Index No.

Mummy education ⇒ 60/- Rec yr

50/- 2 sq ft ⇒ 150007 sq ft

Gas taki = 65 ⇒ 1200/-

JATIN DEMBLA

Index No.

⇒ An Index No. is a Specialised Avg designed to measure the change in one variable or in group of variable with respect to time.

⇒ Index No. measure the effect of change over a Period of time

⇒ It is useful in the study of Inflation & Deflation

⇒ It is useful in case of forecasting

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⇒ There are mainly 2 yrs from which we compare the data & find index No.

Base yr = P_0

current yr = P_1 or P_n

Formula = $\frac{P_1}{P_0} \times 100$

Pencil

2020 = 50

2010 = 20

$= \frac{50}{20} \times 100 = 250\%$

✡ ⇒ Index No. is represented in terms of Percentage.

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Q Granja Salum

2000 = 100
2020 = 300

$\frac{P_1}{P_0} \times 100 = \frac{300}{100} \times 100 = 300\%$

100	× 300%	= 300
100	+ 200%	= 300

300 - 100 = 200

Base of Index no. is taken as 100 if not given.

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@ Granja Salsa.

2010 $\Rightarrow$ P = 30
2020 $\Rightarrow$ P = 60

$\frac{60}{30} \times 100 = 200\%$.

30 + 100% = 60
30 x 200% = 60

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Index No

- Simple
  - Aggregative
  - Relative
- Weighted
  - Aggregative
  - Relative

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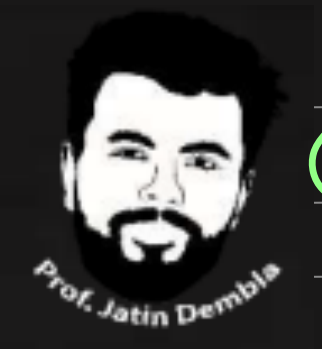

① Simple Aggregative Method

$$= \frac{\Sigma P_1}{\Sigma P_0} \times 100$$

Q

Product	2000	2010	2020
A	10	12	18
B	5	6	8
C	20	18	25
	35	36	51

find index No. of yr 2020 with 2000 as Base

$$= \frac{\Sigma P_1}{\Sigma P_0} \times 100 = \frac{51}{35} \times 100 = 145.71\ \%$$

find index No of yr 2020 with 2010 as base.

$$= \frac{\Sigma P_1}{\Sigma P_0} \times 100 = \frac{51}{36} \times 100 = 141.666\ \%$$

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Q

Product	2000	2010	2020
A	25	30	35
B	45	60	80
C	100	105	115
D	6	8	9
	176	203	239

find index No. of yr 2020 with 2000 as Base

$$= \frac{\Sigma P_1}{\Sigma P_0} \times 100 = \frac{239}{176} \times 100 = 135.79\%.$$

find index No of yr 2020 with 2010 as base.

$$= \frac{\Sigma P_1}{\Sigma P_0} \times 100 = \frac{239}{203} \times 100 = 117.733\%.$$

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✡ Simple Relative Method

$$= \frac{\Sigma \frac{P_1}{P_0} \times 100}{n}$$

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(c)

Product	2010	2020	Price Relative $= \frac{P_1}{P_0} \times 100$
A	10	15	$\frac{15}{10} \times 100 = 150$
B	20	40	$\frac{40}{20} \times 100 = 200$
C	8	9	$\frac{9}{8} \times 100 = 112.5$
D	12	15	$\frac{15}{12} \times 100 = 125$
			587.5

$$= \frac{\sum\left(\frac{P_1}{P_0} \times 100\right)}{n} = \frac{587.5}{4} = 146.875\%$$

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(6)

Product	2010	2020	
A	8	10	$\frac{10}{8} \times 100 = 125$
B	12	16	$\frac{16}{12} \times 100 = 133.33$
C	18	24	$\frac{24}{18} \times 100 = 133.33$
D	30	45	$\frac{45}{30} \times 100 = 150$
			541.66

$$\frac{\sum \frac{P_1}{P_0} \times 100}{n} = \frac{541.66}{4} = 135.415$$

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✡Weighted Aggregative Index.

