

Index No.

Chapter overview:-

1. Definition.
2. Method to construct Index No.
3. Types of Test & their satisfaction.
4. Base Shifting.
5. Splicing.

* Definition:- An index no. is Ratio of Expressed as % of 2 or more than periods.

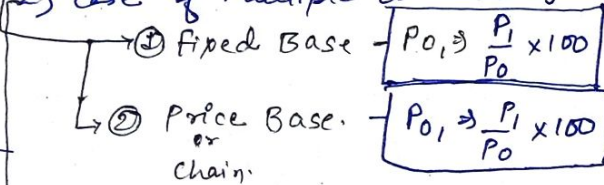
* one of which is base year. - P_0 - Price of base yr.

* other is current year. - P_1 - Price of current yr.

Method to construct Index No:-

1) case of single commodity.

2) case of Multiple commodity.



① unweighted. - only price

② weighted. → price & qty.

Ex- of fixed Base:-

year	Price	Calculate Index no. using Base year 2011
2010	20	$P_{01} \Rightarrow \frac{P_1}{P_0} \times 100$ $\Rightarrow \frac{20}{25} \times 100 \Rightarrow 80$
2011	$P_0 \Rightarrow 25$	$\Rightarrow \frac{25}{25} \times 100 \Rightarrow 100$
2012	30	$\Rightarrow \frac{30}{25} \times 100 \Rightarrow 120$
2014	45	$\Rightarrow \frac{45}{25} \times 100 \Rightarrow 180$

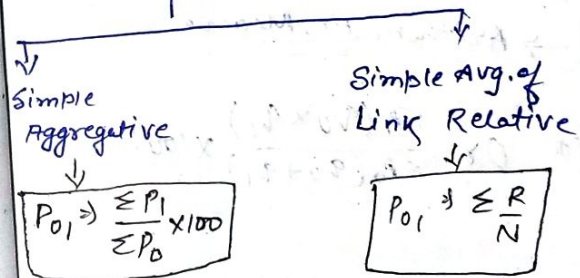
② Chain Base:-

Year	Price	Calculate Index no.
2010	20	$\frac{20}{20} \times 100 \Rightarrow 100$
2011	25	$\frac{25}{20} \times 100 \Rightarrow 125$
2012	30	$\frac{30}{25} \times 100 \Rightarrow 120$
2014	45	$\frac{45}{30} \times 100 \Rightarrow 150$

Calculate Index no.

Index no. $\Rightarrow P_{01} \Rightarrow \frac{P_1}{P_0} \times 100$

① Unweighted:-



where, $R \Rightarrow \frac{P_1}{P_0} \times 100$

Commodity	Year 2020 (P_0)	Year 2024 (P_1)	For Computing Relative to R_0
A	10	24	$\frac{20}{10} \times 100 \Rightarrow 200$
B	40	50	$\frac{50}{40} \times 100 \Rightarrow 125$
C	25	20	$\frac{20}{25} \times 100 \Rightarrow 80$
D	50	100	$\frac{100}{50} \times 100 \Rightarrow 200$
	<u>125</u>	<u>190</u>	$R \Rightarrow 605$

$$P_0 \Rightarrow \frac{\sum P_1}{\sum P_0} \times 100 \Rightarrow \frac{190}{125} \times 100 \Rightarrow 152 \text{ \â}$$

$$P_0 \Rightarrow \frac{\sum R}{N}$$

$$\Rightarrow \frac{605}{4} \Rightarrow 151.25$$

$N \Rightarrow$ No. of Commodity

★★ Weighted (Price & Qty) ★★ V.V-I

1. Laspeyres: $- L \Rightarrow \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100$
2. Paasches: $- P \Rightarrow \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100$
3. Fisher: $- \sqrt{L \times P} \rightarrow$ Geometric mean
4. Borbisk/Bowley: $- \frac{L+P}{2} \rightarrow$ Arithmetic Mean
5. Marshall: $- \frac{P_1 (Q_0 + Q_1)}{P_0 (Q_0 + Q_1)} \times 100$ Or $\frac{\sum P_1 (Q_0 \times Q_1)}{\sum P_0 (Q_0 + Q_1)} \times 100$

Commodity	P_0	P_1	Q_0	Q_1	$P_0 \times Q_0$	$P_0 \times Q_1$	$P_1 \times Q_0$	$P_1 \times Q_1$
A	10	12	20	22	200	220	240	262
B	8	8	16	18	128	144	128	144
C	5	6	10	11	50	55	60	66
D	4	4	7	8	28	32	28	32
					<u>406</u>	<u>451</u>	<u>456</u>	<u>504</u>

find: $- L, P, F, D$ & M Index no.

- ① $L \Rightarrow \frac{P_1 Q_0}{P_0 Q_0} \times 100 \Rightarrow \frac{456}{406} \times 100 \Rightarrow 112.31$
- ② $P \Rightarrow \frac{P_1 Q_1}{P_0 Q_1} \times 100 \Rightarrow \frac{506}{451} \times 100 \Rightarrow 112.19$
- ③ $F \Rightarrow \sqrt{112.31 \times 112.19} \Rightarrow 112.249$
- ④ $D \Rightarrow \frac{L+P}{2} \Rightarrow \frac{112.31 + 112.19}{2} \Rightarrow 112.25$
- ⑤ $M \Rightarrow \frac{P_1 (Q_0 + Q_1)}{P_0 (Q_0 + Q_1)} \times 100 \Rightarrow \frac{\sum P_1 Q_0 + \sum P_1 Q_1}{\sum P_0 Q_0 + \sum P_0 Q_1} \times 100$
 $\Rightarrow \frac{456 + 506}{406 + 451} \times 100 \Rightarrow \frac{962}{857} \times 100$
 $\Rightarrow 112.25 \text{ \â}$

Test of Adequacy :- (4)

1) Unit-Test :- This test requires that the formula should be independent of the unit in which price & Qty are quoted. Except for Simple (unweighted) aggregative index all other formulae satisfy this Test.

2. Time Reversal Test :- It Satisfy all Except Laspeyres & Paasche

$$P_{01} \times P_{10} \neq 1$$

* if Qtn ask to find Quantity index no., use just convert price into Qty & vice versa

for Eg. - formula of Price index by Laspeyres is

$$L \Rightarrow \frac{\sum P_1 \times Q_0}{\sum P_0 \times Q_0} \times 100$$

so, if Qtn ask to find Qty. :-

$$L \Rightarrow \frac{\sum Q_1 \times P_0}{\sum Q_0 \times P_0}$$

$$P \Rightarrow \frac{\sum Q_1 \times P_1}{\sum Q_0 \times P_1} \times 100$$

$$F \Rightarrow \sqrt{L \times P}$$

$$Q \Rightarrow \frac{L + P}{2}$$

$$M \Rightarrow \frac{Q_1 (P_0 + P_1)}{Q_0 (P_0 + P_1)} \times 100$$

* Value Index :-

$$V \Rightarrow \frac{\sum P_1 Q_1}{\sum P_0 Q_0} \times 100$$

(ii) Factor Reversal Test :-

$$P_{01} \times Q_{01} \neq V_{01}$$

* it Satisfy only fisher index.

* That's why fisher index no. is also called Ideal index no.

(iv) Circular Test :- This test not met any ideal index.

* The simple geometric mean of price relatives of the weighted aggregative with fixed weights meet this Test *

Shifting & Splicing of Index no. :- (Formula of Base Shift)

Shifted price index \Rightarrow original price index \leftarrow
price index of the year on $\times 100$
which it had to be
Shifted

* Splicing :- Two types :-

i) forward

ii) backward