

EPFL

ECOLOGICAL ECONOMICS

Env-610

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Basics

SUPPLY

Example – Number of floors for a new building

Consider the following data, which represent the cost of a building depending on the number of floors

Number of floors	Total cost
1	500
2	700
3	1 080
4	1 500
5	2 000
6	2 580

Assume that each floor can be sold for 450

How many floors must be built to maximize the profit from this project?

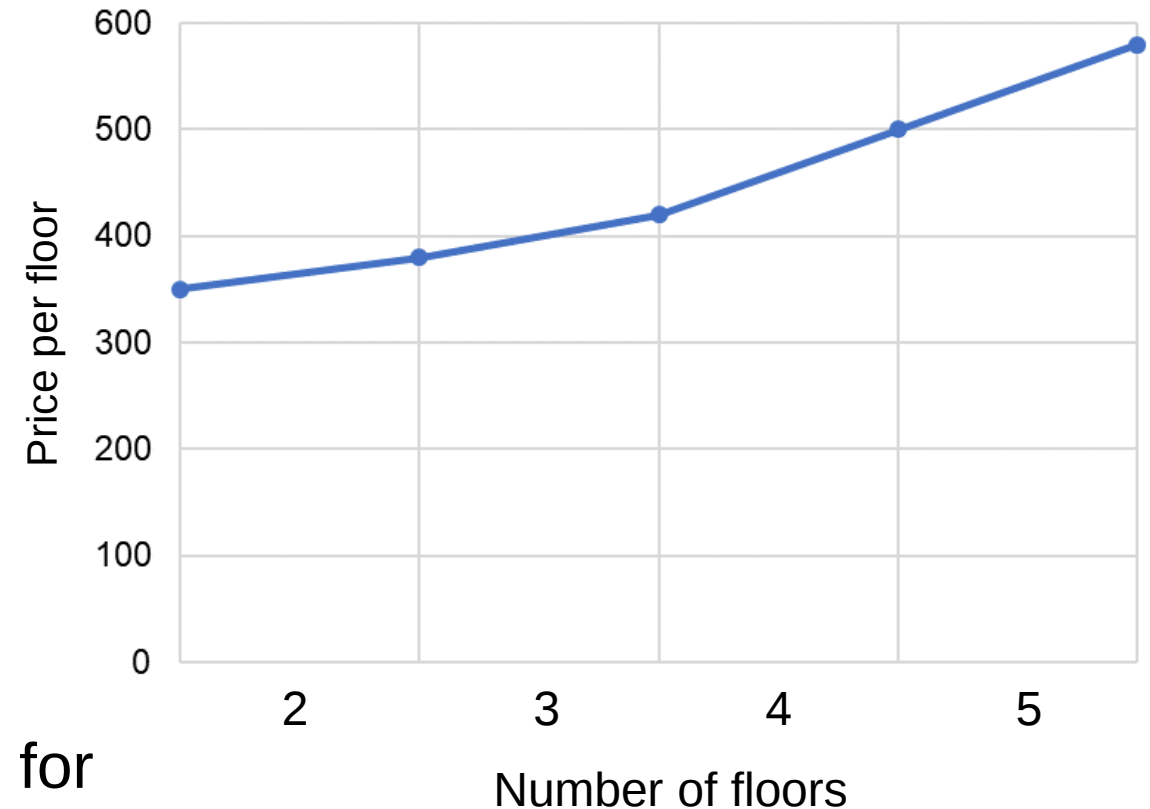
Example resolved

Number of floors	Total cost	Total income	Total profit	Average cost	Sales price	Marginal cost	Marginal profit
1	500	450	- 50	500	450	500	- 50
2	700	900	200	350	450	200	250
3	1 080	1 350	270	360	450	380	70
4	1 500	1 800	300	375	450	420	30
5	2 000	2 250	250	400	450	500	- 50
6	2 580	2 700	120	430	450	580	- 130

- Profit is negative for first floor, it becomes positive with 2 floors and is maximised for 4 floors
- Profit increases with every additional floor so long as the marginal cost of this additional floor is smaller than the sales price
- The number of floors offered is determined by the marginal cost ... provided this marginal cost exceeds the average cost (maximum profit does not guarantee positive profit)

