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Elasticity of demand with respect to price

$$\Sigma^{D}_{P} = \frac{\dfrac{\Delta Q}{Q}}{\dfrac{\Delta P}{P}}$$

$$\Sigma^{D}_{P} = \frac{\dfrac{\delta Q}{Q}}{\dfrac{\delta P}{P}} = \frac{\delta Q}{\delta P} \times \frac{P}{Q}$$

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

Q = 1	Q = 3	Q = 4
P = 8	P = 4	P = 2

Σ = (2/1)/(-4/8) = **-4**

Σ = (1/3)/(-2/4) = **-2/3**

$$P^{d}_{i}\,(Q) = 10 - 2\,Q$$

An example

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

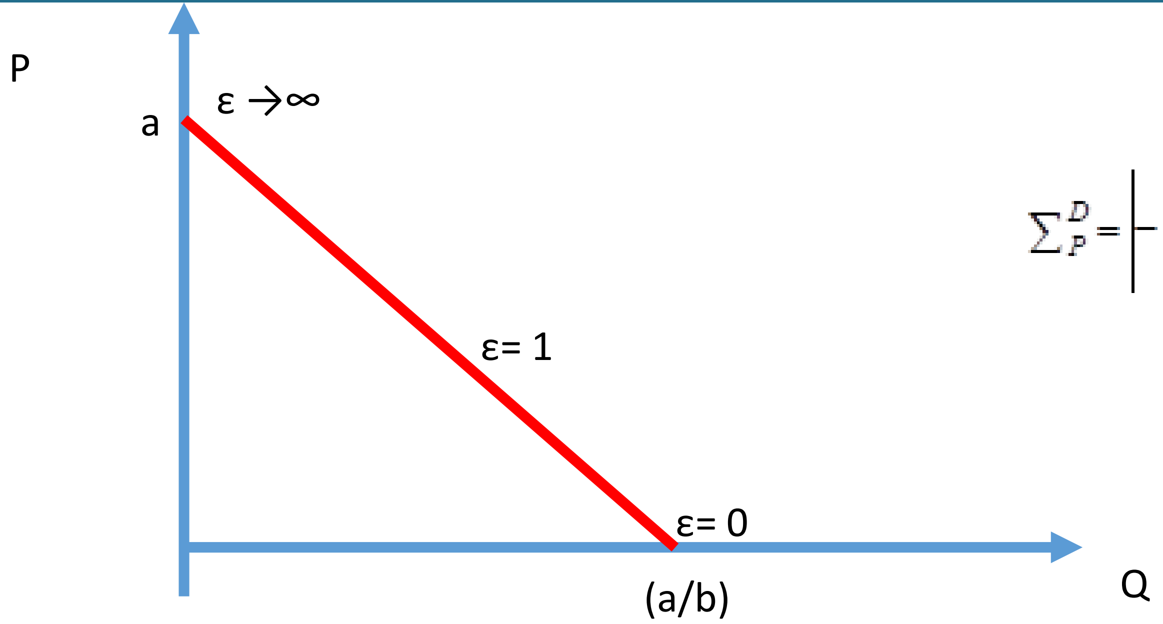
P(Q) = a – bQ,

Q(P) = (a/b) – (1/b)P,

The elasticity of the demand curve is:

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

Marginal revenue function and elasticity



P(Q) = a – bQ,
Q(P) = (a/b) – (1/b)P

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

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

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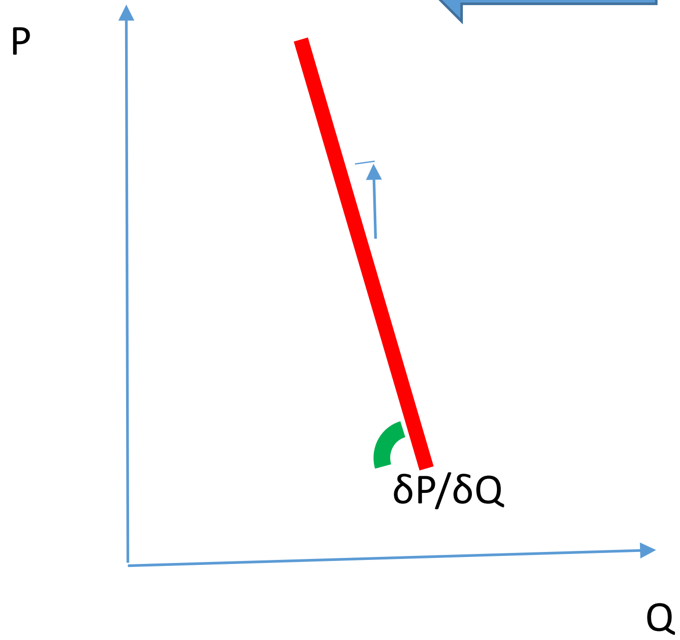
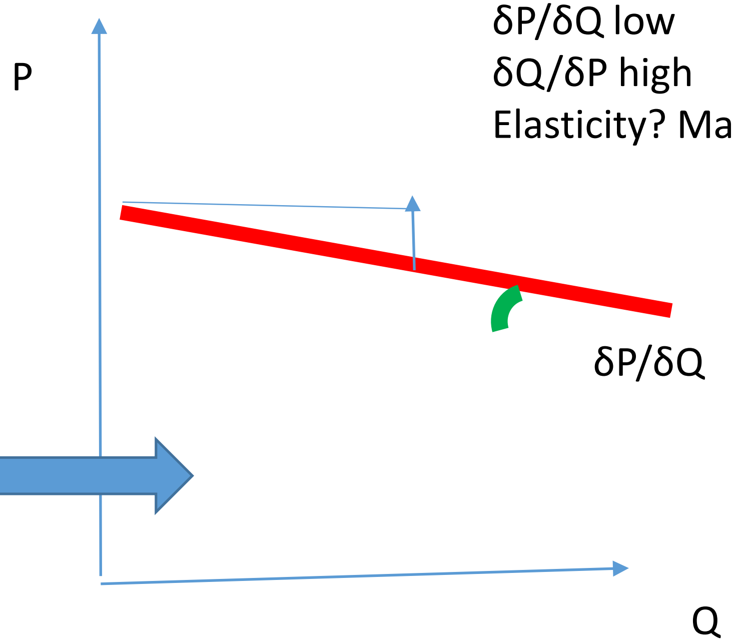
Understanding elasticities





