Index Number

Presented by:
Mahendra AN

Index Numbers

- An index number measures the relative change in price, quantity, value, or some other item of interest from one time period to another.
- A simple index number measures the relative change in just one variable.

2

Index Number – Example 1

According to the Bureau of Labor Statistics, in January 1995 the average hourly earnings of production workers was $11.47. In June 2005 it was $16.07.

What is the index of hourly earnings of production workers for June 2005 based on January 1995?

$$P = \frac{\text{Average hourly earnings of production workers in February 2006}}{\text{Average hourly earnings of production workers in January 1995}}(100) = \frac{\$16.47}{\$11.47}(100) = 143.6$$

3

Index Number –Example 2

An index can also compare one item with another.

Example: The population of the Canadian province of British Columbia in 2004 was 4,196,400 and for Ontario it was 12,392,700. What is the population index of British Columbia compared to Ontario?

The index of population for British Columbia is 33.9, found by:

$$P = \frac{\text{Population of British Columbia}}{\text{Population of Ontario}}(100) = \frac{4{,}196{,}400}{12{,}392{,}700}(100) = 33.9$$

4

Why Convert Data to Indexes?

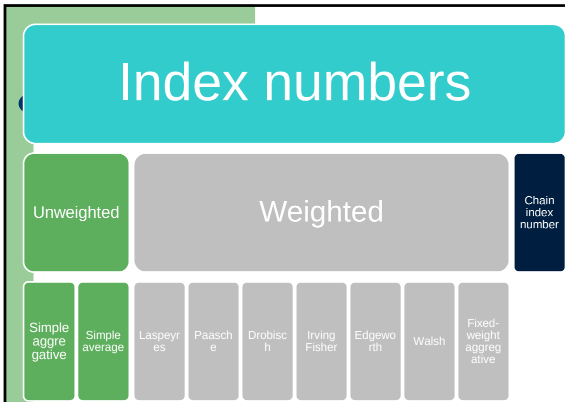
- An index is a convenient way to express a change in a diverse group of items.
  - The Consumer Price Index (CPI), for example, encompasses about 400 items—including golf balls, lawn mowers, hamburgers, funeral services, and dentists' fees. Prices are expressed in dollars per pound, box, yard, and many other different units. Only by converting the prices of these many diverse goods and services to one index number can the federal government and others concerned with inflation keep informed of the overall movement of consumer prices.
- Converting data to indexes also makes it easier to assess the trend in a series composed of exceptionally large numbers.
  - For example, total U.S. retail sales for the month of July 2005 were $357,013,000. For July 2004, the total retail sales were $323,604,000. This increase of $33,409,000 appears significant. Yet if the July 2005 retail sales are expressed as an index based on July 2004 retail sales the increase is 10.3 percent.

5

Indexes

- In many situations we wish to combine several items and develop an index to compare the cost of this aggregation of items in two different time periods.
  - For example, we might be interested in an index for items that relate to the expense of operating and maintaining an automobile. The items in the index might include tires, oil changes, and gasoline prices.
  - Or we might be interested in a college student index. This index might include the cost of books, tuition, housing, meals, and entertainment.
- There are several ways we can combine the items to determine the index.

6



Unweight index number

Price index number

- Simple agregrative

$$I = \frac{\sum P_n}{\sum P_o} .100$$

- Relative average

$$I = \frac{\sum \frac{P_n}{P_o} .100}{k}$$

Quantity index number

- Simple agregrative

$$I = \frac{\sum q_n}{\sum q_o} .100$$

- Relative average

$$I = \frac{\sum \frac{q_n}{q_o} .100}{k}$$

Weighted Index Number

Basic formula

- Is a value index
- Weighted by quantity

$$I = \frac{P_n . W}{P_o . W} .100$$

1. Laspeyres

- Weighted by quantity on base year

$$L = \frac{\sum P_n . q_o}{\sum P_o . q_o} .100$$

Weighted Index Number (cont.)

2. Paasche

- Weighted by quantity on given year

$$P = \frac{\sum P_n . q_n}{\sum P_o . q_n} .100$$

3. Drobisch

- Aritmatic mean of Laspayer's and Paasche's

$$I = \frac{L + P}{2} .100$$

Weighted Index Number (cont.)

4. Irving Fisher

- Is called ideal index
- Geometric mean of Laspayer's and Paasche's

$$I = \sqrt{L.P}$$

5. Edgeworth

- Weighted by sum of quantity on base year and quantity on given year

$$P = \frac{\sum P_n (q_o + q_n)}{\sum P_o (q_o + q_n)} .100$$

Weighted Index Number (cont.)

6. Walsh

- Give the alternative

$$P = \frac{\sum P_n \sqrt{q_o . q_n}}{\sum P_o \sqrt{q_o . q_n}} .100$$

7. Fix weight aggregative index

- Fix weight value
- Not use either given year or base year.

$$i = \frac{\sum P_n q_a}{\sum P_o q_a} .100$$

- Weight average method

$$i = \frac{\sum \left(\frac{P_n}{P_o}\right) . W}{\sum W} .100$$

- Weight is multiplication of price and quantity. Could be base year $W_{(value)} = P_o q_o$ or given year $W_{(value)} = P_n q_n$

Chain Index Number

- A binary comparison that is chain-arranged
- Comparing index with previous year
- Counted year by year and last year period is used as base year
- More flexible, easily to know variable changes

$$I_{t-1,t} = \frac{\sum P_t q_o}{\sum p_{t-1} q_o} . 100$$

Index number use

- Purchasing power measurement
- Deflation
- Escalators
- Studying bunnies conditions

SYUKUR DAN TAFAKUR

mari kita cuci
diri kita dengan
peluh sendiri
di siang hari

dan
mari kita basuh
hati kita dengan
air mata sendiri
di malam hari

Jeihan S. (1999)

15