Resulting individual supply curve

Number of floors	Average cost	Marginal cost	WTA
1	500	500	500
2	350	200	350
3	360	380	380
4	375	420	420
5	400	500	500
6	430	580	580



- "Demanders" are willing to buy an item for a maximum price = "willingness to pay"
- "Suppliers" are willing to sell an item for a minimum price = "**willingness to accept**"

Profit maximisation

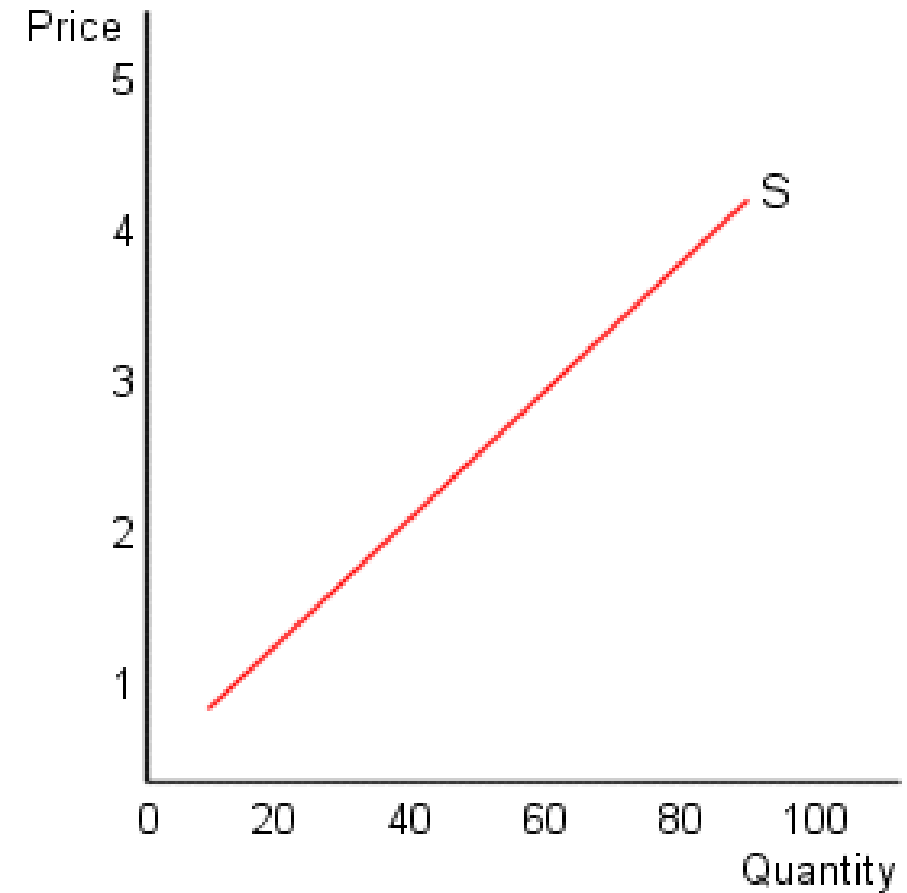
- Profit = Sales revenue – costs
- Competitive market assumption: price is given for individual producer j
- Sales revenue = $P \times Q_j$
- Costs = $C_j(Q_j)$ with $C_j'(Q_j) \geq 0$ and $C_j''(Q_j) \geq 0$
- Profit = $P \times Q_j - C_j(Q_j)$
- Find Q_j maximizing profit...

Supply

- **Definition:** Quantity of some good that people or businesses, who own or produce that good, want to sell for a given price

$$Q^S(p), \text{ with } Q^{S'}(p) > 0$$

- Suppliers only offer an additional unit when the price covers at least their WTA for that unit
- WTA = marginal cost, which rises with increased production



Determinants of willingness to accept (WTA)

Determinants of willingness to accept

Production conditions: costs of manufacturing, distributing/delivering, cashing in, etc., which depend on salaries, prices of materials and energy, taxes and subsidies, etc.

