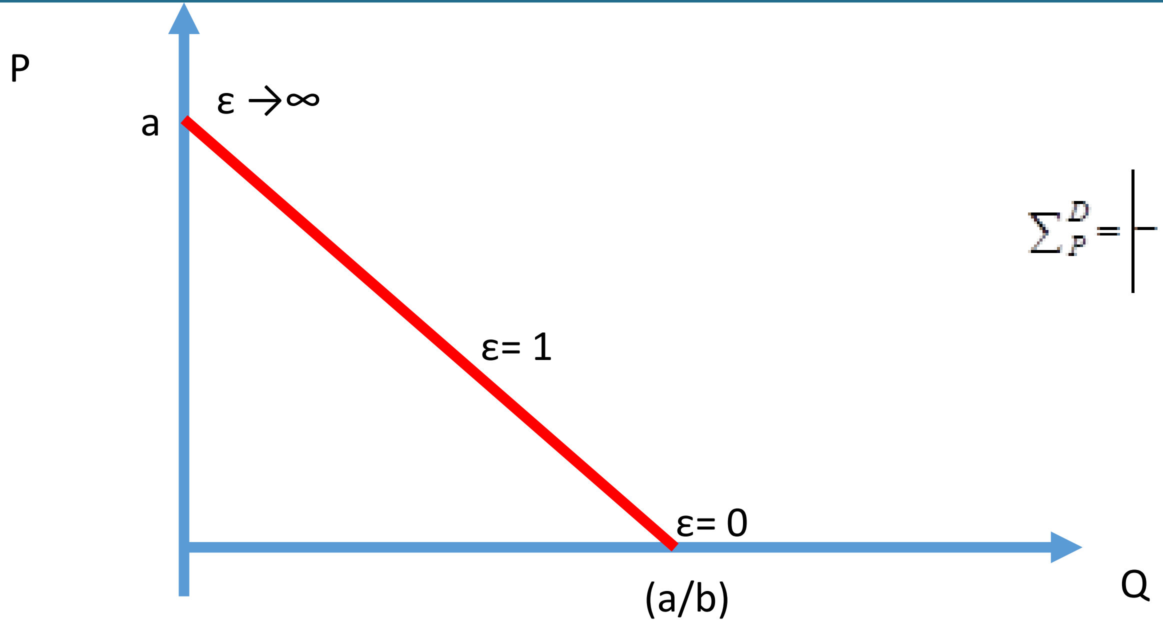
Marginal revenue function and elasticity



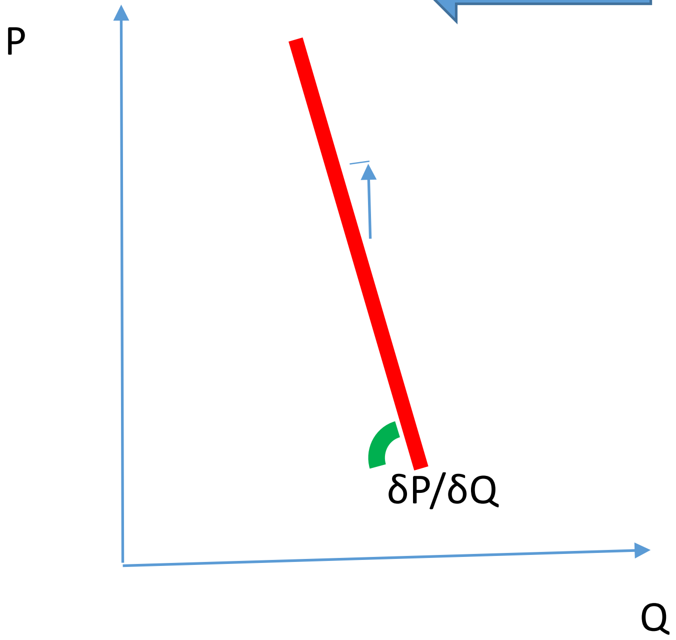
$$\Sigma_P^D = \left| -\frac{1}{b} \times \frac{P}{Q} \right| = \left| \left(-\frac{1}{b} \right) \times \left(\frac{a - bQ}{Q} \right) \right|$$

P(Q) = a – bQ,
Q(P) = (a/b) – (1/b)P

The elasticity (sensitivity) of consumption desires of an individual as prices change **changes** depending on how much we are consuming already!
And what about among individuals, given what they are consuming?

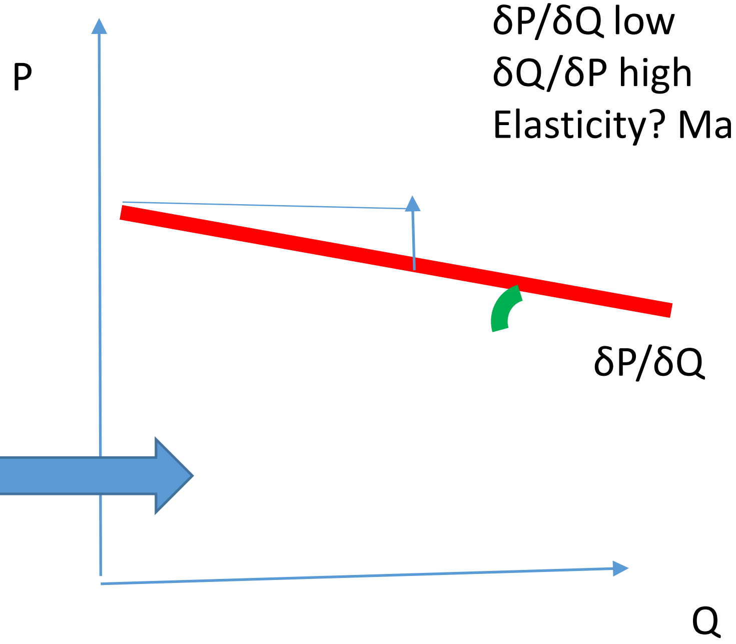
$$\Sigma_P^D = \left| \frac{\delta Q}{\delta P} \times \frac{P}{Q} \right|$$

Understanding elasticities



?

δP/δQ low
δQ/δP high
Elasticity? Market power?

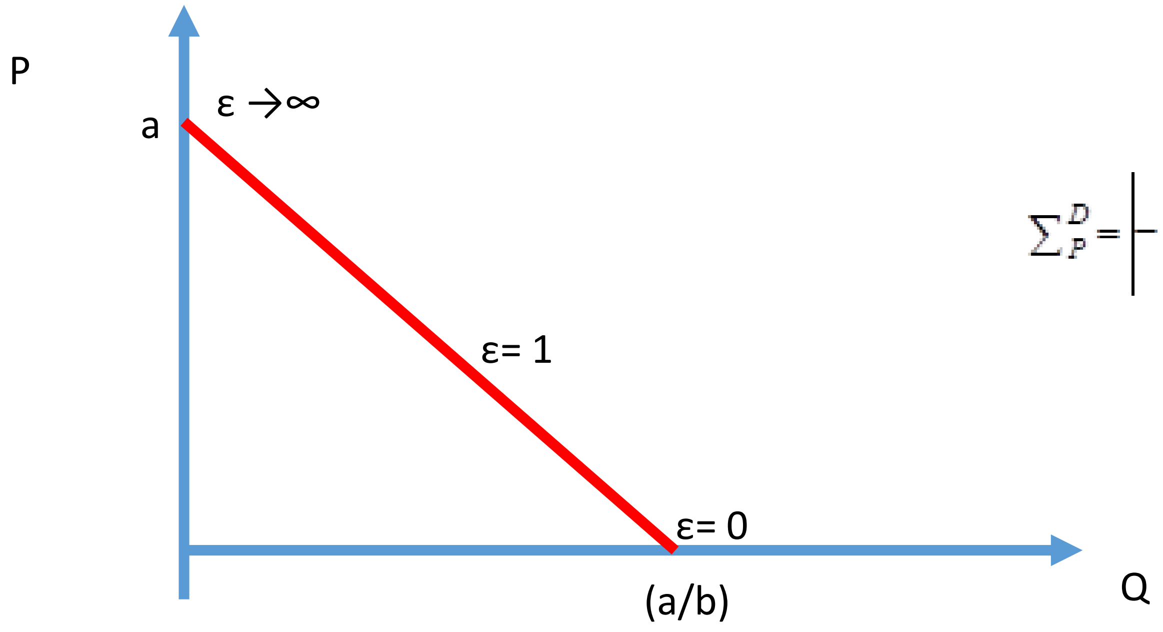


δP/δQ high
δQ/δP low
Elasticity? Market power?

$$\Sigma_P^D = \left| \frac{\delta Q}{\delta P} \times \frac{P}{Q} \right|$$

But how do revenues change with the change in quantity?

