

Monetary policy pass-through to consumer prices: Evidence from granular price data

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Outline

- 1 Introduction
 - Motivation
 - This paper
 - Literature
- 2 Empirical framework
 - Data
 - Model set-up
- 3 Main findings
 - Heterogeneous transmission within the core consumption basket
 - Mechanisms of monetary policy pass-through to prices
- 4 Conclusions

Motivation

Monetary policy transmission to prices:

- Monetary policy affects prices through both direct and indirect channels
- Items with high intertemporal elasticities of substitution of expenditures most sensitive to changes in income, real rates (*Mankiw, 1985; Parker, 1999*)
- Items typically requiring credit are likely to have the earliest and sharpest response to monetary policy shocks (*Bernanke and Gertler, 1995*)

↪ Complex and varied channels imply **pass-through of changes in monetary policy can vary across consumption items**

Motivation

- The ECB modelling toolbox can provide indications of the impact of monetary policy actions on aggregate inflation but aggregate data offers limited information on transmission of monetary policy as the *effects of these channels can vary across consumption items*
- The 2021-2022 inflation surge has raised questions about the persistence of core inflation, and the speed and strength of MP transmission to consumer prices

↪ Assessing the **monetary policy transmission across consumption items** can be **informative about** the channels and strength of **overall monetary policy transmission to inflation**.

What we do

- ① Investigate whether monetary policy transmits **heterogeneously to different consumption items within the core inflation basket in the euro area**
 - Main specification: Bayesian VARs
 - Robustness: Smooth Local Projections
- ② Categorise items as i) sensitive and ii) non-sensitive to monetary policy
 - ↳ Investigate characteristics of the sensitive items related to different hypotheses on monetary policy transmission (e.g., frequency of price changes, administered prices, discretionary character of the items)
- ③ Has transmission to disaggregated prices become stronger lately?

What we find

- ① Sensitive categories comprise around 33% of euro area core HICP basket and largely consist of durable goods, services and goods related to maintenance and repair or of dwellings, and transport and recreation services
- ② Sensitive items **are more frequently consumed by high-income households** and their prices are **more sensitive to changes in consumer credit**
- ③ There is a **considerable overlap between non-sensitive items and administered prices** in the euro area countries
- ④ **Most recent tightening cycle** exhibits pass-through that appears **stronger**

Existing evidence

- ① **On euro area transmission** \hookrightarrow modest impact of monetary policy on aggregate consumer price indicators: Jarociński and Karadi (2020), Slacalek et al. (2020)
- ② **On disaggregated prices** \hookrightarrow high intertemporal elasticity of substitution leads to larger response of expenditure of a consumption item to shocks: Mankiw (1985), Parker (1999), Browning and Crossley (2000), Grigoli and Sandri (2023).
- ③ **On disaggregated prices and mon. policy** \hookrightarrow relatively small role of macroeconomic shocks in explaining disaggregated prices: Boivin et al. (2009).; varying timing and magnitude of the responses across U.S. price categories: Aruoba and Drechsel (2024)
- ④ **On the role of household characteristics** \hookrightarrow : differences in consumption baskets and income shape sensitivity to shocks: Cravino et al. (2020), Orchard (2022), Ampudia et al. (2023)

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Data

- **Variables of interest:** 72 seasonally-adjusted items of the **core inflation (HICPX)** basket (4-digit COICOP level)
- **Sample:** 1999/early 2000s depending on the availability of the item, until September 2023
- **Monetary policy shocks** as in *Jarociński and Karadi (2020)*, updated using the database of surprises by *Altavilla et al. (2019)*
- The block of **controls** (mom growth rates): HICP, HICPX, industrial production, unemployment rate, negotiated wage growth, EURIBOR 3 months, 1-year German Bund yield, BBB bond spread, EUROSTOXX, nominal effective exchange rate, Oil price, producer price index, PMI delivery times index, GSCPI of Benigno et al. (2022)

Bayesian VARs

- A VAR, estimated for each item i , helps us ‘impose’ some structure to our specification:

$$Y_{i,t} = A_{i,0} + A_{i,1} Y_{i,t-1} + \dots + A_{i,p} Y_{i,t-p} + u_{i,t}, \quad (1)$$

Y_i is the $N \times 1$ vector of endogenous data, A_0 the vector of intercepts, A_l the corresponding matrices for $l = 1, \dots, p$ lags, u is the vector of errors.