Alternative options: other buyers, other outlets, later sale (arbitrage). NB: seller could anticipate falling prices...

Desire to conquer a market ('dumping': eliminating competitors by selling below cost)

Financial pressure to sell: financial needs, difficult access to credit

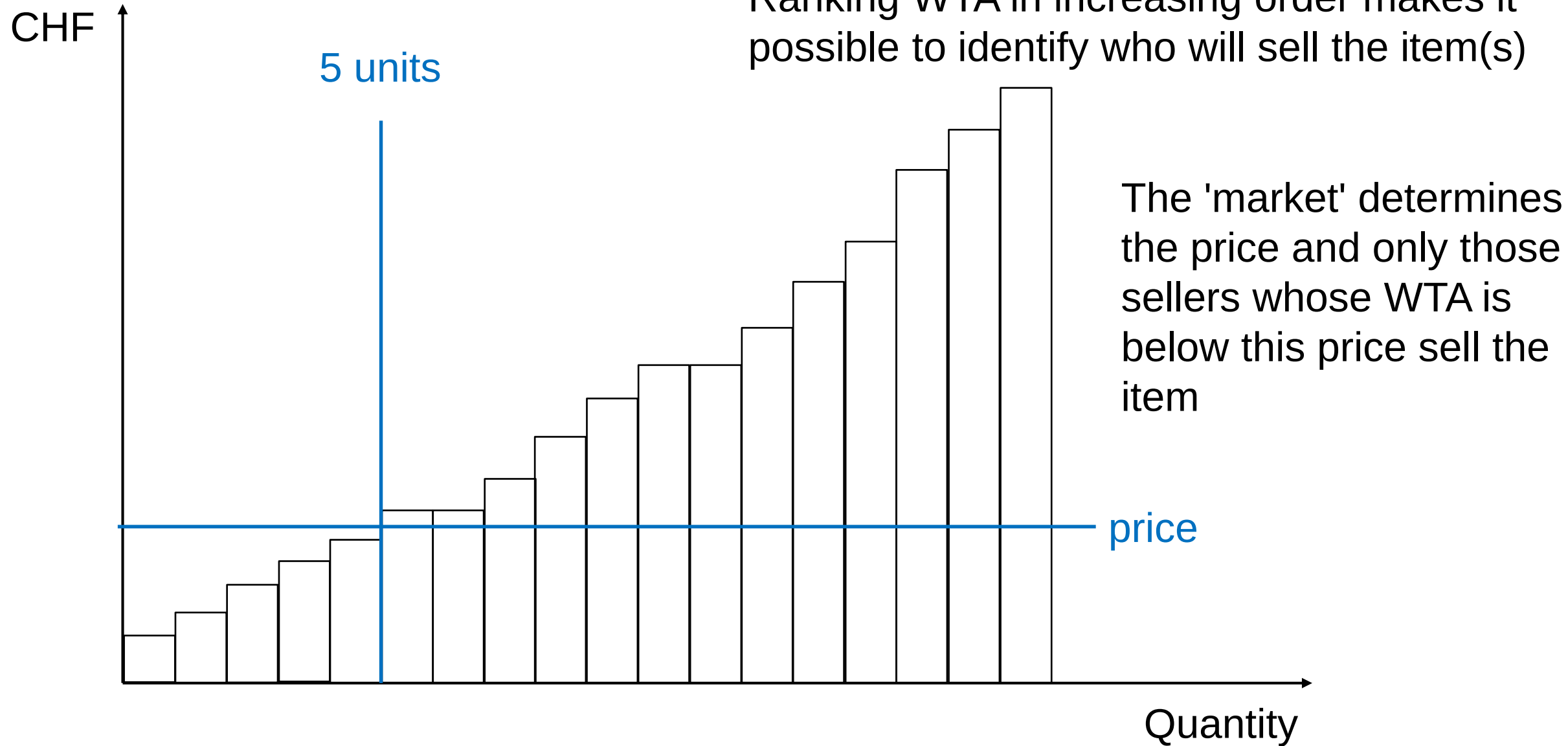
Other pressures to sell, e.g. need to make space in store or stocks

Differences in WTA – who gets to sell?