Marginal revenue function and elasticity



P(Q) = a – bQ,
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$$\Sigma_P^D = \left| -\frac{1}{b} \times \frac{P}{Q} \right| = \left| \left(-\frac{1}{b}\right) \times \left(\frac{a-bQ}{Q}\right) \right|$$

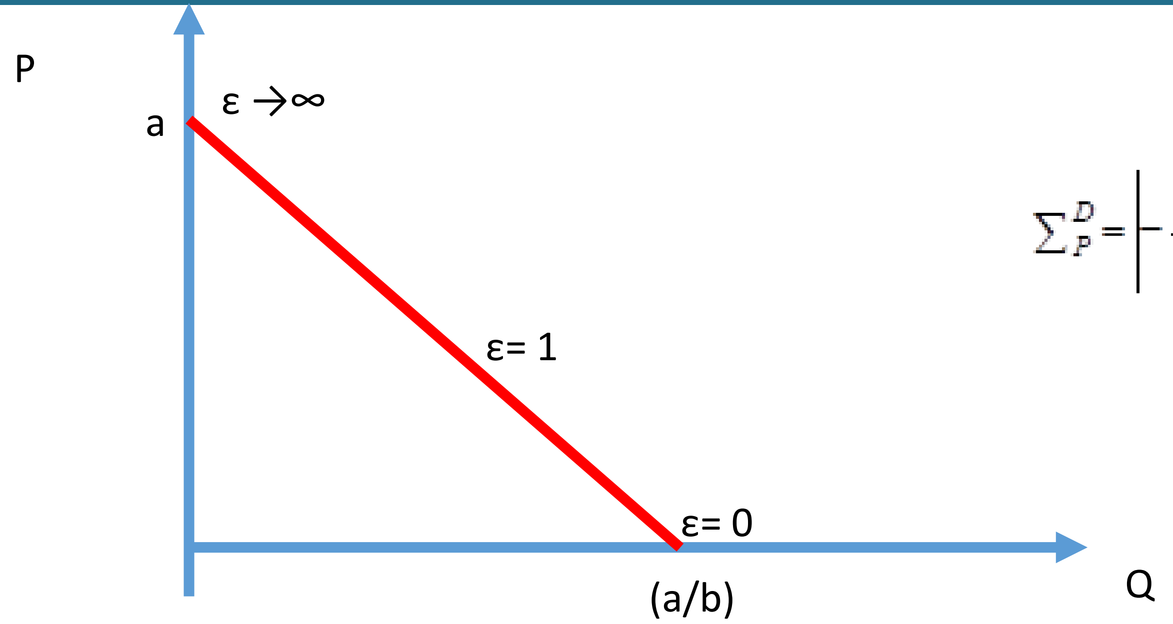
$$\frac{\delta TR}{\delta Q} = \frac{\delta\left[P(Q)Q\right]}{\delta Q}$$

Derivative of UxV = (UV)’

= U’V+UV’

$$\Sigma_P^D = \left| \frac{\delta Q}{\delta P} \times \frac{P}{Q} \right|$$

Marginal revenue function and elasticity



P(Q) = a – bQ,
Q(P) = (a/b) – (1/b)P

$$\Sigma_P^D = \left| -\frac{1}{b} \times \frac{P}{Q} \right| = \left| \left(-\frac{1}{b}\right) \times \left(\frac{a-bQ}{Q}\right) \right|$$

$$\frac{\delta TR}{\delta Q} = \frac{\delta[P(Q)Q]}{\delta Q} = \frac{\delta P}{\delta Q} Q + P(Q)$$

Derivative of UxV = (UV)’

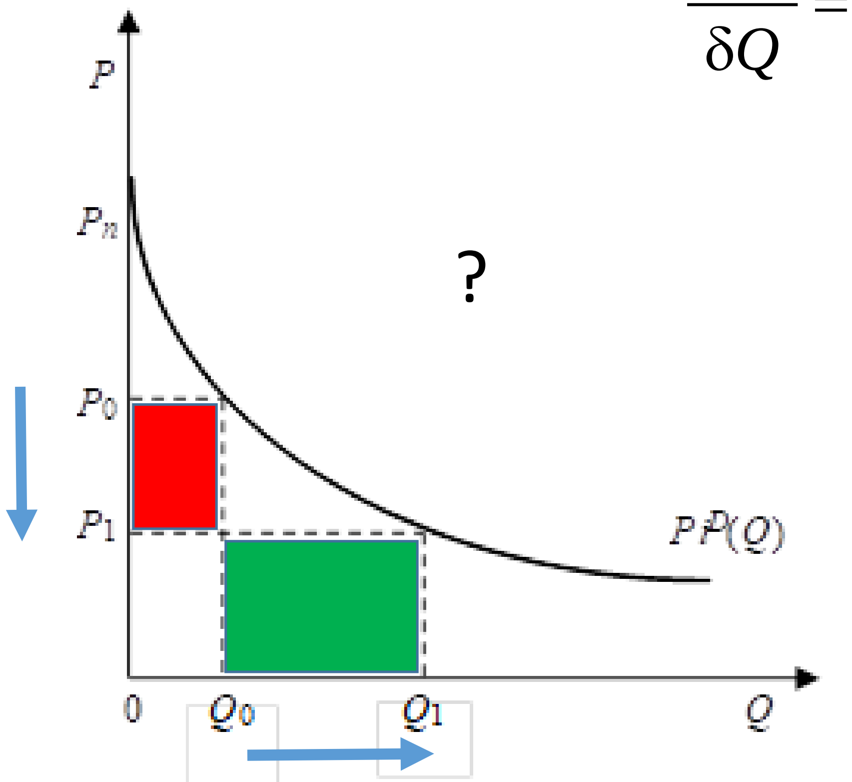
= U’V+UV’

$$\Sigma_P^D = \left| \frac{\delta Q}{\delta P} \times \frac{P}{Q} \right|$$

The revenue dilemma, from Q0 to Q1=Q0+1

$$\frac{\delta TR}{\delta Q} = \frac{\delta[P(Q)Q]}{\delta Q} = \frac{\delta P}{\delta Q}Q + P(Q)$$

By how much do we have to lower the price (increase the discount) to convince the consumer to buy one more unit in order to sell it?



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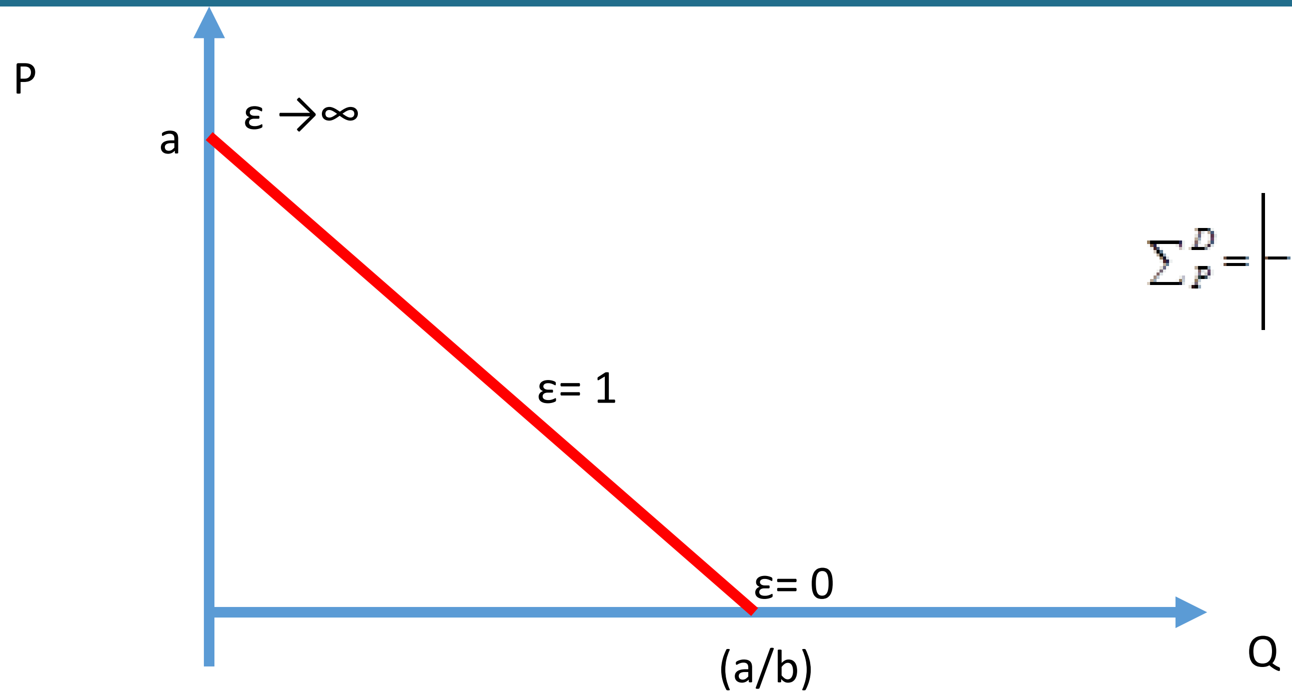
Marginal revenue function and elasticity



