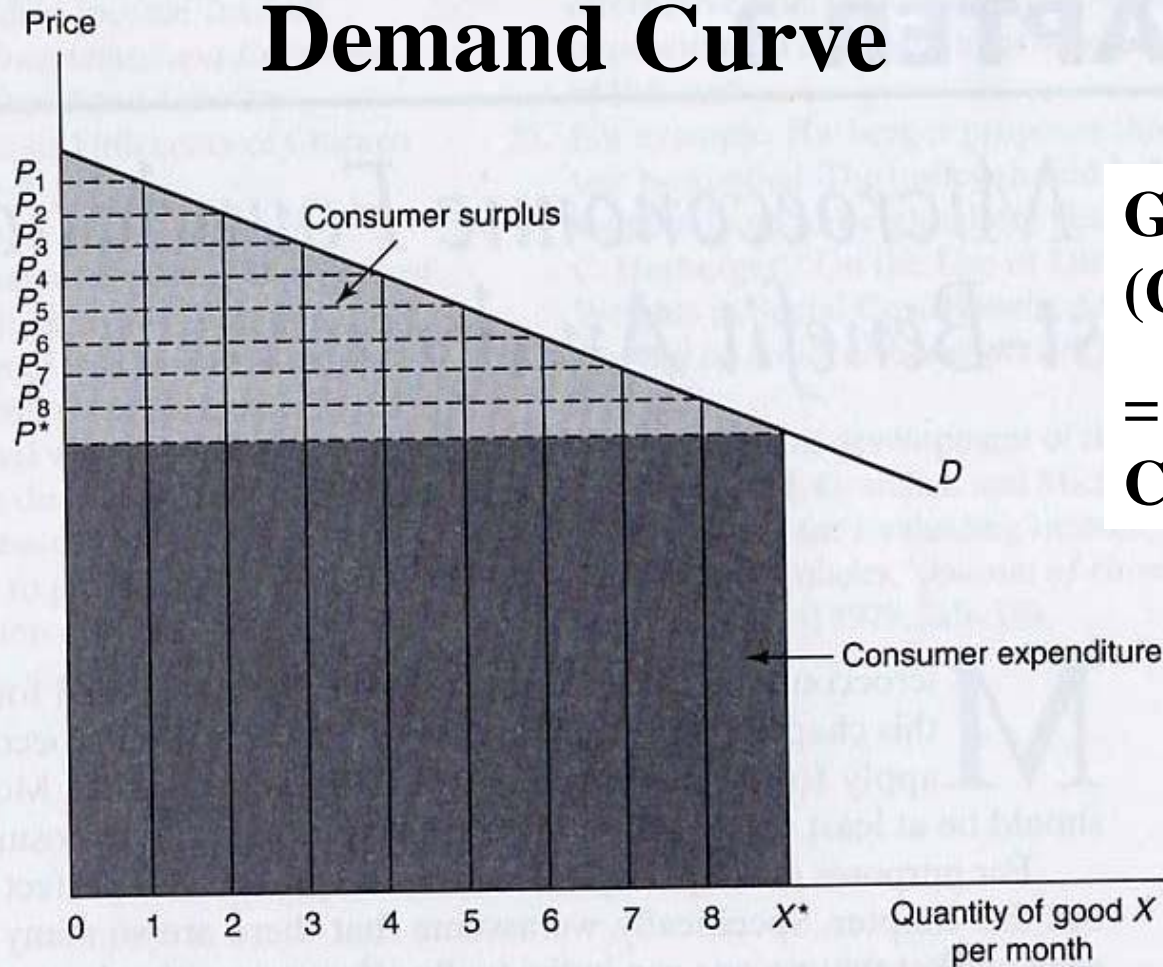


Chapter 3 Basic Microeconomic Foundations of CBA

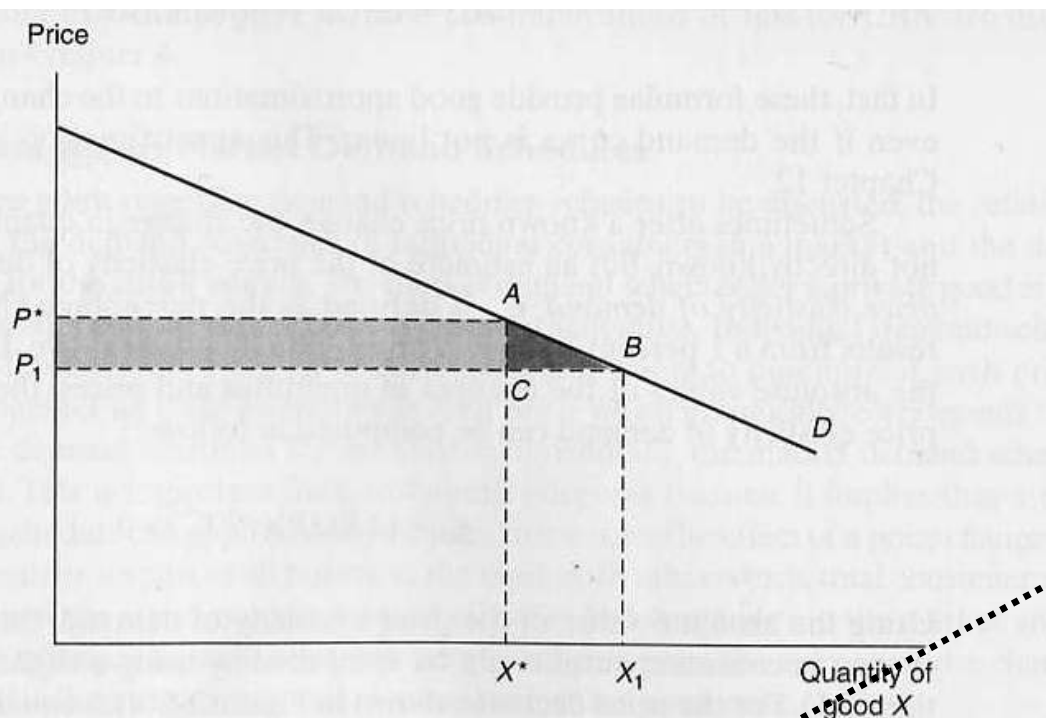
Demand Curve



**Gross Surplus
(Gross Benefit)**

**= Consumer Surplus +
Consumer Expenditure**

Change in Consumer Surplus = Benefit



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

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

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