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

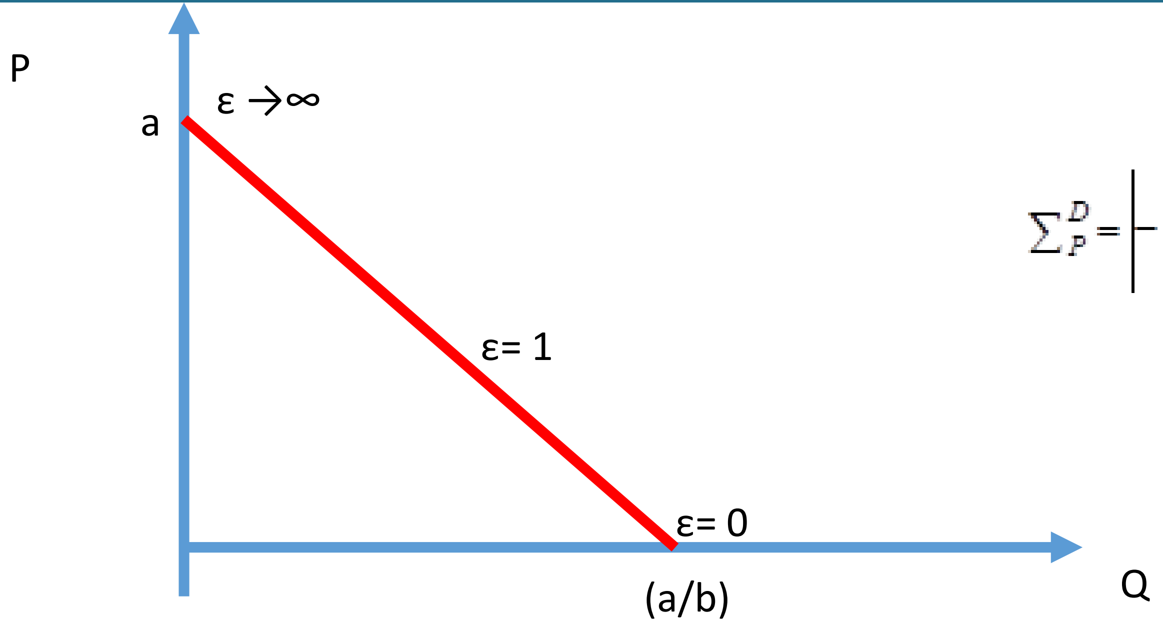
?

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

But how do revenues change with the change in quantity?

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

Marginal revenue function and elasticity



P(Q) = a – bQ,
Q(P) = (a/b) – (1/b)P

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

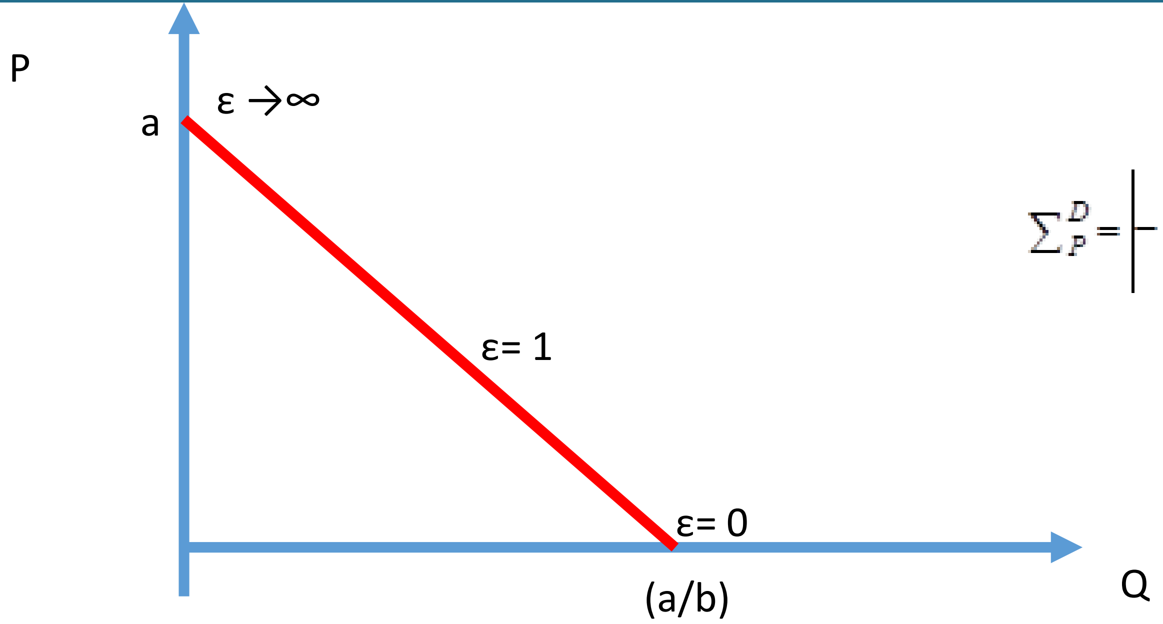
$$\frac{\delta TR}{\delta Q} = \frac{\delta \left[P(Q)Q \right]}{\delta Q}$$

