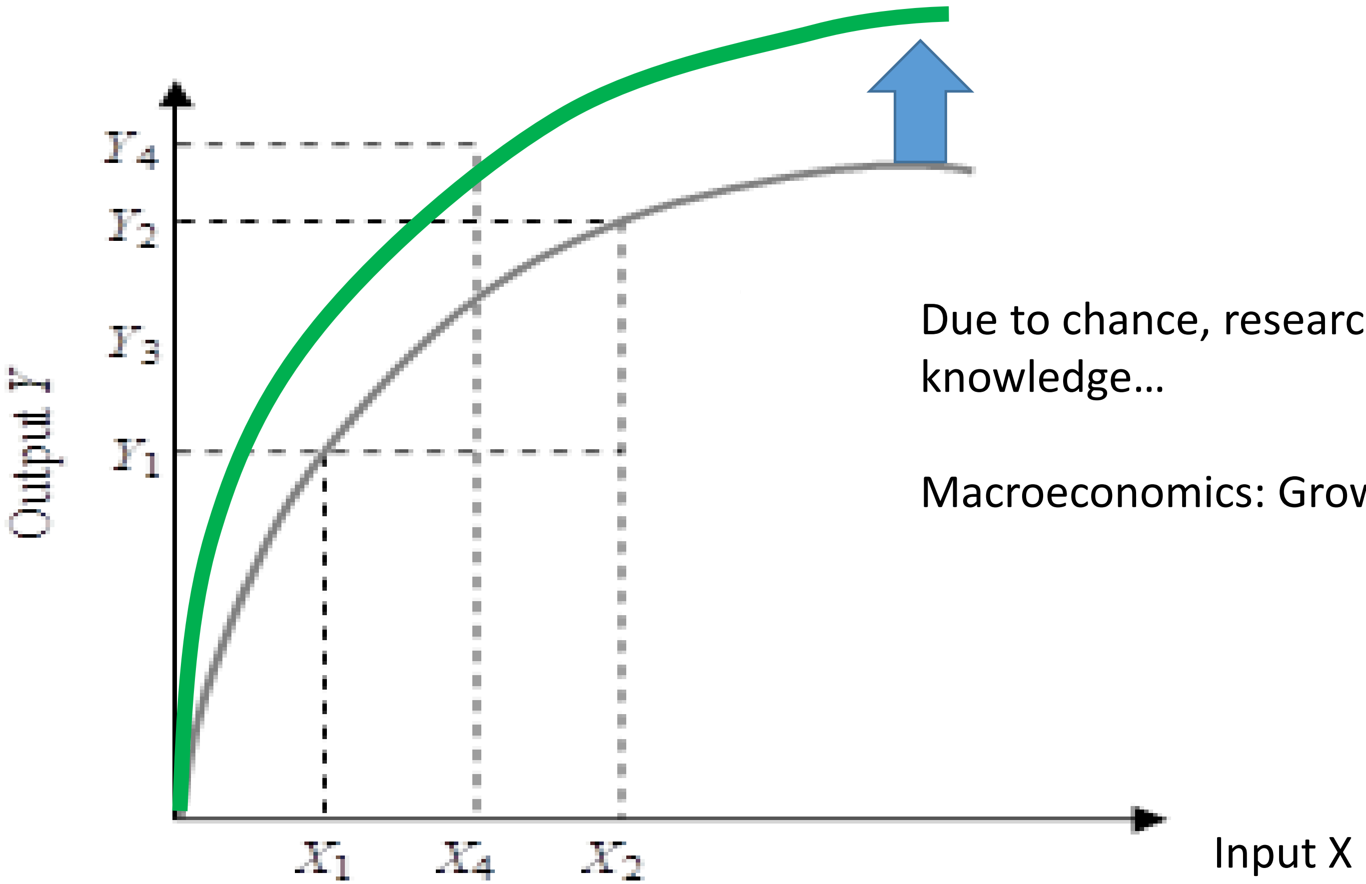


The technologically efficient productive techniques



PS: Technological Progress

The 1-input case

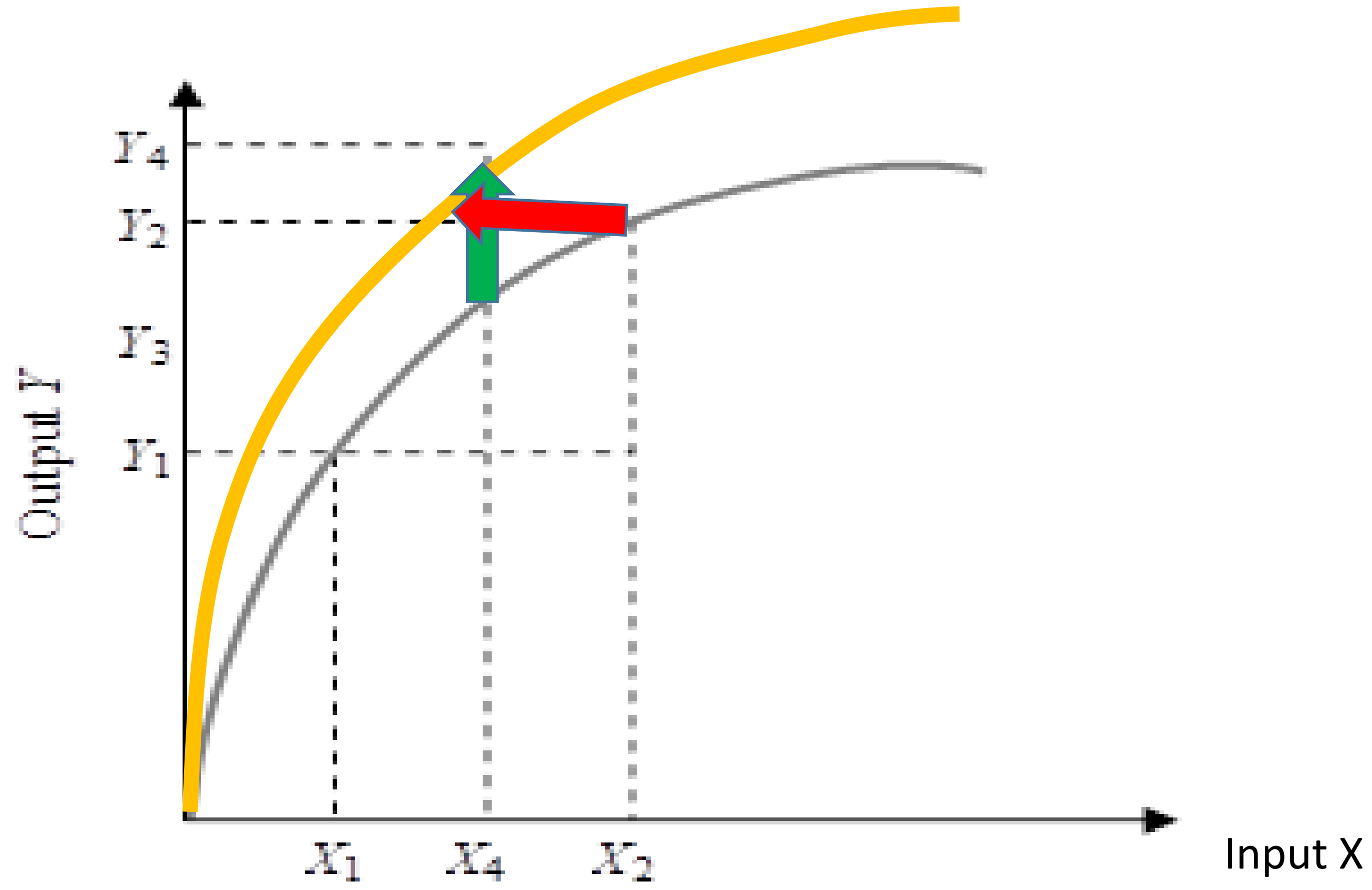


Due to chance, research and innovation, knowledge…

Macroeconomics: Growth theory.

