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The cost channel of monetary policy: evidence from euro area firm-level survey data

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Challenges for Monetary Policy Transmission in a Changing World Network (ChaMP)

This paper contains research conducted within the network “Challenges for Monetary Policy Transmission in a Changing World Network” (ChaMP). It consists of economists from the European Central Bank (ECB) and the national central banks (NCBs) of the European System of Central Banks (ESCB).

ChaMP is coordinated by a team chaired by Philipp Hartmann (ECB), and consisting of Diana Bonfim (Banco de Portugal), Margherita Bottero (Banca d’Italia), Emmanuel Dhyne (Nationale Bank van België/Banque Nationale de Belgique) and Maria T. Valderrama (Oesterreichische Nationalbank), who are supported by Melina Papoutsi and Gonzalo Paz-Pardo (both ECB), 7 central bank advisers and 8 academic consultants.

ChaMP seeks to revisit our knowledge of monetary transmission channels in the euro area in the context of unprecedented shocks, multiple ongoing structural changes and the extension of the monetary policy toolkit over the last decade and a half as well as the recent steep inflation wave and its reversal. More information is provided on its website.

Abstract

This paper explores empirically the cost channel of monetary policy transmission during the recent period of monetary policy tightening in the euro area. We combine unique data on firms' selling price expectation from the Survey on the access to finance of enterprises (SAFE), information on firms' borrowing from the euro area-wide credit register (AnaCredit) and ECB monetary policy surprises. Firms revise upwards their one-year-ahead selling price expectations following monetary announcements in a tightening cycle and this effect increases in firms' working capital exposure. The paper provides supportive evidence on the existence of a cost channel of monetary policy, adding to our understanding of monetary policy transmission to firms in the euro area.

JEL: G30; E52; D84.

Keywords: Firm financing; Monetary policy; Selling price expectations.

Non-technical summary

The paper investigates how firms adjust their pricing strategies in response to changes in monetary policy, specifically during a period of monetary policy tightening in the euro area.

Traditionally, monetary policy impacts demand, with rate hikes reducing demand and prices. However, this study provides supportive evidence for the cost channel of monetary policy, which affects the supply side by increasing firms' borrowing costs due to their working capital requirements. When interest rates rise, firms with significant working capital needs may face higher production costs, prompting them to raise their prices, at least temporarily.

By relying on survey data on firms' price expectations from the Survey on access to finance of enterprises (SAFE), euro area credit register (AnaCredit) and data on monetary policy shocks, this paper examines how firms adjust their future selling prices based on their exposure to working capital. The results indicate that firms with higher working capital exposure tend to increase more their price expectations following interest rate hikes. Larger, established firms, and those in the manufacturing sector, are more likely to raise prices if they use working capital. Additionally, the study shows that firms in concentrated markets are less affected, possibly because they can absorb higher costs without raising prices.

Overall, these results suggest the existence of a cost channel of monetary policy, enhancing our understanding of how monetary policy is transmitted to firms in the euro area. While we find a positive impact on firms' expected selling prices, our results do not contradict the overall impact of monetary policy tightening on inflation.

1 Introduction

How do firms change their pricing strategy following positive monetary policy shocks? Conventionally, monetary policy operates through the demand channel, which predicts that tightening reduces demand, and thus firms' selling prices. However, monetary policy can also influence the supply side of the economy. Interest rate hikes can increase borrowing costs for firms, which may lead them to raise their prices, indicating the presence of a cost channel in monetary policy (Christiano et al. (2005), Hanson (2004)). Aggregate and industry-level evidence shows that there can be a "price puzzle", meaning that an increase in interest rates by the central bank is followed by an increase in the general price level in the economy, rather than a decrease (Barth and Ramey (2002)).

The cost channel of monetary policy operates through the working capital requirements of firms, affecting their production costs and pricing strategies (Barth and Ramey (2002), Gaiotti and Secchi (2006), Suveg (2023)). When central banks adjust interest rates, it directly influences the cost of borrowing for businesses. As many firms rely on short-term financing to cover day-to-day expenses such as wages, inventory, and raw materials, an increase in interest rates raises the cost of borrowing, leading to higher marginal cost of production. This, in turn, can prompt firms to increase prices, contributing to inflationary pressures. Therefore, the cost channel highlights how monetary policy affects inflation on the short run through the cost structures of businesses reliant on credit for their operational needs.

In this paper, we present empirical evidence on the cost channel of monetary policy in the euro area during the recent monetary policy tightening cycle. Our data covers 2023 Q1-2024 Q1, capturing an episode of ECB monetary policy tightening and a period for which data on firms' selling price expectation is available in the Survey on the access to finance of enterprises (SAFE). By combining firm-level data on survey-based selling price expectations from the SAFE, credit register on firm borrowing (AnaCredit), firm balance sheet information, and monetary policy surprises, we investigate how firms, depending on their working capital exposure, adjust their expected selling prices in response to monetary policy surprises.

We find that firms revise upwards their one-year-ahead selling price expectations following monetary announcements in a tightening cycle and this effect increases in firms' working

capital exposure. For a firm with median total working capital exposure (43%), a one basis point increase in the monetary policy shock leads to an 11.6 basis point increase in firms' expected selling prices one year ahead via the working capital channel. Results suggest that the effect is even stronger via the off-balance working capital share. As this captures undrawn amounts for an instrument, it might reflect the uncertainty of the firm regarding future amounts and costs related to these loans. Moreover, we show that large and old firms, those with multiple owners and in the manufacturing sector are more likely to raise their expected selling prices in a monetary policy hiking cycle, if they have working capital exposure. We also find that firms in more concentrated markets are less sensitive to monetary policy shocks via the working capital channel, implying that these firms might have sufficient leeway to absorb increasing costs, without the need to increase prices. Finally, we explore how working capital exposure influences other firm decisions to rationalize our results. We find insignificant effect of monetary policy shocks on labour cost expectations and a negative impact on expected employment through the working capital channel. This might be interpreted as evidence on capital-labour complementarities. In addition, we find a positive impact on expected non-labour input costs such as materials and energy. Since working capital loans finance firms' daily operations, they are crucial to the firm and can quickly lead to higher overall costs.

Our empirical approach employs an event study to examine changes in firms' selling price expectations around ECB Governing Council meetings. We use daily responses of firms on selling price expectations, collected during the fieldwork periods of the SAFE, focusing specifically on firms' replies with working capital exposure within a 6-day time window before or after the meetings. We compare the selling price expectation of firms replying before the Governing Council meetings to the expectations of firms' replying after the meeting, while accounting for firms' ex-ante working capital exposure.

We complement our analysis with a wide set of robustness checks. Specifically, we show that our results are robust to alternative event windows and that there is no impact for a placebo event period without an ECB Governing Council meeting. In addition, we show that firms with working capital exposure do not alter their selling price expectations in response to other events which convey information about the economy, like HICP releases for the euro

area. Our results are also robust to additional firm-level controls such as internal funds, which might enable firms to better adjust to a shock and potentially decrease the impact of rate hikes via the working capital channel. Although we use time fixed effects in our regressions to exhaustively control for all time-varying factors, we also consider oil and gas prices in a different specification, showing that controlling for specific cost-push shocks do not change our results. Finally, we show that our results hold also when we consider changes in the deposit facility rate (DFR), the rate used to steer the stance of monetary policy in the euro area. Firms might be more aware of actual rate changes, however, monetary policy surprises better capture the exogenous variation in monetary policy.

Our analysis has a few limitations. *First*, we cannot capture the dynamic impact on realized selling prices. Instead, we capture the effect on firms' *expected* selling price changes one year ahead. Given these limitations, we cannot assess the pass-through of the shock to realized selling prices at the firm level, nor can we discuss the dynamic reaction of selling prices to monetary policy shocks via the working capital channel. *Second*, monetary policy acts via various channels that we do not focus on. We estimate only the cost channel, which, according to theory, is captured by the working capital exposure of firms. Thus, although we find a positive impact on firms' expected selling prices, our results do not contradict the overall impact of monetary policy tightening.

This paper relates to several strands of the existing literature. *First*, there are numerous macroeconomic models presenting the theoretical underpinnings of the cost channel of monetary policy (see Blinder (1987), Fuerst (1992), Christiano and Eichenbaum (1992), Christiano et al. (2005), Christiano et al. (2015)). According to Rabanal (2003), Christiano et al. (2005) and Rabanal (2007), the importance of the cost channel in the euro area and in the US is only minor. However, several studies offer empirical support for the existence of a cost channel on the aggregate or on the industry level (Ravenna and Walsh (2006) and Chowdhury et al. (2006), Tillmann (2008), Surico (2008), Barth and Ramey (2002) and Dedola and Lippi (2005)). Notably, firms' short-term debt and working capital, which constitute the core mechanism of the cost channel, emerge as salient features affecting responsiveness to monetary policy shocks (see Gaiotti and Secchi (2006) and Suveg (2023)). Our paper contributes to this discussion by using

survey-based data on firm pricing behavior, matched to credit register data on working capital, to capture firms' responses to monetary policy shocks during a tightening cycle.