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

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

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

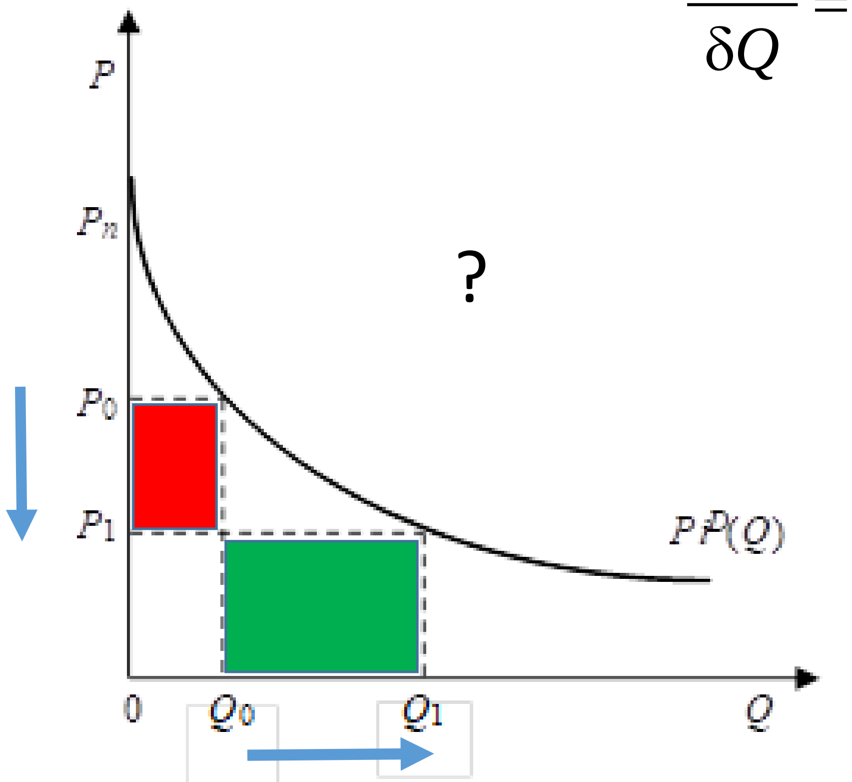
Derivative of UxV = (UV)'

= 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

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



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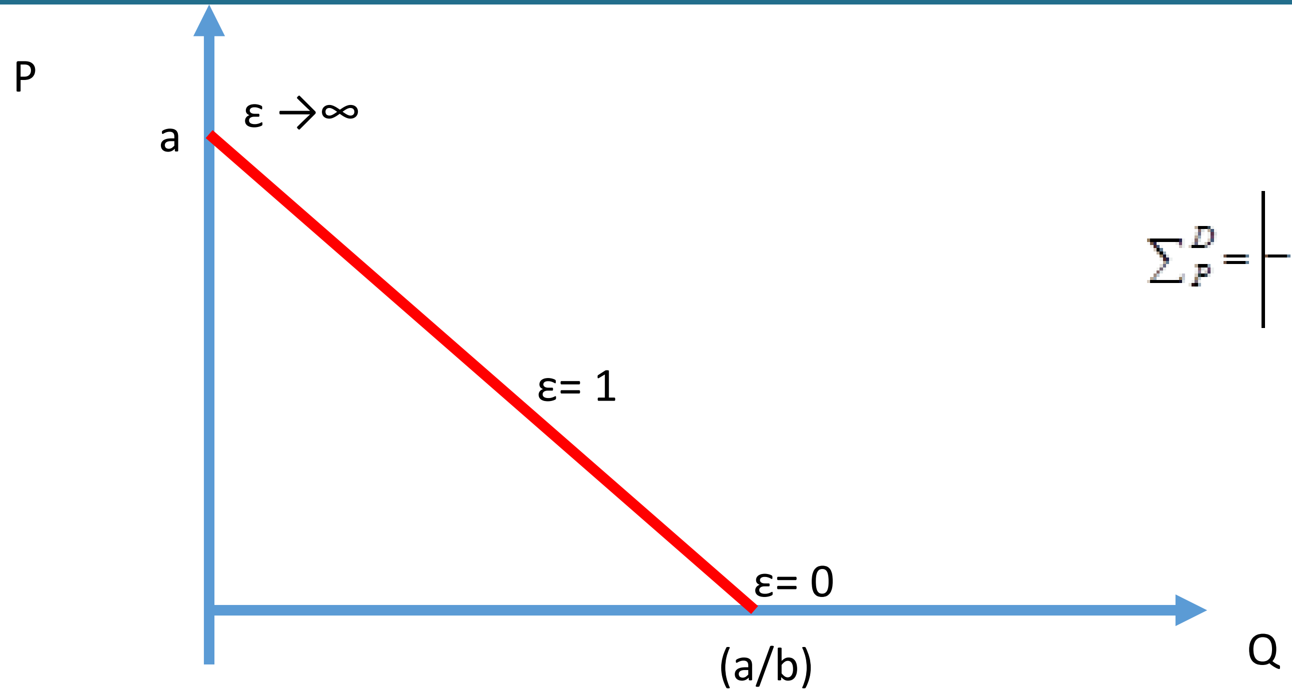
Marginal revenue function and elasticity