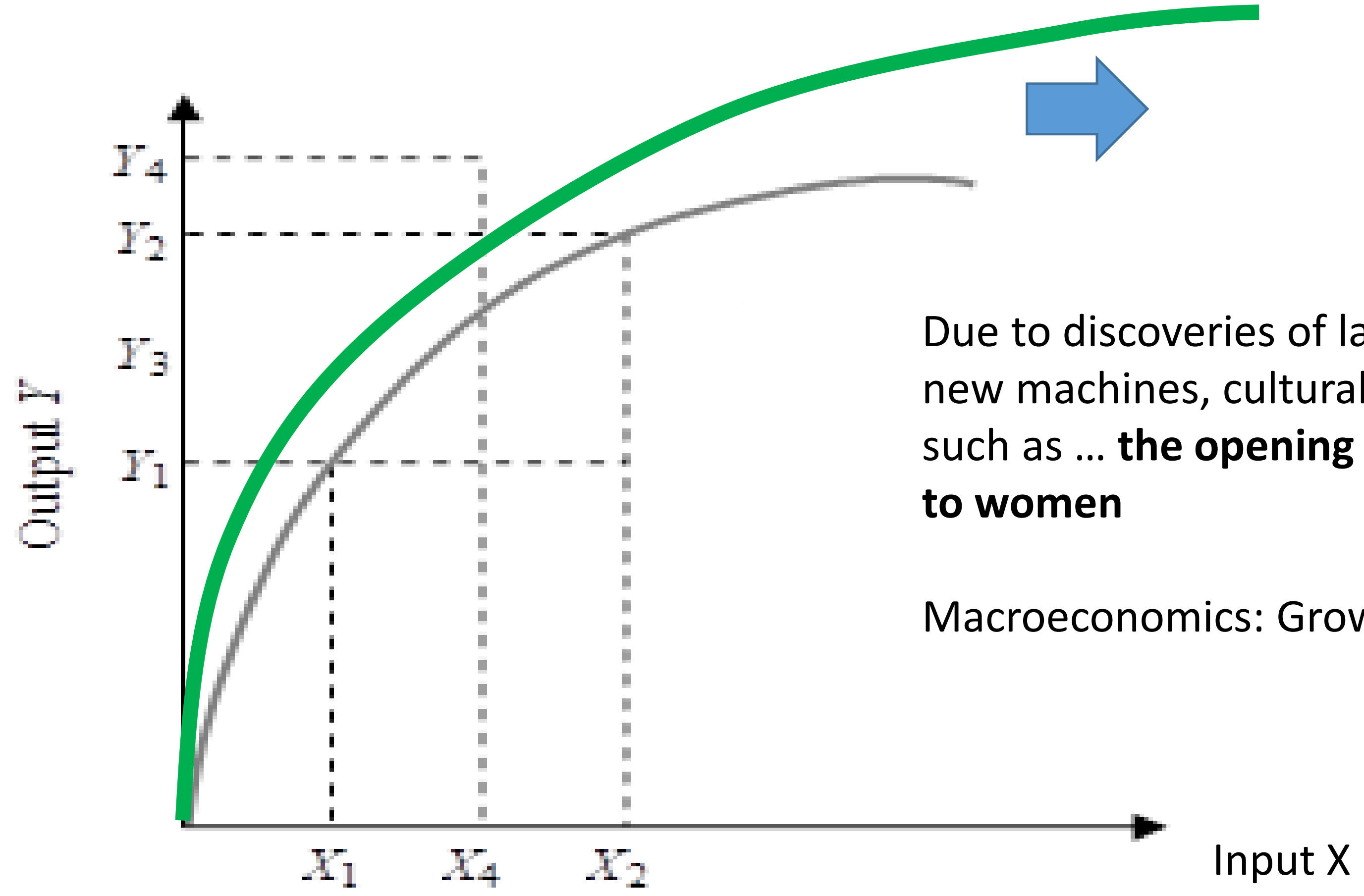
Technological Progress: the AI debate

Good or bad?



PS: New Factors of Production

The 1-input case



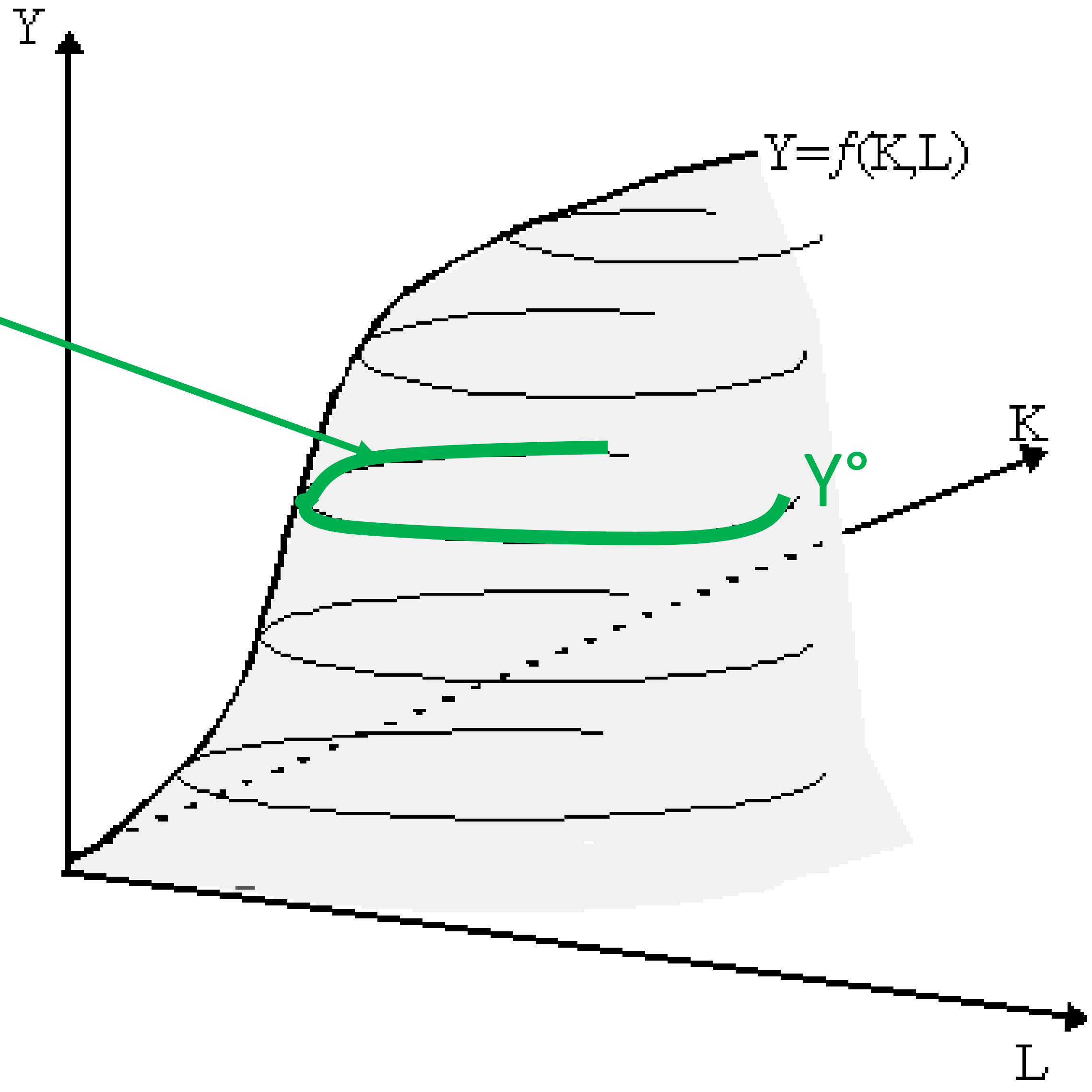
Due to discoveries of land, investment in new machines, cultural changes in society such as … **the opening of the labor market to women**

