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

Utz-Peter Reich (Mainz University of Applied Sciences)

Discussant: Dennis Fixler (Bureau of Economic Analysis)

IARIW-OECD Conference: “W(h)ither the SNA?”
Paris, France
April 16-17, 2015
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

\[ v \equiv p \times q \]  \hspace{1cm} \text{(index number theory)}

\[ q \equiv \frac{\sum_i v_i}{p_k}, 1 \leq k \leq n \]  \hspace{1cm} \text{(national accounts)}

- where \( p_k \) is the price index and \( v_i \) is the value of transaction \( i \)
Key Equations

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

\[ r_i(t) = \frac{p_i(t)}{P(t)} \]  
(real price indices)

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

\[ V = UP \]
\[ dV = UdP + PdU \]

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

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

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

\[ U_t = Q^{0t} + R^{0t} + V^0 \]  \hspace{1cm} [\text{€0}]  \hspace{1cm} (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.
The nominal value equation given above in terms of Frisch (1930) product rule

For “proper” index numbers

\[
\frac{v(t)}{v(0)} = p(t)q(t) \quad \rightarrow \quad v(t) = p(t)q(t)v(0)
\]

where: \( p(t) \equiv \) price index; \( q(t) \equiv \) quantity index
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
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)
This is used in equation

\[ U(t) = \frac{V(t)}{P(t)} = r(t)q(t)V(0) \] (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?
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