P(Q) = a – bQ,
Q(P) = (a/b) – (1/b)P



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

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

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

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

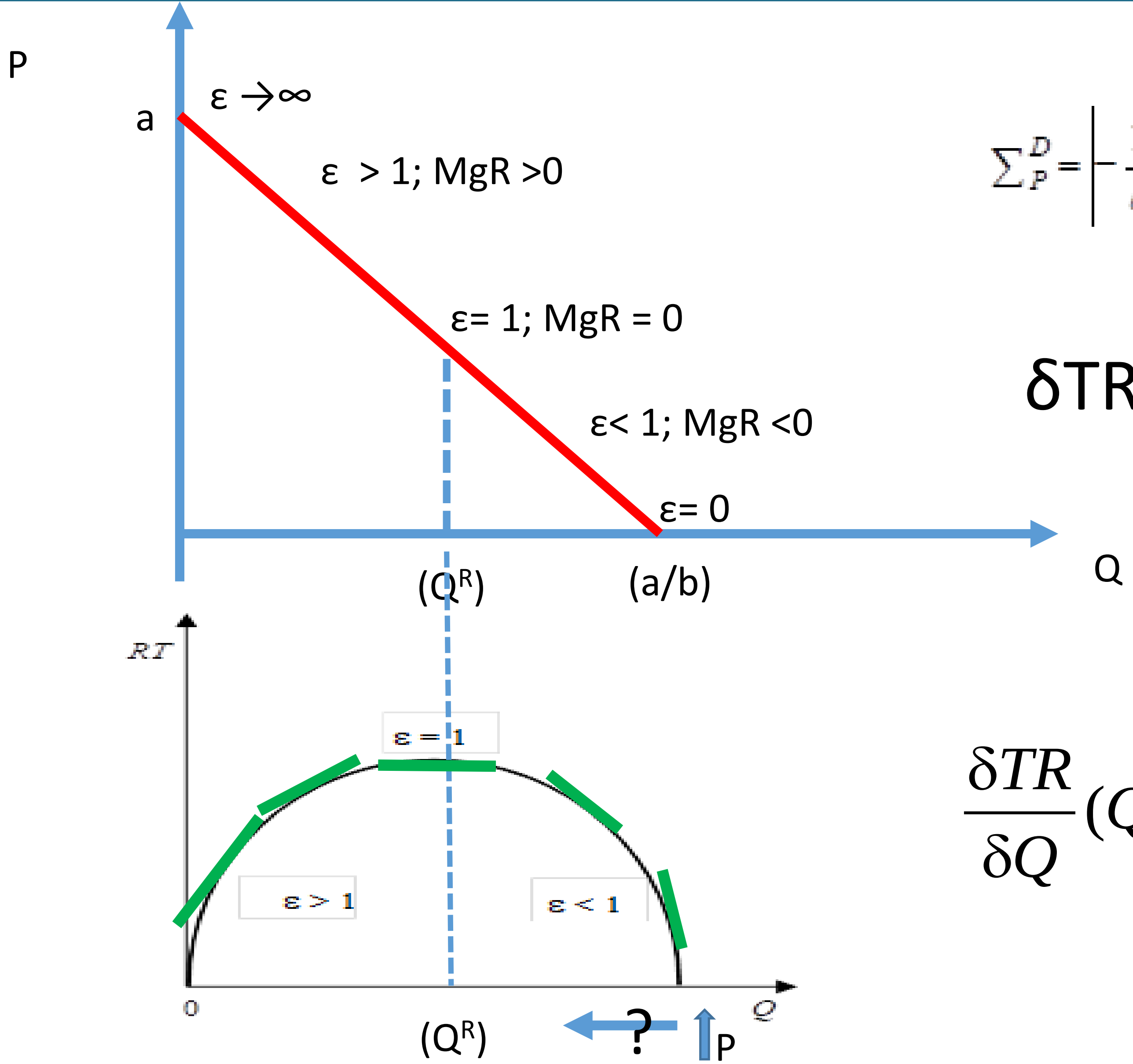
$$\frac{\delta TR}{\delta Q}(Q) = P(Q)\left[1 - \left(\frac{1}{\varepsilon(Q)}\right)\right]$$

The revenue dilemma: solved!

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 €



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

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

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

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.

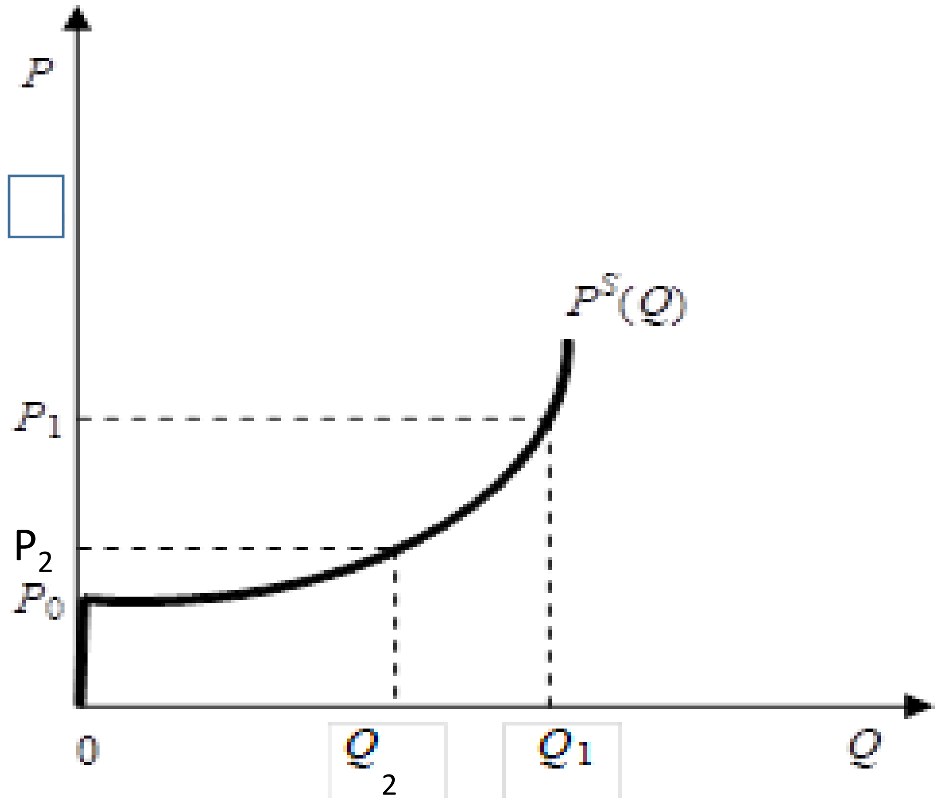
Crime? ↗

Final impact: ↘ + ↗ = ?

