Unit Value Bias in Wholesale and Retail Trade Price Indexes

Melanie Santiago

Industry Pricing Branch Chief

Producer Price Index

U.S. Bureau of Labor Statistics

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Unit value prices in the US PPI

Preferred for industries with:

- Large numbers of transactions
- Homogeneous products or services
- Provided at different prices
- Limitations in collecting them

Benefits:

- Increases sample size
- Eliminates need for frequent substitutions
- Better reflects competitive prices and price adjustments

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Unit value price example: Guestroom rentals

- Prices vary for same level of service based on:
  - ▶ Lodging dates
  - ▶ Type of buyer
  - ▶ Time between booking and stay
  - ▶ Anticipated occupancy rate
- Collect average daily room rates:
  - ▶ Specific type of room
  - ▶ Set time period
- Captures seasonal pricing and discounting

International guidelines

- IMF guidelines state that average prices are acceptable when:
  - ▶ Products are strictly homogeneous
  - ▶ Price represents the current time period

- Including a mix of quality characteristics or terms of sale will lead to unit value bias.
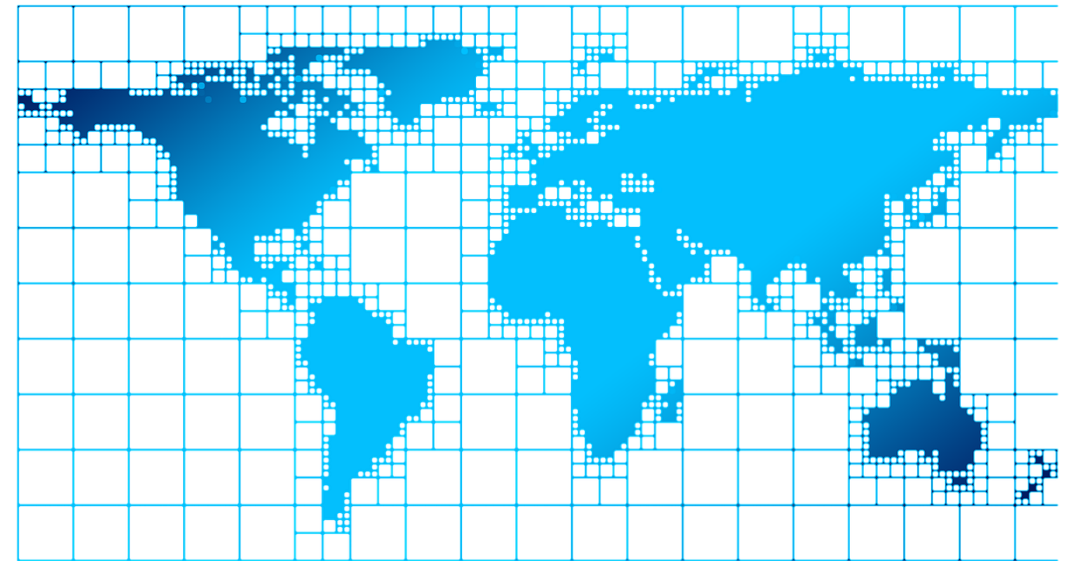
Unit value bias

Known risk when calculating average prices for products

Caused by heterogeneity in product mix

What about the average prices for services provided to sell those products?

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Unit value prices in trade industries

- Output is the retailing or wholesaling service, not the good itself

- Price of trade output estimated using margin prices
  - ▶ Margin price = Buyer price – Replacement cost

- Preferred price is an average margin per unit for a comparable product line
  - ▶ More representative than individual margins for a small number of products

Product comparability

To be considered comparable, products included in the average must be:

- Homogenous
- Able to be substituted for each other
- Priced on the same per unit basis
- Marketed under similar conditions
- Marketed to a similar demographic market
- Sold to the same customer class (wholesale trade only)

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Constant level of service

Product characteristics are used as a proxy for the underlying services:

- Type of product - e.g., produce, canned goods, frozen entrees

- Product manufacturer - national v. store brand (private label)

- Amount of additional services

Risk of unit value bias

- Including different levels of service in the average poses risk of unit value bias
  - Do margin and markup percentages reflect service levels?
  - Does comparability of products equate to comparability of service levels?
  - Do product mix changes result in service level changes?

Broad product line margins

Collected in various industries such as merchant wholesalers and grocery stores

- Broadly defined product lines are less homogeneous
- Likely represent differing levels of service
- Risk of bias likely higher, but no standard for assessing risk level

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Machinery, equipment, and supplies wholesalers

High variability in products offered

Difficult to collect margins for narrowly defined product lines on a continual basis

Broader product lines may be a necessary fallback

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Grocery stores

- Can provide prices for more homogenous product lines on a continual basis
- Product lines appear to require the same level of service
- Markup percentages vary by product line
  - Higher for perishable items due to more frequent replenishing of stock
  - Higher for prepared foods and deli items due to the additional services
  - Lower for dry goods due to longer shelf life and ease of storage
- Mix of store and national brands may be problematic
  - Store brands have higher margins than national brands
  - Does this mean a difference in service level?

Data constraints

Limited by availability of data and consistent product transactions

Data collected based on record keeping practices of sampled firms

Must consider level of respondent burden

No detail on the individual products included in the averages

Product brands, individual margins, and quantities are not reported

Alternative Collection Methods

BLS expanding use of alternative data collection methods and sources

- Collecting large data files from sampled companies
- Evaluating administrative and third-party data sources

Large data sets could provide more details of margin composition

- Analyze margin behavior and determinants of unit value bias
- Limited by respondent and data processing burden

More detailed data does not eliminate the risk for bias.

- ONS found it difficult to narrowly define item groupings and still make use of full dataset
- Needed to use broader definitions at different levels of homogeneity

Unit value bias in trade?

- Presence and extent of unit level bias in BLS trade PPIs is uncertain
  - ▶ Broad product line averages comprise approximately one third of prices reported in impacted industries
  - ▶ Broad average are acceptable is some industries
  - ▶ No measure for determining when an average is too broad
  - ▶ Large datasets may allow for analysis of margin behavior

Conclusion

Guidelines on identifying and measuring bias in trade services needed:

- What are the parameters of bias in an average margin?
- When is the average too broad?
- How do you determine the service level and when the mix has changed?
- How do you identify and measure bias when details about the average margin are unknown?

Efforts to reduce bias should include an evaluation of index variance

Collaboration with statistical agencies and international groups will be critical

Contact Information

Melanie Santiago
Industry Pricing Branch Chief
Producer Price Index
U.S. Bureau of Labor Statistics
www.bls.gov/ppi

202-691-7844

santiago.melanie@bls.gov

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