P(Q) = a – bQ,
Q(P) = (a/b) – (1/b)P

$$\Sigma_P^D = \left| -\frac{1}{b} \times \frac{P}{Q} \right| = \left| \left(-\frac{1}{b}\right) \times \left(\frac{a-bQ}{Q}\right) \right|$$

$$\Sigma_P^D = \left| \frac{\delta Q}{\delta P} \times \frac{P}{Q} \right|$$

$$\frac{\delta TR}{\delta Q} = \frac{\delta\left[P(Q)Q\right]}{\delta Q} = \frac{\delta P}{\delta Q} Q + P(Q)$$

$$\frac{\delta RT}{\delta Q} = \frac{\delta\left[P(Q)Q\right]}{\delta Q} = \frac{\delta P}{\delta Q} P \frac{Q}{P} + P(Q)$$

$$\frac{\delta TR}{\delta Q}(Q) = P(Q)\left[1 - \left(\frac{1}{\varepsilon(Q)}\right)\right]$$

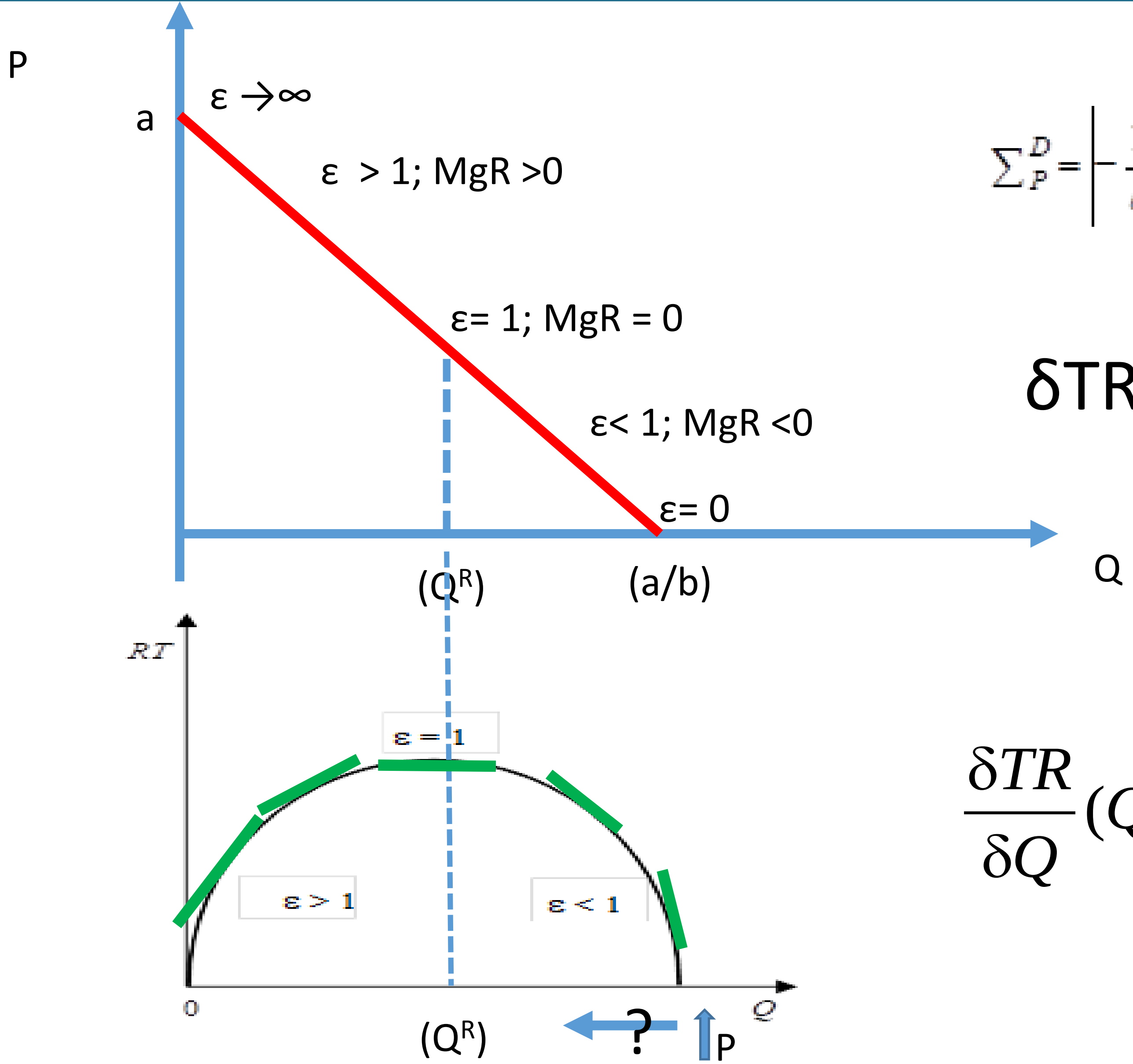
The revenue dilemma: solved!

Expenditure function?

TR (150) = 12.043 €
MR (150) = 50 €
TR (151) = ? €
= 12.093 €

TR (23) = 2300 €
TR (24) = 2200 €
MR (23) = ? €
= -100 €

MR (0) = 8€
MR (1) = 6€
TR (2) = ? €
= 14 €



$$\Sigma_P^D = \left| -\frac{1}{b} \times \frac{P}{Q} \right| = \left| \left(-\frac{1}{b}\right) \times \left(\frac{a-bQ}{Q}\right) \right|$$

$$\delta TR/\delta Q \equiv MR(Q) = ?$$

$$\frac{\delta TR}{\delta Q}(Q) = P(Q)\left[1 - \left(\frac{1}{\varepsilon(Q)}\right)\right]$$

Product cannibalization?

LOCK-IN


Advantage Platinum
DIVIDEND MILES
US AIRWAYS
Miles & More
Lufthansa
GOLD
GOLD
MEDALLION
JOHN Q. SAMPLE
9999999999
VALID THRU 2/12
DELTA
SKYMILES
Frequent flyer
Airline
User Name
Password
Account #
Web Site
Phone
Valid Until


Security
5311
Quanto mi costa

An application of elasticity

«What is the impact of prohibitionism on drugs over crime?»

Prohibitionism raises the «price» cost of a unit of drugs.

Demand effect on drug consumption? ↘

Drug consumption increases crime via: pharmacological and theft effects.

Pharmacologically-induced crime: reduced.

Crime? ↘

Money-need crime: ? The role of elasticity.

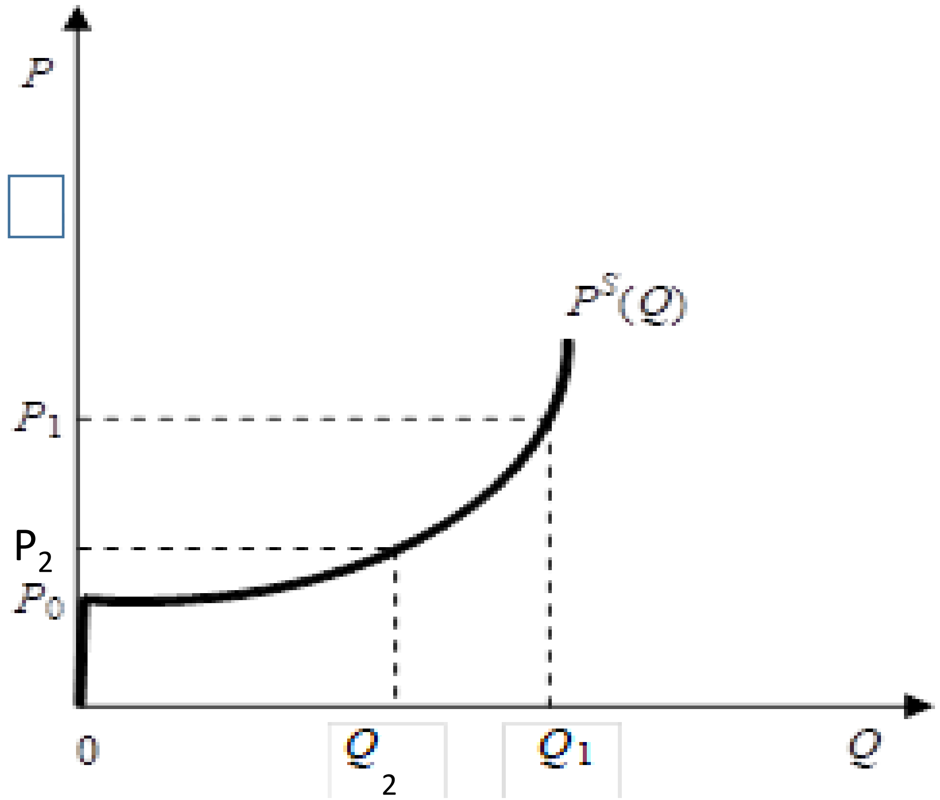
Crime? ↗

Final impact: ↘ + ↗ = ?