Price elasticity of demand

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

% 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

$$P^* \rightarrow P_2$$

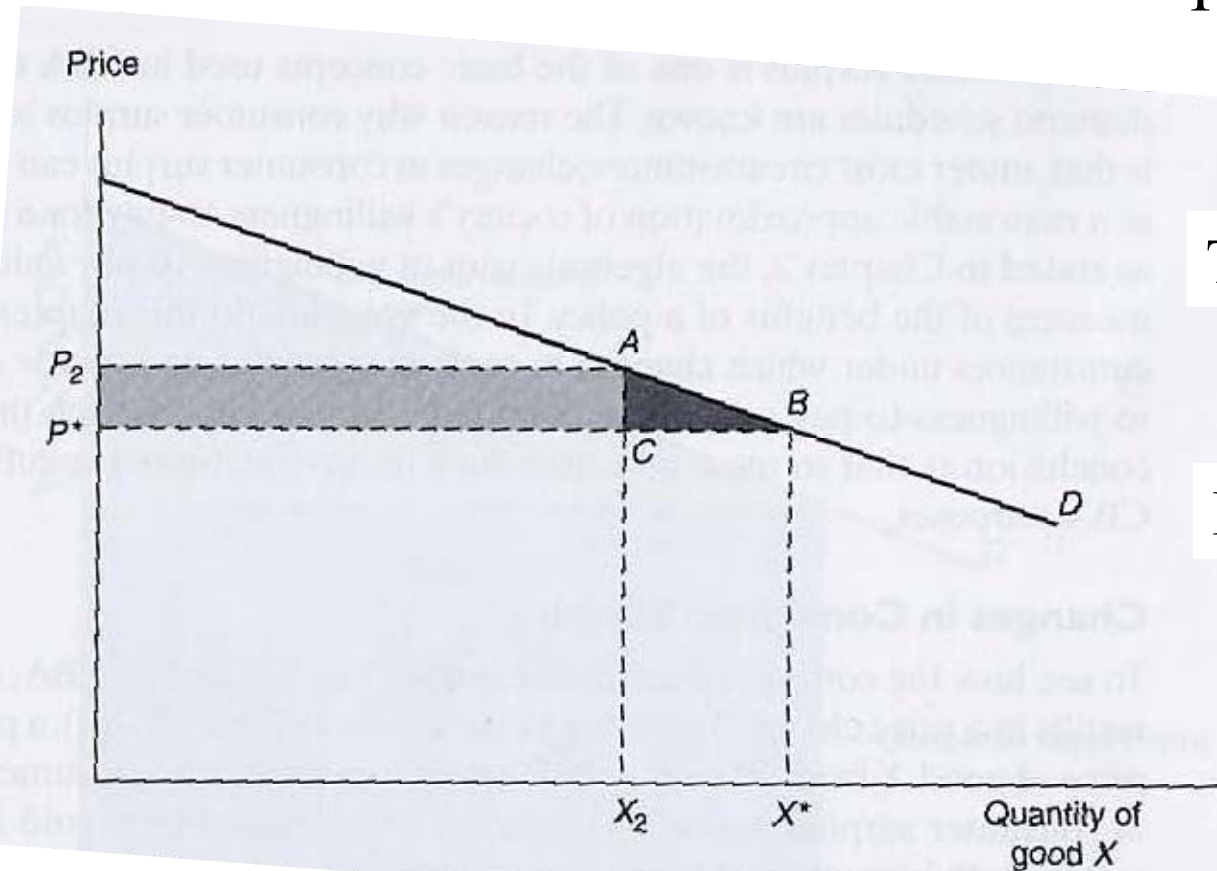
Tax Revenue P_2ACP^*

“Transfer”

Deadweight Loss ΔABC

No offset benefit

Pareto Inefficiency



Cost

Average cost (AC)

Cost per unit output

$$AC(y) = \text{Total cost (TC)} / \text{output (y)}$$