Macroeconomics: Growth theory.

2 inputs- production function

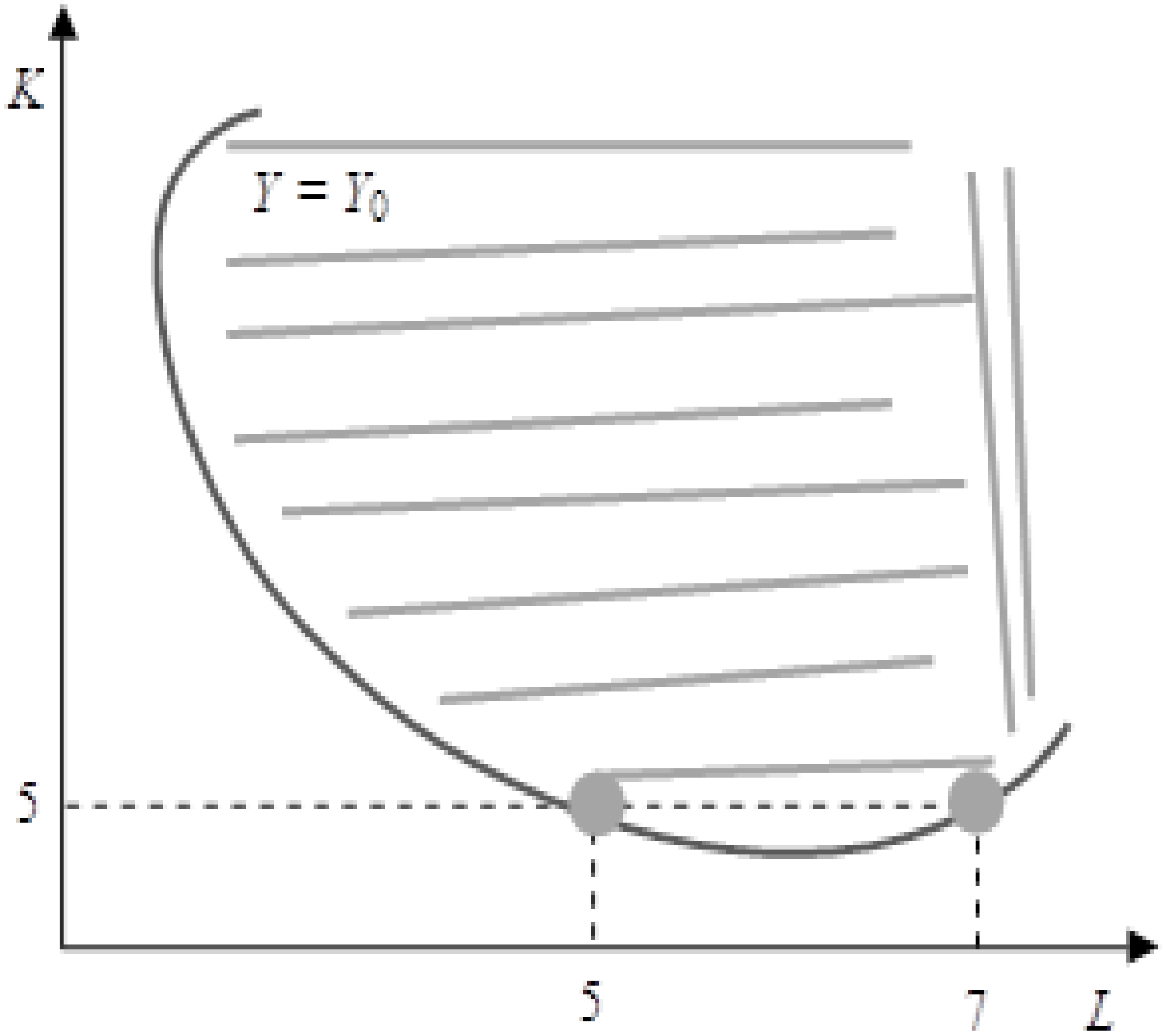
Level curve:
$Y° = f(K, L)$

Many (K,L) combinations guarantee a given Y° as maximum output, not one only.

