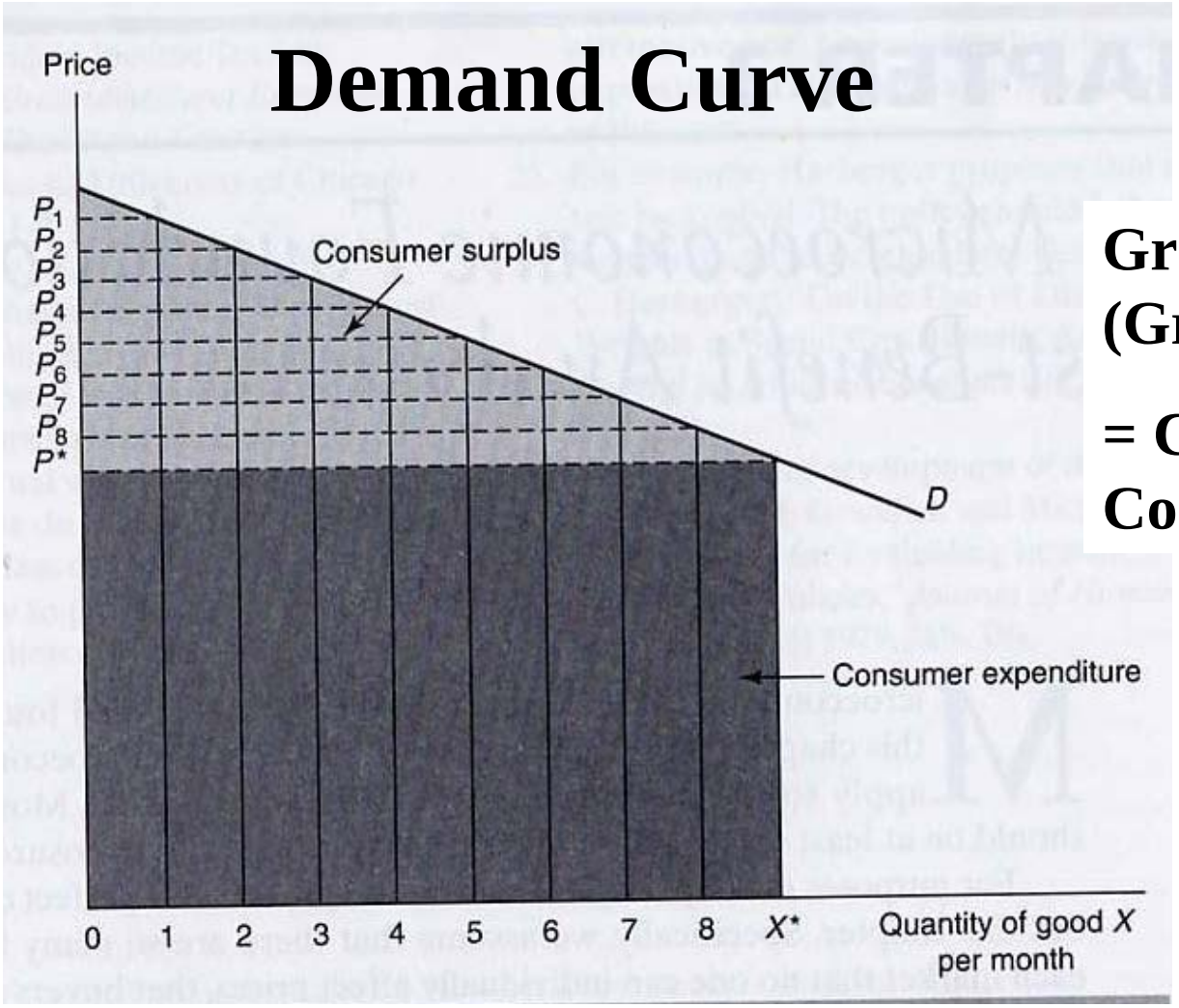
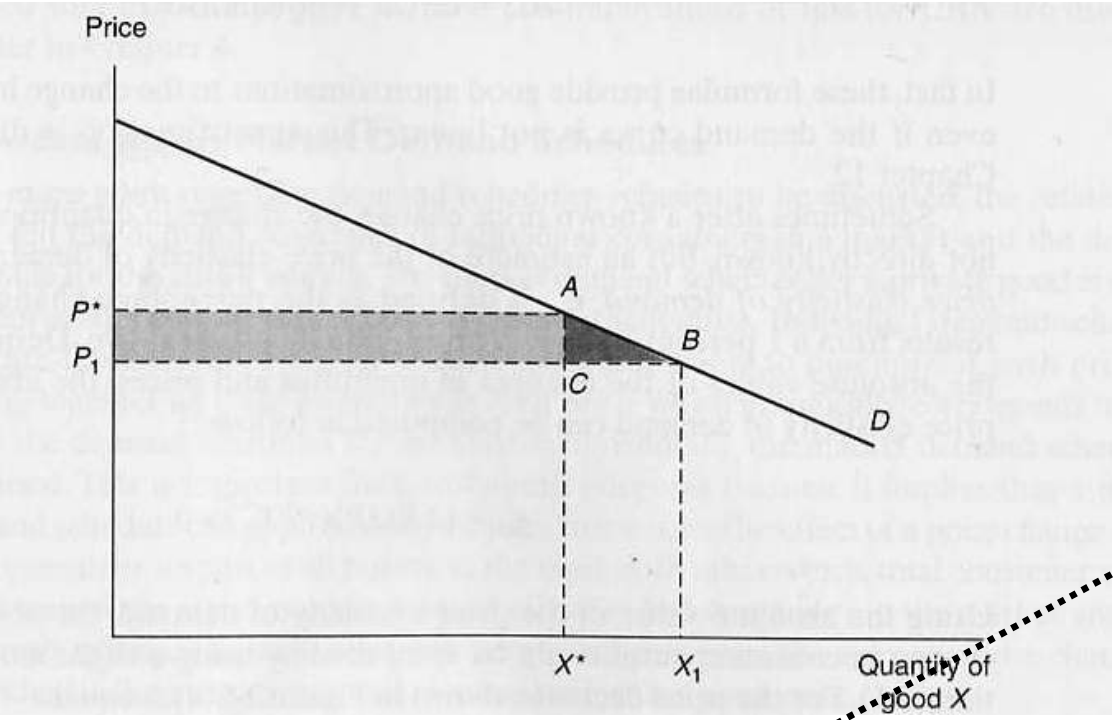
Chapter 3 Basic Microeconomic Foundations of CBA