Second, our paper relates to empirical research examining the effect of monetary policy shocks on firms' pricing behavior. For instance, the paper of Bottone and Rosolia (2019) focuses on monetary policy surprises and documents the impact on expected inflation and firms' future own selling prices. Similarly, Di Pace et al. (2025) use survey data from the UK Decision Maker Panel survey and show that firms' price expectations respond to actual interest rate changes, but not to the surprise component of such announcements. This is in line with standard economic predictions and suggests a predominance of the demand channel over the cost channel, although it does not rule out the existence of the cost channel. Additionally, Enders et al. (2019) finds that firms' price expectations adjust to monetary policy surprises in a nonlinear manner, with the strength of the effect diminishing as the size of the surprise increases, for both positive and negative surprises. More recently, Core et al. (2024) provide evidence for the euro area on the supply-side transmission of monetary policy through a floating-rate channel, suggesting that firms with floating-rate loans may keep prices elevated to offset higher borrowing costs. On the short run, this might reduce the effectiveness of monetary policy. While most of these studies suggest the presence of a cost channel, our contribution lies in directly measuring the cost channel and estimating its impact on firms' expected selling prices.

Third, our paper is related to a strand of literature analyzing the implications of the cost channel of monetary policy. For instance, Henzel et al. (2009) contribute to the literature by exploring whether the cost channel can explain the observed differences in inflation responses to monetary policy shocks between the euro area and the United States. The general evidence in favour of the existence of a cost channel in Europe, opposed to inconclusive evidence for the US, might be explained by the fact that the financial system of the Eurozone is mainly bank-based. Beaudry et al. (2024) contribute to this literature by emphasizing the implications of a cost channel when the Phillips curve is flat, providing both theoretical insights and empirical evidence supporting the relevance of the cost channel in such conditions. We add to this discussion by examining various aspects of the cost channel of monetary policy using

micro-level data for the euro area.

The rest of the paper is organized as follows. Section 2 introduces the granular datasets we combine and provides descriptive statistics. Section 3 presents the empirical strategy, while Section 4 reviews the results. Section 5 presents a number of robustness checks and Section 6 concludes.

2 Data sources and descriptive statistics

The analysis combines multiple granular datasets on the firm level. Our primary dataset is the Survey on the access to finance of enterprises (SAFE) - conducted jointly by the European Central Bank and European Commission. This dataset provides us with information on firms' selling price expectations one year ahead, our main outcome variable of interest. We match SAFE with information on the borrowing activity from the euro area credit register (AnaCredit), which allows us to track firm borrowing, including borrowing with *working capital* purpose. Finally, we use also information on the financial statements of firms, matching the survey-based dataset to the Orbis database supplied by Bureau van Dijk (BvD), a Moody's Analytics subsidiary.

To measure the monetary policy shock, we follow the most recent literature that identifies causal effects of monetary policy using high-frequency movements in interest rates around central bank announcements.[1] We obtain the monetary policy shocks from the Euro Area Monetary Policy Event-Study Database (EA-MPD), compiled by Altavilla et al. (2019) and published on the ECB's website.[2] In particular, we use the surprise component related to the change in the policy rate. The *target* factor captures the market reaction to the ECB decision concerning the current setting of the key policy rates following the press release. Appendix A provides additional information on the monetary policy shocks used.

Our main outcome variable of interest is the one-year-ahead selling price expectation, as indicated by firms in the SAFE. Since March 2023, firms were asked in the survey about their

[1] See for example Gürkaynak et al. (2005); Gertler and Karadi (2015); Altavilla et al. (2019); Jarociński and Karadi (2020); Andrade and Ferroni (2021).

[2] The EA-MPD can be found at the following link: https://www.ecb.europa.eu/pub/pdf/annex/Dataset_EA-MPD.xlsx.

quantitative expectations regarding the percentage change over the next 12 months in their own average selling prices, non-labour costs, wages and number of employees. The wording of the question is as follows:

Looking ahead, by how much do you expect the following to increase or decrease over the next 12 months? Please provide your answer as a percentage change.

1. *Your average selling price of products or services in your main markets*
2. *The average price of your production inputs (non-labour costs such as materials and energy)*
3. *The average wage of your current employees*
4. *Your number of employees*

A key feature of the SAFE is that it surveys firms daily throughout each survey round, which typically spans over a period of four to six weeks. For our analysis we consider the survey rounds in the period covering March 2023 to mid-March 2024, with the following daily fieldworks:[3]

- Survey round 28: 6 March to 14 April 2023.
- Survey round 29, pilot 1: 25 May to 26 June 2023.
- Survey round 30: 4 September to 18 October 2023.
- Survey round 31, pilot 2: 13 November to 13 December 2023.
- Survey round 32: 1 February to 12 March 2024.

We combine firms' daily responses on selling price expectations with the monetary policy shocks of selected Governing Council meetings. Given the timing of the survey rounds, we are able to focus on firms' replies around four ECB Governing Council meetings: 16 March 2023, 15 June 2023, 14 September 2023 and 7 March 2024.

Table 1 Panel A provides descriptive statistics for firms' selling price expectations. Starting from March 2023 firms reported falling expected selling prices, from an average of almost 6% to 3.4% in March 2024.

[3]We stop our analysis covering survey round 32. This is because the next survey round, covering Q2 2024, overlaps already with a monetary policy easing.

[Insert Table 1 here]

Figure 1 shows that for each survey round, the share of firms replying around the ECB Governing Council meeting, relative to the total number of firms in a given survey round. Between 2 to 13% of firms reply on a survey day relative to the total number of firms in a given survey round.

[Insert Figure 1 here]

In Figure 2 we report the distribution of selling price expectations during the fieldwork period, suggesting that there are some differences in the replies of firms, depending on whether they reply to the survey before or after the ECB Governing Council meeting.

[Insert Figure 2 here]

For our analysis, we compare firms' selling price expectations in the days immediately before and after the ECB Governing Council meetings, focusing on 6 days in the pre- and post-period of the event.[4] These are reported in Figure 3, where it can be seen that selling prices tend to increase just after the meetings.

[Insert Figure 3 here]

Next, we merge the sample of SAFE firms to the information derived from AnaCredit, which allows us to focus on firms with bank loan exposures and have more details about firm borrowing. As the existing literature indicates that the cost channel of monetary policy impacts firms by influencing their production costs—particularly when they borrow to finance working capital—we restrict our matched SAFE-AnaCredit dataset to firms which have loans with working capital purpose.

As the working capital channel affects firms through a repricing of loans during periods of changes in the policy rate, we examine whether our SAFE-AnaCredit matched sample is representative in terms of borrowing costs. We first compare the dynamics of average lending rates for loans with working capital purpose faced by the population of firms in AnaCredit with that of firms in our SAFE sample, having working capital exposure in AnaCredit. Figure

[4]The length of the period has been chosen with optimal bandwidth selection method. For more details, see Calonico et al. (2014) and Calonico et al. (2019). This method balances the trade-off between bias and variance. Using a narrow bandwidth can reduce bias because it focuses on observations close to the cutoff point. At the same time, a wider bandwidth includes more observations, which can reduce variance but may introduce bias, the farther we get from the cutoff point. Our results are robust to alternative event windows. The day of the ECB Governing Council meeting is considered in the post period.

4 confirms that exposure-weighted rates on working capital loans for firms in the SAFE are of the same magnitude and have similar dynamics to the cost of borrowing with working capital exposure for all firms in AnaCredit for our period of interest.

[Insert Figure 4 here]

For our estimations, we consider outstanding amounts, off-balance exposures and the total of these exposures for firms with loans with working capital purpose. Off-balance exposures represent amounts not yet drawn by firms. On the firm level, we define ratios capturing the share of on-balance working capital, off-balance working capital and total working capital to the overall borrowing of the firm.