$$= \text{Variable cost (VC)} / y + \text{Fixed cost (FC)} / y$$

$$= \text{Average variable cost (AVC)} + \text{Average fixed cost (AFC)}$$

Marginal Cost (MC)

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

$$MC(y) = \Delta TC / \Delta y$$

$$= \Delta VC / \Delta y + (\Delta FC / \Delta y = 0): \text{ fixed cost do not change as output changes}$$

$$= \Delta VC / \Delta y = VC'(y)$$

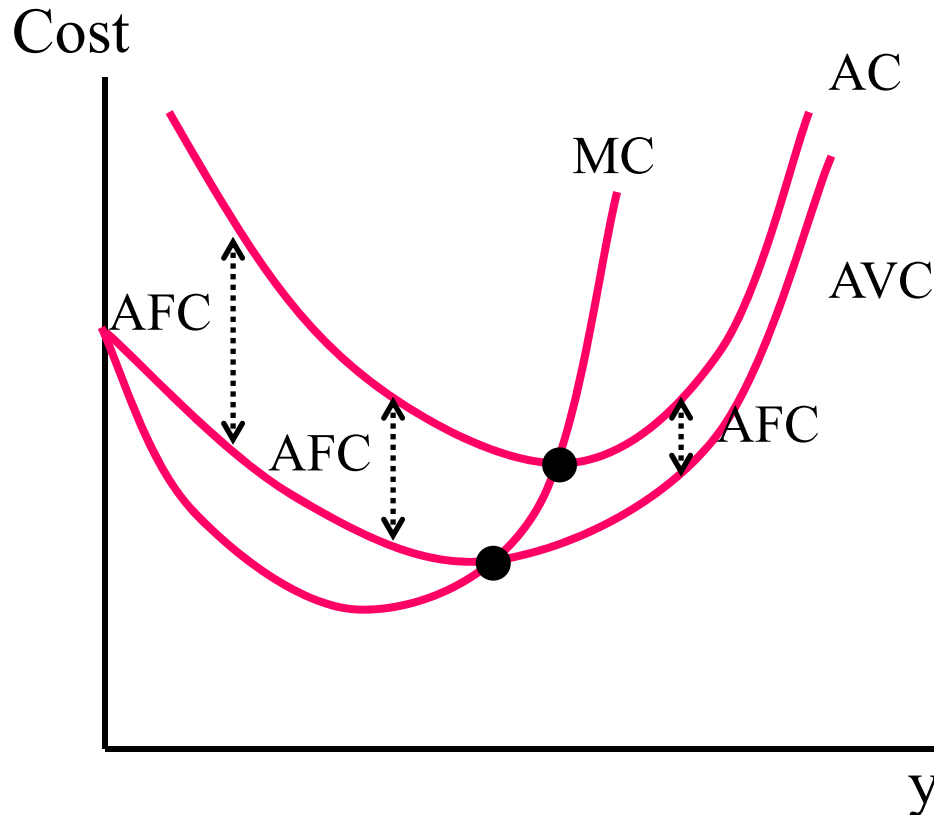
Marginal Cost (MC)

