

# The Cost Channel of Monetary Policy: Evidence from Euro Area Firm-level Survey Data <sup>1</sup>

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<sup>1</sup>The views expressed are those of the authors and do not necessarily reflect those of the European Central Bank or the Eurosystem.

# Motivation

- ▶ How do firms change their prices with changes in monetary policy?
- ▶ Aggregate demand: Models usually assume that changes in monetary policy have an effect on the economy via the **demand channel**
- ▶ Aggregate supply: But several papers stress the importance of the **supply channel**, which might lead to a more muted (or even inverse) response, especially on the short term (e.g. Barth and Ramey, 2002; Christiano et al. 2005; Chowdhury et al. 2006; Ravenna and Walsh, 2006 - 2008; Rabanal, 2007; Surico, 2008; Tillmann, 2008; Henzel et al., 2009)

# This Paper

- ▶ Aims at empirically assessing the **cost channel** of monetary policy transmission in the euro area focusing on the recent monetary policy hiking cycle
  - ▶ Higher nominal interest rates increase firms' marginal costs → role of **working capital exposure**
- ▶ Uses survey data on firms' expected selling prices and credit register for their working capital exposure to study the transmission of monetary policy to selling prices
- ▶ Focuses on understanding the impact of monetary policy on firms' pricing plans by comparing the survey replies of firms given just before / after ECB Governing Council Meetings

## Main result:

- ▶ Rate hikes captured by monetary policy surprises lead to higher expected selling prices for firms with relatively larger exposure for the financing of working capital

# Data

## ▶ Survey on the access to finance of enterprises (SAFE)

- ▶ Firms' selling price expectations one year ahead
- ▶ Use firms' daily replies from 4 survey waves - between: (1) 6 March - 14 April 2023; (2) 25 May - 26 June 2023; (3) 4 September - 18 October 2023; (4) 1 February - 12 March 2024

## ▶ AnaCredit

- ▶ Credit register of the European System of Central Banks which contains information on all individual bank loans to firms at a monthly frequency
- ▶ For each instrument, it reports the interest rate charged by the issuing bank, outstanding and off-balance amount, maturity and other characteristics
- ▶ The purpose of the loan is also specified: here focus on *working capital loans*

## ▶ Monetary policy surprises

- ▶ Monetary policy surprises as in Altavilla et al. (2019), who use high-frequency data on asset prices around the policy decision and the press conference to measure four factors that are able to capture almost all the variation in the yield curve
- ▶ Focus on the *target* component which explains the changes in the short end of the yield curve, especially the 1-month OIS for the GovC meetings on (1) 16 March 2023; (2) 15 June 2023; (3) 14 September 2023; (4) 7 March 2024.

# Estimation and identification (1)

- ▶ We focus on firms' indicating their selling price expectation before/after ECB Governing Council Meetings/Press conferences Descriptive statistics
  - ▶ Firms replying after the Meeting learn about higher interest rates
  - ▶ A large share of firms replying to the survey is captured in this time window
  - ▶ The day on which firms reply to the survey is exogenous → firm characteristics are uncorrelated with treatment status Balance table firms
  - ▶ Select optimal time window of up to 6 days before/after Meetings: Difference in firms' selling price expectations for firms replying before/after the Meeting Difference in expected selling price around Meetings
- ▶ Related literature:
  - ▶ Enders, Hünnekes and Müller (2019), Bottone and Rosolia (2019), Ferrando and Forti Grazzini (2023)
  - ▶ Di Pace, Mangiante and Masolo (2024): UK firms' price expectation respond to actual interest rate changes but not to high-frequency surprises

## Estimation and identification (2)

- ▶ Estimate the impact of monetary policy shocks on selling price expectation of firms
- ▶ With a focus on the working capital exposure of the firm
  - ▶ SAFE firms behave similarly to the universe of firms in AnaCredit Interest rates working capital loans
  - ▶ We consider on- and off-balance-sheet loans, as well as total loans Working capital shares
  - ▶ Firms replying in the days before and after the Meeting are similar in their *borrowing* characteristics Borrowing characteristics
- ▶ Related literature:
  - ▶ Gaiotti and Secchi (2006): the effect of interest rates on prices is intrinsically linked to the role of working capital in the production process of the firm, that is, in the end, to a temporal mismatch between factor payments and sales receipts