- Bayesian estimation accounting for (i) heavy tails as in Chan (2020), and (ii) outlier-correction, as in Stock and Watson (2016) and Carriero et al. (2022).
- Identification following internal instrument approach, Ramey (2011), Plagborg-Møller and Wolf (2021), Paul (2020), Noh (2024)

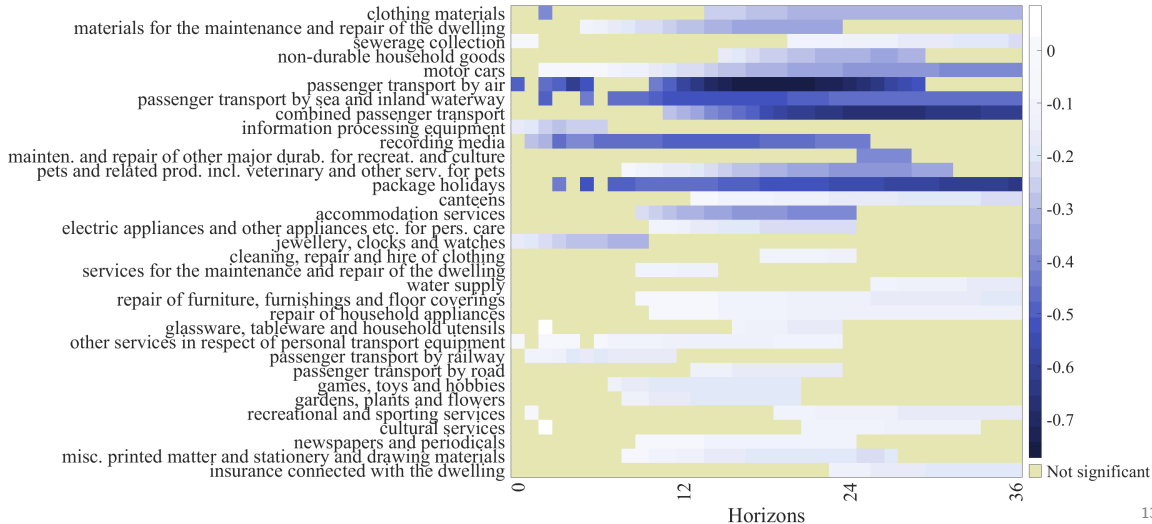
Categorisation of items

- For each item, we identify periods *within* 36 months after the shock with at least three consecutive months of negative and statistically significant price response
- Items with at least one such period are classified as **items sensitive to monetary policy**, the remaining ones are classified as not sensitive
- Additionally, we distinguish between **highly- and moderately-interest rate sensitive items**: maximum (negative) response above/below the median value across sensitive items

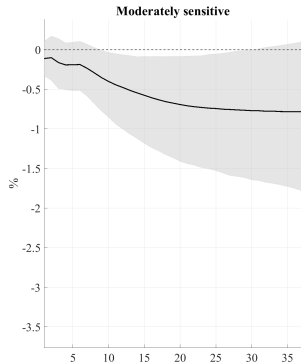
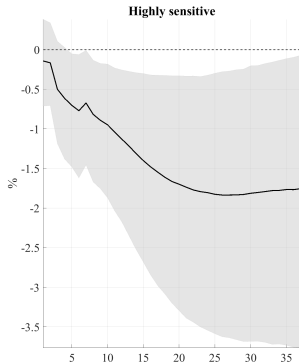
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Which items comprise the categories?