① Laspeyres Index No. -> It is Based on Base yr Index.

$$= \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times 100$$

② Passche's Index No. -> It is Based on Current yr Index.

$$= \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \times 100$$

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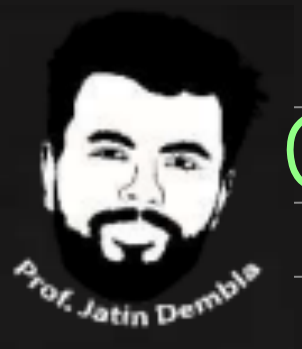

③ Fisher's Ideal Price Index -

→ It is a GM of L & P

$$= \sqrt{L \times P} \quad \text{or} \quad = \sqrt{\frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1}} \times 100$$

④ Dorbish Bowleys Price Index -

→ It is a AM of L & P

$$= \frac{L + P}{2} \quad \text{or} \quad \frac{\frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} + \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1}}{2} \times 100$$

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⑤ Marshall - Edgeworth Price Index -

~~L + P~~

$$= \frac{\Sigma P_1 Q_0 + \Sigma P_1 Q_1}{\Sigma P_0 Q_0 + \Sigma P_0 Q_1} \times 100$$

$$= \frac{\Sigma P_1 (Q_0 + Q_1)}{\Sigma P_0 (Q_0 + Q_1)} \times 100$$

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L & P

Product	2010 P_0	2010 Q_0	2020 P_1	2020 Q_1	$\Sigma P_1 Q_0$	$\Sigma P_0 Q_0$	$\Sigma P_1 Q_1$	$\Sigma P_0 Q_1$
A	20	2	30	2				
B	80	8	60	4				
C	6	5	10	4				
					590	710	340	384

$$L = \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times 100 = \frac{590}{710} \times 100 = 83.098$$

$$P = \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \times 100 = \frac{340}{384} \times 100 = 88.541$$

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Product	2010 P_0	2010 Q_0	2020 P_1	2020 Q_1
A	20	4	100	6
B	80	5	120	4
C	150	2	200	3
D	800	8	1600	12

$$L = \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times 100 =$$

$$P = \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \times 100 =$$

JATIN DEMBLA

Product	2010 P_0	2010 Q_0	2020 P_1	2020 Q_1	P_1Q_0	P_0Q_0	P_1Q_1	P_0Q_1
A	8	4	12	3				
B	20	2	15	1				
C	18	4	20	3				
					158	144	111	98

$$L = \frac{\Sigma P_1 Q_0}{\Sigma P_0 Q_0} \times 100 = 109.72$$

$$P = \frac{\Sigma P_1 Q_1}{\Sigma P_0 Q_1} \times 100 = 113.20$$

$$FI = 111.475$$

$$DB = 111.49$$

$$MF = \frac{158 + 111}{144 + 98} = \frac{269}{242} = 111.157$$

FI =

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Product	2010 P_0	2010 Q_0	2020 P_1	2020 Q_1	P_1Q_0	P_0Q_0	P_1Q_1	P_0Q_1
A	20	5	40	4				
B	50	10	100	8				
C	90	4	125	3				
D	100	8	150	6				
					2900	1760	2235	1350

$$\text{LIN}_0 = \frac{2900}{1760} = 164.77$$

$$\text{PIN}_0 = \frac{2235}{1350} = 165.55$$

$$\text{FIN}_0 = \sqrt{164.77 \times 165.55} = 165.15$$

$$\text{DBIN}_0 = \frac{164.77 + 165.55}{2} = 165.16$$

$$\text{MEIN}_0 = \frac{2900 + 2235}{1760 + 1350} = \frac{5135}{3110} = 165.11$$

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Consumer Price Index

$$\text{New salary} = \frac{\text{Old Salary} \times \text{New Index No}}{\text{Old Index No.}}$$

JATIN DEMBLA

(8) Ankit earn 150 in 2000 and index no of that yr is 120. if in 2020 index no is 380 what should be his salary.

OS = 150 | OI = 120 | NS = ? | NI = 380

$$NS = \frac{OS \times NI}{OI}$$

$$= \frac{150 \times 380}{120}$$

$$= 475$$

JATIN DEMBLA

Q Karan salary in 2010 in 50/2 and index No. Of that yr is 150 what salary should he receive to maintain same standard of living if index no. is 490

$OS = 50 \mid OT = 150 \mid NS = 490$

$$= \frac{50 \times 490}{150} = 163.333$$

JATIN DEMBLA

Q OM received salary of 8000 in 2005. if current Index No is 700 what should be his new salary.

$$= \frac{8000 \times 700}{100} = 56000$$

✡ Base Percentage is always taken as 100 (old Index No = 100) If not given

JATIN DEMBLA

Q Raxan received salary of 5000 in 2000. where index No was 167. if in 2020 his salary is 15,000 & index No is 876. what additional salary should he received or what compensation for inflation should he get.