## Estimation and identification (3)

We estimate the following equation:

$$Y_{it} = \alpha_i + \delta_t + \beta WKexposure_i \times MPShock_t \times Post_t + \Gamma Controls + \varepsilon_{it} \quad (1)$$

where:

- ▶  $i$  denotes firm
- ▶  $t$  denotes daily time
- ▶  $Y_{it}$  denotes firm's selling price expectations specified on a given day around the Meeting
- ▶  $MPShock_t$  refers to monetary policy shocks
- ▶  $Post_t$  captures the days after the Meeting
- ▶  $WKexposure_i$  denotes firms' exposure to working capital financing in the month preceding the Meeting (in terms of total debt)
- ▶  $\alpha_i$  denotes firm fixed effect
- ▶  $\delta_t$  denotes time fixed effect
- ▶  $Controls$  stands for firm level controls

# Change in firms' one year ahead selling price expectations

	(1)	(2)	(3)	(4)	(5)
	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.
Post*MPS	0.0621 *** (0.0134)	0.0965 *** (0.0207)	0.0969 *** (0.0246)	0.0790 *** (0.0270)	0.0907 *** (0.0240)
OnWK			-2.8170 (2.3859)		
OffWK				-3.2973* (1.7078)	
TotWK					-0.4173 (3.0133)
<i>N</i>	9168	2359	1577	1300	1698
<i>R</i> <sup>2</sup>	0.034	0.651	0.649	0.664	0.654
<i>R</i> <sup>2</sup> adj.	0.0317	0.3391	0.3308	0.3627	0.3408
Day FE	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	Yes	Yes

*Notes:* The table shows the effect of monetary policy surprises (target) on firms' one year ahead selling price expectations considering a 6-day time window before and after the Governing Council meetings of the ECB.

\*\*\* = significant at 1-percent level; \*\* = significant at 5-percent level; \* = significant at 10-percent level.



## Change in firms' one year ahead selling price expectations: *the role of working capital exposure*

	(1) $\Delta$ sellp.	(2) $\Delta$ sellp.	(3) $\Delta$ sellp.
OnWKxMPSxPost	0.1212** (0.0561)		
OffWKxMPSxPost		0.1112** (0.0459)	
AllWKxMPSxPost			0.1330*** (0.0508)
<i>N</i>	1577	1300	1698
<i>R</i> <sup>2</sup>	0.638	0.659	0.647
<i>R</i> <sup>2</sup> adj.	0.3111	0.3534	0.3284
Day FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

*Notes:* The table shows the effect of monetary policy surprises (target) on firms' one year ahead selling price expectations considering a 6-day time window before and after the Governing Council meetings of the ECB.

\*\*\* = significant at 1-percent level; \*\* = significant at 5-percent level; \* = significant at 10-percent level.

# Heterogeneous effects: the role of working capital exposure across size classes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.	$\Delta$ sellp.
OnWKxMPSxPost	0.1191*** (0.0396)			0.1293 (0.0841)			0.1913* (0.0983)		
OffWKxMPSxPost		0.1469*** (0.0285)			0.3068*** (0.0955)			0.0810 (0.0772)	
AllWKxMPSxPost			0.1382*** (0.0319)			0.1986** (0.0893)			0.1622* (0.0936)
N	2352	1943	2569	505	440	540	191	160	199
R <sup>2</sup>	0.603	0.627	0.610	0.621	0.684	0.643	0.669	0.671	0.669
R <sup>2</sup> adj.	0.2723	0.3157	0.2879	0.2588	0.3870	0.3079	0.3165	0.3112	0.3176
Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. employees	1-49	1-49	1-49	50-249	50-249	50-249	>250	>250	>250

*Notes:* The table shows the effect of monetary policy surprises (target) on firms' one year ahead selling price expectations considering a 6-day time window before and after the Governing Council meetings of the ECB.