A supply curve

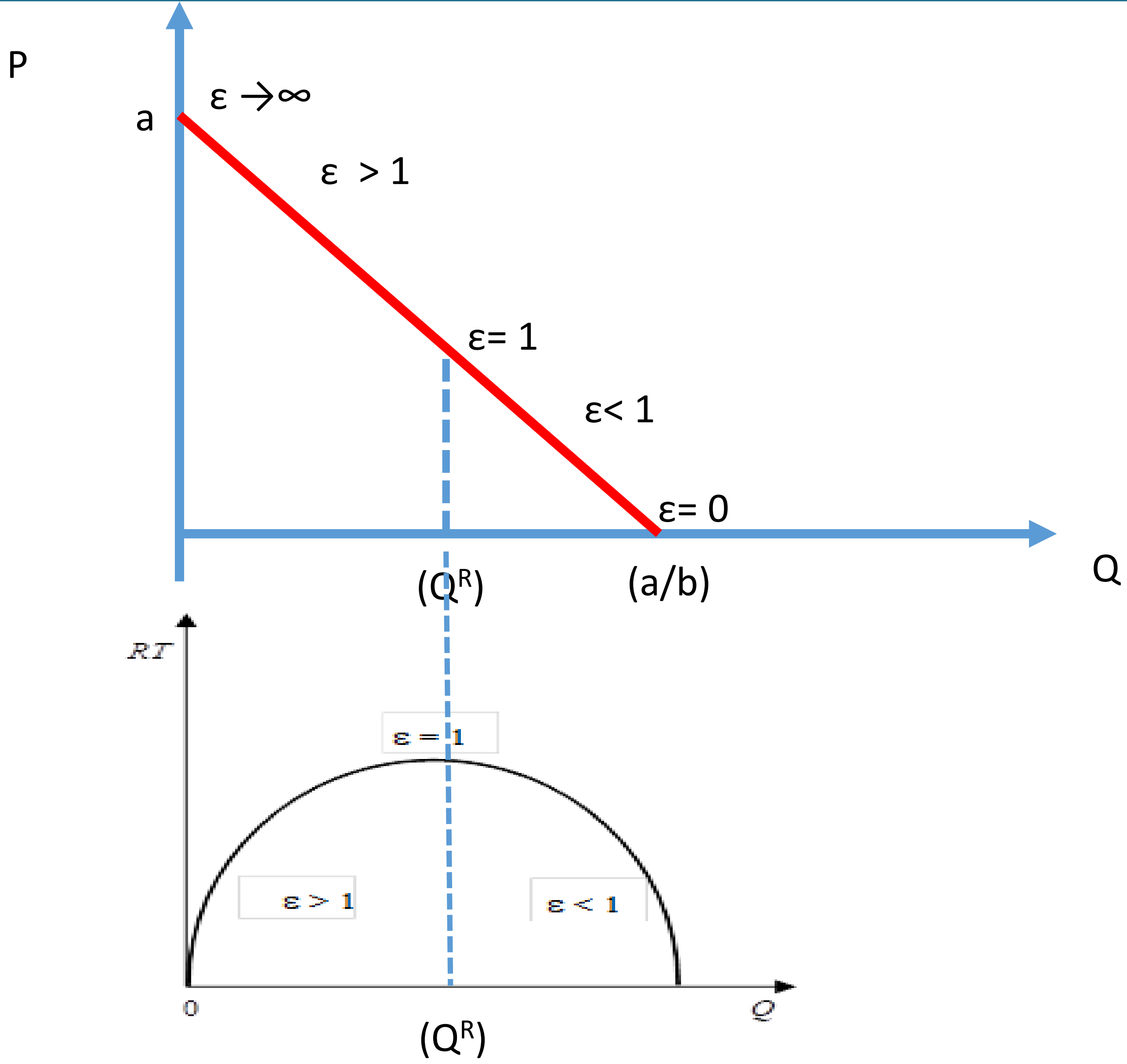
~~The individual firm's supply curve for good Q tells us **for every possible price** how many units the firm sells of good Q~~

The individual firm's supply curve for good Q tells us **for every possible price** how many units the firm **desires to sell** of good Q **given**….

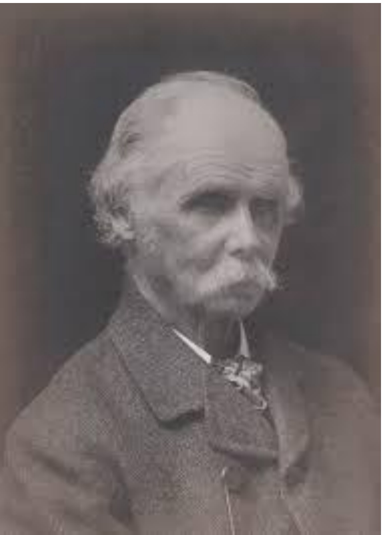


At price P_1 the firm sells Q_1 units of good Q if there is somebody willing to buy them from him *(if allowed to raise prices at P1)*

The goal of a firm: maximize revenues?



Alfred Marshall and the goal of an entrepreneur



"The chemist or the physicist may happen to make money by his inventions, but that is seldom the chief motive of his work. . . . business men are very much of the same nature as scientific men; they have the same instincts of the chase, and many of them have the same power of being stimulated to great and even feverish exertions by emulations that are not sordid or ignoble. This part of their nature has however been confused with and thrown into the shade by their desire to make money. . . . And so all the best business men want to get money, but many of them do not care about it much for its own sake; they want it chiefly as the most convincing proof to themselves and others that they have succeeded."

Goals and Cost curves

Q* such that:

$$\text{Max } \Pi\ (Q) = P^d(Q)\ \mathbf{Q} - TC$$

Q* such that:

$$\text{Max } \Pi\ (Q) = P^d(Q)\ \mathbf{Q} - TC\ (Q)$$

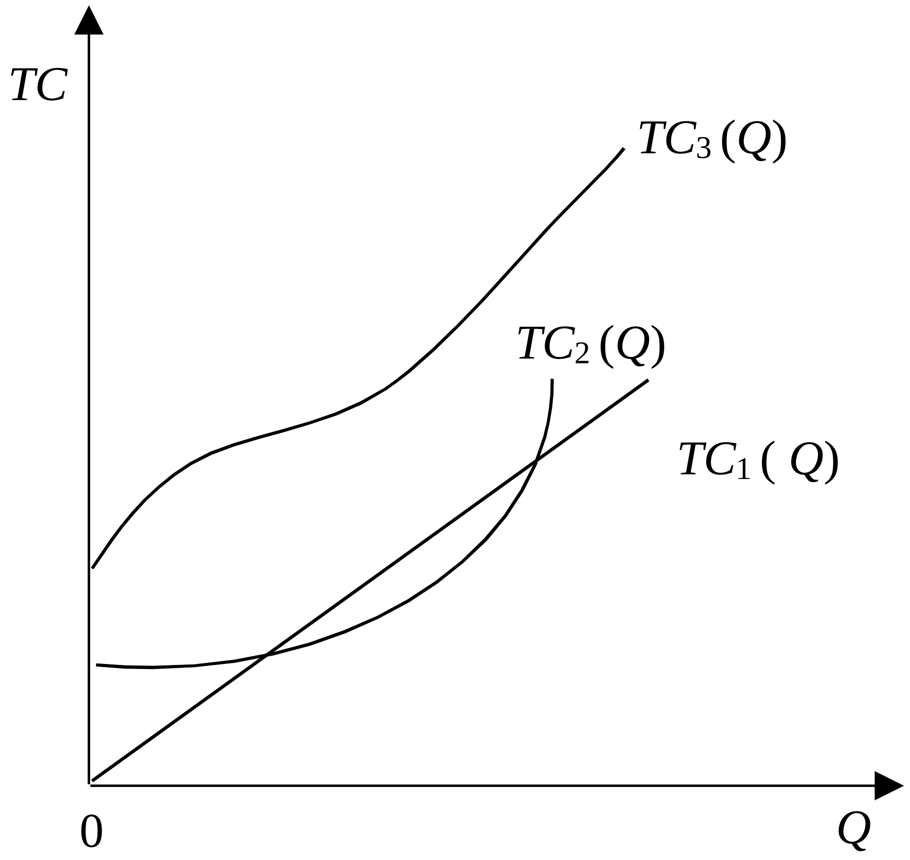
Where $\color{red}{TC}$ $(\mathbf{Q}) \equiv \color{red}{TC^{min}}$ $(\mathbf{Q})$

Where $\color{red}{TC}$ $(\mathbf{Q}) \equiv \color{red}{TC^{min}}$ $(\mathbf{Q, T°, w°, r°, Leg°...})$

~~TC^{min} (1) euro~~
~~TC^{min} (2) euro?~~

TC?