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

$$MC(y) = \Delta TC / \Delta y$$

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

$$= \Delta VC / \Delta y = VC'(y)$$



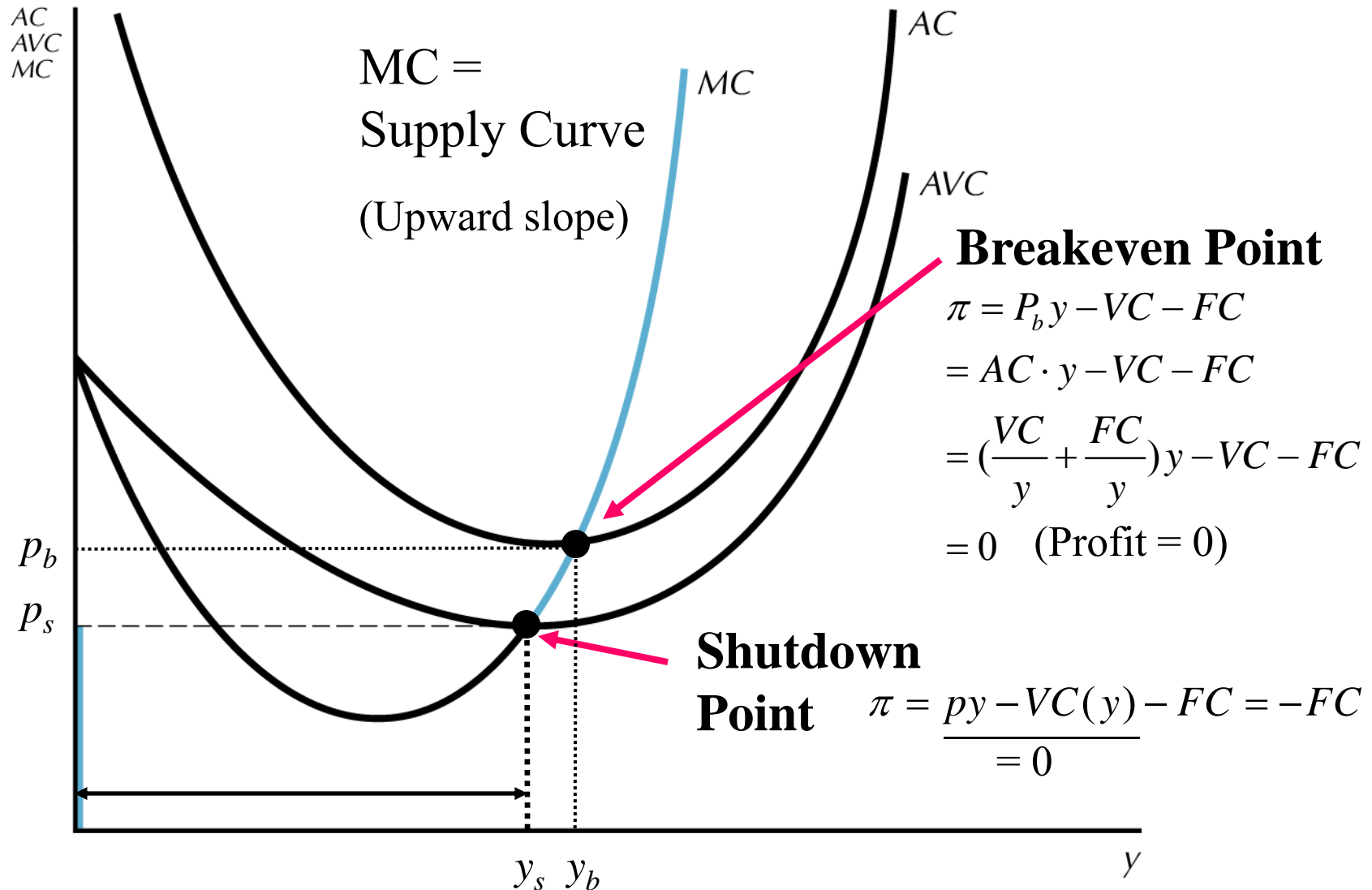
- MC and AVC may initially slope down but need not. It will eventually rise for fixed factors that constrain production.
- AC will initially fall due to declining fixed costs but rise due to the increasing AVC.
- MC passes through the minimum point of both AVC and AC.