Gross Surplus (Gross Benefit)

= Consumer Surplus + Consumer Expenditure

Change in Consumer Surplus = Benefit



$$\Delta CS = \frac{1}{2}(P^* - P_1)(X^* + X_1)$$

$$\left|P^* - P_1\right| = \Delta P, \left|X^* - X_1\right| = \Delta X$$

$$\Delta CS = (\Delta P)(X^*) + \frac{1}{2}(\Delta P)(\Delta X)$$

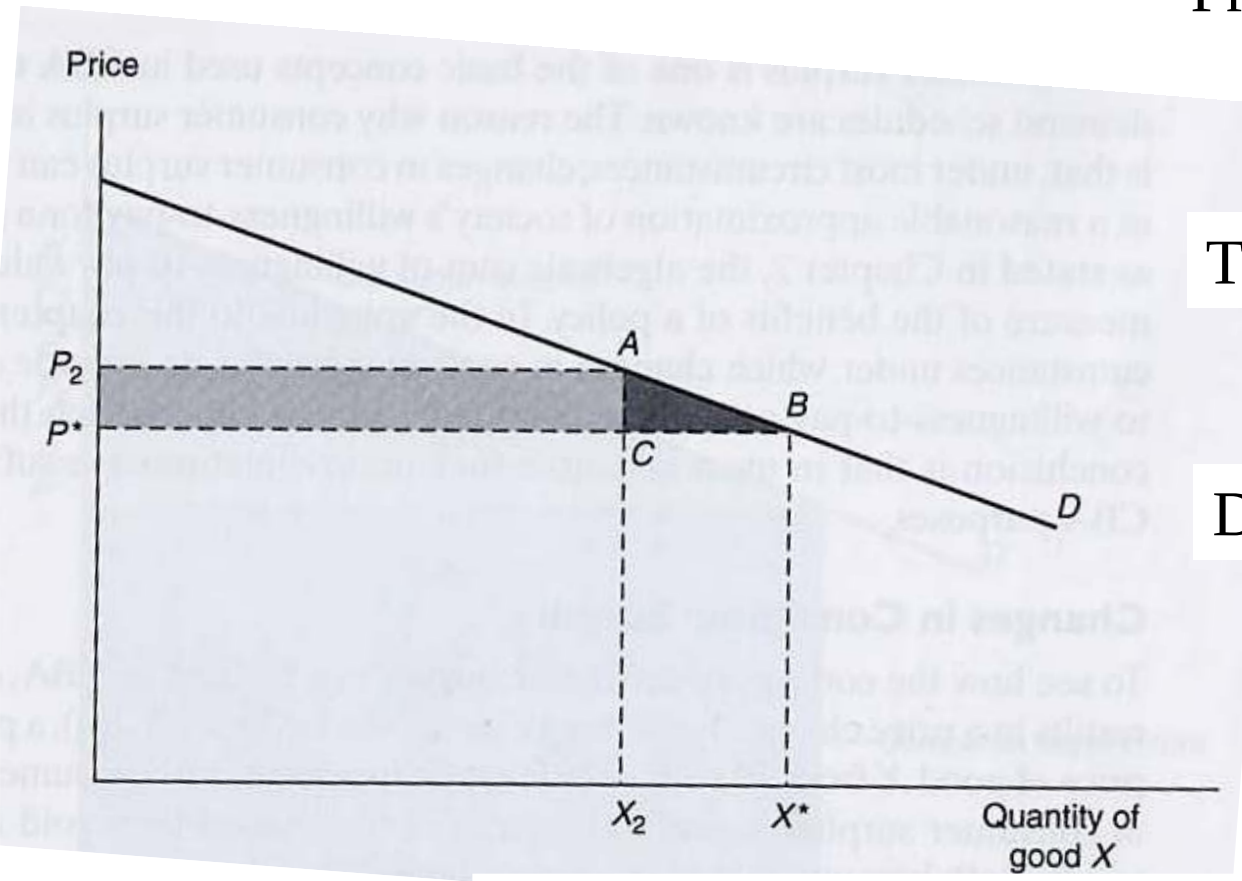
Price elasticity of demand

$$\varepsilon_d = \frac{\left|\Delta X / X^*\right|}{\left|\Delta P / P^*\right|} = (\Delta X / \Delta P)(P^* / X^*)$$

% change of in quantity divided by
% change of in price

$$\Delta CS = (\Delta P)(X^*)\left[1 + \frac{1}{2}(\Delta P / P^*)\,\varepsilon_d\right]$$

Tax and Deadweight Loss



Price increase by tax

$$P^* \rightarrow P_2$$

Tax Revenue $P_2 ACP^*$

"Transfer"

Deadweight Loss ΔABC

No offset benefit

Pareto Inefficiency

Cost

Average cost (AC)

Cost per unit output

AC (y) = Total cost (TC) / output (y)

= Variable cost (VC) / y + Fixed cost (FC) / y

= Average variable cost (AVC) + Average fixed cost (AFC)

Marginal Cost (MC)

Change in cost due to change in output (Rate of change as increased by one unit)