3 Identification and econometric specification

To identify the impact of monetary policy shocks on firms' one-year-ahead selling price expectations, we use a quasi-natural experimental setting. We estimate the impact by comparing firms which reply in a 6 days before the ECB Governing Council meeting, to those firms which reply to the survey 6 days after. The ECB Governing Council meeting is followed by a press release and a press conference, and we assume that firms replying after the meeting learn about higher interest rates from central bank communication. The key identifying assumption underlying this strategy is that firms replying to the survey before the Governing Council meeting are not systematically different from firms replying to the survey in the days after the Governing Council meeting. To test this assumption, we provide a balance table with firms' observable characteristics, such as size class, industry, age, ownership structure or labour productivity. Table 2 shows that firms replying in a short time window before or after the ECB Governing Council meetings are broadly similar. While there are some statistically significant differences in firms' size classes, we control in our regressions for firm size class and other firm level variables. Size, captured through employment and age, both reflect the life cycle of a firm, while productivity (value added relative to employment) reflects the operation of the firm.[5]

[5]We define productivity using 2021 balance sheet data, which is the latest complete year available in the firm balance sheet data in terms of firm coverage. Arguably, firm-level productivity is quite persistent over time. However, many other firm balance sheet variables capturing e.g., the financial situation of the firm change through time, therefore we refrain from using further controls from the 2021 firm balance sheet data.

[Insert Table 2 here]

Following Lamla and Vinogradov (2019) and Di Pace et al. (2025), we estimate the following model:

$$Y_{it} = \alpha + \beta MPShock_t \times Post_{it} + \gamma Controls_{it} + \varepsilon_{it}, \tag{1}$$

where the outcome variable Y_{it} denotes firm i's one-year-ahead inflation expectation as indicated by the firm on day t of the survey period. $MPShock_t$ denotes our measure of monetary policy shock as described earlier, $Post_{it}$ indicates whether firm i replied to the survey in the days after the ECB Governing Council meeting, while $Controls_{it}$ denote $MPShock_t$, $Post_{it}$, firm size class, industry, country, productivity and daily time fixed effects, depending on specification. Robust standard errors are used.

We use monetary policy surprises to capture the unexpected component of a policy action as it provides a clearer signal of the policy's immediate impact. Economic agents often anticipate monetary policy decisions, therefore, much of the effect of expected rate changes might already be priced into financial instruments and economic decisions ahead of announcements of monetary policy decisions. By focusing on the unexpected component, monetary policy surprises help isolate the *causal effect of policy actions* from other concurrent economic developments or information that might be influencing the economy at the same time. This isolation is crucial for understanding the direct effects of monetary policy. Using surprises can mitigate the issue of endogeneity that arises when both the central bank and economic agents react to the same economic conditions. Since surprises are, by definition, unanticipated, they are less likely to be correlated with other contemporaneous economic shocks or trends.

Conversely, since monetary policy surprises depend on financial market information, they may not effectively convey how news about central bank policy reaches less sophisticated economic agents.[6] It can be argued that firms might be more attentive to actual rate changes. In the robustness checks section of the paper we provide a set of results using changes in the deposit facility rate instead of monetary policy surprises and show that our results hold.

[6]Lamla and Vinogradov (2019) shows that households do not pay attention to monetary policy announcements but exposure to news improves the precision of their perceptions and expectations.

Our analysis has a few limitations. *First*, we cannot capture the dynamic impact on realized selling prices. Instead, we capture the effect on firms' *expected* selling price changes one year ahead. Given these limitations, we cannot assess the pass-through of the shock to realized selling prices at the firm level, nor can we discuss the dynamic reaction of selling prices to monetary policy shocks via the working capital channel. *Second*, monetary policy acts via various channels that we do not focus on. We estimate only the cost channel, which, according to theory, is captured by the working capital exposure of firms. Thus, although we find a positive impact on firms' expected selling prices, our results do not contradict the overall impact of monetary policy tightening.

4 Empirical results

In this section, we present our main findings on the impact of monetary policy shocks on selling price expectations.

4.1 Baseline results for the impact of monetary policy shocks on firms selling prices

We find that firms revise upwards their one-year-ahead selling price expectations following monetary policy announcements in a tightening cycle. The results from estimating Equation 1 are shown in Table 3. Column (1) shows the regression results from a simple model without controls and fixed effects. Starting from column (2), fixed effects and firm-level controls are gradually added to the regression. Our coefficient of interest is remarkably stable across specifications. Column (6) shows our preferred specification, which controls for firms size class, industry, country, productivity as well as daily time fixed effects. The coefficient is significant at the 10 percent significance level. It shows that on average, a 10 basis point increase in the target shock leads to a 60 basis point increase in firms' expected selling prices one year ahead.[7]

[Insert Table 3 here]

[7] As a reference, firms' average one-year-ahead selling price expectation for this period was around 4.5 percent.

4.2 The cost channel

New Keynesian models taking into account the working capital channel predict that an increase in the policy rate leads to a higher price increase by firms who use more working capital (see Ravenna and Walsh (2006) and Barth and Ramey (2002)). In this section, we aim to understand to what extent our results from the baseline specification are explained by this channel.

While changes in interest rates can also affect other types of bank loans, the cost channel of monetary policy is associated with working capital for several reasons. First, working capital loans are typically short-term and are used to finance firms' daily operations, such as inventories, accounts receivable and payroll. Hence, these loans are more sensitive to changes in interest rates compared to long-term financing. Second, working capital loans often require refinancing, which means that changes in interest rates can rapidly affect the pricing of these loans. Third, since working capital loans finance firms' daily operations, if they become more expensive, they can quickly lead to increased production costs. In turn, higher costs can lead firms to immediately reassess their pricing strategies, often passing on these higher costs to consumers. Finally, working capital loans are vital for the operation of most companies, meaning that fluctuations in the cost of working capital can have a broad impact. Credit register data for the euro area confirm that loans with working capital purpose are important for euro area firms. Relative to the total volume of loans (including loans with investment purpose), loans with working capital purpose are close to 20%. This share is also constant for our period of interest (Figure 5, left panel). Working capital loans can be on the balance sheet (around 70%), or off-balance (the remaining 30% Figure 5, right panel).[8] The outstanding nominal amount is the amount drawn under the instrument; the off-balance-sheet amount measures the remaining amount that is contractually agreed between the firm and the bank and that can be drawn, up until the credit limit.

[Insert Figure 5 here]

A first look at the data on firms' working capital exposure and their expected selling prices suggests that for the overall period of monetary policy tightening, firms with more working capital are more likely to expect higher selling prices, both in case of on-balance and off-balance

[8] Similar percentages are found also in our estimation sample.

working capital exposure (Figure 6).

[Insert Figure 6 here]

We expand our original Equation 1 to capture the working capital exposure of firms in the month before the Governing Council meeting. We use the matched SAFE and AnaCredit sample and define various measures for working capital exposure, considering on-balance, off-balance and total exposures with working capital purpose, scaled by firms' total exposures (considering all types of bank loans).[9]

We estimate the following equation with firms' working capital share:

$$Y_{it} = \alpha + \beta WKexposure_i \times MPShock_t \times Post_{it} + \delta Controls_{it} + \varepsilon_{it}, \quad (2)$$

where i denotes firm; t denotes daily time; Y_{it} denotes firm's one-year-ahead selling price expectations provided on a 6-day time window around the Governing Council 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 and $Controls_{it}$ stands for the set of control variables, which in our specification refer to firm size class, industry, country, daily time fixed effects and firm-level productivity.[10]

As an additional check, we show that firms with working capital exposure, replying in a short time window before or after the ECB Governing Council meetings are similar. While there are some statistically significant differences in firms' size classes, we control in our regressions for firm size class and other firm level variables. See Table 4 for firm characteristics and Table 5 for working capital related loan characteristics of these firms.

[Insert Table 4 here]

[Insert Table 5 here]

Table 6 shows the results using our preferred specification and capturing firm-level working capital exposure using different measures. Column (1) shows the results for the triple interaction using total working capital to total exposure, column (2) shows results using on-balance sheet working capital to total exposure, while column (3) shows results using off-balance

[9] Table 1 Panel B provides descriptives statistics for selling price expectations for the subsample of SAFE firms with working capital exposure.

[10] The regression estimates also the double interactions.

working capital to total exposure. In all three specifications, the coefficient of the monetary policy shock interacted with the post-meeting indicator is insignificant, whereas the triple interactions considering firms' total working capital shares or off-balance shares are significant at conventional significance levels. This suggests that firms react differently to monetary policy shocks, and the impact translates to firms via their working capital exposure. For a firm with median total working capital exposure (43%), a 1 basis point increase in the target shock leads to 11.6 basis point increase in firms' expected selling prices one year ahead via the working capital channel.[11] Results suggest that the effect of a monetary policy shock on expected selling prices is stronger via off-balance working capital. As this captures undrawn amounts for an instrument, it might reflect the uncertainty of the firm regarding future amounts and costs related to these loans.

