Subject: Economics(H)4th SEM

Course:SEC(Research Methodology)

Chapter:INDEX NUMBERS

PREPARED BY-

SAJAL JANA

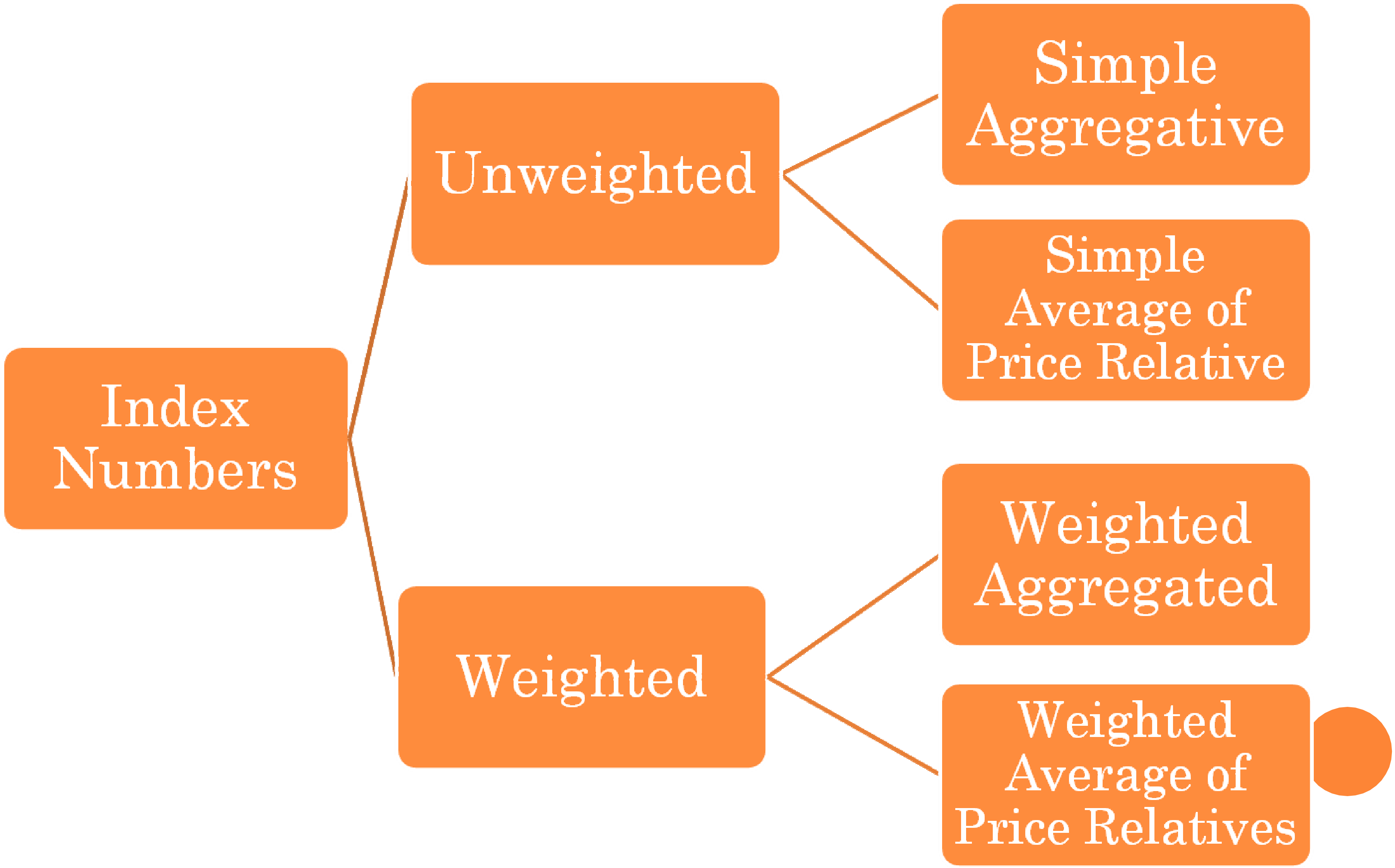
Assistant Professor, Dept. of Economics

Dinabandhu Andrews College

WHAT IS AN INDEX NUMBER

- An index number measures how much a variable changes over time.
- We calculate the index number by finding the ratio of the current value to a base value.

METHODS OF CONSTRUCTING INDEX NUMBERS



SIMPLE AGGREGATIVE METHOD

It consists in expressing the aggregate price of all commodities in the current year as a percentage of the aggregate price in the base year.

$$P_{01} = \frac{\sum p_1}{\sum p_0} \times 100$$

P_{01}=Index number of the current year.

p_1 = Total of the current year's price of all commodities.

p_0 = Total of the base year's price of all commodities.