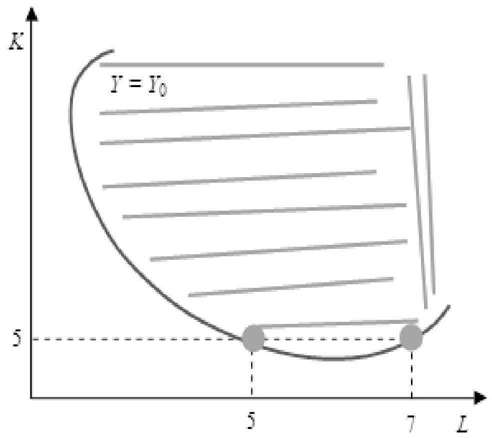


$Y^{max} = f(K, L)$

An Isoquant: an output efficient locus



Along the Isoquant



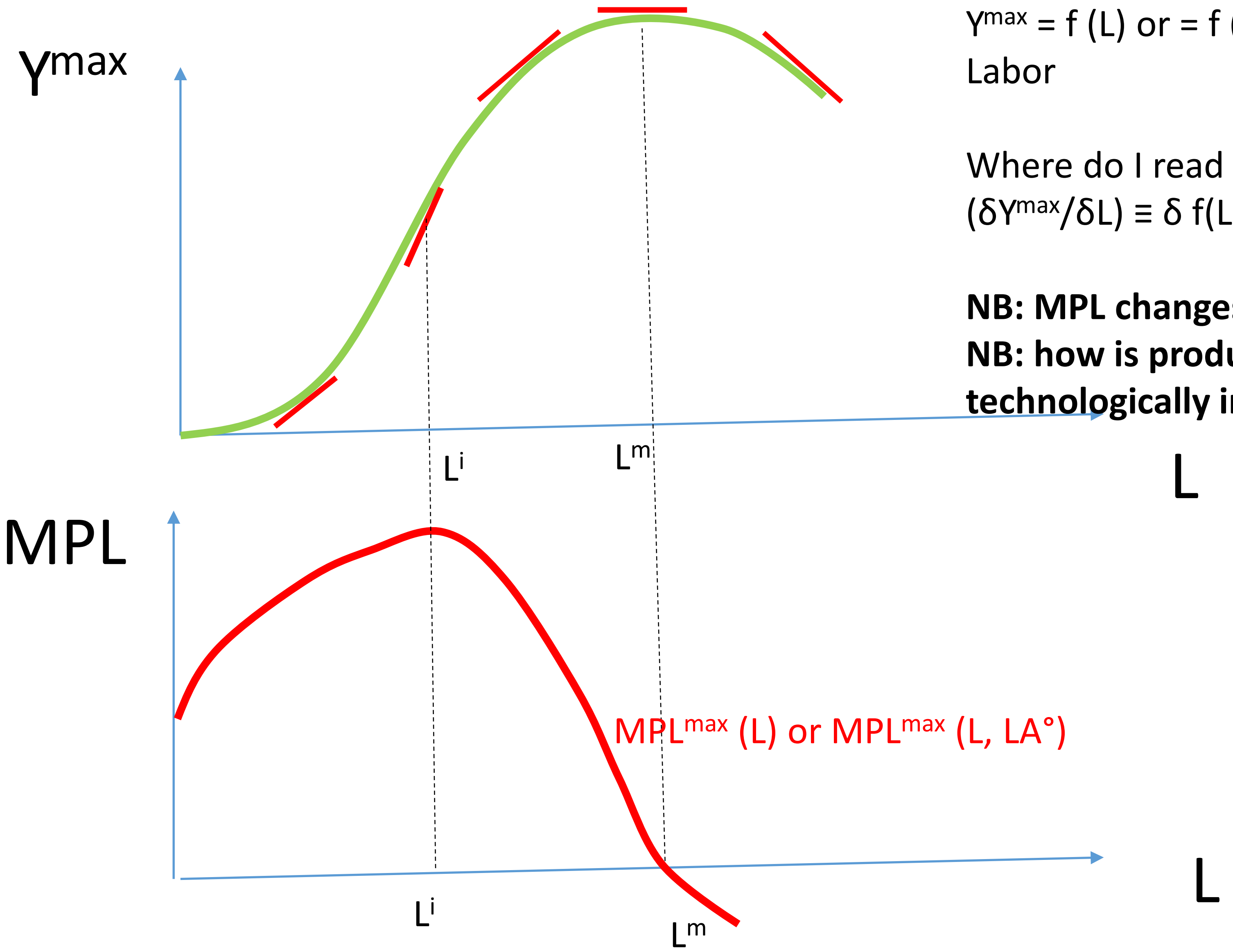
$$Y^{max} = f\,(K,L)$$

$$Y^{max} = Y_0 = f\,(K,\ L)$$

MARGINAL PRODUCTIVITIES OF…

$$dY = 0 = dK \times \frac{\delta Y}{\delta K} + dL \times \frac{\delta Y}{\delta L} = f^{k} dK + f^{l} dL$$

Marginal Productivity, the slope of the PF



Y^{max} = f (L) or = f (L, LA°) where LA is Land and L Labor

Where do I read MPL:
($\delta Y^{max}/\delta L$) ≡ δ f(L)/δL or δ f(L,LA°)/δL ?

NB: MPL changes with L: the MPL function.
NB: how is productivity of labor in the technologically inefficient part of the PF?

Why this shape?

Some calculations

If MPL (13) = 80 shirts
and
$Y^{max}(L=13)$ = 2700 shirts

$Y^{max}(L=14)$ = ?

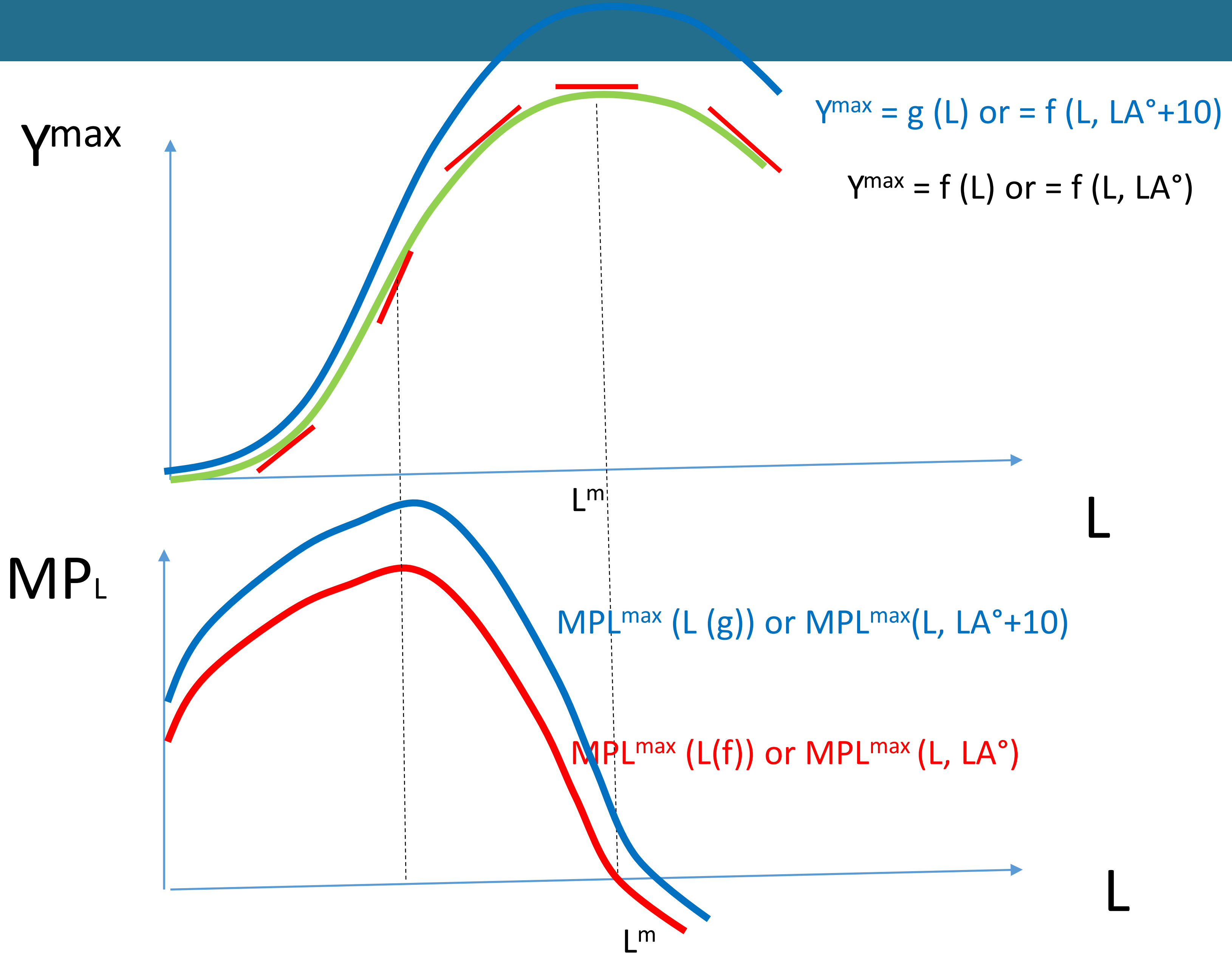
$Y^{max}(L=14)$ = 2780

If $Y^{max}(L=14)$ = 2780 shirts
and
$Y^{max}(L=15)$ = 2800 shirts

Then …
MPL (14) = ?