A supply curve

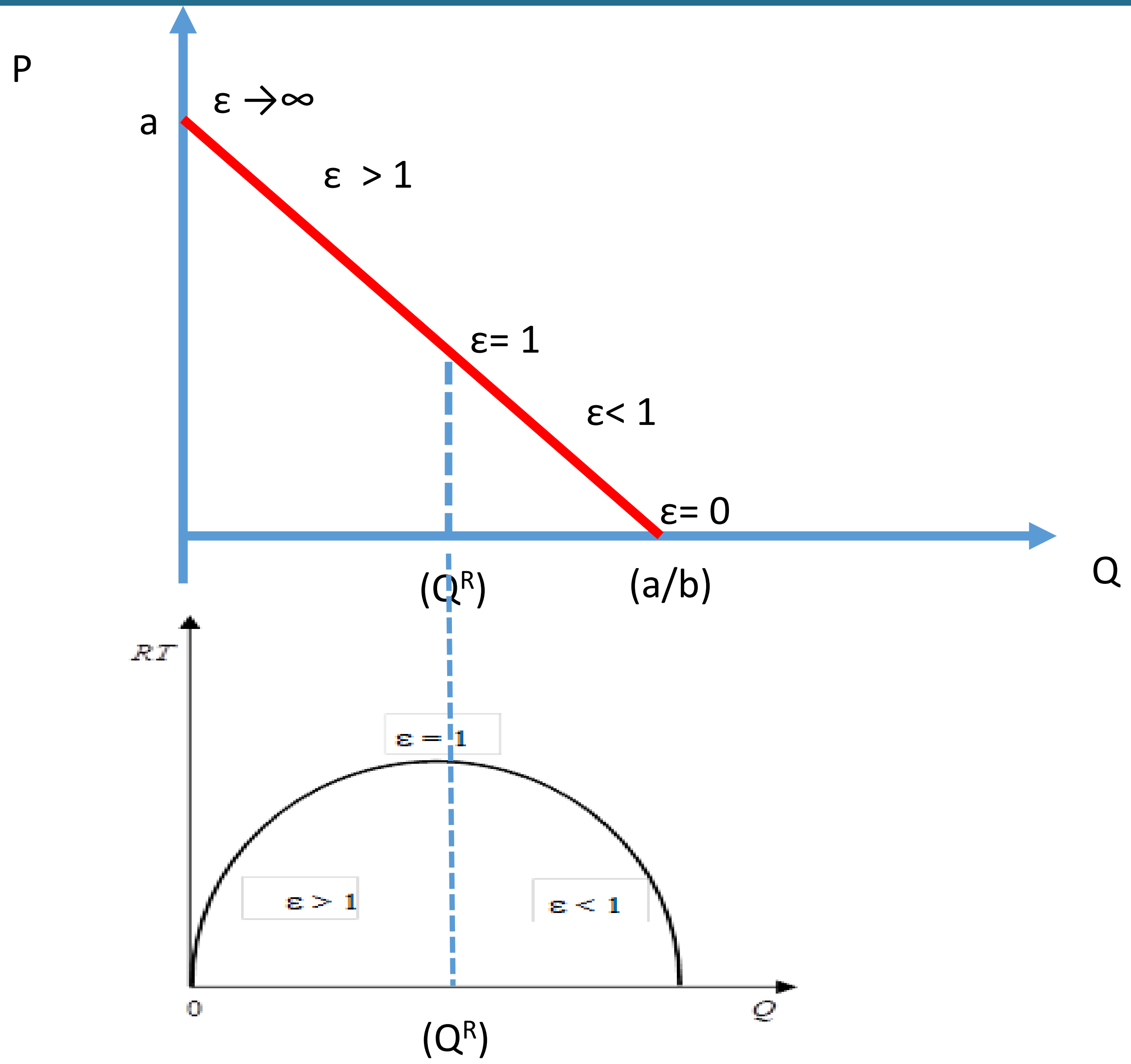
~~The individual firm's supply curve for good Q tells us **for every possible price** how many units the firm sells of good Q~~

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**….



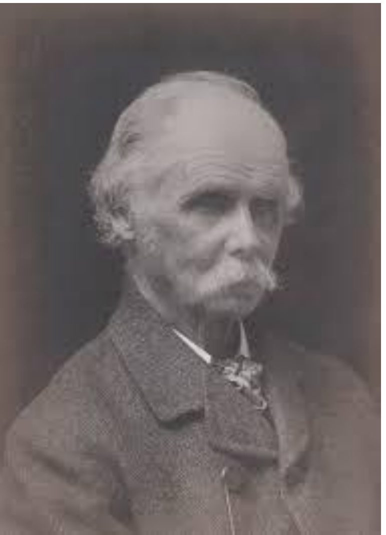
At price P_1 the firm sells Q_1 units of good Q if there is somebody willing to buy them from him *(if allowed to raise prices at P1)*

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:

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

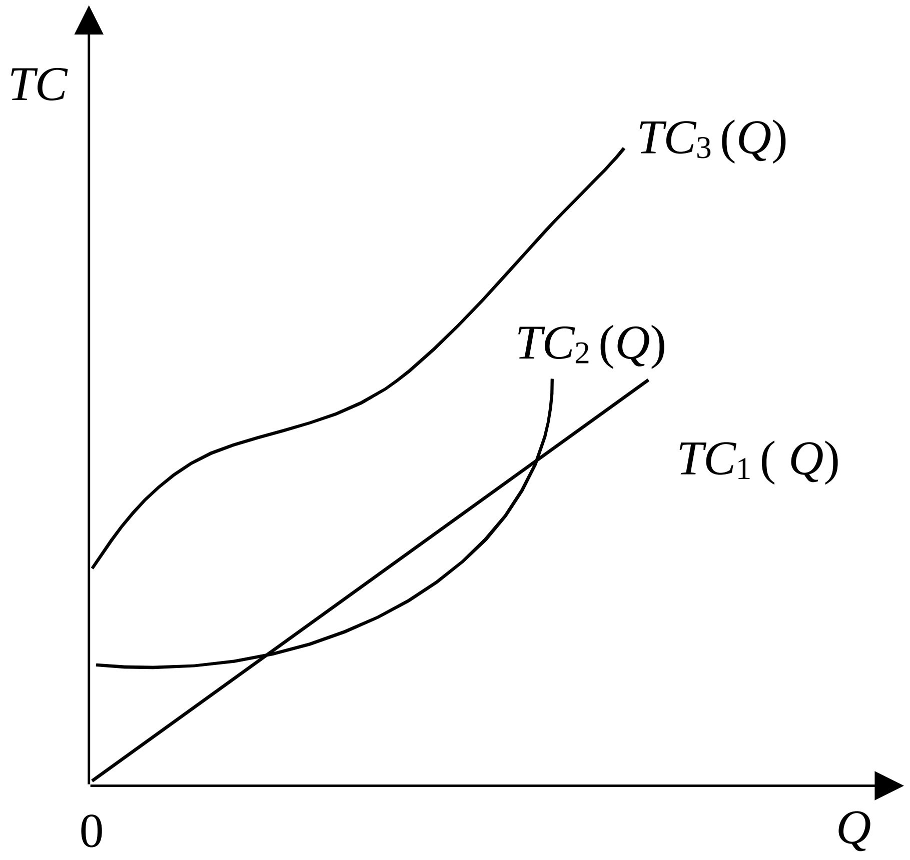
Where $TC\ (\mathbf{Q}) \equiv TC^{min}\ (\mathbf{Q})$

