



# Value added: Why Consistency in aggregation is essential for global accounting standards, and how to achieve it

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# Purpose of Paper

- Paper addresses the impact of SNA 1993 recommendation to use chain indexes for deflation (SNA 1993 Chapter 16)
- Impact: loss of additivity and consistency in aggregation
- Paper proposes a way of using a chained fixed-weight indexes to achieve consistency in aggregation

# Basics of Argument

- Paper first discusses the difficulty in developing the concept of commodity
  - Commodities have dates and location attached
  - Assumption of homogeneous goods
  - Defining classes of goods

# Key Equations

$$v \equiv p \times q \quad (\text{index number theory})$$

$$q \equiv \frac{\sum_i v_i}{p_k}, 1 \leq k \leq n \quad (\text{national accounts})$$

- where  $p_k$  is the price index and  $v_i$  is the value of transaction  $i$

# Key Equations

$$V = \sum_i v_i = \sum p_i q_i v_i^0 \quad [€^t] \quad \text{(nominal values)}$$

$$r_i(t) = \frac{p_i(t)}{P(t)} \quad \text{(real price indices)}$$

$$U = \frac{V}{P} = \sum_i u_i = \sum p_i q_i v_i^0 \quad [€^0] \quad \text{(nominal values)}$$

# Key Equations

$$V = UP$$

$$dV = UdP + PdU$$

$$= \sum_i [r_i q_i dP + P(q_i dr_i + r_i dq_i)] v_i^0$$

$$\cong \sum_i [r_i^t q_i^t \Delta P + P^{t-1} (q_i^t \Delta r + q_i^{t-1} \Delta q)] v_i^0$$

Nominal change = change in unit of measure  
 + change in real price  
 + change in volume

# Key Equations

- The last equation is key
- It yields equations (19), (20) and (21) in the paper with the last being the decomposition
- $$U^t = Q^{0t} + R^{0t} + V^0 \quad [€0] \quad (21)$$
- Where:
  - $Q^{0t} \equiv$  an additive chain of Laspeyres indices
  - $R^{0t} \equiv$  an additive chain of Paasche indices
  - $V^t \equiv$  monetary value in t; it is the base level  $V^0$  multiplied by (general) price index  $P(t)$

# Key Equations

- The paper motivates equation (21) by showing in equations (24) – (26) that chaining with a Laspeyres index is not consistent in aggregation
- There is an empirical illustration of why this matters



# Comments

- The nominal value equation given above in terms of Frisch (1930) product rule
  - For “proper” index numbers
    - $\frac{v(t)}{v(0)} = p(t)q(t) \rightarrow v(t) = p(t)q(t)v(0)$ 
      - where:  $p(t) \equiv$  price index;  $q(t) \equiv$  quantity index

# Comments

- Regarding the quantity index and the definition of commodity
  - Hicks composite commodity; grouping commodities whose prices move together linearly
  - Raises the issues of the adequacy of sampling
  - Rate of quality adjustment for prices to get at the product characteristics, such as location

# Comments

- Notion of real price index,  $r_i(t) = \frac{p_i(t)}{P(t)}$  is difficult to understand
  - Argued that is needed because deflation focuses on consumer prices and so to capture influences of other parts of GDP need a price level for the economy (last paragraph on pg 13)

# Comments

This is used in equation

$$U(t) = \frac{V(t)}{P(t)} = r(t)q(t)V(0) \quad (14)$$

- How is  $P(t)$  constructed?
- If consumption is the largest expenditure in GDP, doesn't this overly account for consumption price inflation?
- If the decomposition in (21) uses chained Laspeyres and chained Paasche, why not use Fisher indexes?

# Comments

- Advantage: Fisher index superlative and Diewert (1978) shows that superlative indexes “almost” consistent in aggregation – in his example third decimal place
- Furthermore, Fisher avoids the problems of substitution bias and chain drift that exist with fixed weight indexes
- BEA Tables 5 & 6 provide price and quantity indexes (chained Fisher) that accord with the Frisch product rule; the  $v$ 's would represent nominal GDP

# Summary

- Paper examines an issue raised since the SNA 1993 recommendation of using chain indexes
- Correct on the importance of consistency in aggregation
- Interesting that the proposed solution chained Laspeyres and chained Paasche indexes
- Raises the question: why not use the Fisher?
- Accordingly would be interesting to compare the results of the suggested approach with the Fisher

# Reference

- W.E. Diewert, Superlative index numbers and consistency in aggregation, *Econometrica* **46**(4) (1978), 883–900.
- Ragnar Frisch, Necessary and Sufficient Conditions Regarding the Form of an Index Number which Shall Meet Certain of Fisher's Tests, *Journal of the American Statistical Association*, **25**(172) (1930), 397-406