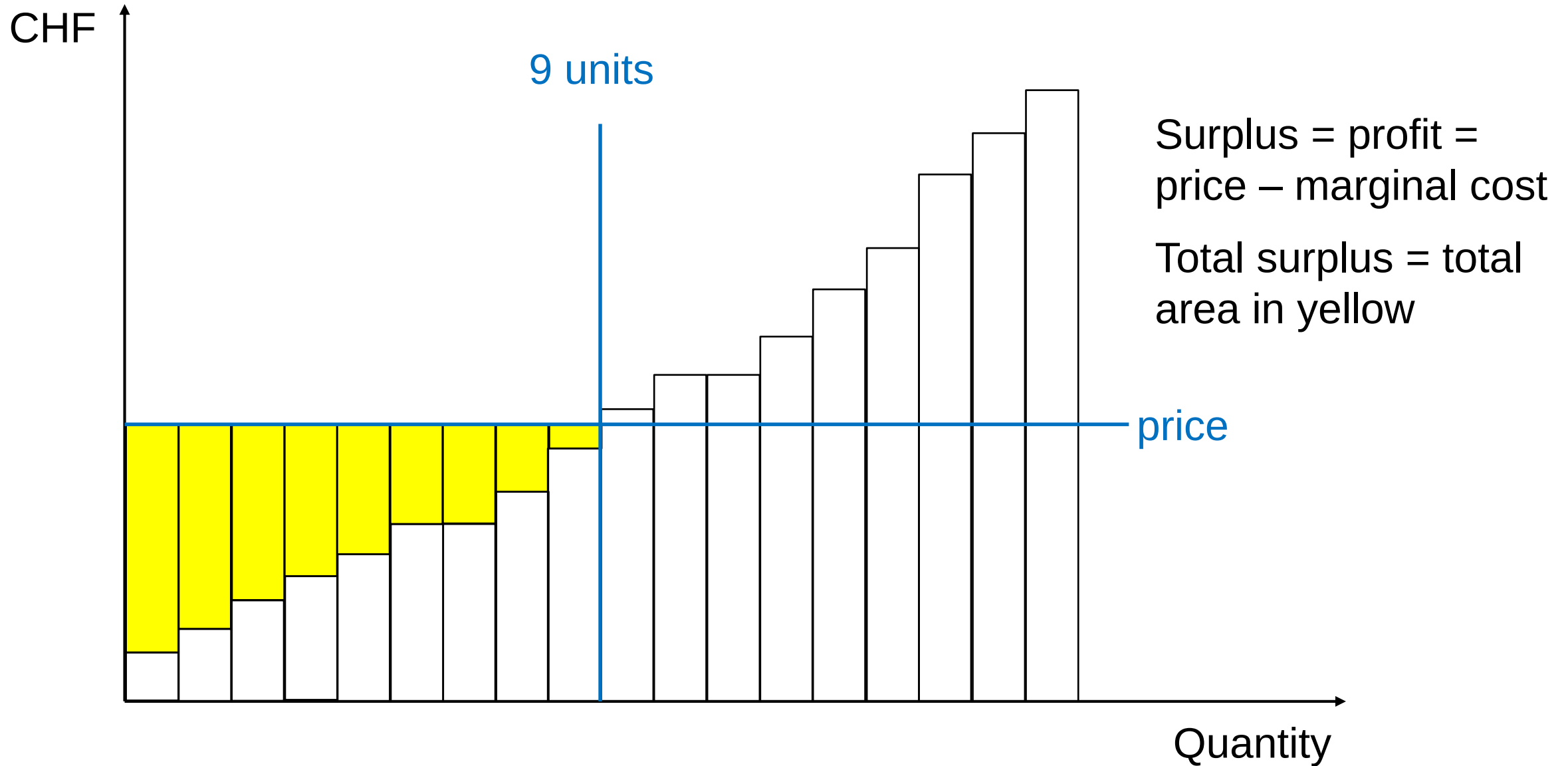
- Production costs are the most important determinant of WTA
- Producers have different production costs for many reasons:
 - Different production conditions, e.g. farming on soils of different fertility with different climate conditions
 - Different technologies, e.g. electricity generation using coal, oil, gas, hydropower, wind, sun, geothermal, etc.
 - Different locations, e.g. producing steel in Europe or China with different prices for inputs and different regulatory conditions
- On free competitive markets, low-WTA sellers win over high-WTA sellers