[Insert Table 6 here]

4.3 Heterogeneous effects

In this section, we examine the impact of the monetary policy shock through the working capital channel, emphasizing how various firm characteristics influence the extent to which firms are affected. We look at the effect by firm (1) size class, (2) industry, (3) age and (4) ownership type (see Table 7). The estimated coefficients in Column 2 show that our results are driven by large firms with working capital exposure and those in the manufacturing (Column 3). The comparison of Columns (5) and (6) reveals that the impact of monetary policy shocks via the working capital affects firms that are at least 10 years old, and Column (8) shows that it affects firms with multiple ownership, as opposed to single owner firms (Column 7). In summary, large, established firms with multiple owners in the manufacturing sector with working capital exposure tend to increase their expected selling prices in response to a monetary policy shock.

[Insert Table 7 here]

[11] The median of total working capital share to total exposure is 43%, the median of off-balance working capital to total exposure is 69% while the median of on-balance working capital to total exposure is 31%.

4.4 Market concentration

Next, we explore how firms respond to unexpected monetary policy changes through the working capital channel, considering the level of market concentration. Industries are categorized into low and high market concentration groups at the 2-digit NACE code level, based on firms' sales data from 2021.[12] This classification uses several measures, including the Herfindahl index, the market share of the top 5 and that of the top 10 firms. As a cutoff for low/high industry concentration, we use the median of the respective measure.

[Insert Table 8 here]

Our findings indicate that firms in less concentrated markets tend to increase their expected selling prices significantly more, as shown for all three measures of market concentration (Table 8, columns 1, 3 and 5). In contrast, firms in highly concentrated markets may maintain larger markups, allowing them to absorb changes in marginal costs without the need to adjust prices. This observation aligns with existing literature, which suggests that firms with high markups are less responsive to monetary policy shocks (see Ferrando et al. (2021), and Duval et al. (2024)).

Although we lack direct data on firms' marginal cost, we use a proxy for production costs by leveraging on firm-level survey information from the SAFE on expected cost growth related to materials and energy. This proxy is calculated as the average expected cost growth at the 2-digit NACE level. According to our finding, firms in less concentrated sectors are expected to raise their selling prices if those sectors also have above median expected growth in production costs related to materials or energy (see Table 9).

[Insert Table 9 here]

4.5 Working capital exposure and other firm outcomes

For this period, the survey provides data on other firm-level expectations: wages, employment and non-labour input related costs. We use these expectations as outcome variables in our estimation to further understand the working capital channel. Table 10 shows the results for wages, Table 11 shows the results for employment and Table 12 shows the results for

[12] This is done out-of-sample, based on all firms in Orbis in 2021.

non-labour input costs. We find insignificant effects for labour cost expectations throughout all specifications. At the same time, we find a negative impact on expected employment considering the overall working capital exposure. This might be interpreted as suggestive evidence on capital-labour complementarities. In addition, we find a positive impact on expected non-labour input costs in the case of on-balance working capital (costs such as materials and energy). As working capital loans finance firms daily operations, they are crucial to the firm and can quickly translate to higher production costs.

[Insert Table 10 here]

[Insert Table 11 here]

[Insert Table 12 here]

5 Robustness checks

5.1 Placebo period

To provide further indirect evidence supporting the validity of our analysis, we employ a placebo test. We on a survey wave which provides information on firms' selling price expectations but it does not overlap with an ECB Governing Council meeting. For this analysis, we use wave 31 of the survey, run between November 13 - December 13 2023. We define a mock ECB Governing Council meeting day for November 23, 2023, allowing us to match the period of the survey and the 6- day time window before and after the event. Results are shown in Table 13. We obtain statistically insignificant results. [13]

[Insert Table 13 here]

5.2 Alternative event windows

Our analysis focuses on 6 days before and 6 days after the meetings of the ECB Governing Council. The length of the period has been chosen with the mean squared error optimal bandwidth selection method following Calonico et al. (2014) and Calonico et al. (2019).

[13] As this analysis refers to one survey wave, the monetary policy shock has no variation and is set to 1 in the regressions. Across the waves used for estimating the regressions, the average value of the target shock is 8.4 basis points.

As a further robustness check, we reproduce our results with one shorter (3 days before and after) and one longer (7 days before and after) time window. Table 14 and Table 15 show the estimated coefficients on shorter and longer time windows. The magnitude of the coefficients of interest changes slightly and they are less precisely estimated when considering the 3-day time window, which leads to losing more than half of the observations compared to our baseline estimations. Results based on the 7-day window are very close to our baseline results using a 6-day window.

[Insert Table 14 here]

[Insert Table 15 here]

5.3 Firm liquidity

Arguably, if firms have sufficient internal funds, they might react less to interest rate changes that increase their financing costs. We estimate our main regression controlling for firms' internal funds. As the latest available balance sheet data are for 2021, we use a variable directly taken from the SAFE indicating whether the firm has used internal funds over the past 3 months as a proxy for liquidity. Table 16 shows the results when we control also for the use of internal funds. While the use of internal funds has a negative impact on selling prices, it does not alter the impact of monetary policy shocks via the working capital channel.

[Insert Table 16 here]

5.4 Cost-push shocks

Could expected prices rise because of changes in production costs? In our specification, time fixed effects should control for macroeconomic developments, nonetheless, we re-estimate our regressions by explicitly including gas and oil prices. As proxy for oil prices, we use the end-of-day price of the first future contract on Brent crude oil. As proxy for gas prices, we use the end-of-day price of the one-day-ahead future contract on Dutch TTF natural gas. Our coefficients of interest are unchanged, as shown in Table 17 and Table 18.

[Insert Table 17 here]

[Insert Table 18 here]

5.5 Inflation releases

Do firms' selling prices respond to news about the economy? We examine how firms modify their selling price expectations in response to monthly euro area inflation releases, considering their working capital. Specifically, we assess firms' exposure to working capital in the month before the HICP release date. Using a methodology similar to our baseline specifications, we analyze the impact of the HICP release on firms' selling price expectations, comparing those that respond 6 days before versus 6 days after the release. When accounting for the working capital channel in our analysis, we find no impact of HICP release on selling price expectations. These results are shown in Table 19. In a second exercise we define euro area inflation surprise as the difference between firms' one-year-ahead inflation expectations and the HICP release.[14] Again, this exercise shows that given their working capital exposure, firms do not adjust their selling price expectations to a surprise in inflation (see Table 20). We interpret this result as indicative evidence that firms with working capital exposure adjust their selling price expectations only in response to changes in monetary policy and not to other news about the economy, at least via the working capital channel.

[Insert Table 19 here]

[Insert Table 20 here]

5.6 Change in the deposit facility rate

So far, we have focused on monetary policy surprises to capture the impact of monetary policy decisions on firms' selling price expectations. However, monetary policy surprises inherently depend on financial market information, which may not effectively capture how news about central bank policy reaches less sophisticated economic agents. Therefore, we re-estimate our results by replacing the target component of the monetary policy surprise with a more direct measure of policy rate change in our regression. We focus on the change of the deposit facility rate (DFR), the rate through which the Governing Council steers the monetary policy stance.[15]

[14] In the absence of firm-level replies on actual inflation in the survey, we use firms' inflation expectation one-year-ahead, which is the shortest horizon available from the survey.

[15] The deposit facility rate is the rate on the deposit facility, which banks may use to make overnight deposits with the Eurosystem at a pre-set interest rate. The Governing Council decided in March 2024 to continue to steer the monetary policy stance through this rate.

The results (shown in Table 21) imply that on average, for a firm with median (43%) working capital exposure, a 25 bps increase in the DFR leads to a close to 150 bps increase in expected selling prices one-year-ahead through the working capital channel. This effect is approximately half of the coefficient in the main specification, which was obtained using monetary policy shocks.

[Insert Table 21 here]

6 Conclusion

In this paper, we present evidence on the cost channel of monetary policy during the recent hiking cycle, enhancing our understanding of how monetary policy is transmitted to firms in the euro area. This channel significantly affects firms through their working capital requirements, impacting their pricing strategies. When central banks adjust interest rates, the cost of borrowing for businesses is directly affected. Many firms rely on short-term financing to manage working capital, which covers essential day-to-day expenses such as wages, inventory, and raw materials. By combining firm-level data on survey-based selling price expectations from the Survey on the access to finance of enterprises (SAFE), credit register data on firm borrowing, firm balance sheet information, and monetary policy surprises, we investigate how firms adjust their one-year-ahead selling prices in response to monetary policy surprises, depending on their working capital exposure. Our empirical approach employs an event study to examine changes in firms' selling price expectations around ECB Governing Council meetings. We analyse the daily responses of firms collected during the fieldwork periods of the SAFE, focusing specifically on firms' replies with working capital exposures within a 6-day time window before or after the meetings. We find that firms revise their one-year-ahead selling price expectations upwards following monetary announcements in a tightening cycle, and this effect is increasing in their working capital exposure. The reaction is more pronounced when considering the yet undrawn balance of working capital, which might reflect firms' uncertainty regarding the future availability and costs of credit. Moreover, we show that large, established firms with multiple owners in the manufacturing sector tend to raise their expected selling

prices in response to a monetary policy shock through the working capital channel. Conversely, firms in more concentrated markets exhibit less sensitivity to these shocks, suggesting that they may have sufficient flexibility to absorb rising costs, without increasing prices. Our analysis is complemented by a wide set of robustness checks.