MC (y) = Δ TC / Δ y

= Δ VC / Δ y + (Δ FC / Δ y = 0): fixed cost do not change as output changes

= Δ VC / Δ y = VC' (y)

Marginal Cost (MC)

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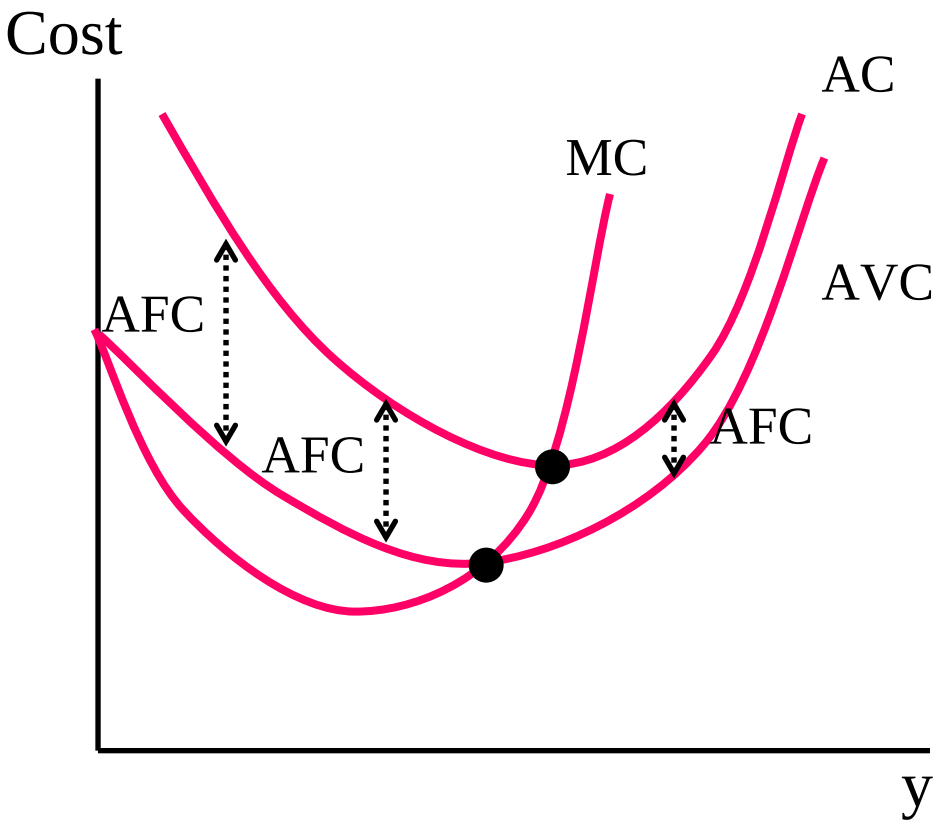


- MC and AVC may initially slope down but need not. It will eventually rise for fixed factors that constrain production.
- AC will initially fall due to declining fixed costs but rise due to the increasing AVC.
- MC passes through the minimum point of both AVC and AC.