MPL (14) = 20 shirts

Marginal Productivity and technical progress

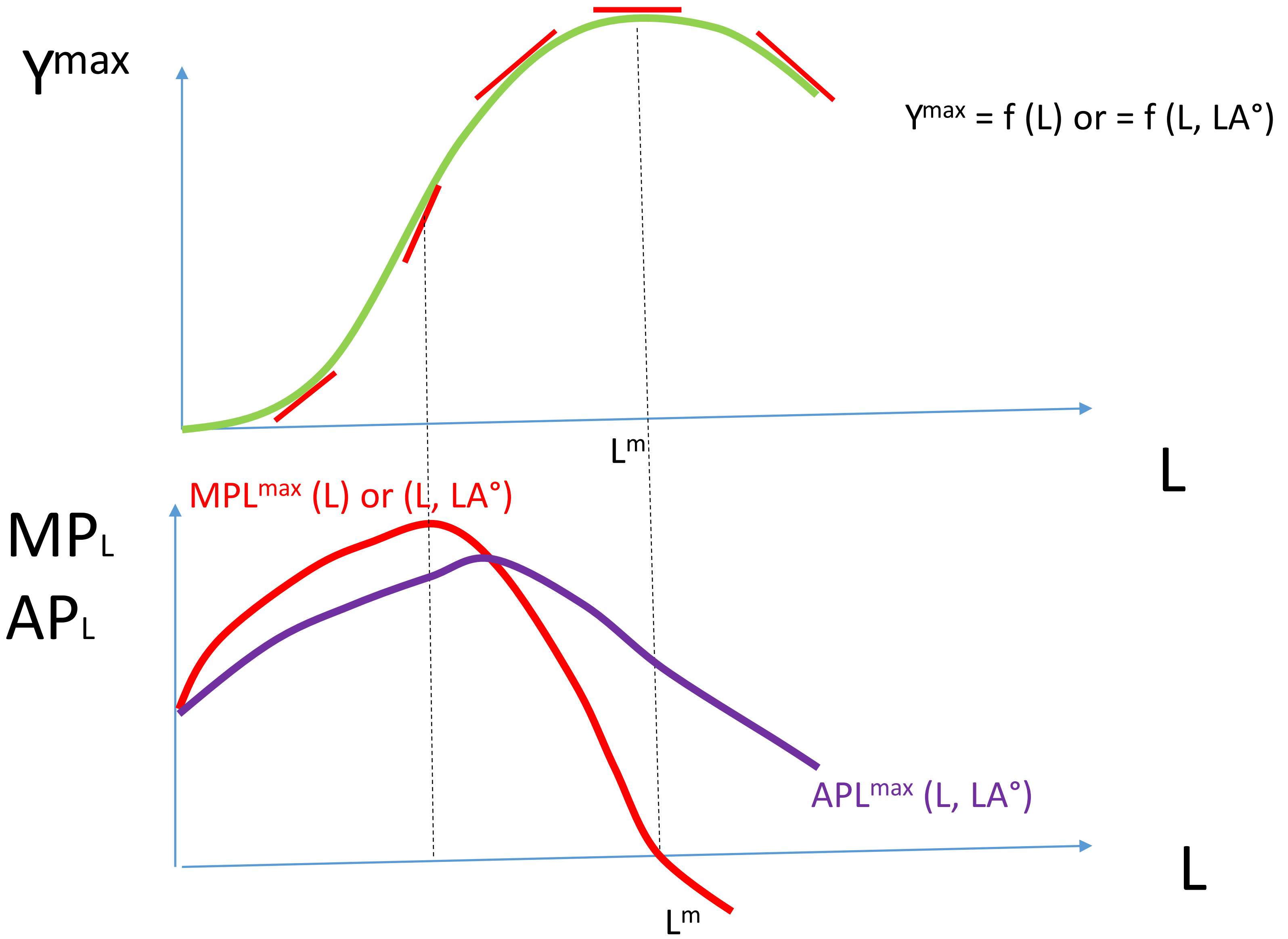


Malthus

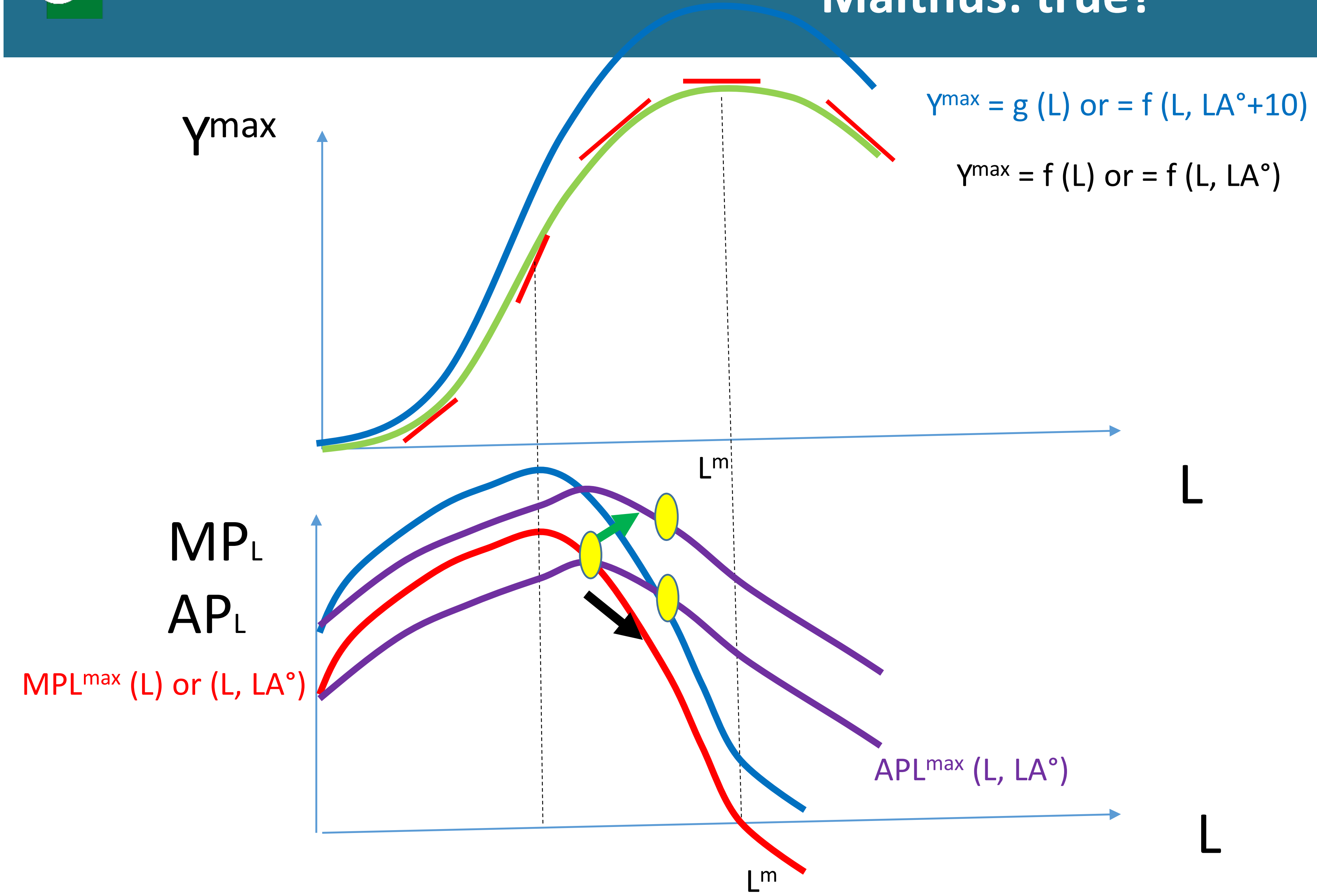
Y/L = **Average** Productivity of Labor collapses as L grows?