Ex. MC is constant

Ex. MC has optimum value

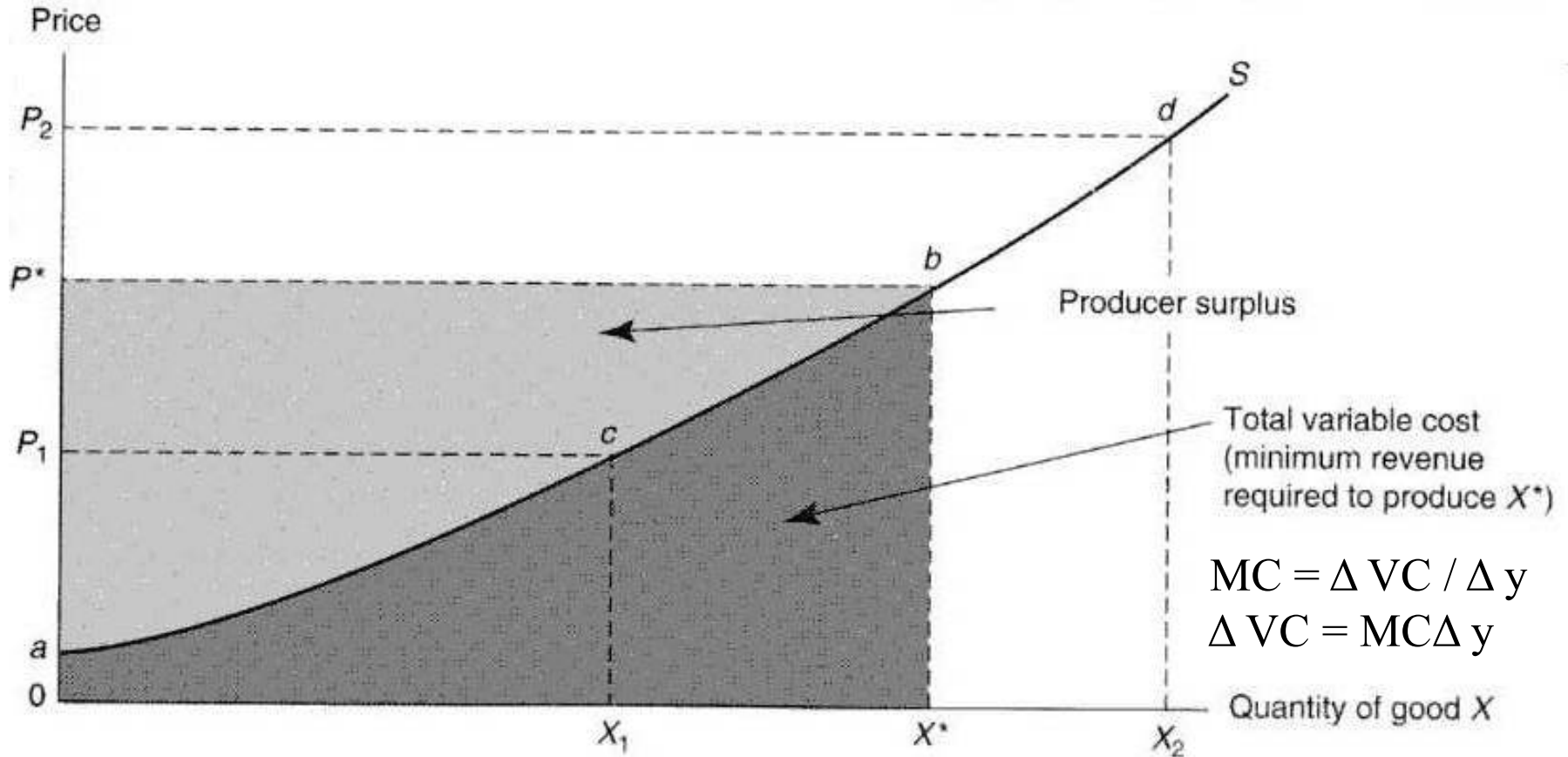
Q	MC	AVC	AFC	AC	Q	MC	AVC	AFC	AC
1	100	100	100	200	1	100	100.0	100	200
2	100	100	50	150	2	95	97.5	50	148
3	100	100	33	133	3	90	95.0	33	128
4	100	100	25	125	4	80	91.3	25	116
5	100	100	20	120	5	70	87.0	20	107
6	100	100	17	117	6	60	82.5	17	99
7	100	100	14	114	7	70	80.7	14	95
8	100	100	13	113	8	80	80.6	13	93.1
9	100	100	11	111	9	90	81.7	11	92.8
10	100	100	10	110	10	95	83.0	10	93.0
11	100	100	9	109	11	100	84.5	9	94
12	100	100	8	108	12	110	86.7	8	95
13	100	100	8	108	13	120	89.2	8	97
14	100	100	7	107	14	130	92.1	7	99
15	100	100	7	107	15	140	95.3	7	102