Cost curves



Q* such that:

Max Π (Q) = P(Q) **Q** – TC (**Q**)

Where TC (**Q**) ≡ TC^{min} (**Q, w°, r°, Leg°…**)

Where TC (**Q**) ≡ TC^{min} (**Q**)

~~For each possible Q, TC (Q) tells me the cost of producing that Q, given all the elements that influence the cost of producing Q.~~

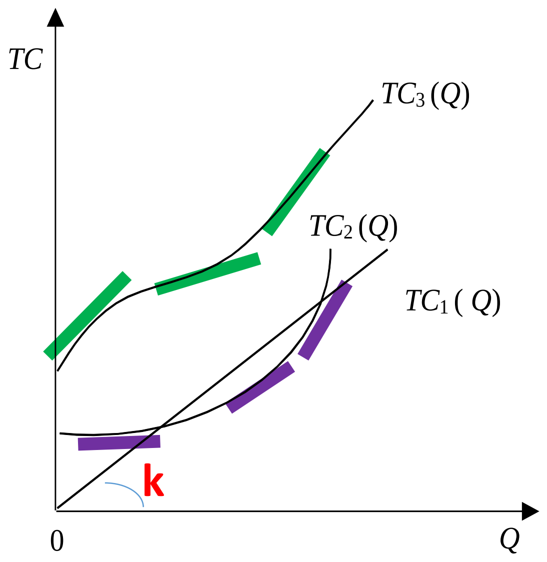
For each possible Q, CT (Q) tells me the **minimum** cost of producing that Q, given all the elements that influence the minimum cost of producing Q.

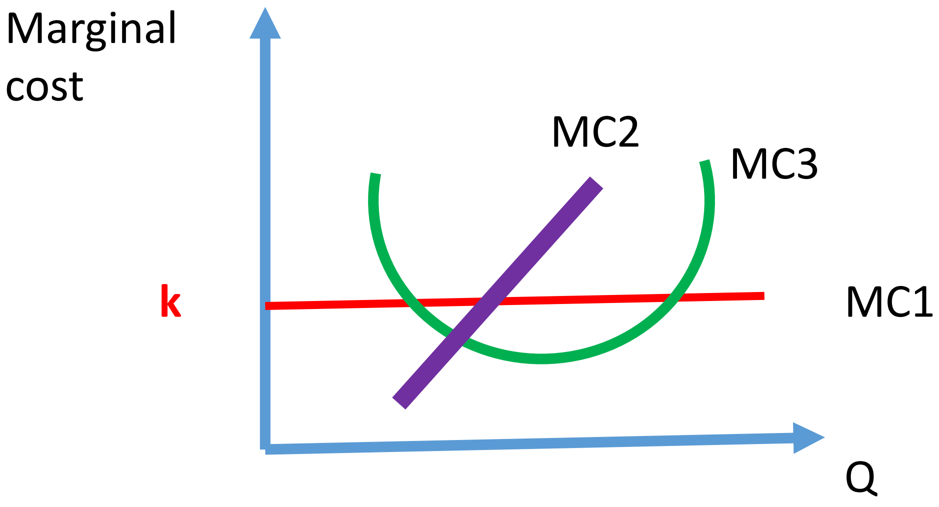
Cost curves

MC1 (0) = k €
MC1 (1) = k €
TC1 (2) = ? €
= 2k €

TC2 (23) = 230 €
MC2 (23) = 15 €
TC2 (24) = ?
= 245 €

TC3 (150) = 80€
TC3 (151) = 86€
MC3 (150) = ?
= 6 €





$\delta TC/\delta Q \equiv MC(Q) = ?$

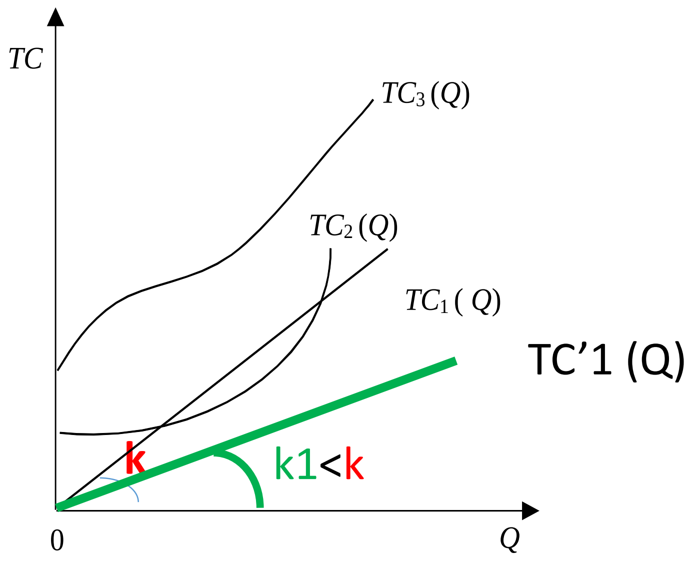
$MC(Q) > 0$

Cost curve change

Distinguish:

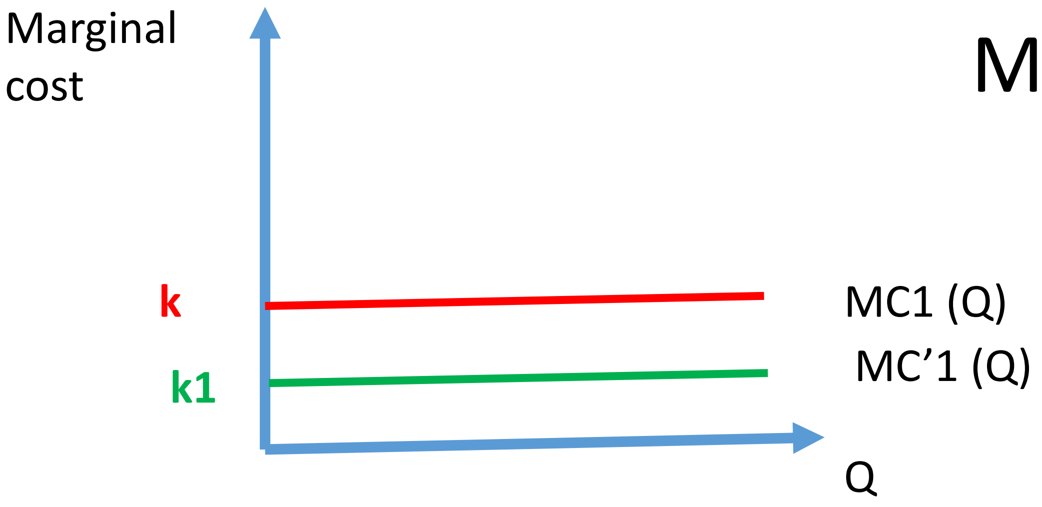
- movements **along** the cost curve (impact of changes of quantity on minimum costs)
- Movements **of** the cost curve (impact of all changes of all other variables that affect minimum cost):