Overall, these results suggest that there is a cost channel of monetary policy, adding to our understanding about the transmission of monetary policy to firms in the euro area. Monetary policy acts via various channels and while we find a positive impact on firms' expected selling prices, our results do not contradict the overall impact of monetary policy tightening on inflation.

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A Data appendix

This section provides a detailed description of the datasets used for our analysis.

Survey on the access to finance of enterprises (SAFE) is a European firm-level survey launched in 2009. The survey was conducted twice a year until 2023: once by the ECB, covering euro area countries (around 11,000 firms), and once in cooperation with the European Commission (EC), covering all EU and some EU neighboring countries (around 16,000 firms). These survey rounds covered Q2-Q3 and Q4 and Q1 of the next year. Following a pilot phase that lasted between June 2023 and December 2023, the survey frequency is increased to quarterly as of 2024 Q1. Two new survey rounds have been introduced to cover Q1 and Q3 for a reduced sample of almost 6,000 euro area firms. The samples of the earlier round covering Q2-Q3 and Q4-Q1 have been split so that around 40 % of the sample replies on a quarterly basis (covering Q2 and Q4, respectively) while the other 60 % of the sample keeps replying on a bi-annual basis (covering Q2-Q3 and Q4-Q1). The sample comprises non-financial firms across manufacturing, construction, trade, and services sectors. More than 90 % of surveyed firms are small and medium enterprises (SMEs). Firms in the sample are randomly selected from the Dun & Bradstreet business register. The sample is stratified by country, enterprise size class, and economic activity and the sample size is chosen to ensure a satisfactory representation across activities and size classes. The data does not have a panel structure by design, although some firms participate in multiple rounds.

The survey contains mainly qualitative information on various firm characteristics (for example, employment, sector, autonomy, turnover, age, and ownership) and on each firm's assessment of recent developments associated with its economic situation and its financing, including the firm's financing needs and its access to finance.

Since the 2023 Q2-Q3 round, firms in the SAFE were also asked about their quantitative expectations regarding the percentage change over the next 12 months in their average selling prices, non-labour costs, wages and number of employees. In addition, as of 2023 Q2, the survey also asks firms about their inflation expectations for the euro area on the 1-, 3- and 5-year horizons.

ECB Governing Council meetings and monetary policy shocks Our analysis considers the period Q2 2023 - Q1 2024, period for which the SAFE survey provides information on firms' selling price expectations. In addition, the aim is to cover the recent monetary policy tightening cycle, therefore, we focus on the following ECB Governing Council meetings:

- Governing Council meeting of 16 March 2023. The three key interest rates are increased by 50 basis points, with the main refinancing operation (MRO), marginal lending facility (MLF) and the deposit facility (DFR) rates reaching 3.50%, 3.75% and 3.00%, respectively. This overlaps with round 28 of the SAFE, covering the period Q2-Q3 2023.

- Governing Council meeting of 15 June 2023. The three key interest rates are increased by 25 basis points, with the MRO, MLF and DFR rates reaching 4.00%, 4.25% and 3.50%, respectively. This overlaps with round 29 of the SAFE, the first pilot, covering the period Q2 2023.

- Governing Council meeting of 14 September 2023. The three key interest rates are increased by 25 basis points, with the MRO, MLF and DFR rates reaching 4.50%, 4.75% and 4.00%, respectively. This overlaps with round 30 of the SAFE, covering the period Q4 2023 -Q1 2024.

- Governing Council meeting of 7 March 2024. The three key interest rates are kept unchanged. This overlaps with round 32 of the SAFE, covering the period Q2-Q3 2024.

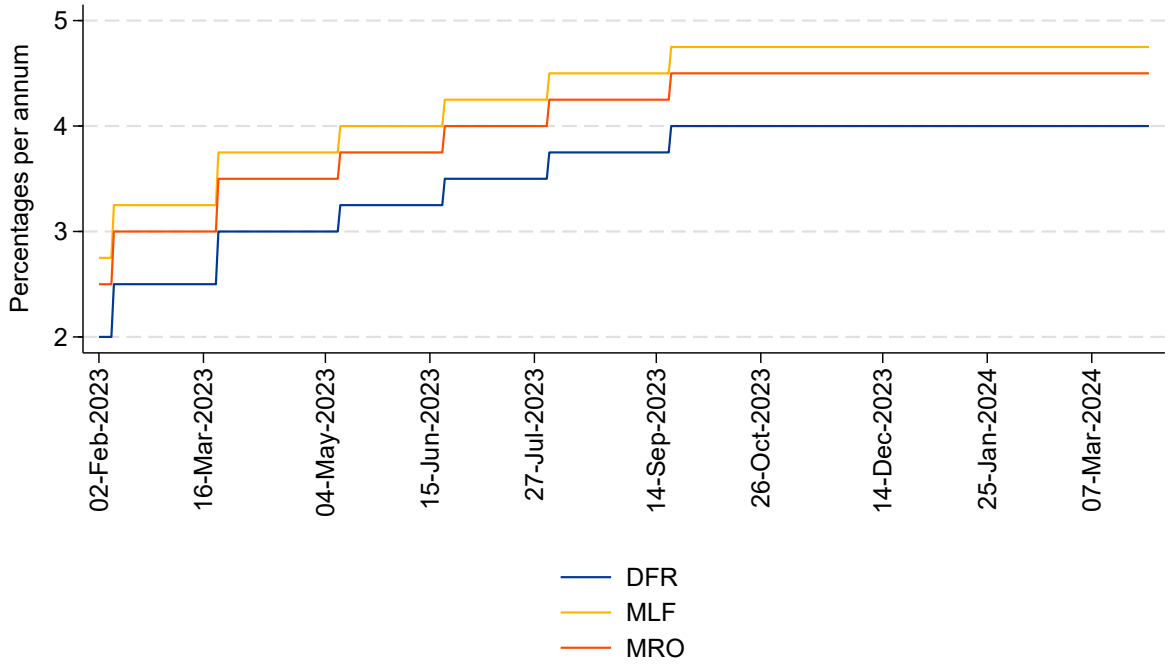
Figure A.1 summarizes the decisions regarding the key ECB interest rates by Meeting.

In order to measure the impact of each monetary policy decision by the European Central Bank, we use monetary policy shocks calculated as in Altavilla et al. (2019), who use high-frequency data on asset prices around the policy decision and the press conference to show that four factors are able to capture the market perceptions of ECB policy communication: target, timing, forward guidance and quantitative easing.

The data used to construct the factors is collected into the Euro Area Monetary Policy Event-Study Database[16] (henceforth, EA-MPD). The policy decision and the statement are

[16]The database is available at https://www.ecb.europa.eu/pub/pdf/annex/Dataset_EA-MPD.xlsx

Figure A.1: Key ECB interest rates



Notes: The chart shows the ECB deposit facility rate (DFR), the marginal lending facility rate (MLF) and the main refinancing operation rate (MRO) for the ECB Governing Council meetings taking place between February 2023 and March 2024.