Marginal Cost = Supply Curve

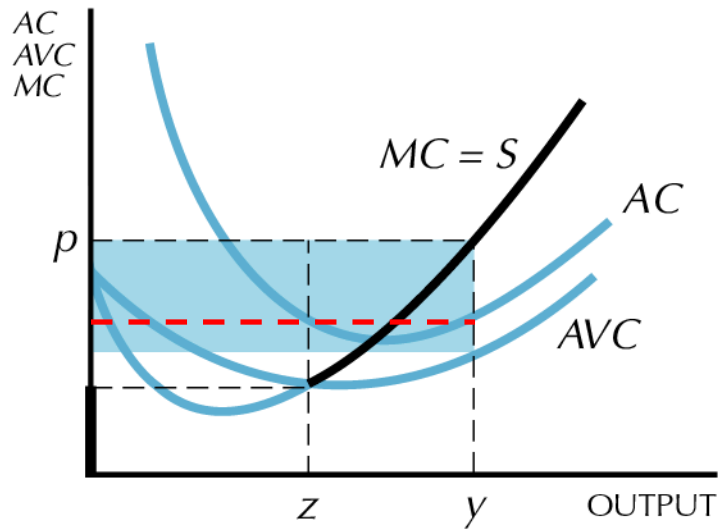


Shutdown Condition

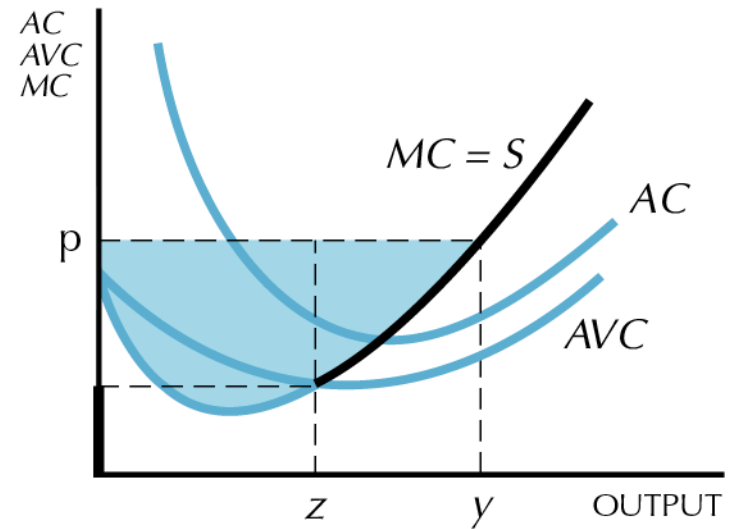
Supply Curve and Producer Surplus



Profits and Producer's Surplus

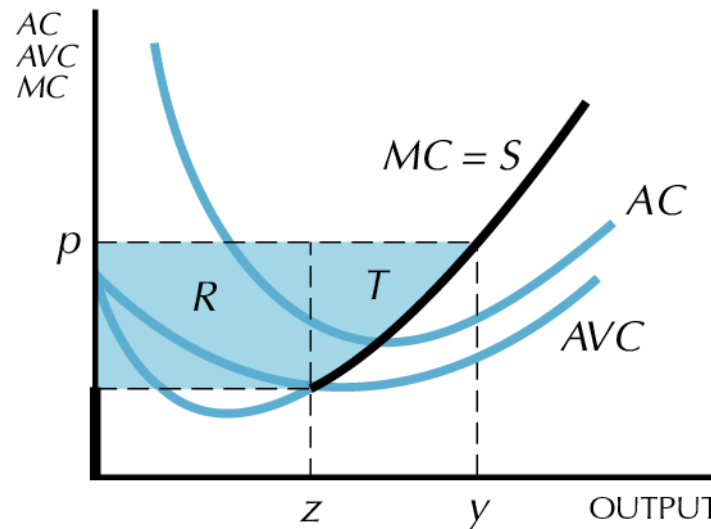