ECB Governing Council Meetings considered: 16 March 2023, 15 June 2023, 14 September 2023.

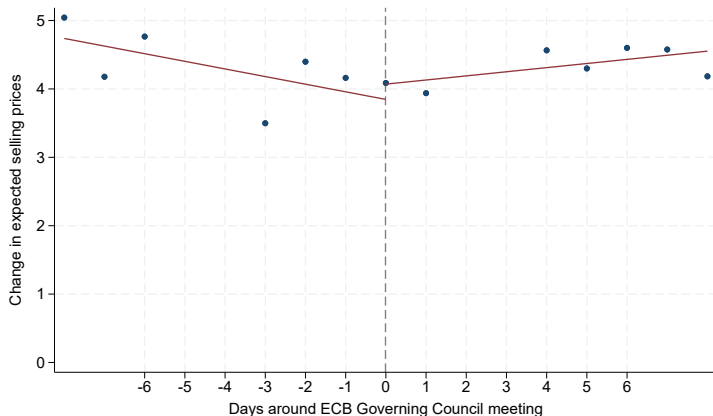
\*\*\* = significant at the 1-percent level; \*\* = significant at 5-percent level; \* = significant at 10-percent level.

# Conclusion

- ▶ Rate hikes captured by monetary policy surprises lead to higher expected selling prices for firms with working capital exposure
- ▶ Heterogeneous effects by observable firm characteristics (size)
- ▶ Ongoing work
  1. Explore in detail relevant dimension of heterogeneity, including:
    - ▶ firms' cost and financing structure and market power
    - ▶ the intensity of their lending relationships
    - ▶ the balance sheet conditions of their lenders, therefore establishing a link between the cost channel and the lending channel of monetary policy
    - ▶ the corresponding heterogeneous implications for quantities (on top of those on prices)
  2. Assess implications for the conduct of monetary policy
    - ▶ the presence of a cost channel entails a higher degree of gradualism of monetary policy transmission

**Thank you!**

# Selling price expectations of firms *around the days* of the ECB Governing Council meetings



*Notes:* The chart shows a binned scatter plot for the expectations of selling prices for firms replying up to 6 days before/after the ECB Governing Council meeting.

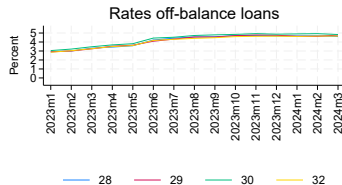
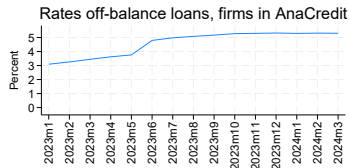
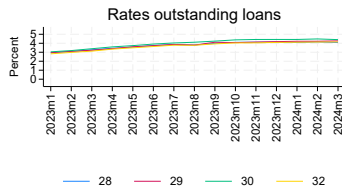
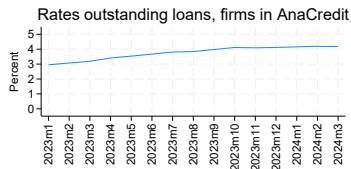
# Characteristics of firms replying to the SAFE survey before and after the MP shocks)