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

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°…**)

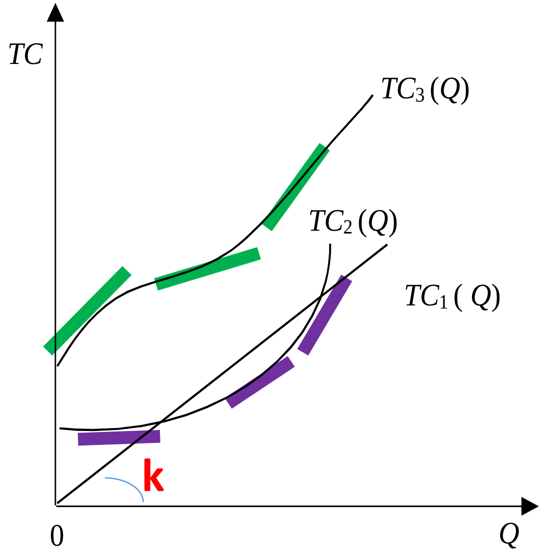
Where TC (**Q**) ≡ TC^{min} (**Q**)

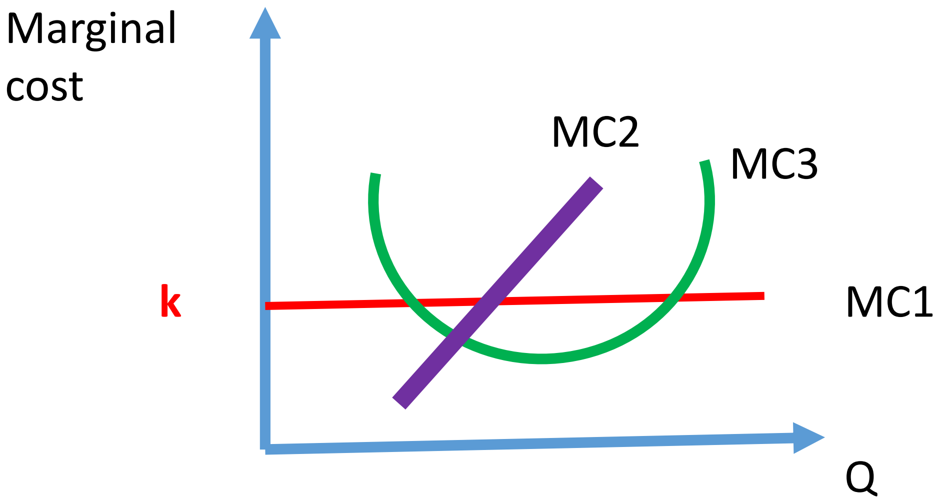
Cost curves

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 €

