

How producer price changes transmit into final goods prices*



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The most recent surge in inflation rates in many industrialized countries has led to an increased interest in understanding price-setting behavior. Using microdata underlying the official Swedish producer price index (PPI) and consumer price index (CPI), we examine the pass-through from intermediate goods prices to final goods prices. We find a robust pass-through, in line with theoretical models emphasizing production inter-linkages between sectors. Upstream pricing seems much more rigid than downstream pricing in the supply chain and the pass-through across CPI products varies substantially with price-change frequencies. The recent COVID- and high-inflation periods do not change the main results.

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The most recent surge in inflation rates in many industrialized countries has led to an increased interest in understanding price-setting behavior. A key metric for investigating inflation dynamics is the price pass-through along the supply chain, i.e. by how much a change in producer prices (intermediate goods) transmit into changes in consumer prices (final goods). The theoretical literature typically highlights the important role of a significant pass-through from producer to consumer prices in economies with strong inter-linkages between sectors where upstream pricing shapes downstream cost (Baqae and Fahri, 2022; Acemoglu et al., 2012).

In a recent paper, we use a novel granular price data set and provide robust evidence of a strong price pass-through (Ahlander et al, 2023). In particular, we provide new empirical evidence on the pass-through from producer to consumer prices, utilizing product-level data comprising all of the price observations underlying the official Swedish producer and import price index (PPI) and consumer price index (CPI). Importantly, we establish a link between products in the PPI and CPI by merging related product groups observed in both price indices. Examples of product groups included in both the PPI and CPI are food, furniture and fuels for transportation.

The advantages of microdata

This merge enables us to investigate the price pass-through at the very granular level, which offers several important advantages compared to estimates at the aggregate level. First, organizing the data in comparable product groups solves any issues with differences in the composition of the two aggregate indices, as emphasized by e.g. Clark (1995) when discussing reasons that would weaken the link between aggregate PPI and CPI indices. Secondly, with group-level data it is possible to control for any general equilibrium feedback effects that influence the interpretation of a regression of one aggregate price index on another. Third, the large cross-sectional variation of our micro price data should reduce estimation uncertainty on the relation between producer and consumer prices. Finally, pooling the data might mask important heterogeneity across individual product groups. We indeed show that the price-change frequency across product groups significantly influences the price pass-through. Our micro price data set, which covers the period from January 2010 to September 2022, further allows for an in-depth analysis on the pass-through during the recent COVID and high-inflation episodes.

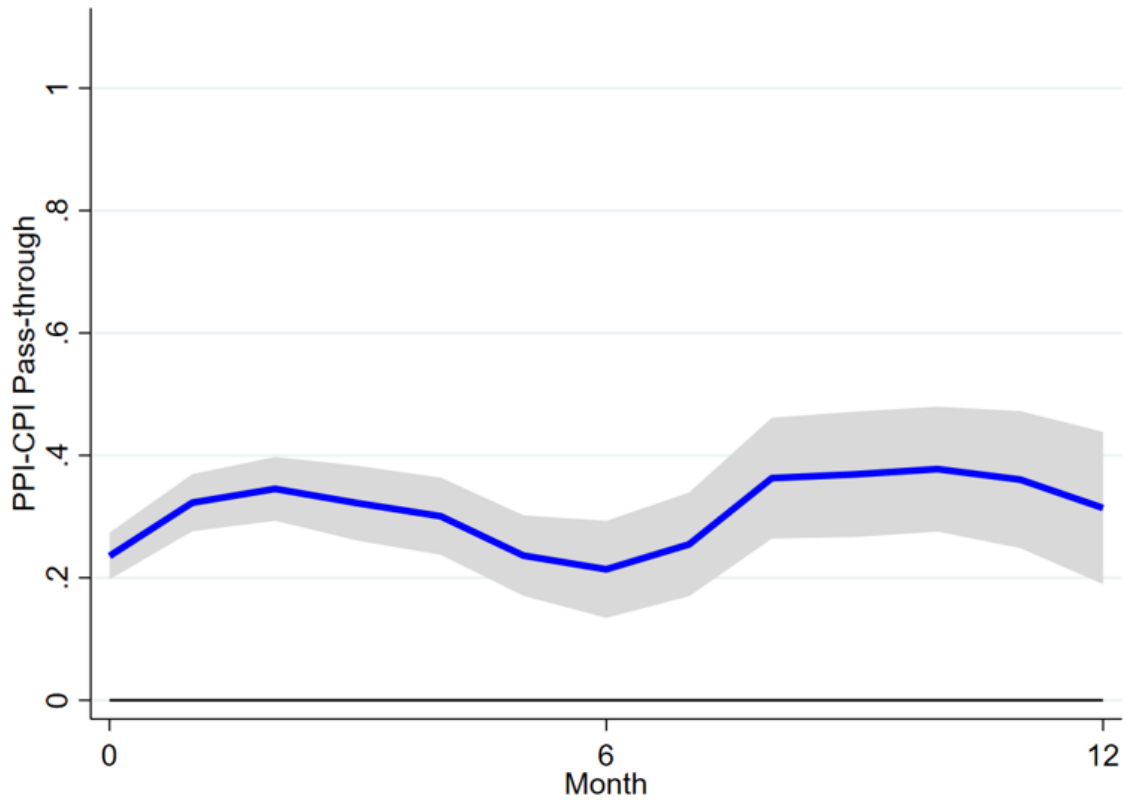
To evaluate the price pass-through, we estimate local projections relating cumulated changes in consumer prices to cumulated changes in producer prices. Our baseline model is set up to trace the dynamic group-level response of consumer prices to a shock to producer prices. In particular, throughout we control for aggregate shocks common to both consumer and producer prices and past innovations to producer prices by including current and lagged values of the aggregate CPI as well as lags of producer prices at the group level, respectively.