	Before mean/sd	After mean/sd	T-statistics of the difference
Size, 1-9 empl.	0.35 (0.48)	0.37 (0.48)	-3.05**
Size, 10-49 empl.	0.29 (0.46)	0.31 (0.46)	-1.83
Size, 50-249 empl.	0.26 (0.44)	0.24 (0.43)	2.54*
Size, >=250 empl.	0.10 (0.30)	0.08 (0.27)	4.13***
Industry	0.25 (0.44)	0.25 (0.43)	1.22
Construction	0.12 (0.33)	0.12 (0.33)	0.03
Trade	0.23 (0.42)	0.23 (0.42)	-0.69
Services	0.39 (0.49)	0.40 (0.49)	-0.51
Age at least 10 yrs.	0.90 (0.31)	0.91 (0.29)	-1.92
Age between 5-10 years	0.07 (0.26)	0.06 (0.24)	1.94
Age between 2-5 yrs	0.03 (0.16)	0.03 (0.16)	0.15
Age below 2 yrs	0.01 (0.08)	0.01 (0.07)	0.72
Public shareholders	0.03 (0.16)	0.02 (0.14)	2.08*
Family/entrepreneurs	0.42 (0.49)	0.43 (0.50)	-1.82
Other firm	0.15 (0.36)	0.14 (0.35)	0.80
Venture capital	0.01 (0.09)	0.01 (0.09)	0.13
One owner, natural p.	0.36 (0.48)	0.36 (0.48)	-0.16
Observations	7292	9371	16663

Notes: The table shows the characteristics of firms replying 6 days before and 6 days after the ECB Governing Council meetings and the significance of the average difference between the two groups of firms (t-statistics).

\*\*\* = significant at 1-percent level; \*\* = significant at 5-percent level; \* = significant at 10-percent level. [Back](#)

# Rates on loans with working capital purpose to firms in AnaCredit and SAFE



Notes: Left panels show rates at origination of outstanding/off-balance sheet nominal amounts with working capital purpose for all firms in AnaCredit, whereas right panels show rates of outstanding or off-balance sheet nominal amounts with working capital purpose for firms in the SAFE waves. [Back](#)

## Loan characteristics of firms with working capital exposure replying before/after the Meeting

	Before mean/sd	After mean/sd	T-statistics of the difference t
Outstanding amount, Th. Eur	817.80 (2282.18)	845.40 (2572.71)	-0.42
Off-balance amount, Th. Eur	437.53 (958.45)	394.74 (901.06)	1.67
Rate outstanding amount, Percent	2.98 (3.23)	2.97 (3.24)	0.04
Rate off-balance amount, Percent	3.47 (3.73)	3.57 (3.81)	-0.93
Maturity, outstanding amount, Months	18.81 (65.99)	20.04 (74.38)	-0.64
Maturity, off-balance amount, Months	5.65 (30.28)	5.22 (34.71)	0.49
Observations	2326	3115	5441

*Notes:* The table shows the characteristics of bank loans of firms with exposure in AnaCredit replying up to 6 days before and 6 days after the ECB Governing Council meetings and the significance of the average difference between the two groups of firms (t-statistics). \*\*\* = significant at 1-percent level; \*\* = significant at 5-percent level; \* = significant at 10-percent level.



## Descriptive statistics, for firms replying around the Meeting

	Wave 28 Mean	Wave 29 Mean	Wave 30 Mean	Wave 32 Mean	Overall Mean
Expected selling price change (%)	5.47	3.94	3.33	2.76	3.97
EA HICP all-items (%)	6.88	5.52	4.34	2.50	4.80
Monetary policy surprise (bps)	21.10	-0.33	7.13	0.16	7.02
Change in policy rate (bps)	50.00	25.00	25.00	0.00	25

*Notes:* The table shows descriptive statistics for the sample of firms replying up to 6 days before and 6 days after the ECB Governing Council meetings. [Back](#)

## Working capital shares of firms replying around the Meeting

	Obs.	Min	Summary statistics			
			Mean	Median	Max	Std. dev.
On-balance-sheet loans over total debt	7985	0.00	25.14	0.56	100.00	35.48
Off-balance-sheet loans over total debt	6603	0.00	39.98	18.68	100.00	43.07
On- and off-balance sheet loans over total debt	8528	0.00	30.22	12.56	100.00	36.17

*Notes:* The table shows working capital shares of firms with exposure in AnaCredit replying up to 6 days before and 6 days after the ECB Governing Council meetings. [Back](#)