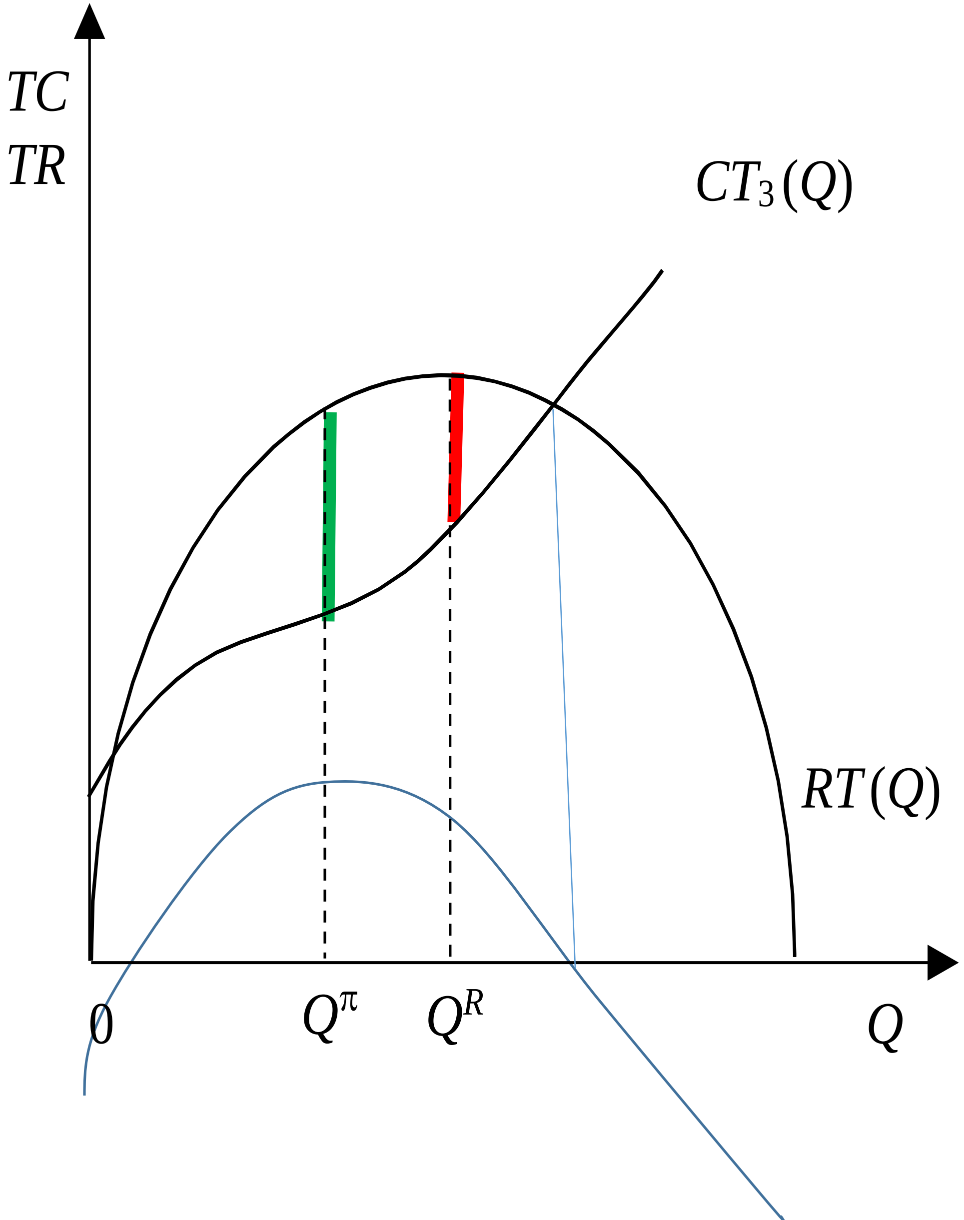




$\delta TC/\delta Q \equiv MC(Q) = ?$

$MC(Q) > 0$

Maximizing profits vs. revenues



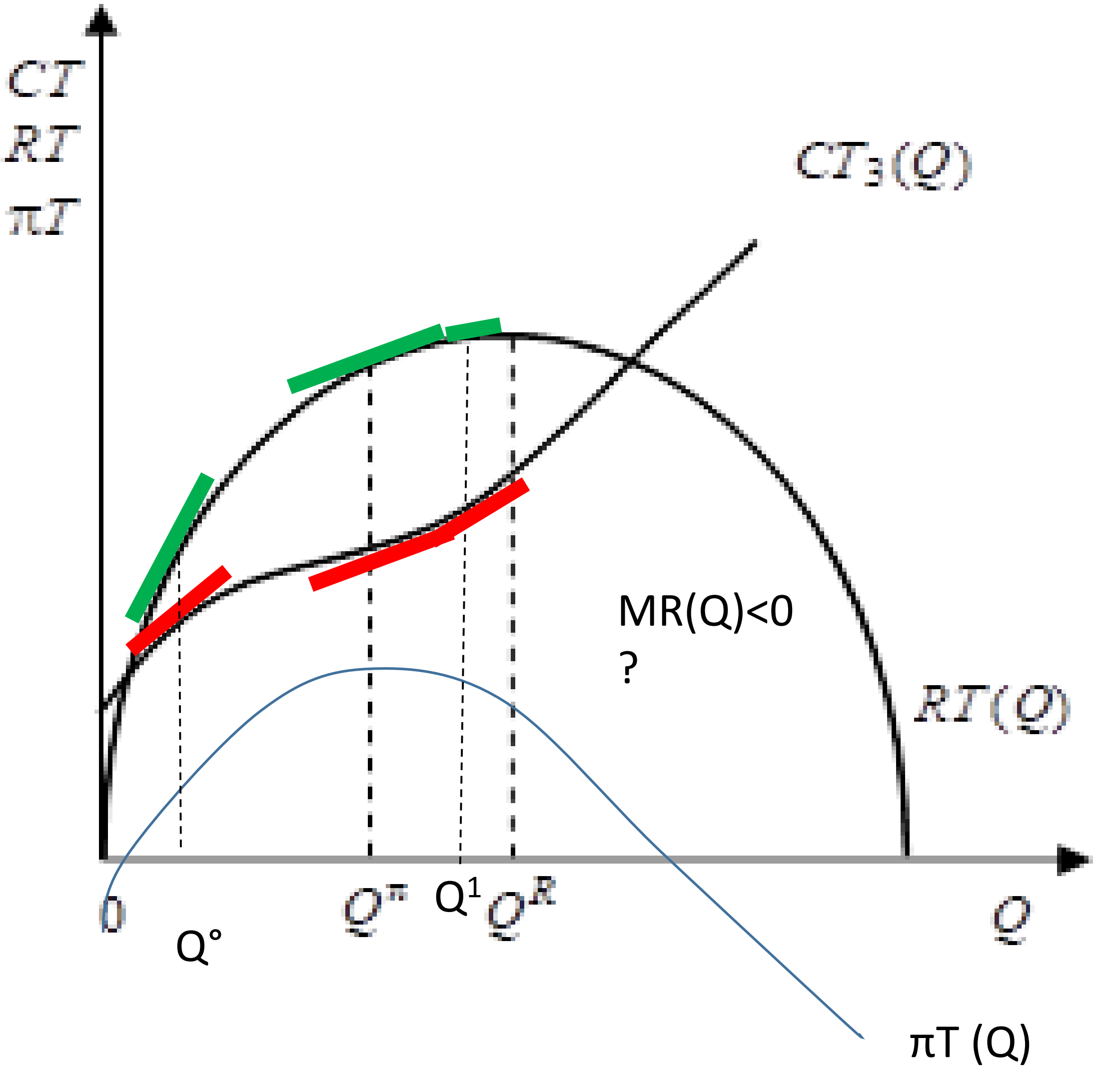
Maximizing profits

~~$Rmg (Q°) > Cmg (Q°)$~~

~~$Rmg (Q^1) < Cmg (Q^1)$~~