Core inflation items and monetary policy



- Sensitive items account for 33% of HICP basket
- MP shocks have around 2.5 times larger (peak) impact on highly-sensitive items as compared to moderately sensitive items

Which characteristics of HICPX items matter for their sensitivity to monetary policy?

Are properties and dynamics of interest-sensitive items consistent with theories and predictions regarding the impact of monetary policy on consumption and inflation?

- flexibility of prices Hong et al. (2023), Gautier et al. (2024), Alvarez et al. (2024)
- intertemporal elasticity of substitution and discretionary spending Browning and Crossley (2000), Grigoli and Sandri (2023)
- financial constraints Browning and Crossley (2000)

Frequency of price adjustments

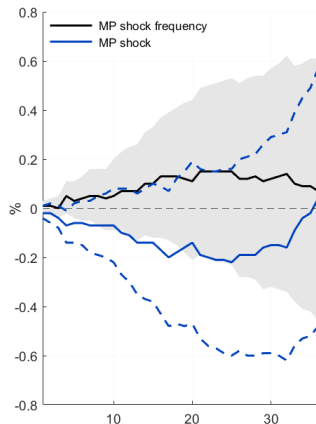
Frequency of price changes

Consider the following *panel* local projection of the 72 COICOP-4 items:

$$y_{i,t+h} - y_{i,t} = \alpha_{2,i}^{f,(h)} + \beta_1^{f,(h)} MP_t + \beta_2^{f,(h)} MP_t \times \mathbf{Freq}_i + \sum_{j=1}^M \gamma_j^{f,(h)} X_{i,t-j} + u_{t+h}^f,$$

where $Freq_i$ is the estimate of price change frequency for item i from Gautier et al. (2024). $X_{i,t-j}$ is the set of controls as in the BVAR and the sample ends in 2019 (pre-inflation surge).

Frequency of price changes and responses of COICOP-4 prices to a monetary policy shock



- Frequency of price changes does not explain the relative sensitivity of core items to MP shocks
 - Possibly related to exclusion of energy/food, sample period etc.,
▸ HICP results
- Larger size of price changes strongly associated with higher responsiveness
 - Size of price changes

The role of credit

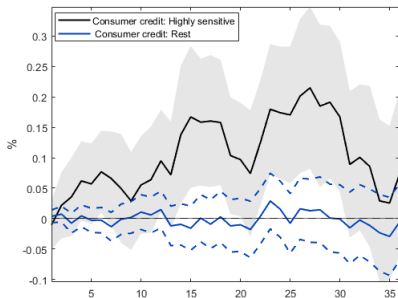
Monetary policy sensitivity and the credit channel

Consider the following *panel* local projection of the 72 COICOP-4 items:

$$y_{i,t+h} - y_{i,t} = \alpha_i^{(h)} + \beta_1^{(h)} \Delta CCredit_t + \beta_2^{(h)} \Delta CCredit_t \times \mathbf{I}_i + \sum_{j=1}^M \gamma_j^{(h)} X_{i,t-j} + u_{i,t+h}. \quad (2)$$

where \mathbf{I}_i is a dummy variable equal to one if the i -th core inflation item is (highly) sensitive to monetary policy changes and $\Delta CCredit_t$ stands for the month-on-month change in new consumer loan volume (excluding revolving loans and overdrafts, convenience and extended credit card debt). We instrument $\Delta CCredit_t$ with twelve lags of the monetary policy shocks from Jarociński and Karadi (2020). Set of controls as before, but also include a dummy for the COVID-19 years.