Let them enter….	Average?
1,50	1,50
1,60	1,55
1,70	1,60
1,80	1,65
1,70	1,66
1,66	**1,66**
1,50	1,63

Average Productivity? A function

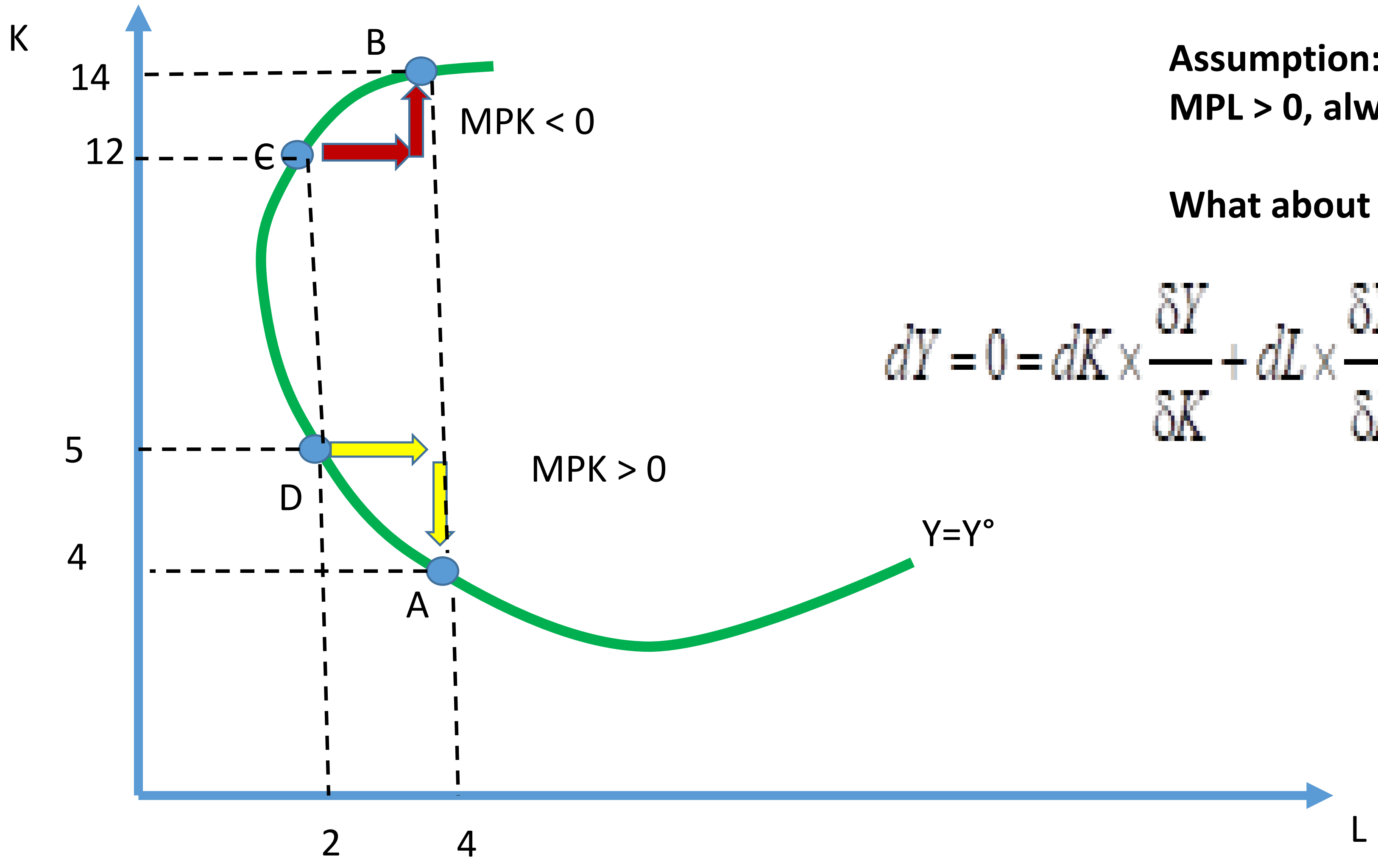


Malthus: true?



Will technology save us from the demographic Malthusian trap?

The Isoquant, again



Assumption:
MPL > 0, always

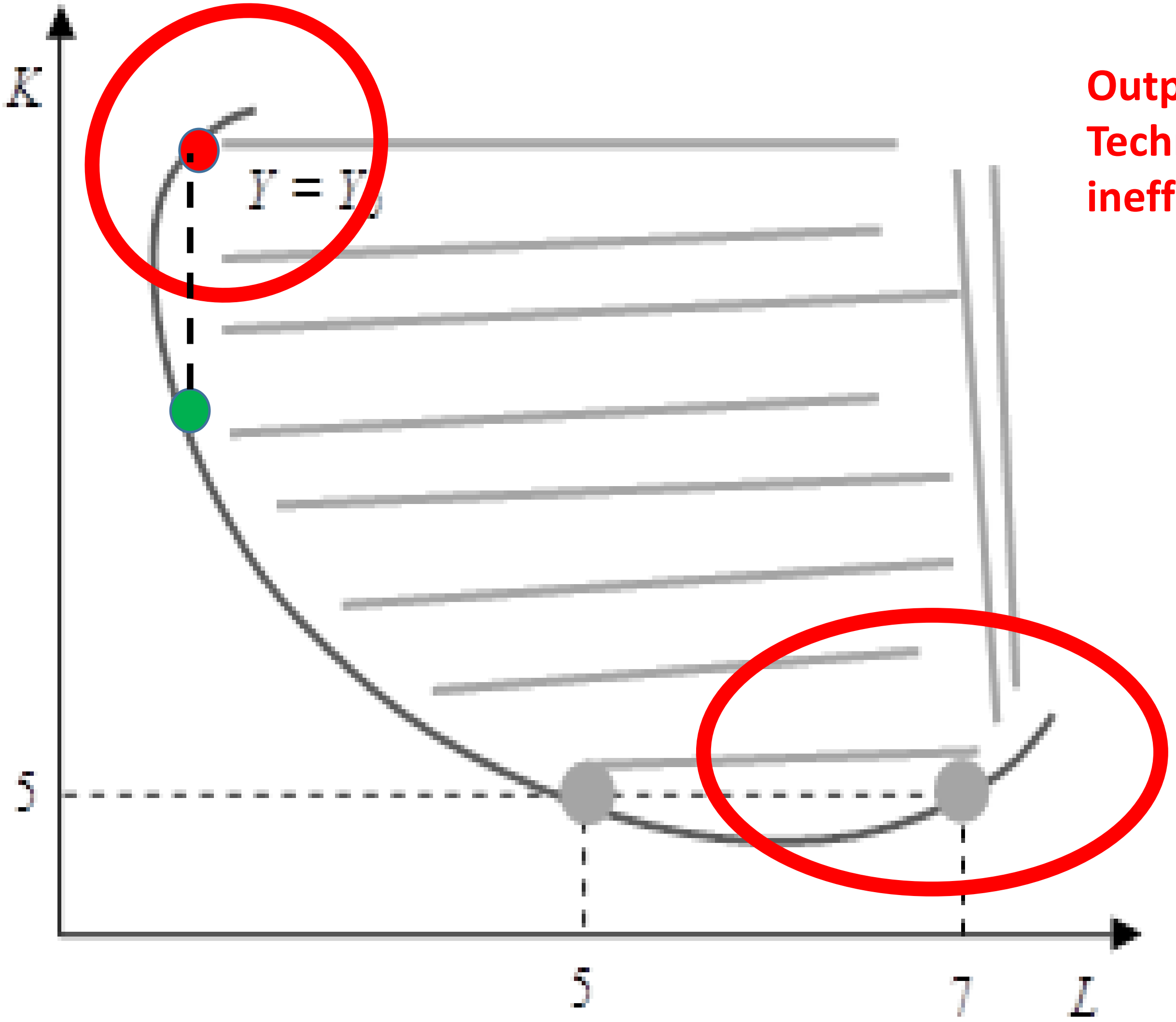
What about MPK ?