Immediate and constant price-pass through

Figure 1 shows our baseline results. As we see from the figure, the price pass-through is very rapid. An increase in producer prices by 1 percent leads to an increase in consumer prices by about 0.25 percent within the same month. Thus, at the very short horizon, one fourth of the change in producer prices is transmitted into consumer prices. After two months, consumer prices are up by around 0.35 percent and the pass-through approximately stays at this level for the duration of the period of elevated producer prices. Given the large cross-sectional variation in the data, the estimated price pass-through is relatively precise with tight confidence bands up to 12-months out.

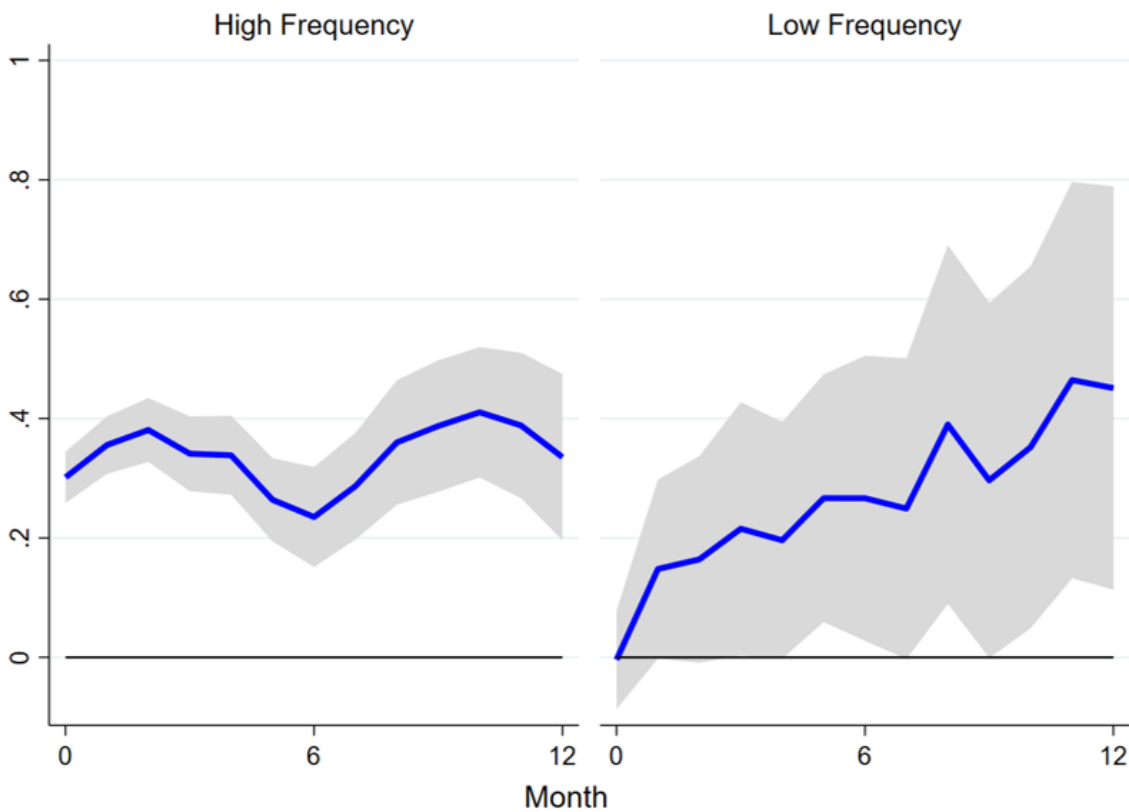
The very fast pass-through does point away from Calvo-style staggered contracts being important in the consumer sector. Instead, the evidence points towards a flexible- or menu-cost model where a large and self-selected share of price changers rapidly perform the bulk of the overall group-level adjustment, which continues over time and upholds a more or less constant group-level pass-through.

Figure 1: PPI-CPI Pass-through



Notes: Cumulative Impulse Response of Producer Prices on Consumer Prices estimated with baseline model. Shaded areas indicate 90% confidence bands.

Figure 2: Pass-through by Price-Change Frequency Groups



Notes: Cumulative Impulse Response of Producer Prices on Consumer Prices estimated with baseline model on sample splitted at the COICOP level by price-change frequency in consumer prices. Shaded areas indicate 90% confidence bands.

Heterogeneity and recent inflation episode

Our findings further reveal strong heterogeneity across product groups. In particular, we find that the price-change frequency in CPI groups significantly influences the price pass-through (see Figure 2). For groups with a high price-change frequency, like fuels for transportation or typical food items, the pass-through is immediate reaching its peak already after two months. In stark contrast, the pass-through is much more sluggish for product groups with a low price-change frequency, such as motor cycles or durables. While the immediate and constant adjustment for the high-frequency groups is well in line with the predictions of a flexible- or menu-cost pricing model, the prolonged gradual adjustment for the low-frequency groups better matches the predictions of a standard Calvo-pricing model. Importantly, by relying on granular data we are able to detect such significant heterogeneity whereas pooled analyses at the aggregate level mask important non-linearities. Overall, this heterogeneity in impulse response indicates that the price-setting behavior is substantially different across these groups. Moreover, when using disaggregated PPI data to predict the future development of CPI inflation, it strongly matters which product group we are looking at. All in all, the pass-through results above points to important differences in the pricing behavior, both along the supply chain and across product groups.

The most recent episode does not significantly influence our main results. When dropping either the COVID period (January 2020 and onwards) or the high-inflation period (April 2021 and onwards), the estimated price pass-through is remarkably similar to our baseline estimates. This indicates that how changes in producer prices transmit into changes in consumer prices is relatively stable across time and did not significantly change in the most recent past. ■

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