

# Role of retail chains in inflation measurement and price dynamics

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A study by Columbia Business School Professor Emi Nakamura, Chazen Senior Scholar at The Jerome A. Chazen Institute of International Business at Columbia Business School and David W. Zalaznick Associate Professor of Business, Finance and Economics, featured in the *Journal of Econometrics*, found that retailer characteristics are crucial determinants of heterogeneity in pricing dynamics, in addition to product characteristics.

Alongside Alice Nakamura, Professor of Business Economics, School of Business, University of Alberta, and Leonard Nakamura, Vice President and Economist, [Federal Reserve Bank](#) of Philadelphia, Professor Nakamura studied grocery price dynamics. Previously, research based on store scanner data emphasized differences in price dynamics across products. Instead the researchers studied differences in price movements across different grocery store chains. A variance decomposition revealed that characteristics at the level of the chains (as opposed to individual stores) explain a large fraction of the total variation in price dynamics. The study is of particular interest to central bankers and macroeconomists as well as price index specialists who analyze price dynamics.

One reason for why previous studies in this area relied on data that focused on heterogeneity in pricing behavior across products is that product category data is more available in broad-based price databases such as in the research database associated with the United States' [Consumer Price Index](#) (CPI). In this new study, the researchers decided

to use a dataset consisting of millions of price observations per year at a large number of grocery stores in numerous retail chains to document the nature and dispersion of high frequency price dynamics across stores and chains in addition to products. The researchers constructed weekly average prices (i.e., unit prices) for products defined at the Universal Product Code (UPC) level by dividing store level dollar sales by the sales volumes.

The empirical analysis confirmed that temporary sales, which occur frequently in many stores, are important determinants of price dynamics in the United States. To investigate the implications of this phenomenon, Professor Nakamura and her colleagues compared price index measures calculated using all prices and those calculated using only "regular prices" (i.e., using only prices excluding temporary sales). The study found that a substantial amount of the variation in the prevalence of sales across stores is accounted for by differences among chains.

Another key finding of the study is that the measurement of temporary sales matters for inflation measurement, analysis, and forecasting purposes. The results show that the implications of temporary sales for index number measurement cannot be ignored when constructing price indexes. In addition, the study reveals that retailer characteristics are crucial determinants of heterogeneity in pricing dynamics.

In terms of future implications, conclusions about the importance of chain-level pricing can potentially help improve the efficiency of CPI sampling. The results also imply that the chain drift problem, the possible bias that can arise when separate price indexes are linked, will not be solved solely by averaging data across stores within retail chains.

The study's analysis is based on proprietary scanner price data, consisting of weekly price and quantity observations for product sales at grocery stores across the United States. The scanner dataset is from a national

sample of hundreds of grocery stores belonging to numerous grocery chains. The dataset represents over 20 billion dollars of retail sales annually for thousands of UPCs, with tens of millions of observations per year.

Provided by Columbia Business School

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