



Statistics  
Canada

Statistique  
Canada

Canada



Statistics Canada  
[www.statcan.gc.ca](http://www.statcan.gc.ca)



# The Conceptual Basis of the SPPI for Services

**Feedback from Ottawa Group**

# Questions from Voorburg Group

1. Clarify what is meant by a Fixed-Input Output Price Index, which is the foundation for output price indexes.
  - a) Is this concept, as it applies to services, any different from what is outlined in the PPI manual?
2. Demonstrate this framework on output SPPIs for service industries
  - a) Should services be treated differently than manufacturing industries? Our default practice in the Voorburg Group has been to treat them similarly, but some participants have suggested that they should be treated differently.
  - b) Is the method of quality adjustment determined by what information the indexes are being used to deflate (expenditures versus industry turnover)?
3. Provide examples of the data resulting from the same change in services calculated through a resource cost approach and through a consumer utility approach. This should be both a theoretical exercise and an exercise using real “obtainable” values if possible.
  - a) How do practical considerations apply – see VG examples below?
    - Advertising
    - Air Transportation
    - Software Publishing



# The conceptual basis of the PPI is the Fixed-Input Output Price Index (FIOPI)

- A price-taking revenue-maximizing establishment has a production function (technology) with fixed (intermediate and primary) inputs
- The technology describes the combination of outputs that can be produced given the fixed inputs available.
- The revenue-maximizing establishment, as a price-taker, chooses the combination of outputs to produce given the current prices that will maximize revenue.



# Index shows pure price change between 2 periods

- A Laspeyres formulation would ask in the numerator what the hypothetical revenue (for this revenue maximizer) would be in period  $t$  at period  $t$  prices if we held the technology and inputs constant in period 0; it would then compare this with the (maximizing) revenue in the denominator at period 0 prices, technology, and inputs.
- Any change in the ratio is due to price changes, not inputs or technology.
- It is not a requirement that in practice either utility or production technologies/inputs are in practice constant, though this is referred to in both papers as such.

# Quality adjustment in FIOPI

- Conceptual basis of quality adjustment is addressed in the PPI Manual – Chapter 21 Quality Change and Hedonics
- **The formulation in B.6 is well-suited as a practical standard, but it is not a unique solution to the problem.** The B.6 approach uses observed market (basic) prices and thus may be phrased as a market user valuation at basic prices, but this arises from the assumption of a firm as a price taker. The market price may well be an equilibrium price arising from the interplay of demand and supply considerations or one arising from monopolistic behavior.



# Other practical methods of quality adjustment in Chapter 7

- Hedonic regressions is one method but there are other suitable methods
- Examples:
  - Quantity (service flow)
  - Option costs
  - Imputed valuations from similar products/brands with and without the additional service flow.
  - Overlap method



## **Note on reconciling quality adjustment based on different valuations (Chapter 7 B.2.5)**

- Output and import price indexes: valuations are at basic prices
- Price indexes for intermediate input, final consumption, capital formation: valuations are at purchasers' price
- The PPI Manual advises, for consistency in valuation and reconciliation of the Supply-Use Table (SUT), the use of basic prices throughout the SUT.
- It is also recognized that in practice there will be second-best methods based on resource costs that require careful use.



## SPPI Quality Adjustment

- There is neither an apparent reason nor is it strongly argued in the papers, that there is something about the nature of service industries that would lead to abandoning the PPI Manual (2004) principles for a SPPI.
- Detailed-level nominal service output changes at basic prices should be deflated by appropriate output SPPI sub-indices at basic prices.

# SPPI Quality Adjustment

- Establishments are price takers
- Producers' costs or production functions enter into the quality adjustment only to determine which combination of characteristics, i.e. models, establishments will produce given their different technologies, primary inputs and, possibly, input prices.

# Distributive Trade

- margins should not reflect changes in the quality-mix of what is sold
  - unless there is a convincing case that the service flow required to trade a good of given quality differs significantly from that needed to trade a better/worse quality of the good.
- service performance characteristic ratios, such as the of number of checkouts to store traffic, or hedonic regressions might be more appropriate.

# Advertising Services

- Depends on the price function
- Both the examples in Tables 1 and 2 are correct, reflecting price-determining characteristics and quality adjustments for these extreme hedonic cases where, in turn, *intended* and *achieved audiences* are sufficiently important to enter the hedonic price function to the extent that they shift from the right-hand-side of the function to a denominator on the left, to become part of the pricing mechanism itself.



# Air transport services

- Also suggests a hedonic approach to resolve the issue



## Conclusion

- FIOPI – basis of all PPIs including SPPIs
- Firms are price takers (except monopolies)
- PPIs should be valuated at Basic Prices  
(reconciliation of SUT should be done at basic prices)



## Discussion

- Practical methods to quality adjust
- Hedonics may be ideal but collecting sufficient detailed characteristics on utility from price-taking firms may not be possible