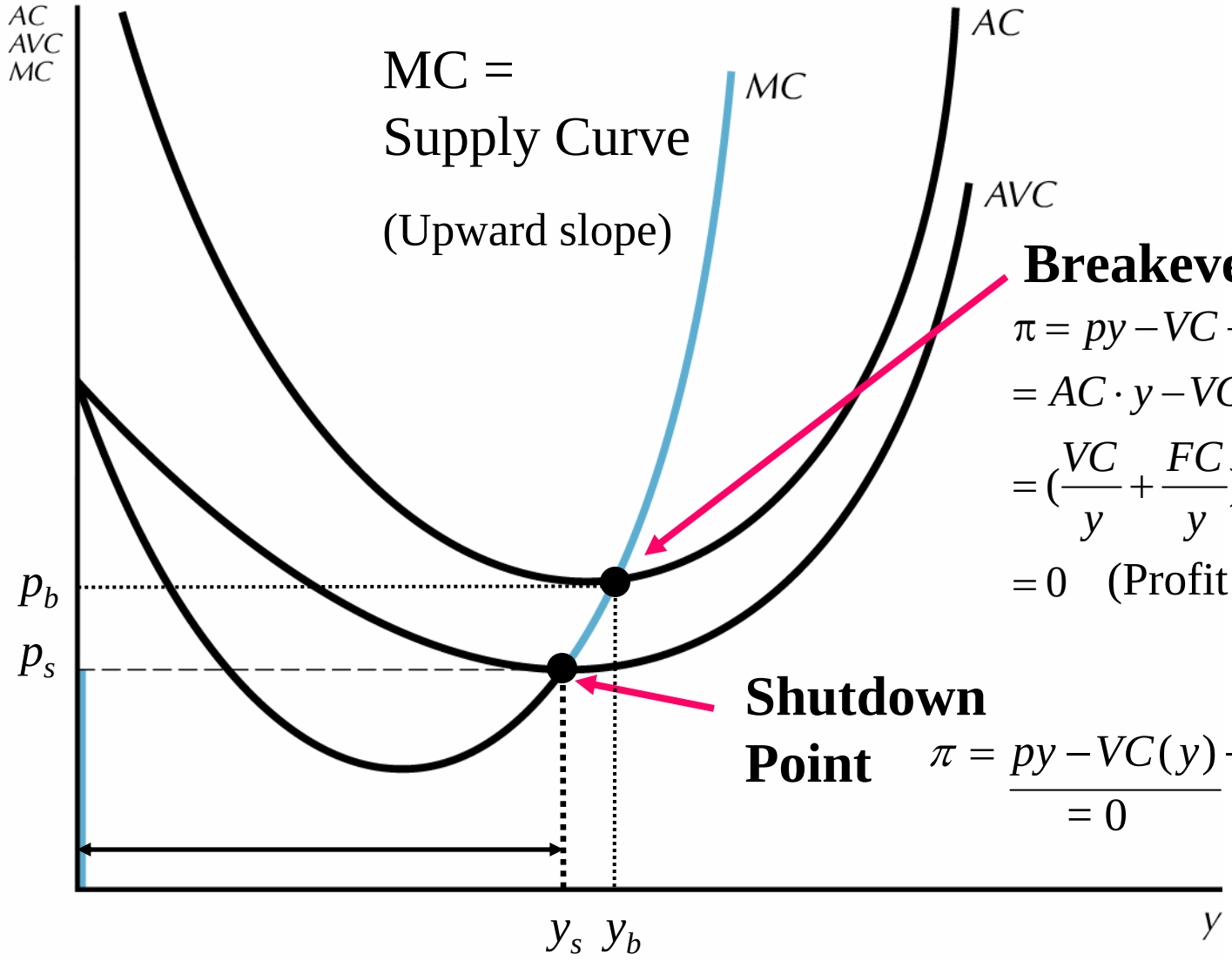
Ex. MC is constant

Q	MC	AVC	AFC	AC
1	100	100	100	200
2	100	100	50	150
3	100	100	33	133
4	100	100	25	125
5	100	100	20	120
6	100	100	17	117
7	100	100	14	114
8	100	100	13	113
9	100	100	11	111
10	100	100	10	110
11	100	100	9	109
12	100	100	8	108
13	100	100	8	108
14	100	100	7	107
15	100	100	7	107

Ex. MC has optimum value

Q	MC	AVC	AFC	AC
1	100	100.0	100	200
2	95	97.5	50	148
3	90	95.0	33	128
4	80	91.3	25	116
5	70	87.0	20	107
6	60	82.5	17	99
7	70	80.7	14	95
8	80	**80.6**	13	93.1
9	90	81.7	11	**92.8**
10	95	83.0	10	93.0
11	100	84.5	9	94
12	110	86.7	8	95
13	120	89.2	8	97
14	130	92.1	7	99
15	140	95.3	7	102

