

*17th Ottawa group meeting
Rome, 7 – 10 June 2022*

Title: Household Inventory, Temporally Sales, and Price Indices

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Abstract (maximum length of 400 words)

Large-scale household inventory buildups occurred in Japan five times over the last decade, including those triggered by the Tohoku earthquake in 2011, the spread of COVID-19 infections in 2020, and the consumption tax hikes in 2014 and 2019. Each of these episodes was accompanied by considerable swings in GDP, suggesting that fluctuations in household inventories are one of the sources of macroeconomic fluctuations in Japan. In this paper, we focus on changes in household inventories associated with temporary sales and propose a methodology to estimate changes in household inventories at the product level using retail scanner data. We construct a simple model on household stockpiling and derive equations for the relationships between the quantity consumed and the quantity purchased and between consumption and purchase prices. We then use these relationships to make inferences about quantities consumed, consumption prices, and inventories.

Next, we test the validity of this methodology by calculating price indices and check whether the intertemporal substitution bias we find in the price indices is consistent with theoretical predictions. We empirically show that there exists a large bias in the Laspeyres, Paasche, and Törnqvist price indices, which is smaller at lower frequencies but non-trivial even at a quarterly frequency and that intertemporal substitution bias disappears for a particular type of price index if we switch from purchase-based data to consumption-based data.

We presented some of our key empirical results at the 16th Ottawa Group Meeting in 2019, but only provided an overview of our model. At the 2022 meeting, we will primarily provide a detailed description of our model and how it can be applied to the scanner data to reduce a bias in chained price indices.

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