$$dY = 0 = dK \times \frac{\delta Y}{\delta K} + dL \times \frac{\delta Y}{\delta L} = f^k dK + f^l dL$$

Positively sloped?

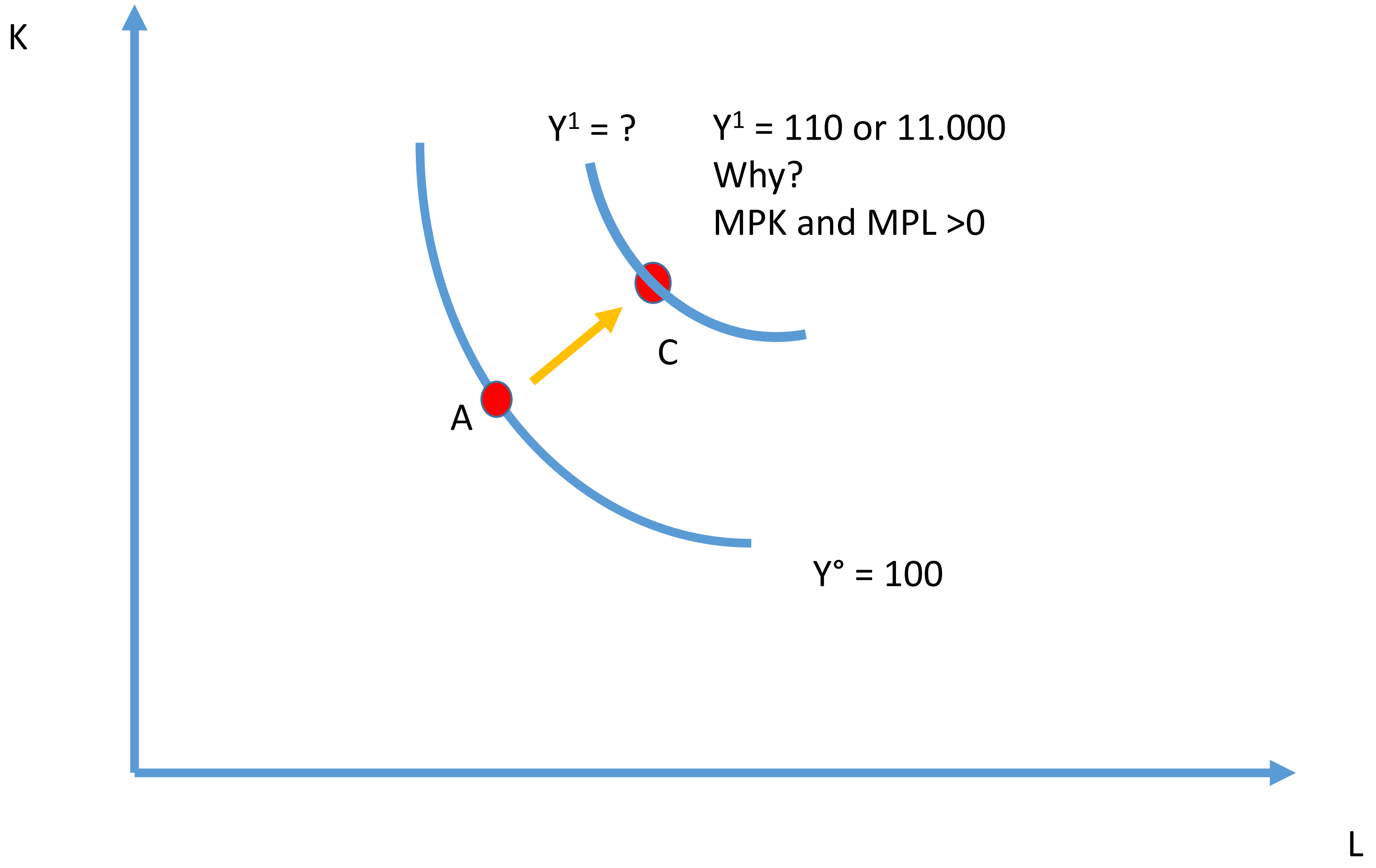
Isoquants are decreasing, why?

MPK **and** MPL > 0!



Output efficient, Technologically inefficient (MPK<0)!

