

Quantity Index Numbers: (Q_{01})

(1) Simple Aggregate Method (Unweighted)

$$Q_{01} = \frac{\sum q_1}{\sum q_0} \times 100$$

(2) Weighted Aggregate Method:

(I) Laspeyres's Quantity Index $Q_{01} = \frac{\sum q_1 p_0}{\sum q_0 p_0} \times 100$

(II) Paasche's Quantity Index $Q_{01} = \frac{\sum q_1 p_1}{\sum q_0 p_1} \times 100$

(III) Fisher's Quantity Index $Q_{01} = \sqrt{L \times P}$

where L is Laspeyres's Quantity Index
 P is Paasche's Quantity Index.

$$Q_{01} = \sqrt{\frac{\sum q_1 p_0}{\sum q_0 p_0} \times \frac{\sum q_1 p_1}{\sum q_0 p_1}} \times 100$$

(IV) Dorbish and Bowley's Quantity Index

$$Q_{01} = \frac{L + P}{2}$$

$$Q_{01} = \frac{1}{2} \left(\frac{\sum q_1 p_0}{\sum q_0 p_0} + \frac{\sum q_1 p_1}{\sum q_0 p_1} \right) \times 100$$

(V) Marshall-Edgeworth's Quantity Index

$$Q_{01} = \frac{\sum q_1 (p_0 + p_1)}{\sum q_0 (p_0 + p_1)} \times 100$$

$$Q_{01} = \frac{\sum q_1 p_0 + \sum q_1 p_1}{\sum p_0 q_0 + \sum p_1 q_0} \times 100$$

(VI) Kelly's Quantity Index

$$Q_{01} = \frac{\sum q_1 p}{\sum q_0 p} \times 100$$

Ques 4) Find Laspeyres's, Passche's, Fisher's, Doornik and Bowley's Marshall-Edgeworth, ~~Price~~ index number from the following data

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	5	25	6	30
B	10	5	15	4
C	3	40	2	50
D	6	30	8	35

Solution :

Commodity	p_0	q_0	p_1	q_1	$p_0 q_0$	$p_0 q_1$	$p_1 q_0$	$p_1 q_1$
A	5	25	6	30	125	150	150	180
B	10	5	15	4	50	40	75	60
C	3	40	2	50	120	150	80	100
D	6	30	8	35	180	210	240	280
					$\Sigma p_0 q_0 = 475$	$\Sigma p_0 q_1 = 550$	$\Sigma p_1 q_0 = 545$	$\Sigma p_1 q_1 = 620$

(I) Laspeyres's Quantity Index: $Q_{01} = \frac{\Sigma q_1 p_0}{\Sigma q_0 p_0} \times 100 = \frac{550}{475} \times 100$
 $= 1.1579 \times 100$
 $= 115.79$

(II) Paasche's Quantity Index: $Q_{01} = \frac{\Sigma q_1 p_1}{\Sigma q_0 p_1} \times 100 = \frac{620}{545} \times 100$
 $= 1.1376 \times 100$
 $= 113.76$

(III) Fisher's Quantity Index: $Q_{01} = \sqrt{L \times P} = \sqrt{115.79 \times 113.76}$
 $= \sqrt{13172.2704}$
 $= 114.77$

(IV) Dorbish and Bowley's Quantity Index: $Q_{01} = \frac{L+P}{2} = \frac{1}{2} (115.79 + 113.76)$
 $= \frac{1}{2} \times 229.55 = 114.77$

(V) Marshall-Edgeworth Quantity Index: $Q_{01} = \frac{\sum p_1(A_0 + A_1)}{\sum p_0(A_0 + A_1)} \times 100$

$$= \frac{\sum p_1 A_0 + \sum p_1 A_1}{\sum p_0 A_0 + \sum p_0 A_1} \times 100$$

$$= \frac{550 + 620}{475 + 545} \times 100$$

$$Q_{01} = \frac{1170}{1020} \times 100$$

$$Q_{01} = 1.1470 \times 100$$

$$Q_{01} = 114.70$$

Ques (2) From the following data Calculate Quantity Index Number by (I) Fisher's method (II) Marshall-Edgeworth's method

Commodity	Base year		current Year	
	Price	Quantity	Expenditure	Quantity
A	25	40	2000	50
B	22	18	1200	30
C	54	16	1320	44
D	20	40	1350	45
E	18	30	630	15