Quadrant II – Notes

Paper Code : CAG101

Module Name: Index Numbers: Deflating and Cost of Living Index

Cost of Living Index Number:

The prices of goods and services may vary over a period of time. This has an effect on the purchasing power of society. The main purpose of the Cost of Living Index number is to determine how much the consumers of a particular class/section of society have to spend for a certain group of goods and services in the given year(current year) compared to the base year so that they can maintain the same standard of living in the current year as in the base year.

Uses of Cost of Living Index Numbers:

Cost of Living index numbers are used to:

- Determine purchasing power of money.

  $$\text{Purchasing power of money} = \frac{1}{\text{Cost of Living Index Number}}$$

- Compute real wages/real income.
- Decide Dearness Allowance (D.A.) or to grant bonus to the employees by Government/industries.
- Formulate policies by Government.
- Negotiate settlement of wages with trade unions.

Steps involved in construction of Cost of Living Index Number:

- In addition to the points involved in construction of index numbers, following points also have to be kept in mind while constructing Cost of Living Index number:
- Before constructing Cost of Living Index number, we need to decide about class of people for whom we are going to calculate the Cost of Living Index number as the consumption pattern, goods and services to be included, their prices and quantities depends upon this factor.
- Prices of the commodities have to be retail prices as most of the consumers buy from retail stores. Shops from where retail prices are to be obtained also have to be fixed to avoid variation in the prices. As far as possible quality of the commodities to be included should also be fixed.
- The items selected while calculating Cost of Living Index Number can be divided into following five groups namely Food, Clothing, Fuel and Lighting, House Rent and Miscellaneous.

Methods of calculating Cost of Living Index number:

i) Aggregate Expenditure Method
ii) Family Budget Method

Cost of Living Index Number by Aggregate Expenditure Method:

Cost of Living Index Number by Aggregate Expenditure Method $= \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$

Where
p_1 – Current year prices
p_0 – Base year prices
q_0 – Base year quantities

Please note: This formula is same as formula used for calculating Laspeyre's Price Index Number.

Cost of Living Index Number by Family Budget Method:

Family budget of large number of people is studied. Price relative(I) corresponding to each of the selected goods and services is calculated. Weights are taken proportional to the amounts spent on quantity.

Cost of living Index Number by Family Budget Method $= \frac{\sum WI}{\sum W}$

Where
W - Weights corresponding to the base year
I is price relative and $I = \frac{p_1}{p_0} \times 100$

If instead of providing weights, base year quantities (q_0) corresponding to each of the selected goods and services are given, then weights can be calculated for each of the selected goods and services using the formula $w = p_0 q_0$.

Please note: This formula is same as formula used for calculating Weighted Average of Price Relatives.

Example 1: Construct Cost of Living Index Number for the current year on the basis of the base year from the following data using the Aggregate Expenditure Method:

Group	Base year price (In ₹)	Current year price (In ₹)	Base year quantity
A	20	25	6
B	13	15	7
C	18	22	9
D	30	35	3
E	7	8	4

Solution:

Group	p_0	p_1	q_0	p_1q_0	p_0q_0
A	20	25	6	150	120
B	13	15	7	105	91
C	18	22	9	198	162
D	30	35	3	105	90
E	7	8	4	32	28
				$\sum p_1q_0 = 590$	$\sum p_0q_0 = 491$

Cost of Living Index Number by Aggregate Expenditure Method

$$= \frac{\sum p_1q_0}{\sum p_0q_0} \times 100$$

$$= \frac{590}{491} \times 100$$

$$= 120.16$$

Therefore we can conclude that the cost of living has increased by 20.16% in current year as compared to base year.

Example 2:
Construct Cost of Living Index Number from the following data using Family Budget Method:

Group	Weight	Index
Food	58	330
Clothing	5	300
Fuel and Lighting	9	210
House Rent	8	120
Miscellaneous	20	290

Solution:

Group	Weight (W)	Index (I)	WI
Food	58	330	19140
Clothing	5	300	1500
Fuel and Lighting	9	210	1890
House Rent	8	120	960
Miscellaneous	20	290	5800
	$\sum W = 100$		$\sum WI = 29290$

Cost of Living Index Number by Family Budget Method

$$= \frac{\sum WI}{\sum W}$$

$$= \frac{29290}{100}$$

$$= 292.9$$

Interpretation:
Therefore we can conclude that the cost of living has increased by 192.9% in the current year as compared to the base year.

Deflating:
Over a passage of time, the prices of goods and services keep on changing. Income also changes during this time. However the question is, whether the change in the income is proportional to the change in the prices of the goods and services. **It is not always the case.**
Say for example, the income of a person has gone up by 25% and prices of the goods and services have increased by 40% in a current year as compared to the base year. In this case though income has increased by 25% in the current year, the person will not be able to buy as much as he used to buy with base year's income. In this case, though the income has increased by 25% in the current year, its purchasing power has gone down as compared to the base year. To compensate for this increase in the prices, the income should also rise by 40% in the current year, so that the person can maintain the same standard of living in the current year as in the base year.

To get the purchasing power of income for any year in comparison to the base year, we express the income for that year in terms of income at base year by applying appropriate price index number to the actual income, so as to allow for the changes in the prices. This method is called as **Deflating**. Income calculated by this method is called as **Real Income**.

$$\text{Real Income} = \frac{\text{Income}}{\text{Index Number}} \times 100$$

Index number used in this case is Cost of Living Index Number.

Example:
Following data represents the annual income of a person during the years 2017-20. The Cost of Living indices for these years with 2017 as base year is also represented in the table given below.

Year	2017	2018	2019	2020
Annual Income (In ₹)	55000	62000	71000	80000
Cost of living Index No.	100	115	134	158

Determine the Real Income of the person during the years 2017-20 as compared to his income in the year 2017.

Solution:

Year	**Annual Income (In ₹)**	**Cost of Living Index Number**	**Real Income (In ₹)** $= \frac{\textbf{Income}}{\textbf{Cost of Living Index No.}} \times \mathbf{100}$
2017	55000	100	$\frac{55000}{100} \times 100 = 55000$
2018	62000	115	$\frac{62000}{115} \times 100 = 53913.04$
2019	71000	134	$\frac{71000}{134} \times 100 = 52985.07$
2020	80000	158	$\frac{80000}{158} \times 100 = 50632.91$