Experimental clothing indexes using Australian web scraped data

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Background

- ABS in a transformation environment – seeking ways to utilise ‘big data’ for compilation of economic statistics
- March quarter 2014 – Transactions (scanner) data introduced into the Australian CPI
- December quarter 2017 – Expansion of transactions data and introduction of multilateral index methods
What alternative big data sources are available to obtain price information?

Web scraping – the extraction and transformation of unstructured data from the web into structured data.

The ABS is currently expanding its use of web scraped data in the CPI:
  – Progressively incorporated since March 2017
Clothing and footwear – high priority for ABS

Challenges with clothing and footwear:
- High collection and data editing costs
- Competitive market environment
- Strong seasonality
Matched model indexes (e.g. Jevons, Törnqvist) rely on the ability of price analysts to identify which items are identical (i.e. homogenous) from the consumer’s perspective.

Broader product definitions improve product matching over time but increase the risk of average price bias.

3 alternative product definitions considered:

- Item Name
- Brand + Product Type
- Brand + Product Type + Product Characteristics
A keyword approach was used to extract potentially important product information from item name strings.

Product information extracted included:
- Brand
- Product Type (e.g. t-shirt, dress, shorts)
- Product characteristics (e.g. sleeve length, material, length)
ABS currently aggregates clothing and footwear products across retailers to derive elementary aggregates (EAs).

This presentation instead aggregates products to EAs within each retailer.

Aggregation across retailers is carried out at the Expenditure Class (EC) level.
Multilateral Methods

- Unweighted index methods are required since web scraped data does not contain expenditure or quantity information.
- Multilateral index methods can be used to match products across multiple time periods and resolve the “chain drift” problem with chained indexes.
- 2 unweighted multilateral index methods are considered:
  - GEKS-Jevons (GEKS-J)
  - Time dummy hedonic (TDH) model with OLS weights.
Expenditure Class Results

Accessories - Monthly

Accessories - Quarterly

Australian Bureau of Statistics  Informing Australia’s important decisions
Conclusions

- Pre-processing to form ‘clustered’ homogenous products is one viable strategy for NSOs to consider for ‘dynamic’ basket categories.
- At the elementary level, our clothing results exhibit downward drift for chained indexes.
- Fixed and multilateral indexes produced the ‘most plausible’ results with broader clothing product definitions.
Conclusions

- Characteristic extraction more difficult with some footwear and accessory indexes – sparse text data means some heterogeneity still exists in our broader product definitions

- At the published level, experimental multilateral results broadly comparable with CPI equivalent
Further development

- Web scrapers maintained by ABS Prices Branch – funding attempts to expand across organisation
- Alternative strategies for forming clustered homogenous products
- Alternative strategies for respondent aggregation
- Alternative strategies for weighting individual products within clustered homogenous definitions
Questions?