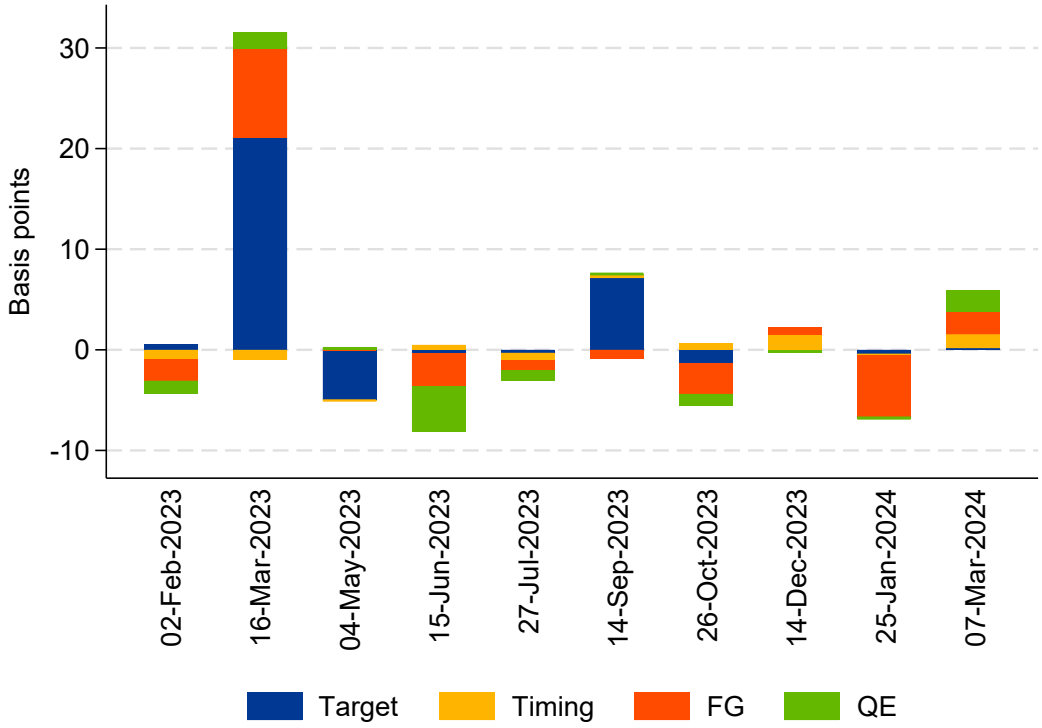
announced at different times by the ECB, therefore, using intraday data, asset price changes are measured for the Press Release Window, the Press Conference Window, and their union, the Monetary Event Window. The change in asset prices due to the policy decision is the difference between the median quote in the post- and pre-release windows, whereas the change due to the press conference is the difference between the median quote in the post- and pre-conference windows. The change in asset prices attributed to the overall monetary policy event is calculated as the difference between the median quote in the post-conference window and the median quote in the pre-press release window.

The identification strategy of Altavilla et al. (2019) is based on the assumption that monetary policy does not respond to intraday asset price movements; therefore, causality goes from monetary policy to asset prices. The four factors, *Target*, *Timing*, *Forward guidance* and *Quantitative easing* are shown on Figure A.2.

In our analysis we use the target factor as a measure of monetary policy shocks. This

factor captures the market reaction to the ECB decision concerning the current setting of the key policy rates following the press release. Since in our sample the ECB Governing Council decisions affected only the key interest rates and not the pace of purchases or reinvestments of the APP and PEPP portfolios, the target factor seems to be the natural choice for our analysis.

Figure A.2: Monetary policy shocks



Notes: The chart shows monetary policy shocks, computed as in Altavilla et al. (2019) for the ECB Governing Council meetings taking place between February 2023 and March 2024.

AnaCredit is the credit register of the European System of Central Banks which contains information on all individual bank loans to firms at a monthly frequency. It contains information on all individual bank loans to firms with a reporting threshold above €25,000. Additional documentation can be found here: https://www.ecb.europa.eu/stats/money_credit_banking/anacredit/html/index.en.html.

The dataset covers a comprehensive set of credit instruments: overdrafts, revolving credit, credit lines, reverse repurchase agreements, and other loans, including term loans. For each instrument, it reports the interest rate charged by the issuing bank, outstanding and off-balance

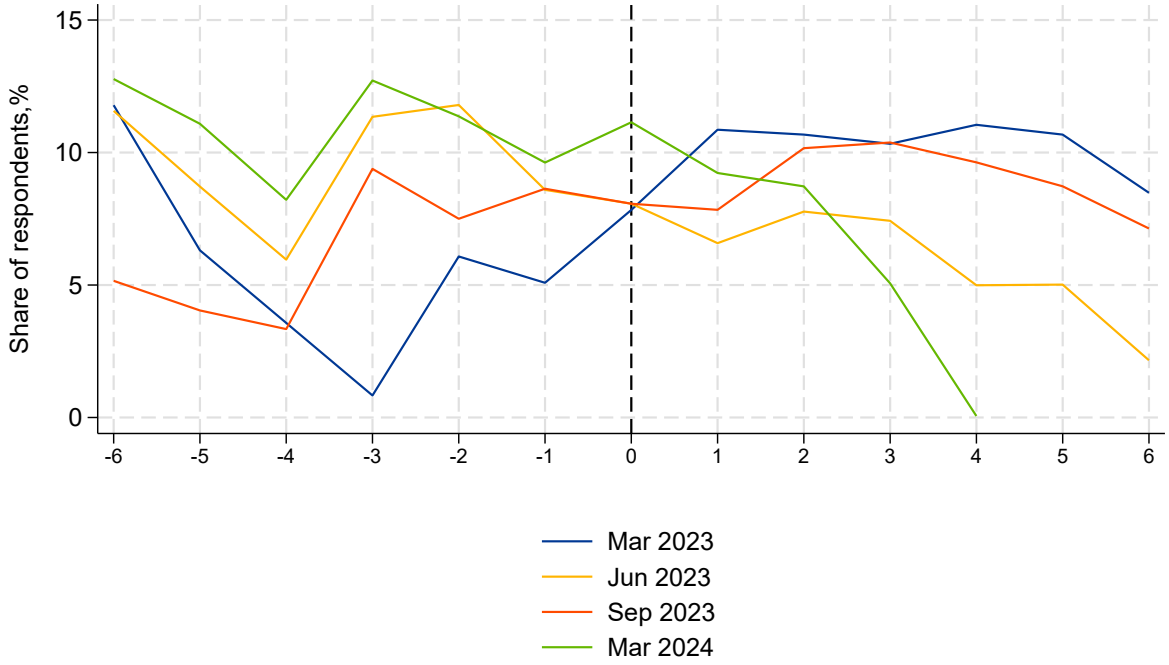
amount and maturity, among other characteristics. Important for our analysis is that the purpose of the loan is also indicated, one among them being working capital loans.

In addition, *AnaCredit* provides information on key borrower characteristics: (1) the 2-digit NACE code of the firm; (2) the location of the firm based on 4 or 5-digit postal code for the largest countries in the sample and for the smallest (Cyprus, Estonia, Latvia, Lithuania, Luxembourg, Malta, Slovakia and Slovenia) on the firm's country headquarter; (3) the classification of firm size based on the Eurostat definition, for more information see https://ec.europa.eu/growth/smes/sme-definition_de.

Orbis database We also match balance sheet information to SAFE firms provided in Orbis. Formerly a Bureau van Dijk (BvD) database, Moody's Orbis provides information on balance sheets and profit and loss statement. The latest available year for which Orbis is complete and contains all firms which must submit balance sheet information and profit and loss statement is 2021.

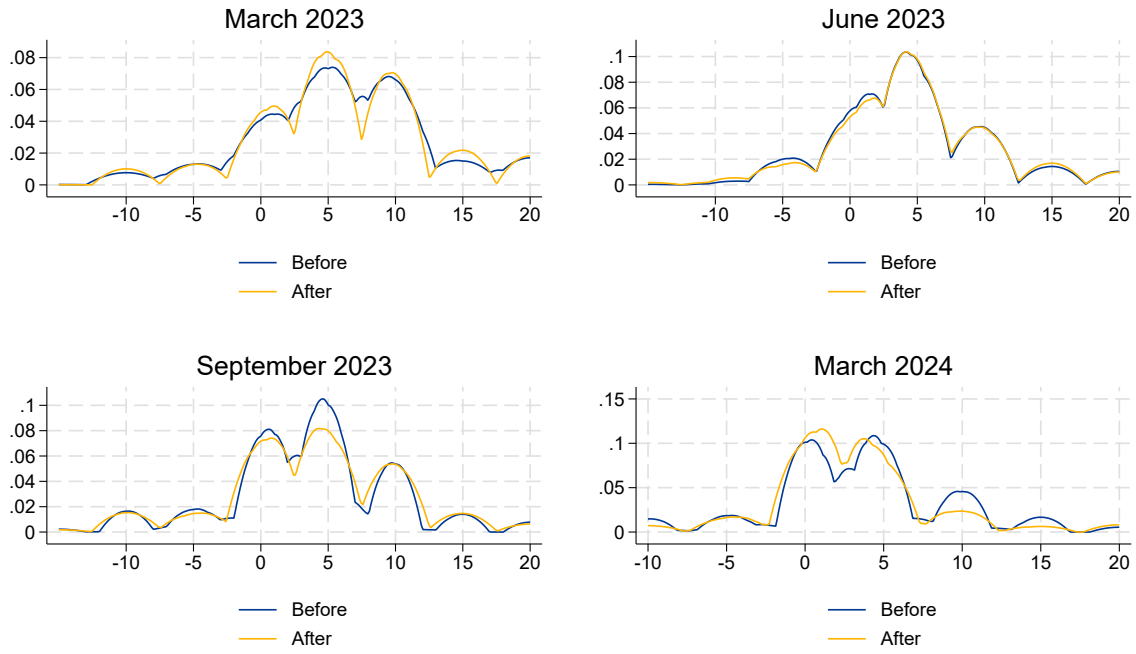
B Figures

Figure 1: Share of firms responding in the SAFE survey in the days around the ECB Governing Council Meeting