A Revenue – variable costs



B Area above MC curve

$$\begin{aligned}\pi &= py - AC \\ &= py - VC - FC \\ PS &= py - VC\end{aligned}$$



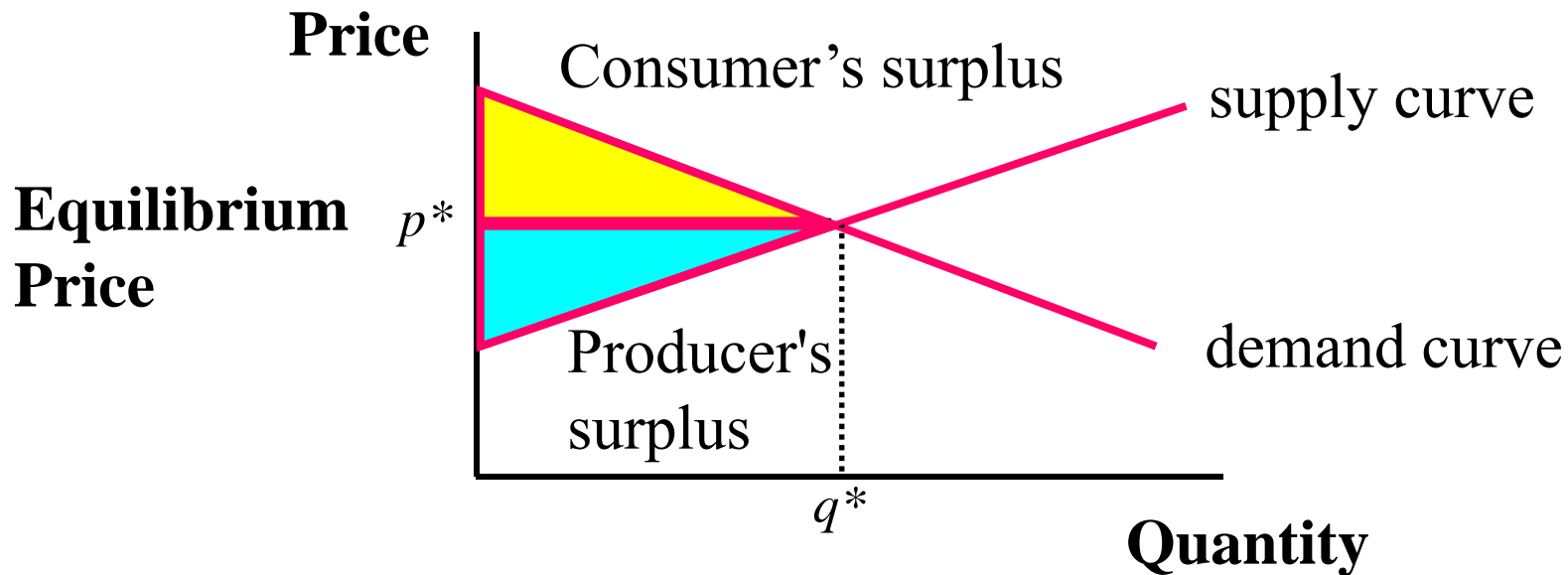
C Area to the left of the supply curve

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

