

Given, the total cost function $TC = 1500 + 15Q - 6Q^2 + Q^3$ where TC is the total cost and Q is level of output.

(i) Determine

- (a) Total variable cost function
- (b) Marginal cost function
- (c) Average variable cost function

(ii) Calculate total cost, ATC , AVC and MC when the firm produces 50 units of output.

Solⁿ:
(1)

Given,

$$TC = 1500 + 15Q - 6Q^2 + Q^3 \quad \text{--- (1)}$$

(a) We know that,

$$TC = \text{Total Fixed cost} + \text{Total variable cost}$$

In eqⁿ (1), $TFC = 1500$

$$\therefore \text{TVC Function} = 15Q - 6Q^2 + Q^3 \quad (\text{Am})$$

(b) By differentiating TC function, we will get Marginal cost function.

$$\therefore MC \text{ function} = 15 - 12Q + 3Q^2 \quad (\text{Am})$$

(c) We know that

$$AVC = \frac{TVC}{Q}$$

$$\begin{aligned} \therefore AVC \text{ function} &= \frac{15Q - 6Q^2 + Q^3}{Q} \\ &= 15 - 6Q + Q^2 \quad (\text{Am}) \end{aligned}$$

i) Given,

Output unit, $Q = 50$

$$\begin{aligned}\therefore \text{Total cost, } TC &= 1500 + 15Q - 6Q^2 + Q^3 \\ &= 1500 + (15 \times 50) - (6 \times 50^2) + 50^3 \\ &= 112250 \text{ (Am)}\end{aligned}$$

$$\begin{aligned}\text{Average Total Cost, } ATC &= \frac{TC}{Q} \\ &= \frac{112250}{50} \\ &= 2245 \text{ (Am)}\end{aligned}$$

$$\begin{aligned}\text{Average Variable cost, } AVC &= \frac{TVC}{Q} \\ &= \frac{(15 \times 50) - (6 \times 50^2) + 50^3}{50} \\ &= \frac{110750}{50} \\ &= 2215 \text{ (Am)}\end{aligned}$$

$$\begin{aligned}\text{Marginal Cost, } MC &= 15 - (12 \times 50) + (3 \times 50^2) \\ &= 6915 \text{ (Am)}\end{aligned}$$

Q The table below shows the market demand schedule and the cost structure. Fill in all the column rows for column Total Cost, ATC, MC.

P	Q	Fixed Cost	Variable Cost (TK)	TC (TK)	ATC (TK)	MC (TK)
20	1	45 TK	200	245	245	No change in unit of output. So, No MC
18	2	45 TK	280	325	162.5	$(325 - 245) / (2 - 1) = 80$
16	3	45 TK	375	420	140	$(420 - 325) / (3 - 2) = 95$
14	4	45 TK	400	445	111.25	$(445 - 420) / (4 - 3) = 25$
12	5	45 TK	500	545	109	$(545 - 445) / (5 - 4) = 100$

National Income

Q National Income (NI)

NI of a country can be defined as the total market value of all ^{final} goods and services produced in the country in a year.

Samuelson defined, "NI is money measure of the overall annual flow of goods and services in an economy."

J.M. Keynes defined, "National income is the money value of all goods and services produced in a country during a year."

If x_1, x_2, \dots, x_n be the different kinds of final goods and services ~~and~~ produced in a country in a year and P_1, P_2, \dots, P_n be their respective prices, then,

Calculate GNP, NNP, NI, PI, Personal DI from the following data -

$$\text{GDP} = 5677.5$$

$$\text{Net factor payment from abroad} = 17.5$$

$$\text{Capital consumption allowance} = 626.1$$

$$\text{Indirect taxes} = 475.2$$

$$\text{Social security contribution} = 528.8$$

$$\text{Govt. \& business transfers to person} = 771.1$$

$$\text{Dividends} = 137$$

$$\text{Personal Tax \& Non-Tax Payment} = 618.7$$

Solⁿ:

$$\begin{aligned}\text{GNP} &= \text{GDP} + \text{Net factor payment from abroad} \\ &= 5677.5 + 17.5 \\ &= 5695\end{aligned}$$

$$\begin{aligned}\text{NNP} &= \text{GNP} - \text{Depreciation / Capital consumption Allowance} \\ &= 5695 - 626.1 \\ &= 5068.9\end{aligned}$$