Marginal Cost = Supply Curve



MC = Supply Curve

(Upward slope)

Breakeven Point

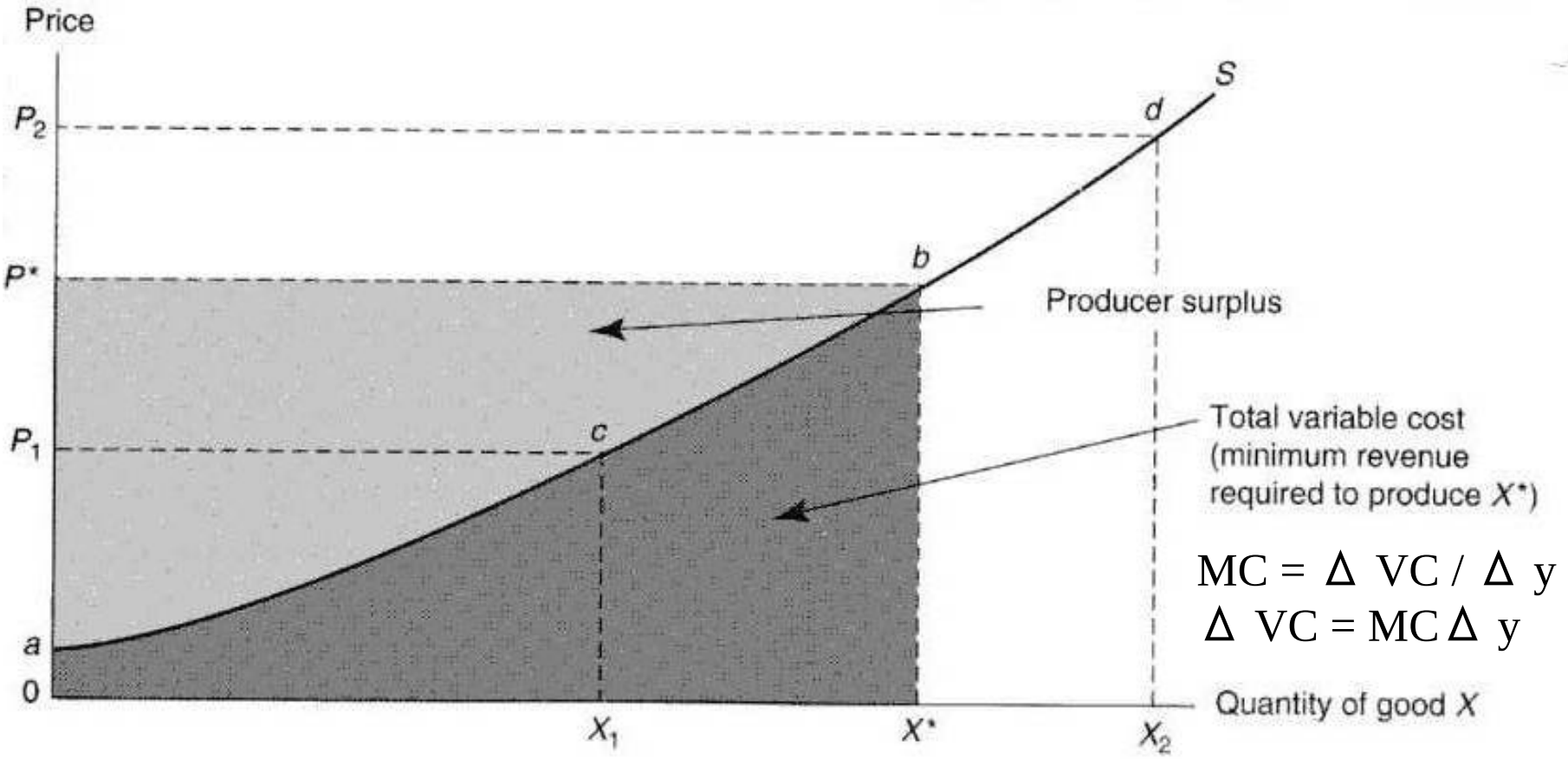
$$\pi = py - VC - FC$$
$$= AC \cdot y - VC - FC$$
$$= \left(\frac{VC}{y} + \frac{FC}{y}\right) y - VC - FC$$
$$= 0 \quad \text{(Profit = 0)}$$