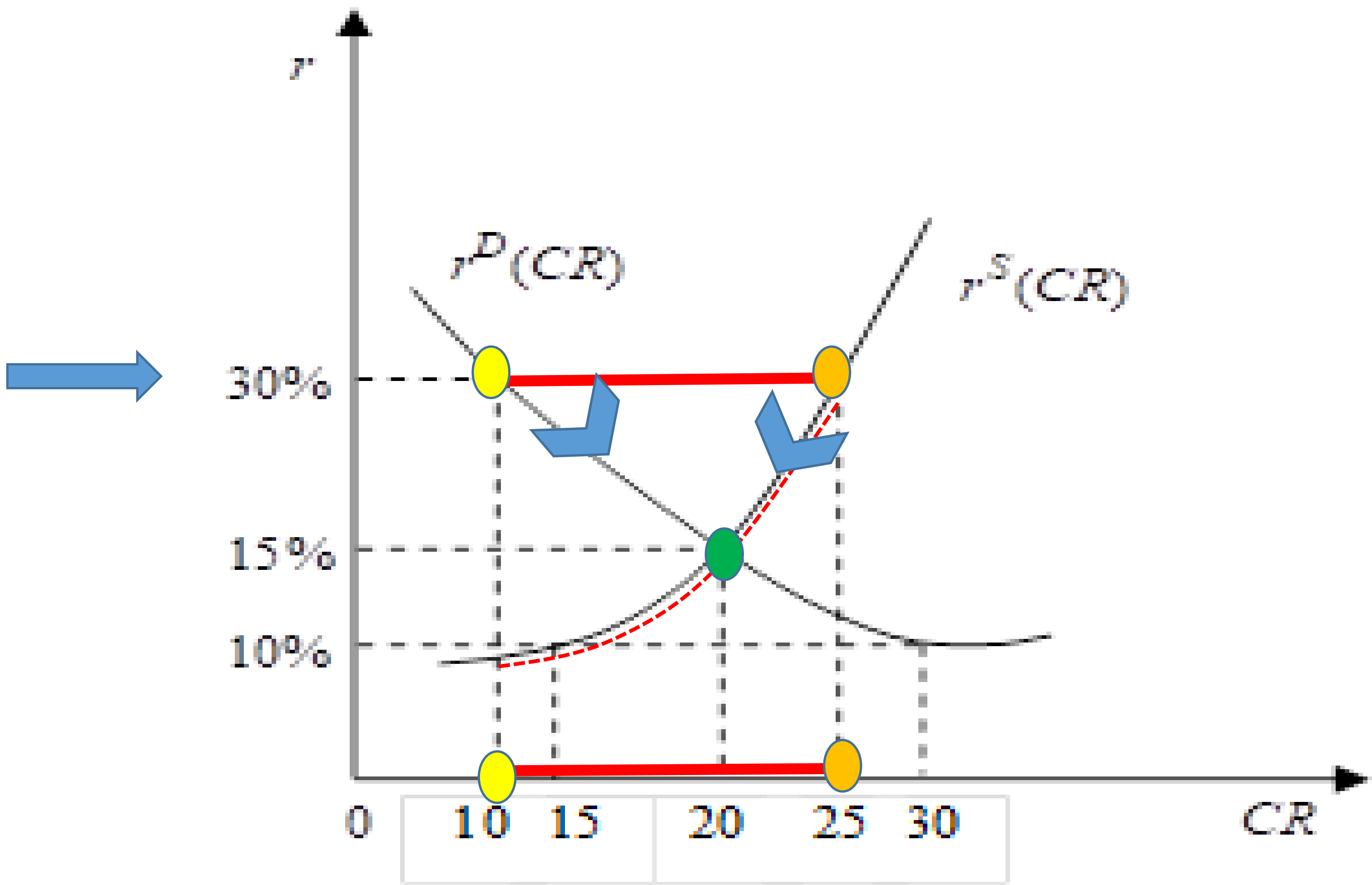
$Rmg (Q^\pi) = Cmg (Q^\pi)$

!



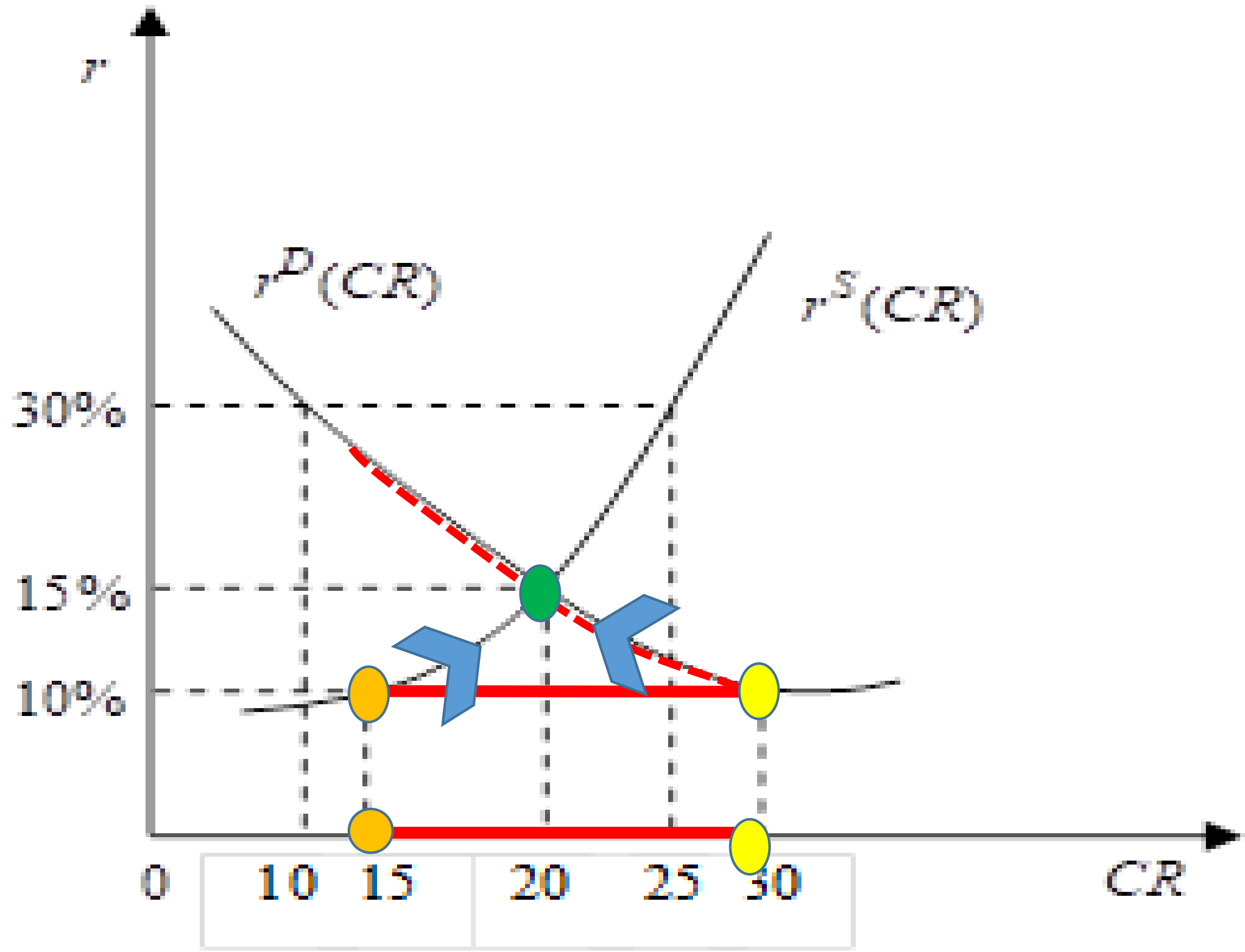
Equilibr... ia, free market

?



Equilibr… ia, free market

?



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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?