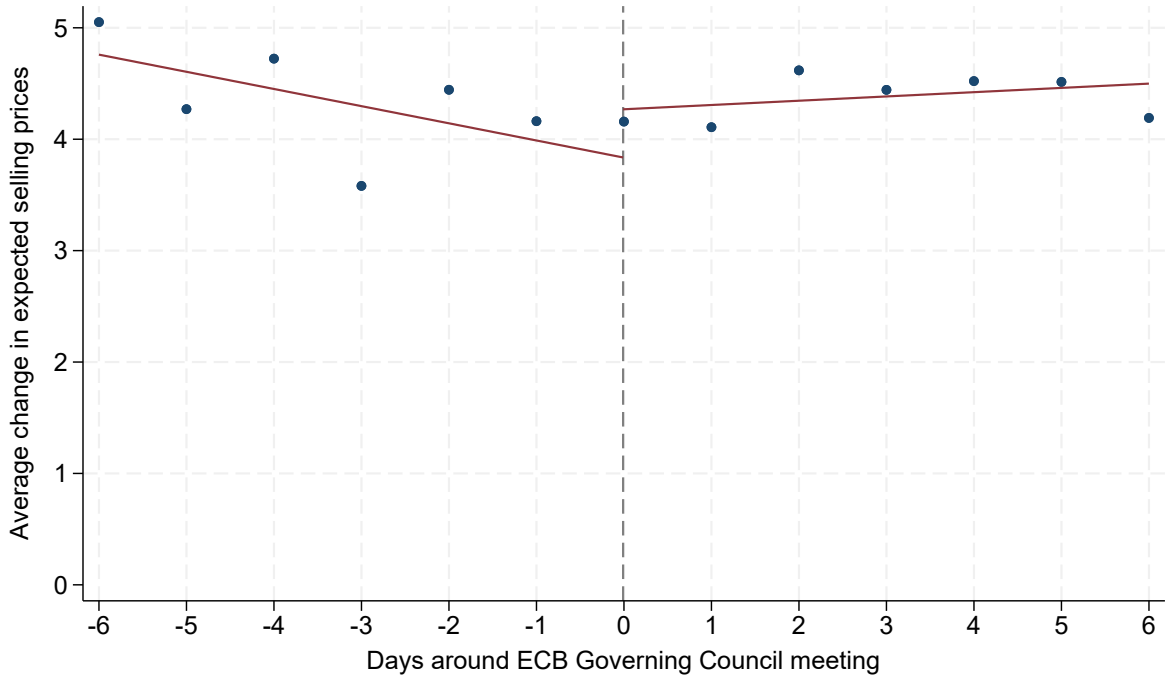
Notes: The chart shows the share of firms responding 6 days before/after the ECB Governing Council meetings, relative to the total number of firms replying in a given survey round. The vertical line represents the day of the ECB Governing Council meeting.

Figure 2: Distribution of selling price expectations before and after the ECB Governing Council Meeting



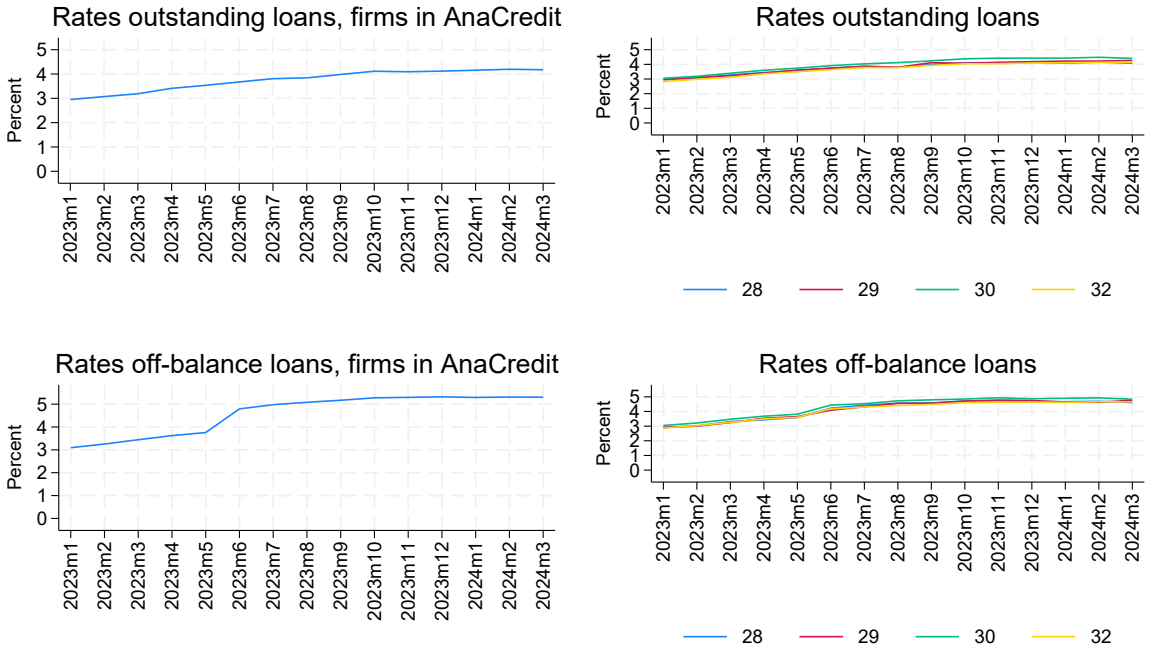
Notes: The chart shows kernel densities for the one-year-ahead expectations of selling prices (in %) for firms replying 6 days before/after the ECB Governing Council meeting. Day 0 represents the day of the ECB Governing Council meeting. Meetings considered: 16 March 2023, 15 June 2023, 14 September 2023 ad 7 March 2024.

Figure 3: Selling price expectations around the days of the ECB Governing Council Meetings



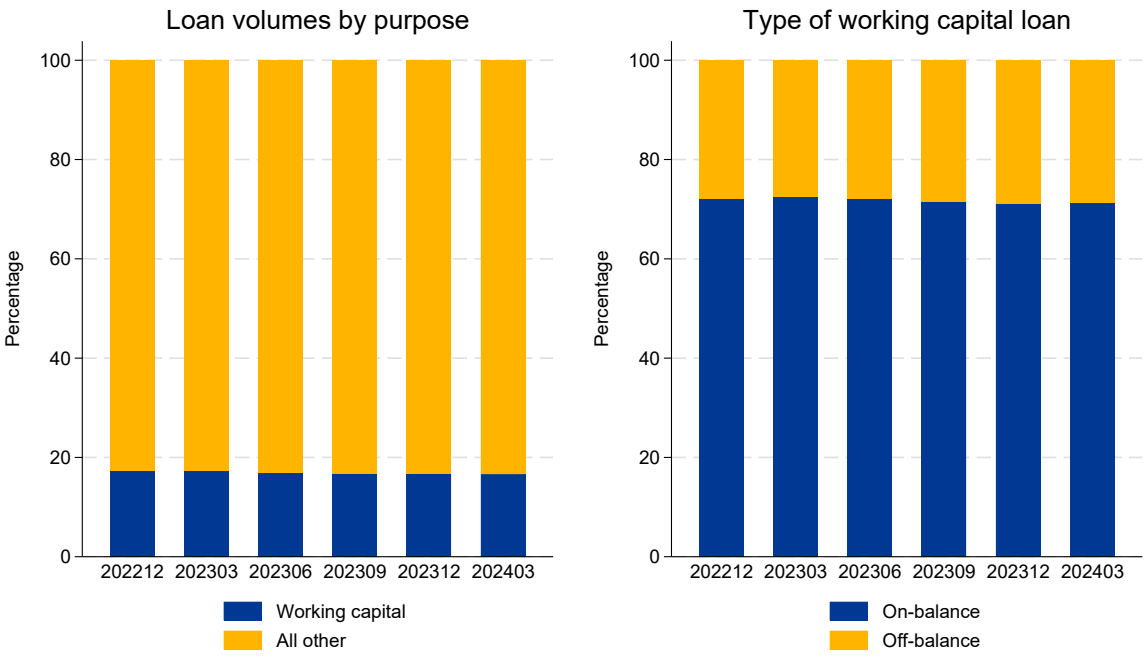
Notes: The chart shows a binned scatter plot for the expectations of selling prices for firms replying up to 6 days before/after the ECB Governing Council meeting. Dots show daily average selling prices. The length of the period has been chosen with optimal bandwidth selection method, taking into account the tradeoff between bias and variance. For more details, see Calonico et al. (2019). Meetings considered: 16 March 2023, 15 June 2023, 14 September 2023 ad 7 March 2024.