Bravura, unit cost of factors of production…

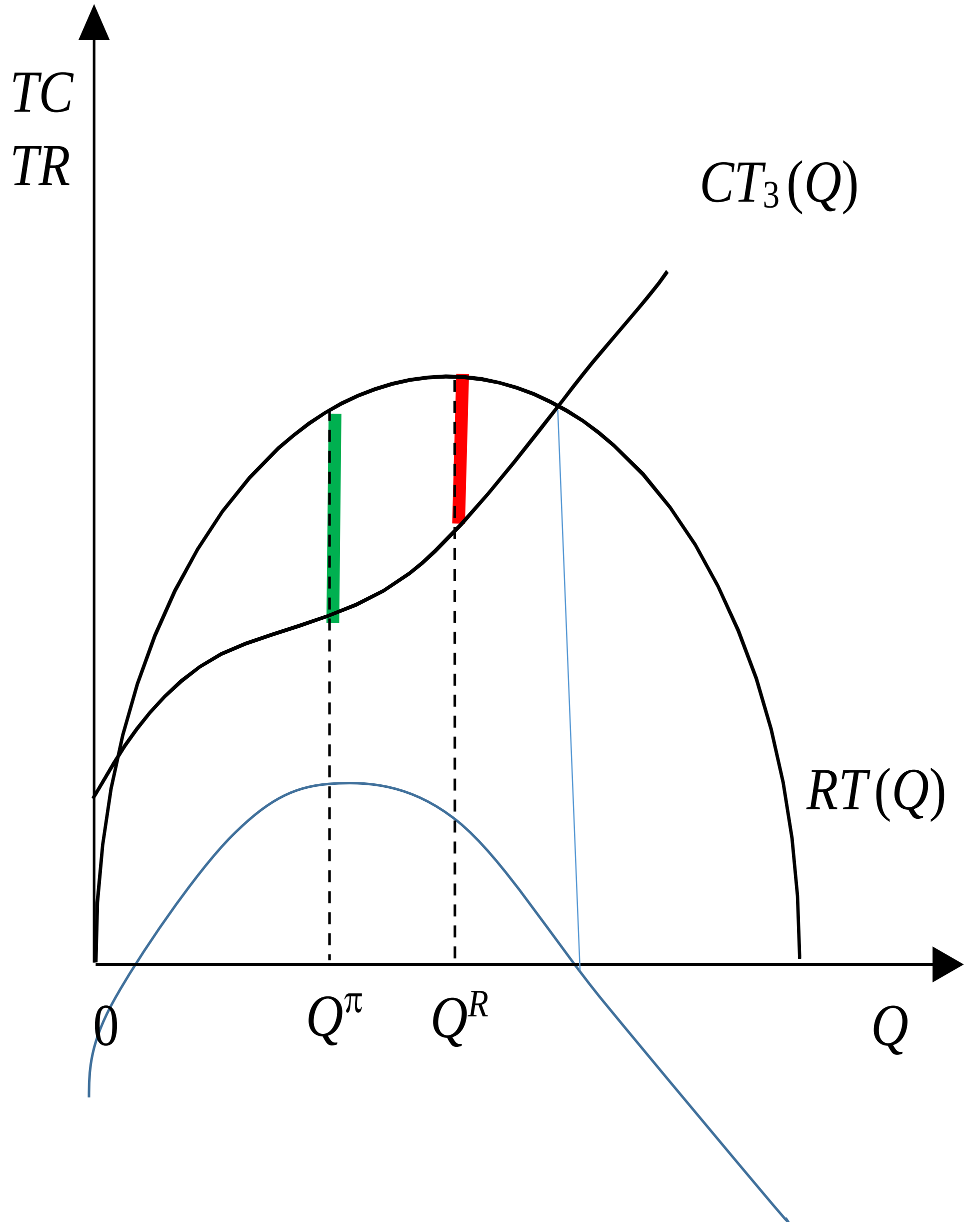


$$\delta TC/\delta Q \equiv MC\ (Q) = ?$$

$$MC\ (Q) > 0$$



Maximizing profits vs. revenues



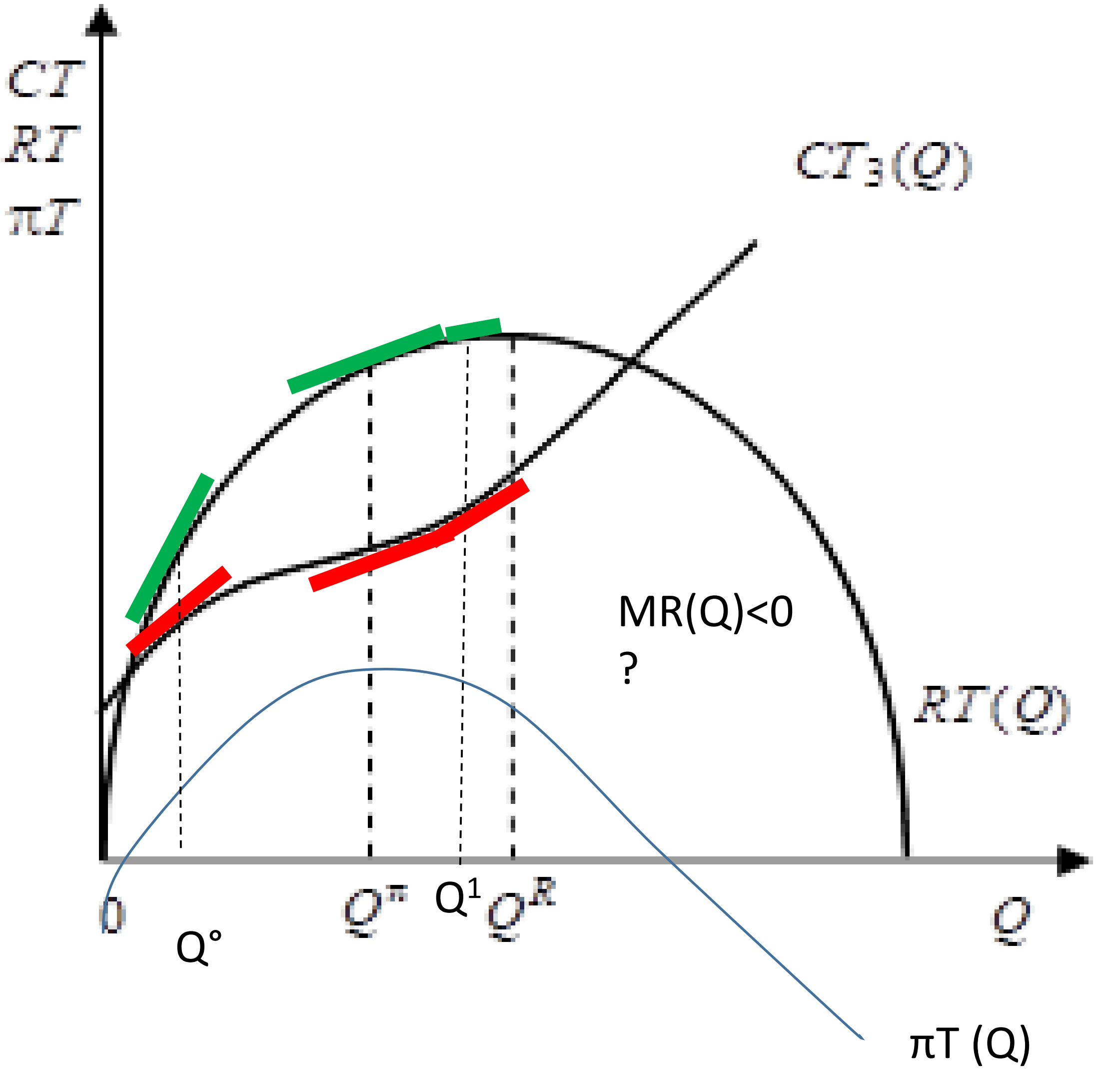
Maximizing profits

R (Q°) >
C g Q°)

R) <
Cr Q¹)

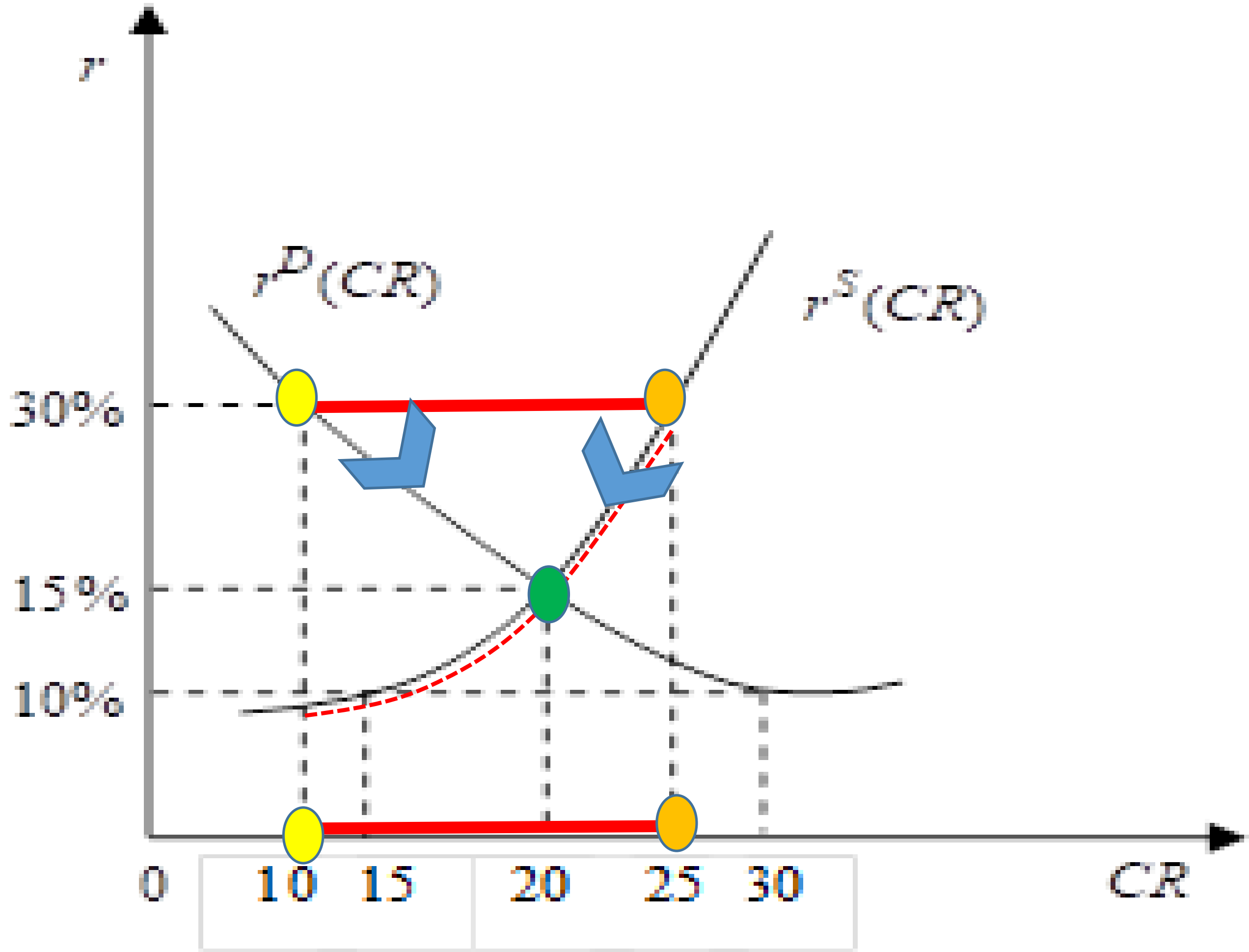
Rmg (Q^π) =
Cmg (Q^π)