Supply curve

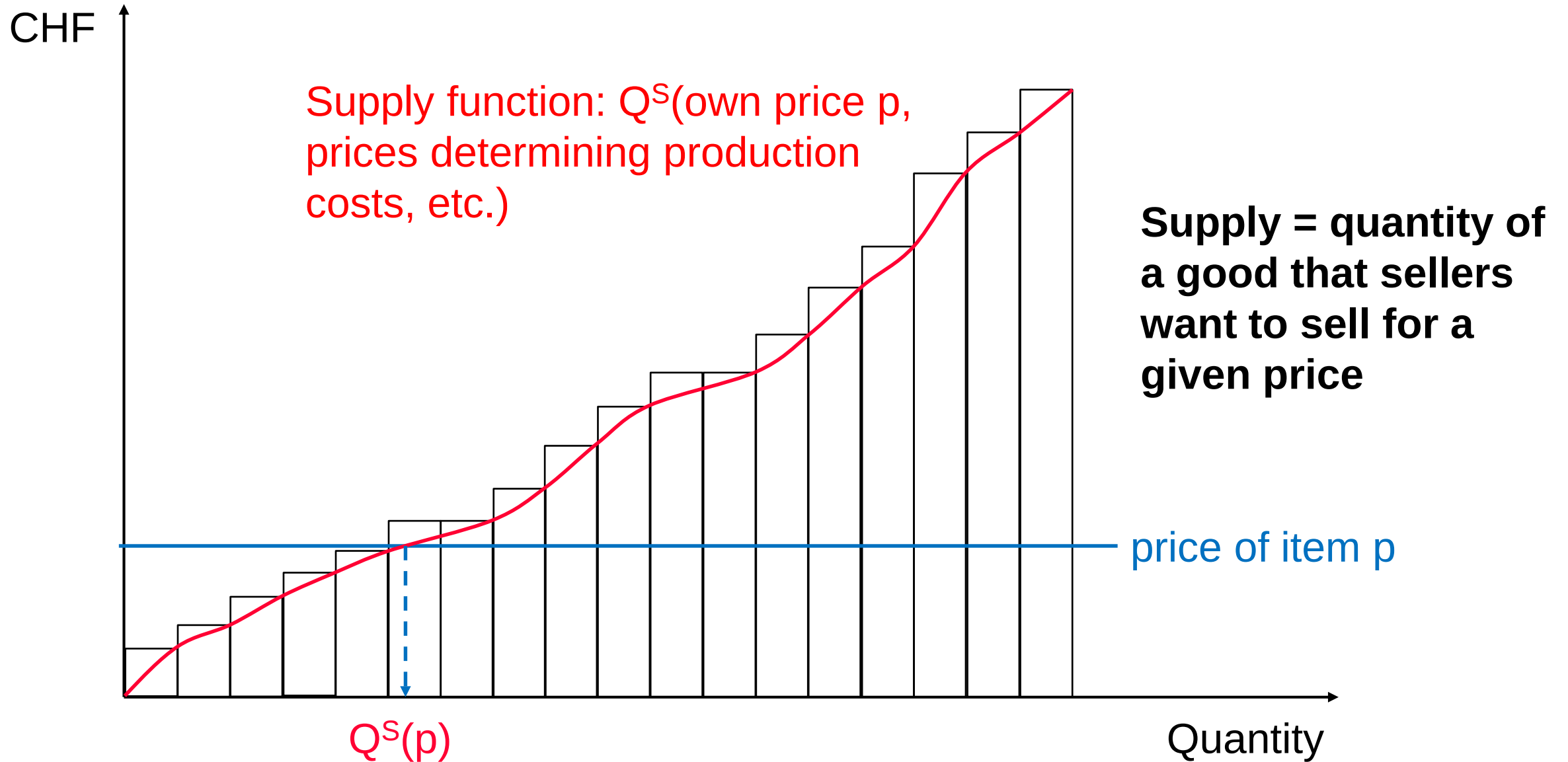
Ranking WTA in increasing order makes it possible to identify who will sell the item(s)



