Week-01-L-02

Agricultural Statistics in Practice

Index Numbers & Forecasting

Identifying Good Index Numbers

Prof. J. Ramkumar
Dept. of ME & Design
Indian Institute of Technology Kanpur

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Identifying good index numbers

- Price index is made via Laspeyres Index, *by using prices as weights instead of quantities:*

$$Q_L = \frac{\sum p_b q_c}{\sum p_b q_b} \times 100$$

- Quantity Index is made via Paasche Index:

$$Q_P = \frac{\sum p_c q_c}{\sum p_c q_b} \times 100$$

- Value Index is:

$$V = \frac{\sum p_c q_c}{\sum p_b q_b} \times 100$$

Key:

p_c = price in current period

p_b = price in base period

q_c = quantity in current period

q_b = quantity in base period

Factor Reversal Test (FRT)

Factor reversal test permits interchange of price and quantities without giving inconsistent results, i.e. the two results multiplied together should give the true value ratio:

FRT is satisfied when:

Price Index x Quantity Index = Value Index

OR

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

Time Reversal Test (TRT)

According to this test, if considering any year as a base year, some other year's price index is computed and for another price index, time subscripts are reversed, then the both price indicies must be reciprocal to each other.

TRT is satisfied when:

$$P_{01} = \frac{1}{P_{10}} \quad or \quad P_{01} \times P_{10} = 1$$

Where, P_{01} is price index for the year 1 with 0 as base and P_{10} is the price index for the year 0 with 1 as base.

Tests to determine reliability

- The *factor reversal test* determines whether swapping index elements changes the relative value of the index.
- The *time reversal test* checks if the index will hold its direction when the time period is reversed.

- Both L & P Index fail these tests but Fisher's Ideal Index passes them.
- **Fisher's Ideal Index =** $(\mathbf{L} \times \mathbf{P})^{1/2}$

$= \sqrt{LP}$

Making of Index Numbers

- ***Selection of Base Period***
  →An index is used to compare movement in a statistical series over time, with a chosen base period representing a period of normalcy. Base period may be shifted to a more recent date as conditions change over time.
  →It should reflect average or normal conditions, & be recent enough that weights used in calculation & interpretations derived from index are meaningful.

- ***Weights Selection in Index Numbers***
  →Selection of weights for an index number can be complex.
  →Weights must represent a fraction of the total if not all items can be included.
  →Careful judgment and experience are needed, considering different sets of weights and their gain in information versus calculation costs.

Thank You

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