!



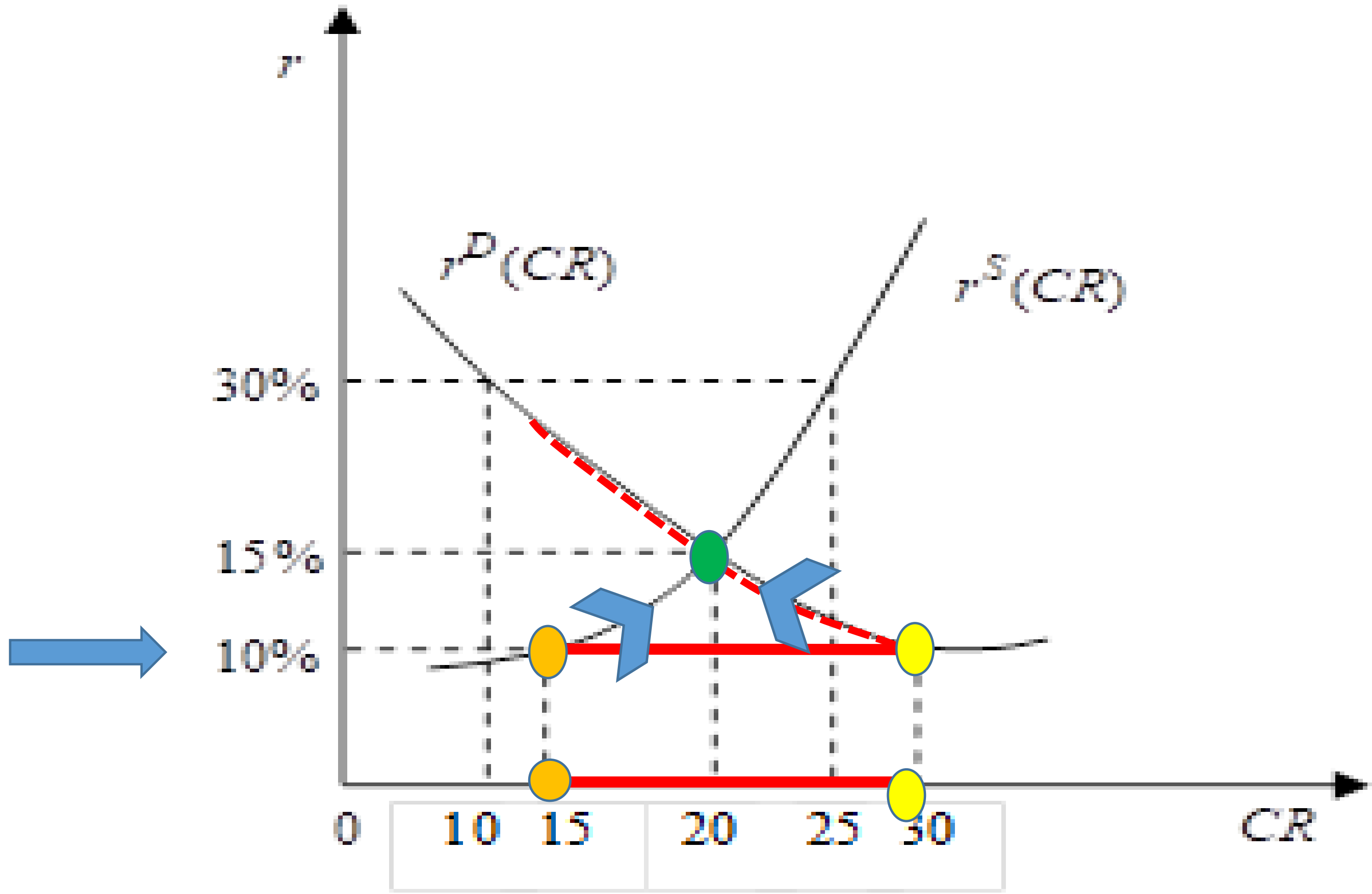
Equilibr… ia, free market

?



Equilibr… ia, free market

?



Equilibr… ia, regulated market

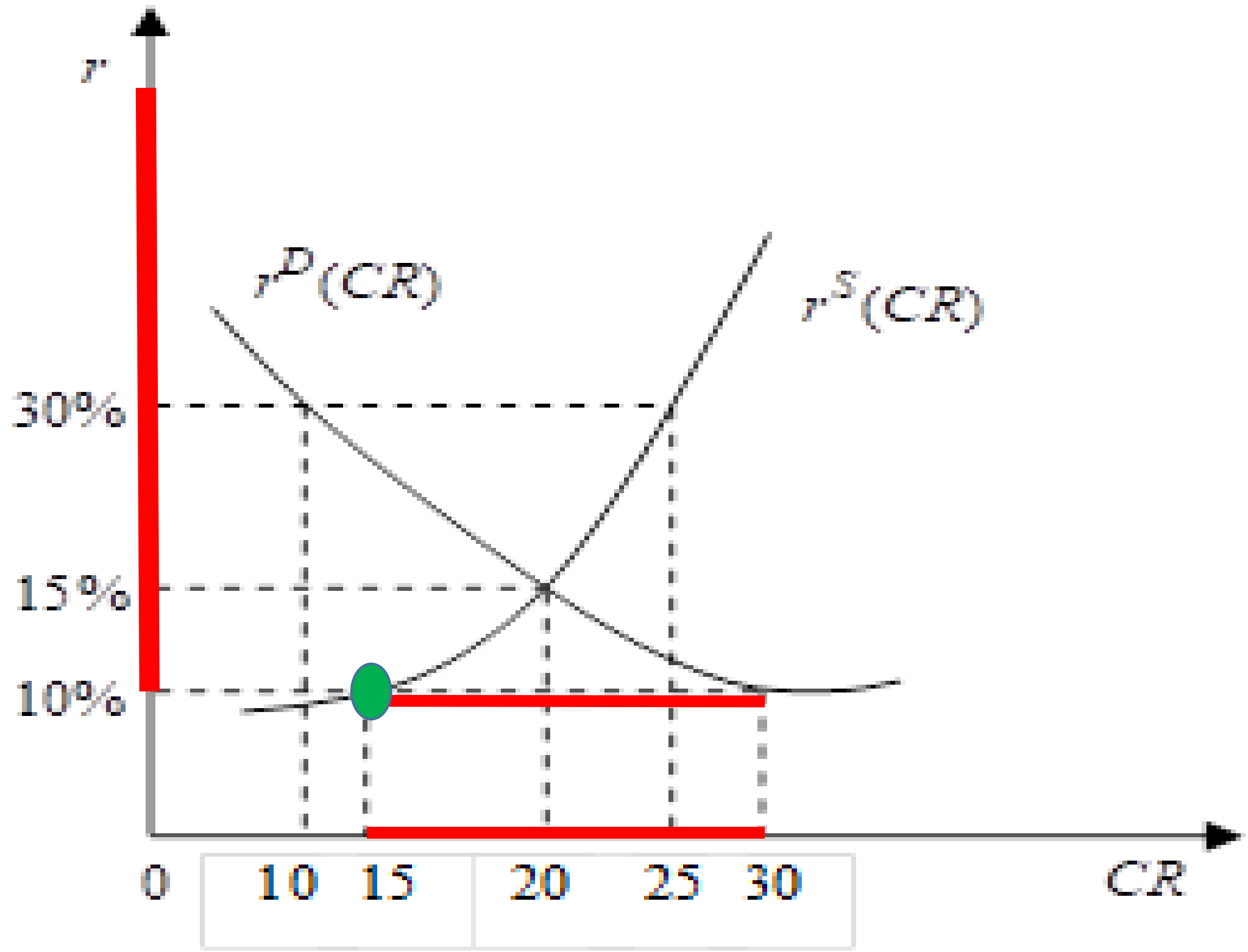
To whom (1)?
The first in
the queue?