Shutdown Point

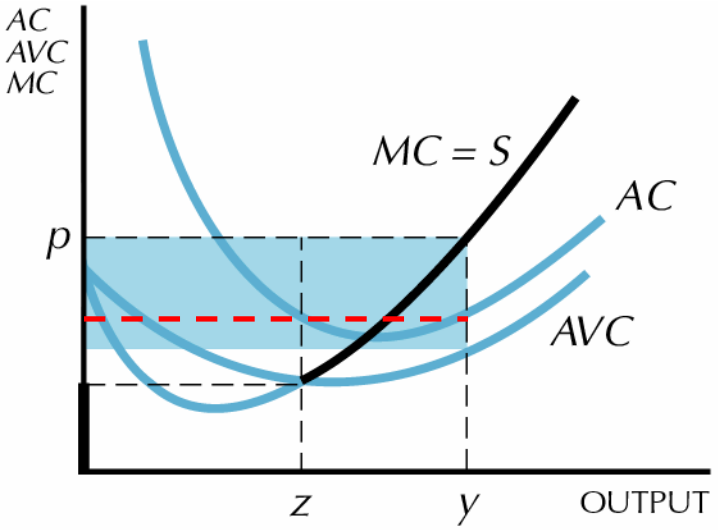
$$\pi = \underbrace{py - VC(y)}_{=0} - FC = -FC$$