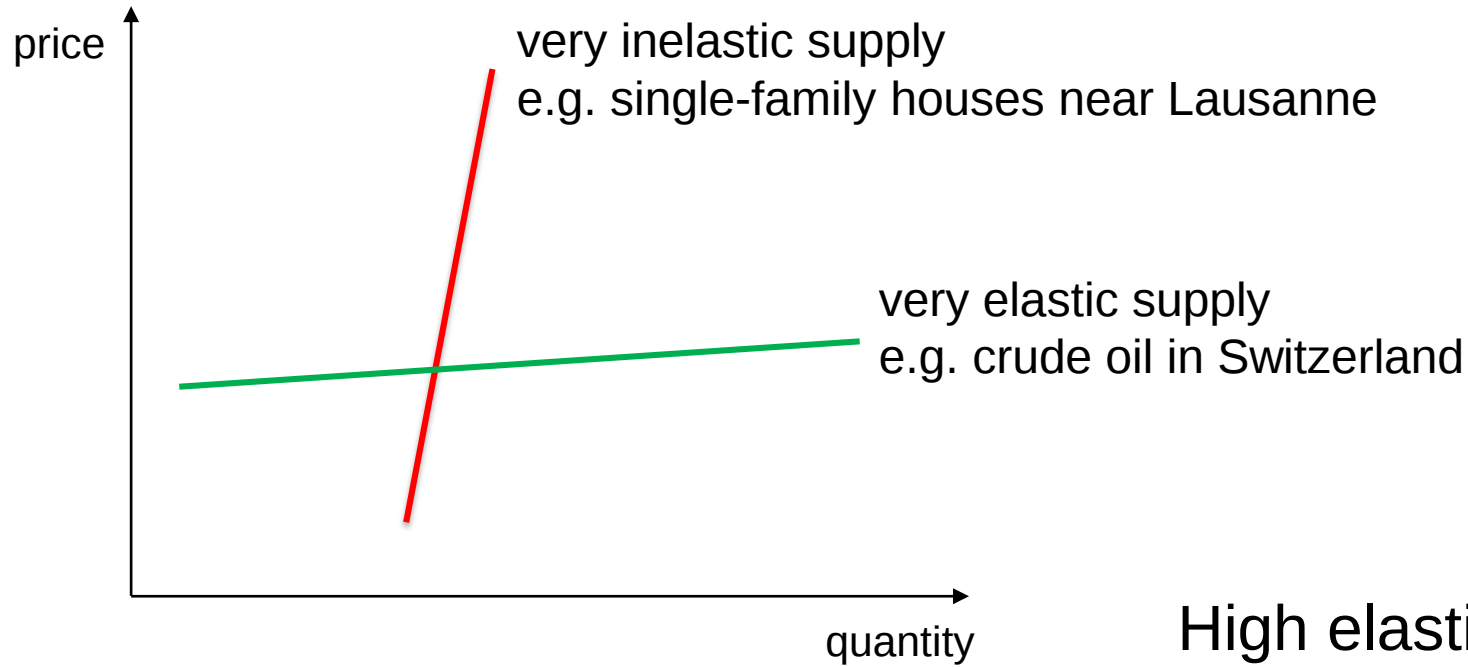
Producer surplus = profit



Supply function



Elasticity of supply



$$\text{elasticity of supply} = \frac{\frac{\partial Q^S}{\partial p}}{\frac{Q}{p}}$$
$$\approx \frac{\frac{dq}{q}}{\frac{dp}{p}} = \frac{\%change\ q\ supplied}{\%change\ p}$$

High elasticity when

- easy to increase production or provisioning
- a longer time horizon is considered
- many competing sellers

Other determinants of supply and shifting supply curve