Are we sure
about 15 bn
at 10%?

To whom (2)?
The richest?

?

Helping the
poor?



Chapter 2 - At least as liked as

$$\succsim_i$$

$\cancel{\geq}$?

A «is at least as liked as» B by «i»

$$A \succsim_i B$$

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Strictly preferred to; indifferent to

$$\succ_i$$

$$\sim_i$$

A «is at least as liked as» B by «i»

$$A \succ_i B$$

either or

$$A \sim_i B$$

$$A \succsim_i B$$

Assumption 1

RATIONALITY

A.1 Completeness of the preference ordering «at least as liked as»

either A $\succsim$ B or B $\succsim$ A or both occur simultaneously. In the latter case, given the above definitions on the ordering "preferred or indifferent to", check that the individual must be indifferent between bundles A and B. This also means that if A $\succ$ B then it cannot be that B $\succ$ A (an hypothesis called of preference asymmetry).

A counter-example

Suppose you are a doctor, working in a country subject to a pandemic disease, who has been informed that 1,000 people will certainly die if left untreated. By using a vaccine you may get the following results:

- if you adopt vaccine A, it will save 600 of the 1000 people;
- if you adopt vaccine B, it will not save anyone with probability 1/4 and will save all with probability 3/4.

$A \succ B$ $\quad\quad$ $B \succ A$

A or B?

A counter-example

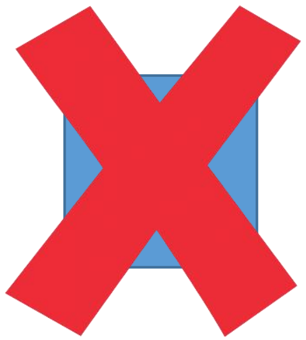
Suppose instead of having to choose between the following two alternatives (always in the hypothesis of certainty of death without cure):

- adopt the C vaccine which will result in the death of 400 of the 1000 people;
- adopt vaccine D which will involve death with probability 3/4 of nobody and of all with probability 1/4.

C or D?

Framing and the default option

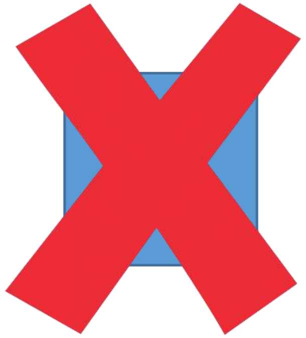
CONSENT CHOICE



I want to participate to organ donation (5)

Framing and the default option

EXIT CHOICE



I do not want to participate to organ donation (3)

Framing: if you want to participate (5)

I want to participate to organ donation (5)

I do not want to participate to organ donation (5)

Framing: if you do not want to participate (3)

☐ **I want to participate to organ donation (0)**

☐ **I do not want to participate to organ donation (3)**

Framing: final result

I want to participate to organ donation (5)

I do not want to participate to organ donation (8)

Binge watching

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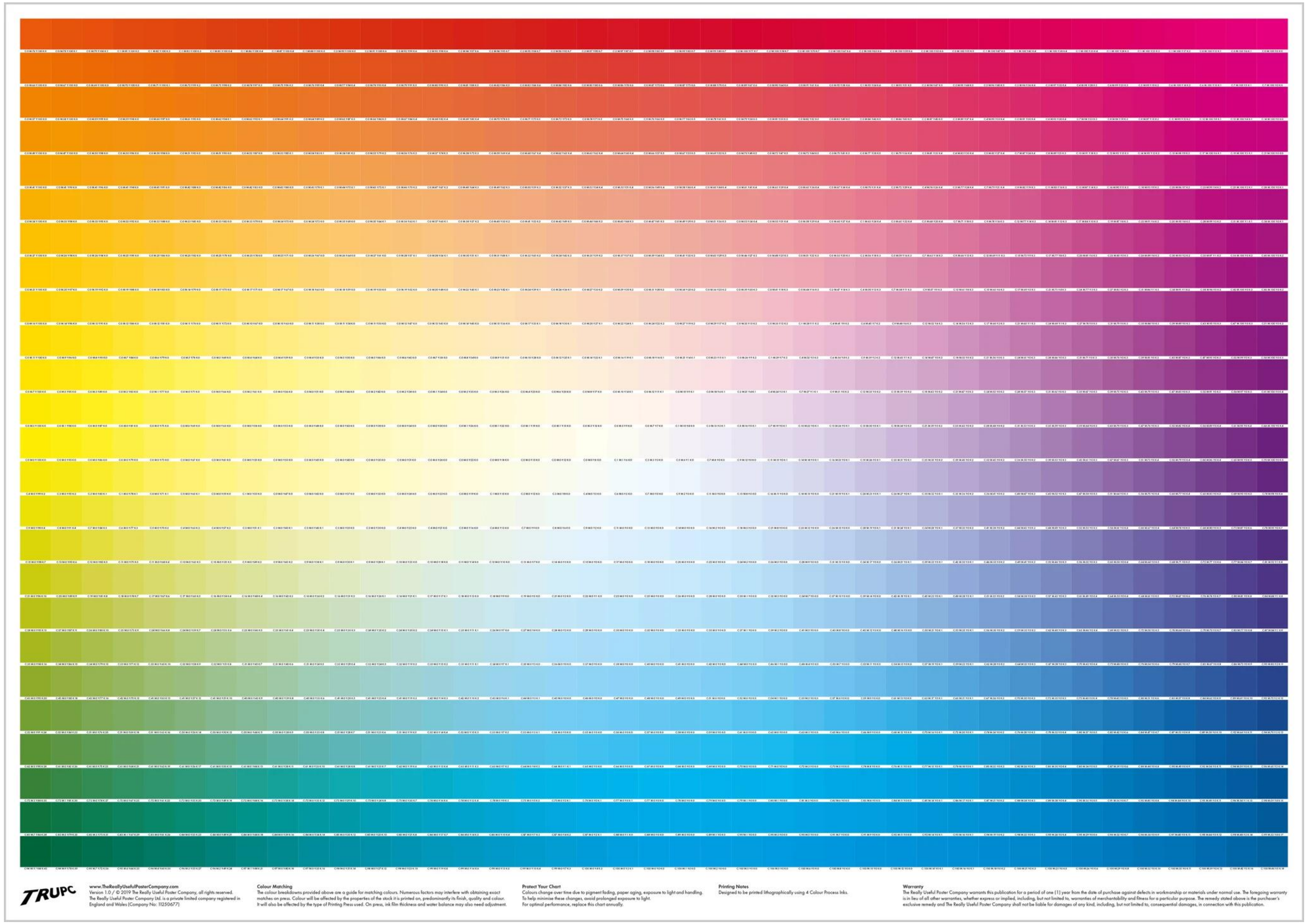
PS

Waiter: "*we have amatriciana and carbonara, dottore*";
Customer : "*amatriciana, thank you*";
Waiter (back from the kitchen): "*I forgot, we also have minestrone*";
Customer : "*ah, then give me the carbonara thank you*".

A.2 Transitivity of preferences

your preferences "preferred or indifferent to" are such that, if you do not prefer a basket Y to a basket X (which we sometimes write as $X \succsim Y$, or that X is at least equally appreciated as Y) and you do not prefer a basket Z to basket Y ($Y \succsim Z$) then you do not prefer Z to X ($X \succsim Z$).

Transitivity of preferences?



Transitivity of preferences?

Ulysses and the sirens

the best thing would be to listen to the sirens tied to the mast of the ship thus obtaining not only to listen to them, but also not to yield to their singing and survive (basket X) rather than not listening to the sirens that guarantee that "nothing unknown or dark to us remains" (basket Y), and that the latter alternative is itself better than listening to the sirens without being tied up and therefore die (basket Z)

$$X \succsim Y \succsim Z$$

But when he actually got to the sirens, Ulysses modifies its order of preference and feels that he would ultimately prefer to die listening to the sirens free of bonds (Z) rather than listen to the sirens bound by the ties to the mat (X): Z $\succ$ X . In this case we would have a dramatic non-transitivity:

$$X \succ Y \succ Z \succ X$$