Changes in consumer credit flows and price movements of sensitive items



- Some tentative evidence on the link between consumer credit and inflation of consumption items
- Changes in consumer credit flows are associated with larger price movements of highly-sensitive items
 - Less evidence when comparing overall sensitive with non-sensitive categories

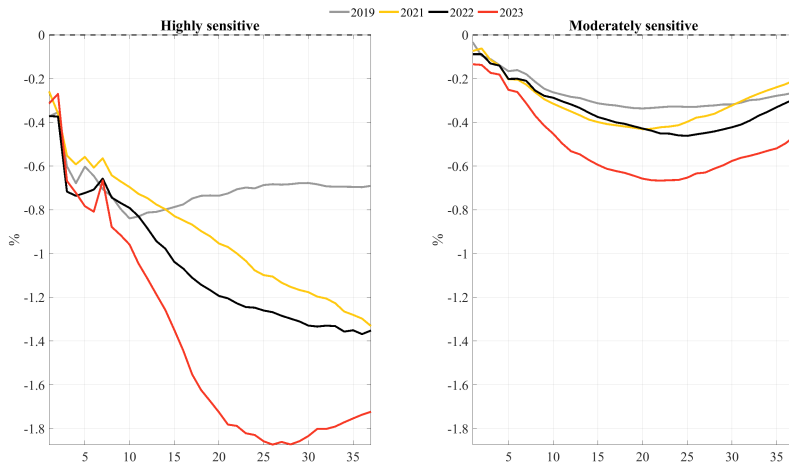
Additional relevant mechanisms

In the Appendix:

- ① Discretionary spending and household characteristics ▶ Results
 - Idea: Use the Household Budget Survey conducted by the Eurostat every five years to compare consumption shares on HICPX items by their interest-sensitive category among low- and high-income households
 - Main result: Items categorized as 'sensitive' are those of discretionary nature, more frequently purchased by higher-income households
- ② Administered prices ▶ Results
 - Idea: Eurostat classification done at country-level; item marked as administered if it has regulated status in countries accounting for a least 50% of EA HICP.
 - Main result: Administered prices are present mostly among items that are not sensitive to monetary policy

Time-varying transmission

Evidence of time-variation



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Conclusions

- We adopt a **granular approach** in examining the transmission of monetary policy in the euro area by looking at **responsiveness of prices of individual HICPX items to monetary policy shocks**
- Main findings:
 - ① Sensitive categories comprise around 33% of HICPX, and include items of discretionary nature, primarily consumed by high-income households; their prices are more correlated with changes in consumer credit
 - ② Not-sensitive items have a considerable overlap with administered prices, but differences in price flexibility do not seem to fully explain our results
 - ③ The recent monetary policy tightening cycle has been characterised by a stronger transmission to consumer prices

Appendix

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Smooth local projections

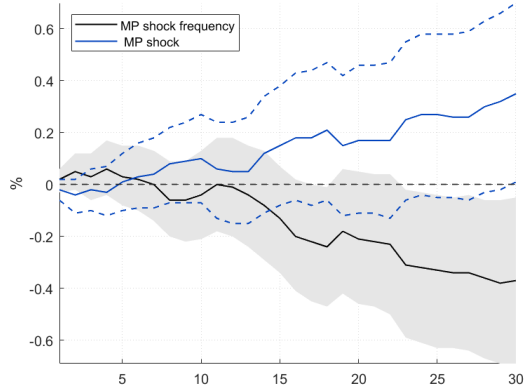
- We pin down HICPX items sensitive to monetary policy through smooth local projections (*Barnichon and Brownlees, 2019*):

$$y_{i,t+h} - y_{i,t} = \alpha_{0,i}^{(h)} + \beta_{1,i}^{(h)} MP_t + \sum_{j=1}^M \gamma_{i,j}^h X_{i,t-j} + u_{t+h}, \quad (3)$$