$$\begin{aligned}\text{NI} &= \text{NNP} - (\text{Indirect Taxes} + \text{Subsidies}) \\ &= 5068.9 - 475.2 \\ &= 4593.7\end{aligned}$$

$$\begin{aligned}\text{PI} &= \text{NI} + \text{Transfer Payments} - \text{Profit Taxes} - \\ &\quad \text{Undistributed Profit} \\ &= 4593.7 + 771.1 - 528.8 - 137 \\ &= 4699\end{aligned}$$

$$\begin{aligned}
 DI &= PI - \text{Personal Taxes} \\
 &= 4699 - 618.7 \\
 &= 4080.3
 \end{aligned}$$

Q1 GDP \rightarrow \$6000

Gross Investment \rightarrow \$800

Net Investment \rightarrow \$200

Consumption \rightarrow \$4000

Govt. Purchase of Goods & Services \rightarrow \$1100

Govt. Budget Deficit \rightarrow \$30

a) NDP = ?

$$NDP = GDP - \text{Depreciation}$$

$$= GDP - (\text{Gross Investment} - \text{Net Investment})$$

$$= \$6000 - (\$800 - \$200)$$

$$= \$5400$$

b) Net Exports (N_x) = ?

$$GDP = C + I + G + N_x$$

$$\Rightarrow N_x = GDP - C - I - G$$

$$= \$6000 - \$4000 - \$800 - \$1100$$

$$= \$100$$

c) Govt Taxes Minus Transfer ($T_A - T_R$) = ?

Given,

$$\text{Budget Deficit} = -30$$

$$\Rightarrow G + T_R - T_A = -30$$

$$\Rightarrow T_R - T_A = -30 - G$$

$$\Rightarrow T_R - T_A = -30 - 1100$$

$$\Rightarrow T_R - T_A = -1130$$

$$\therefore T_A - T_R = \$1130$$

d) DPI = ?

$$\text{DPI} = \text{Personal Income} - \text{Tax}$$

$$= Y + T_R - T_A$$

seperately

$$= Y - (T_A - T_R)$$

$$= \$6000 - \$1130$$

$$= \$4870$$

Q Assume that GDP is \$6000, Personal Disposable Income is \$5100 and Govt. Budget Deficit is \$200, Consumption is \$3800 and Trade Deficit is \$100.

a) How large is saving?

We know that,

$$\text{Disposable Personal Income} = \text{Consumption} + \text{Savings}$$

$$\Rightarrow \text{PDI} = C + S$$

$$\Rightarrow S = \text{PDI} - C$$

$$= \$5100 - \$3800$$

$$\therefore S = \$1300$$

b) What is the size of Investment?

We know that,

$$\text{Saving} - \text{Investment} = \text{Govt. Budget}^{\text{Deficit}} - \text{Net Export/Trade Deficit}$$

$$\Rightarrow \$1300 - I = \$200 - \$100$$

$$\Rightarrow I = 1300 - 200 + 100$$

$$\therefore I = \$1200$$

c) How large is Govt. spending?

We know that,

$$\text{GDP} = \text{Consumptions} + \text{Investment} + \text{Govt. Spending/Govt. Expenditure} + \text{Net Exports/Trade Deficit}$$

$$\$6000 = \$3800 + \$1200 + G + \$100$$

$$\Rightarrow G = \$6000 - \$3800 - \$1200 + \$100$$

$$= \$1100$$

- Consumptions — 4000
 Investment — 1300
 Transfer Payments — 1050
 Govt. Expenditures — 1200
 Exports — 1050
 Imports — 950
 Net foreign factor income — 20

1) Calculate GDP

$$\begin{aligned}
 \text{GDP} &= C + I + G + \text{Export} - \text{Import} \\
 &= 4000 + 1300 + 1200 + 1050 - 950 \\
 &= 7500
 \end{aligned}$$

2) Calculate GNP

$$\begin{aligned}
 \text{GNP} &= \text{GDP} + \text{Net foreign factor income} \\
 &= 7500 + 20 \\
 &= 7520
 \end{aligned}$$

3) Calculate Net Exports

$$\begin{aligned}
 \text{Net Exports} &= \text{Exports} - \text{Imports} \\
 &= 1050 - 950 \\
 &= 100
 \end{aligned}$$