Shutdown Condition

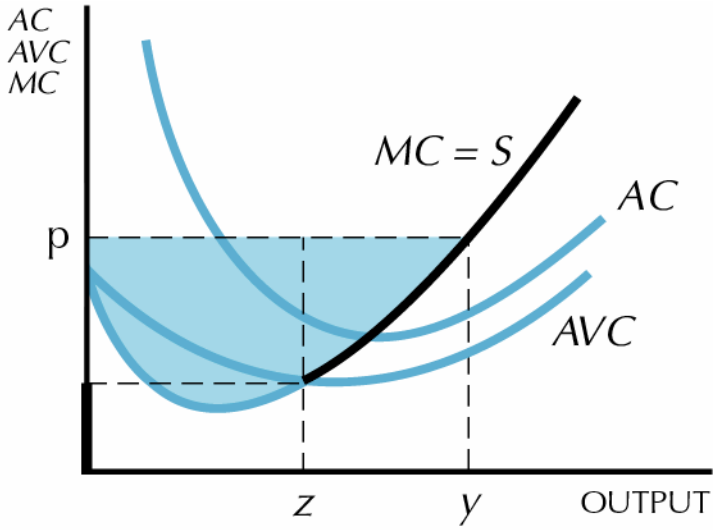
Supply Curve and Producer Surplus



Profits and Producer's Surplus

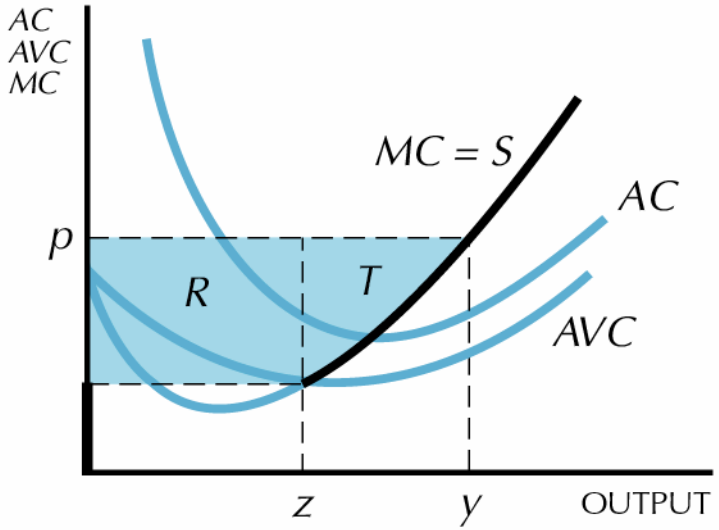


A Revenue –variable costs



B Area above *MC* curve

$$\pi = py - AC$$
$$= py - VC - FC$$
$$PS = py - VC$$



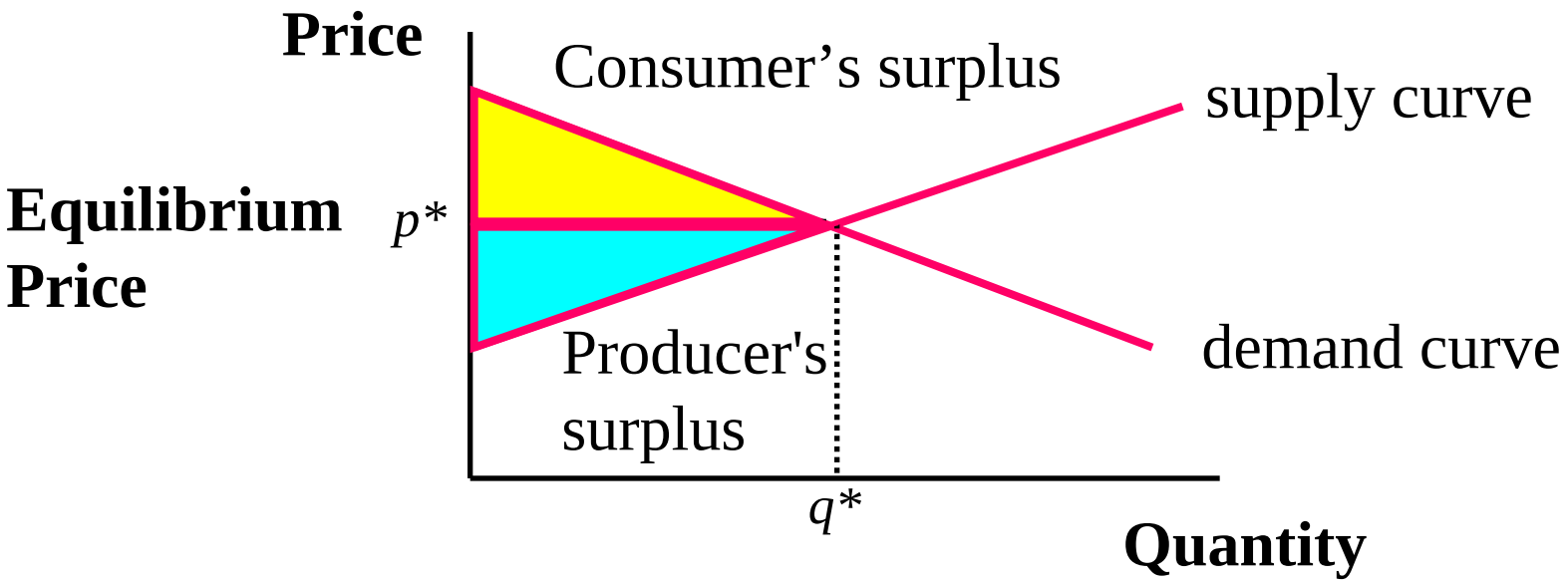
C Area to the left of the supply curve

Equilibrium and Social Surplus

Competitive Market

Consumers and Suppliers are *Price Takers*

Market price is independent of any agent's behavior



Social surplus = Consumer's surplus + Producer's surplus

Efficiency of Perfect Market

Target Pricing

e.g. rice in Japan