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Title: Matching, grouping and linking: What impact does the product specification have on a Fisher price index?

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Abstract (maximum length of 400 words)

Before applying any index compilation method to scanner data, a decision must be made on the product definition. The individual product is the statistical unit which is tracked over time and corresponds to the input of, for example, a multilateral price index. When specifying individual products, one needs to consider the time, outlet and product dimensions (Eurostat, 2021a). An average price (unit value) is calculated over days or weeks of the reference period, over outlets, and possibly over item codes. The specification of the individual product can have a significant impact on the final index.

Tightly specified individual products may cause a bias as new and disappearing products in the two comparison periods are not taken into account in a matched price index. This can especially be a concern if the pricing strategy depends on the life-cycle of a product (Eurostat, 2021b). Broadly specified individual products may cause a bias as the underlying transactions that make up the individual product may not be of the same quality. This trade-off has been referred to as assignment versus assortment bias (Von Auer, 2017), and is also the underlying idea in the MARS method (Chessa, 2019). One challenge is to quantify this trade-off in order to evaluate different product specifications in practice. In this paper, we examine this problem in the particular context of a Fisher price index.

We start with a *matched* Fisher index based on a tight product specification. We then consider a *hybrid* Fisher index (Diewert and von der Lippe, 2010) calculated by first grouping some of the individual products of the tight specification and then applying a Fisher index to these broader individual products. Finally, we consider an *imputation* Fisher index (de Haan, 2001) which is based on the tight product specification but which links observed with imputed prices for the unmatched individual products. We compare these three indices in order to assess matched-model bias and unit value bias. We extend the analysis defined in the bilateral context to multilateral methods which primarily aim at avoiding chain drift bias.

Our practical conclusion is to prefer the broad over the tight product specification if the matched-model bias of the tight specification outweighs the unit value bias of the broad specification, and vice-versa. Imputation should best be considered if both lack-of-matching bias and unit value bias are large.

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