EXAMPLE:-

FROM THE DATA GIVEN BELOW CONSTRUCT THE INDEX NUMBER FOR THE YEAR 2007 ON THE BASE YEAR 2008 IN WEST BENGAL STATE.

COMMODITIES	UNITS	PRICE (Rs) 2007	PRICE (Rs) 2008
Sugar	Quintal	2200	3200
Milk	Quintal	18	20
Oil	Litre	68	71
Wheat	Quintal	900	1000
Clothing	Meter	50	60

SOLUTION:-

COMMODITIES	UNITS	PRICE (Rs) 2007	PRICE (Rs) 2008
Sugar	Quintal	2200	3200
Milk	Quintal	18	20
Oil	Litre	68	71
Wheat	Quintal	900	1000
Clothing	Meter	50	60
		$\sum p_0 = 3236$	$\sum p_1 = 4351$

Index Number for 2008-

$$P_{01} = \frac{\sum p_1}{\sum p_0} \times 100 = \frac{4351}{3236} \times 100 = 134.45$$

It means the price in 2008 were 34.45% higher than the previous year.

SIMPLE AVERAGE OF RELATIVES METHOD.

- The current year price is expressed as a price relative of the base year price. These price relatives are then averaged to get the index number. The average used could be arithmetic mean, geometric mean or even median.

$$P_{01} = \frac{\sum \left(\frac{p_1}{p_0} \times 100 \right)}{N}$$

Where N is Numbers Of items.

When geometric mean is used-

$$\log P_{01} = \frac{\sum \log \left(\frac{p_1}{p_0} \times 100 \right)}{N}$$

EXAMPLE-

From the data given below construct the index number for the year 2008 taking 2007 as by using arithmetic mean.

Commodities	Price (2007)	Price (2008)
P	6	10
Q	2	2
R	4	6
S	10	12
T	8	12

SOLUTION-

Index number using arithmetic mean-

Commodities	Price (2007) p_0	Price (2008) p_1	Price Relative $\frac{p_1}{p_0} \times 100$
P	6	10	166.7
Q	12	2	16.67
R	4	6	150.0
S	10	12	120.0
T	8	12	150.0

$$\sum\left(\frac{p_1}{p_0}\times 100\right)=603.37$$

$$P_{01}=\frac{\sum\left(\frac{p_1}{p_0}\times 100\right)}{N}=\frac{603.37}{5}=120.63$$

LASPEYRES METHOD-

This method was devised by Laspeyres in 1871. In this method the weights are determined by quantities in the base.

$$p_{01} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$$

Paasche's Method.

This method was devised by a German statistician Paasche in 1874. The weights of current year are used as base year in constructing the Paasche's Index number.

$$p_{01} = \frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$$

Fisher's Ideal Index.

Fisher's deal index number is the geometric mean of the Laspeyre's and Paasche's index numbers.

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

MARSHALL-EDGEWORTH METHOD.

In this index the numerator consists of an aggregate of the current years price multiplied by the weights of both the base year as well as the current year.

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

EXAMPLE-

Given below are the price quantity data,with price quoted in Rs. per kg and production in qtls.

Find- (1) Laspeyers Index (2) Paasche's Index (3)Fisher Ideal Index.

	2002		2007	
ITEMS	PRICE	PRODUCTION	PRICE	PRODUCTION
BEEF	15	500	20	600
MUTTON	18	590	23	640
CHICKEN	22	450	24	500

SOLUTION-

ITEMS	PRICE (p_0)	PRODUCTION (q_0)	PRICE (p_1)	PRODUCTION (q_1)	(p_1q_0)	(p_0q_0)	(p_1q_1)	(p_0q_1)
BEEF	15	500	20	600	10000	7500	12000	9000
MUTTON	18	590	23	640	13570	10620	14720	11520
CHICKEN	22	450	24	500	10800	9900	12000	11000
TOTAL					34370	28020	38720	31520

SOLUTION-

1.Laspeyres index:

$$p_{01} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100 = \frac{34370}{28020} \times 100 = 122.66$$

2. Paasche's Index :

$$p_{01} = \frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100 = \frac{38720}{31520} \times 100 = 122.84$$

3. Fisher Ideal Index

$$P_{01} = \sqrt{\frac{\sum p_1 q_0}{\sum p_0 q_0} \times \frac{\sum p_1 q_1}{\sum p_0 q_1}} \times 100 = \sqrt{\frac{34370}{28020} \times \frac{38720}{31520}} \times 100 = 122.69$$