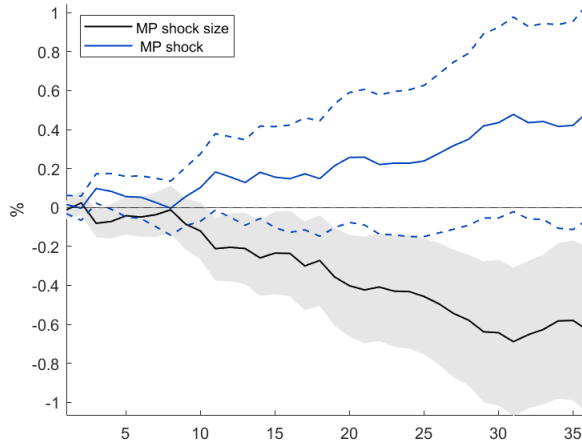
where $y_{i,t+h}$ is the log price of the i -th item in HICPX at time $t+h$, MP_t is the monetary policy shocks by *Jarocinski and Karadi (2020)*, $X_{i,t-j}$ is a vector of controls, u_{t+h} is the forecast error at horizon h .

- **Why SLP?** Methodology based on B-spline smoothing as a remedy to the excessive variability of baseline LPs; can also allow for heteroskedasticity and autocorrelation robust standard errors.

Frequency of price changes and response to monetary policy: full HICP basket



Size of price changes and response to monetary policy: HICPx basket



Discretionary spending and household characteristics

- Hypothesis: Items categorized as 'sensitive' are those of discretionary nature, possibly more frequently purchased by higher-income households
- We use the Household Budget Survey (HBS) conducted by the Eurostat every five years to compare consumption shares on HICPX items by their interest-sensitive category among i) low- and high-income households, ii) employed manual workers, employed non-manual workers and unemployed.
- We aggregate the COICOP-4 results at COICOP-3 level to match the HBS data and consider the largest six euro area economies (euro area aggregates available for 2010 only)

Evidence from the Household Budget Survey

Table: Difference in the share of consumption baskets spent on COICOP-3 HICPX items by their monetary policy sensitivity: High-income versus low-income households (%).

	2010		2015		2020	
	Non-sens.	Sensitive	Non-sens.	Sensitive	Non-sens.	Sensitive
EA	-14.0	52.8				
BE	-10.3	52.2	-21.0	74.4	-31.1	53.2
DE	-19.2	55.6	-26.1	57.3	-24.0	52.0
ES	0.7	61.3	2.4	63.6	-7.4	57.4
FR	-26.2	43.5	-27.5	49.4	-27.5	49.4
NL	-14.1	35.8	-27.0	62.8	-24.0	56.0
No. items	21	13	21	13	21	13

Notes: The Table shows percentage differences in the share of consumption baskets spent on items sensitive- and non-sensitive to monetary policy shocks by households in the 5th quintile of income distribution compared to 1st income quintile households. Consumption shares come from HBS.

Administered prices

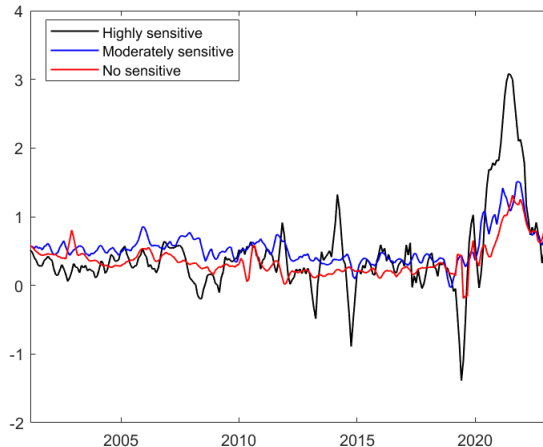
Administered prices are present mostly among items that are not sensitive to monetary policy:

Table: Administered prices and interest-rate sensitivity

	HICPX	Sensitive	Non-sensitive
number of items	72	33	39
weight in HICP	681.3	213.1	468.2
number of items with adm. prices	13	4	9
weight in HICP (HICP=1000)	107	19.4	87.6

Notes: The table shows the number of items with administered prices among the 72 COICOP-4 HICPX items in the euro area. An item is classified as administered if it was classified as such by Eurostat in 2021 in countries accounting for at least 50 percent of the euro area HICP basket.

Dynamics of sensitive and non-sensitive HICPX inflation over time (3m-on-3m percentage changes)



Selection of items across time