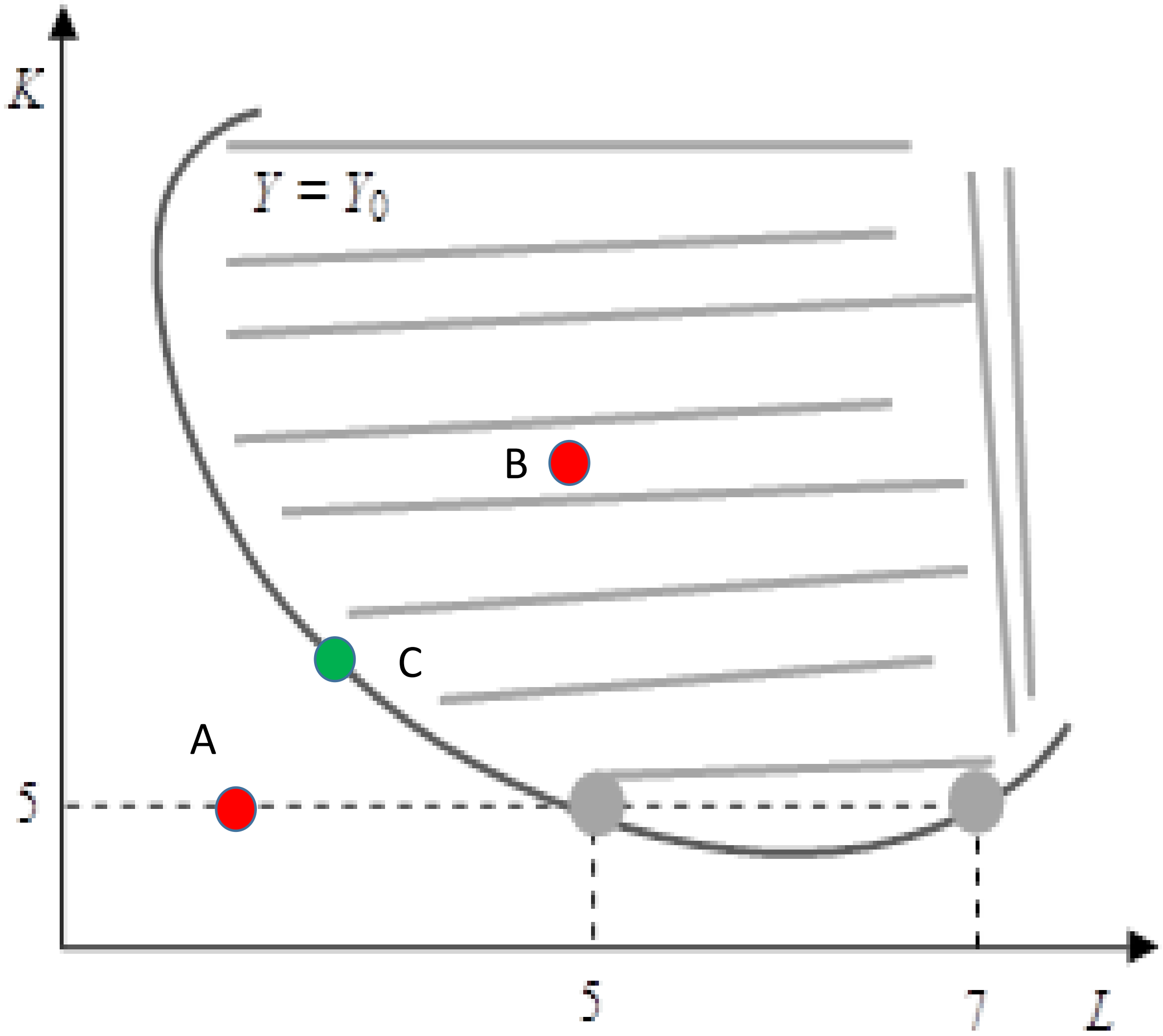
Isoquants: implications

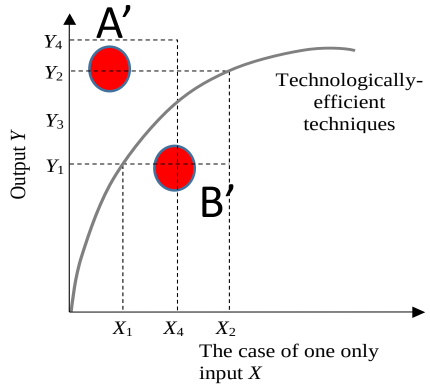


An Isoquant: an output efficient locus

B: why produce Y° with so many input?

A: impossibile to produce Y° with those input





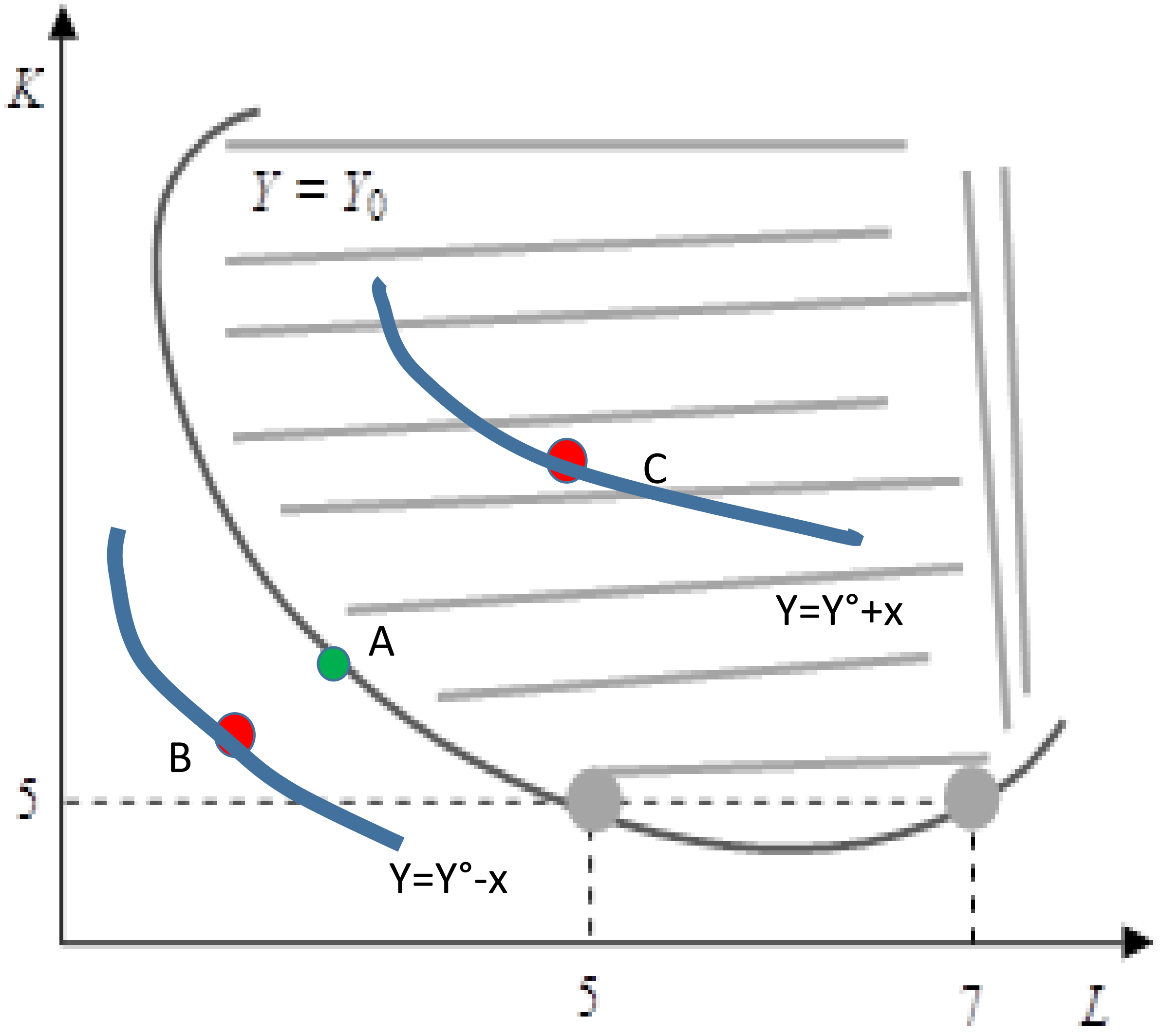
B': why produce Y1 with so much input X4?

A': can't produce Y2 with that input X1.

PS: a further clarification

B: technologically possible (for Y=Y°-x)

C: output and technologically efficient (for Y=Y°+x)



A: output efficient (and technologically efficient) for Y=Y°

B: technologically impossible (for Y=Y°)

C: output and technologically inefficient (for Y=Y°)

PS: technological progress