$OS = 5000 \mid OI = 166 \mid NS = 15000 \mid NI = 876$

$$= \frac{5000 \times 876}{166} =$$

$$NS = 26,227.54$$
$$- 15,000$$
$$\overline{11,227.}$$

JATIN DEMBLA

Q Ankit salary in 2010 was 8000 per month if his salary in 2020 is 12000 per month. & index No is 300 what Conversation should he received for last yr. to have some living standard.

$$= \frac{8000 \times 300}{100}$$

$$= 24000$$

$$-12000$$

$$12000 \qquad \times 12 = ₹ 144000$$

JATIN DEMBLA

Test of Adequacy.

1. Unit Test.
2. Time Reversal Test.
3. Factor Reversal Test.
4. Circular Test.

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① Unit Test

⇒ All Test should be Independ of unit

⇒ All Formula of Index No. satisfy this test.

Except

⇒ Simple (Unweighted) Agg Indexes.

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② Time Reversal Test.

⇒ This test is given by Fisher Index No.

⇒ $P_{01} \times P_{10} = 1$ $\left\{ \frac{P_1}{P_0} \times \frac{P_0}{P_1} = 1 \right\}$

$P_{01} = 1 \text{ on } 0 = \frac{P_1}{P_0}$	$P_{10} = 0 \text{ on } 1 = \frac{P_0}{P_1}$

⇒ This method is not satisfied by LIN₀ & PIN₀.

But satisfied by Fisher Index No.

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③ Factor Reversal Test.

⇒ This test is also given by Fisher Index No.

⇒ $P_{01} \times Q_{01} = V_{01}$

Price × Quantity = Value.

⇒ This test is also satisfied by Fisher Index No.

✡✡✡ Fisher Index No. is Ideal Index No. bcoz it satisfied test II & III

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(4) Circular Test

⇒ This test is extension of Time reversal Test

⇒ $P_{01} \times P_{12} \times P_{23} \times P_{30} = 1$

⇒ This test is not satisfied by any Index No.

Except

⇒ Simple GM of Price relative & weighted Agg Index with fixed weight.

JATIN DEMBLA

(1) The chain Index No.

Chain Index = $\frac{\text{Link Relative of current yr} \times \text{Chain Index of previous yr}}{100}$

$$LR = \frac{P_1}{P_0} \times 100$$

JATIN DEMBLA

@

Yr	Price	LR	CI
2000	50	= 100	100
2005	60	$= \frac{60}{50} \times 100 = 120$	$\frac{120 \times 100}{100} = 120$
2010	62	$= \frac{62}{60} \times 100 = 103.3$	$\frac{103.3 \times 120}{100} = 123.96$
2015	65	$\frac{65}{62} \times 100 = 104.838$	$\frac{104.838 \times 123.96}{100} = 129.9$

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✡ Quantity Index No.

① Simple Agg Quant $= \frac{\Sigma Q_1}{\Sigma Q_0} \times 100$

② Simple Relative Quant $= \frac{\Sigma \frac{Q_1}{Q_0} \times 100}{n}$

③ Laspeyres $= \frac{\Sigma Q_1 P_0}{\Sigma Q_0 P_0} \times 100$

④ Passche's $= \frac{\Sigma Q_1 P_1}{\Sigma P_0 Q_1}$

FI, DB & ME formula will also be same.

JATIN DEMBLA

Value Indices

$$\frac{\Sigma V_n}{\Sigma V_0} = \frac{\Sigma P_n Q_n}{\Sigma P_0 Q_0}$$

✡ Deflating time series.

$$\text{Deflated Value} = \frac{\text{Current Value}}{\text{Price Index of current yr.}}$$

or

$$= \frac{\text{Current Value}}{\frac{P_1}{P_0}} \Rightarrow \boxed{\text{Current Value} \times \frac{P_0}{P_1}}$$

JATIN DEMBLA

Shifted Price Index

$$= \frac{\text{Original Price Index}}{\text{Price index of the yr which it has to be shifted}} \times 100$$

When two Index covering different base may be combined into single series by Splicing

2010 2020

Some Base

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