Figure 4: Rates for loans with working capital purpose



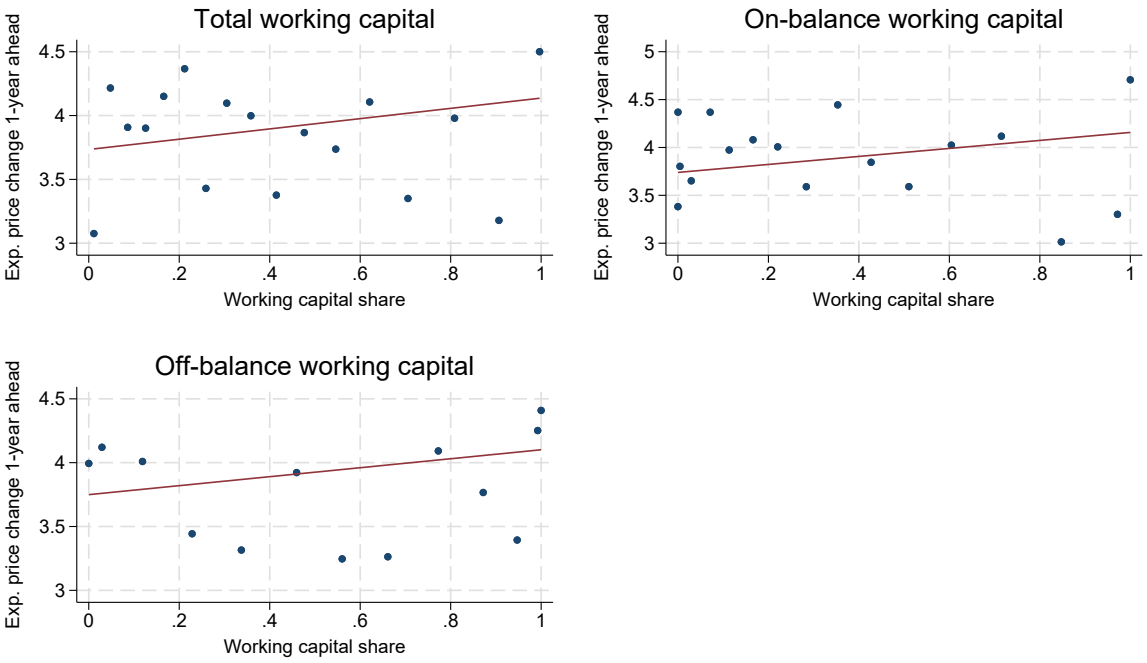
Notes: The panels on the left show rates at origination of outstanding or off-balance sheet nominal amounts with working capital purpose for all firms in AnaCredit, whereas the panels on the right show rates at origination of outstanding or off-balance sheet nominal amounts with working capital purpose for firms in the SAFE waves captured in the analysis.

Figure 5: The importance of working capital financing for firms in the euro area



Notes: The left panel shows for specific months the share of loans with working capital purpose to total loans for firms in the euro area, based on AnaCredit. The right panel shows the share of on-balance and off-balance loans with working capital purpose for firms in the euro area, based on AnaCredit.

Figure 6: Relationship between expected selling prices and working capital for firms in the SAFE



Notes: The panels of the chart show binned scatter plots for the relationship between expected selling prices and the share of working capital, considering firms' total working capital exposure, on-balance working capital or off-balance working capital.

C Tables

Table 1: One-year-ahead selling price expectations of firms

	(1) Mean	(2) Median	(3) SD	(4) Number of obs.
Panel A: Firms in the SAFE				
Mar 2023	5.99	5.00	6.20	9256
Jun 2023	4.58	5.00	5.61	4769
Sep 2023	3.79	4.00	5.91	9369
Mar 2024	3.40	3.00	5.45	9953
Panel B: Firms in the SAFE with working cap. loans in AnaCredit				
Mar 2023	5.70	5.00	6.06	4831
Jun 2023	3.97	4.00	5.18	2484
Sep 2023	3.39	3.50	5.57	4715
Mar 2024	2.84	3.00	4.51	4307

Notes: The table shows descriptive statistics for SAFE firms' one-year-ahead selling price expectations. Data are winsorized at the bottom/top 5% of the distribution on the wave-country level. Panel A shows descriptive statistics for firms in the SAFE, while Panel B shows statistics for firms in the SAFE with working capital related loan exposure from AnaCredit for the period when firms reply to the survey.

Table 2: Characteristics of firms replying before and after the ECB Governing Council Meetings

	Before mean/sd	After mean/sd	T-statistics for the diff.
Size, 1-9 empl.	0.35	0.37	-3.05**
	(0.48)	(0.48)	
Size, 10-49 empl.	0.29	0.31	-1.83
	(0.46)	(0.46)	
Size, 50-249 empl.	0.26	0.24	2.54*
	(0.44)	(0.43)	
Size, >=250 empl.	0.10	0.08	4.13***
	(0.30)	(0.27)	
Industry	0.25	0.25	1.22
	(0.44)	(0.43)	
Construction	0.12	0.12	0.03
	(0.33)	(0.33)	
Trade	0.23	0.23	-0.69
	(0.42)	(0.42)	
Services	0.39	0.40	-0.51
	(0.49)	(0.49)	
>=10 years	0.90	0.91	-1.92
	(0.31)	(0.29)	
>=5, <10 years	0.07	0.06	1.94
	(0.26)	(0.24)	
>=2, <5 years	0.03	0.03	0.15
	(0.16)	(0.16)	
<2 years	0.01	0.01	0.72
	(0.08)	(0.07)	
Public shareholders	0.03	0.02	2.08*
	(0.16)	(0.14)	
Family/entrepreneurs	0.42	0.43	-1.82
	(0.49)	(0.50)	
Other firm	0.15	0.14	0.80
	(0.36)	(0.35)	
Venture capital	0.01	0.01	0.13
	(0.09)	(0.09)	
One owner, natural p.	0.36	0.36	-0.16
	(0.48)	(0.48)	
Labor productivity, Eur th.	63.67	66.53	-1.17
	(83.26)	(88.77)	
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.

Table 3: The impact of monetary policy shocks on firms' one-year-ahead selling price expectations in a short time window around the event

	(1)	(2)	(3)	(4)	(5)	(6)
	Δ sellp.	Δ sellp.	Δ sellp.	Δ sellp.	Δ sellp.	Δ sellp.
MPS × Post	0.0223	0.0306	0.0334*	0.0312	0.0402**	0.0600*
	(0.0196)	(0.0194)	(0.0194)	(0.0192)	(0.0192)	(0.0356)
N	13853	13853	13853	13853	13853	4007
R^2	0.019	0.033	0.043	0.058	0.061	0.055
Size FE	No	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes
Time FE	No	No	No	No	Yes	Yes
Firm control	No	No	No	No	No	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. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 4: Characteristics of firms with working capital exposure replying before and after the ECB Governing Council meetings

	Before mean/sd	After mean/sd	T-statistics for the difference
Size, 1-9 empl.	0.30	0.32	-2.35*
	(0.46)	(0.47)	
Size, 10-49 empl.	0.30	0.31	-1.53
	(0.46)	(0.46)	
Size, 50-249 empl.	0.29	0.28	1.76
	(0.45)	(0.45)	
Size, >=250 empl.	0.11	0.09	3.30***
	(0.31)	(0.29)	
Industry	0.28	0.28	0.31
	(0.45)	(0.45)	
Construction	0.12	0.12	-0.87
	(0.32)	(0.33)	
Trade	0.23	0.23	-0.33
	(0.42)	(0.42)	
Services	0.38	0.37	0.58
	(0.48)	(0.48)	
>=10 years	0.91	0.92	-2.10*
	(0.28)	(0.27)	
>=5, <10 years	0.06	0.05	2.77**
	(0.24)	(0.22)	
>=2, <5 years	0.02	0.02	-0.43
	(0.14)	(0.14)	
<2 years	0.00	0.00	-0.08
	(0.07)	(0.07)	
Public shareholders	0.03	0.02	1.66
	(0.16)	(0.15)	
Family/entrepreneurs	0.43	0.44	-1.22
	(0.49)	(0.50)	
Other firm	0.16	0.16	0.16
	(0.37)	(0.37)	
Venture capital	0.01	0.01	0.39
	(0.10)	(0.09)	
One owner, natural p.	0.33	0.33	0.12
	(0.47)	(0.47)	
Labor productivity, Eur th.	62.75	67.25	-1.80
	(79.36)	(90.69)	
Observations	5239	6772	12011

Notes: The table shows the characteristics of firms with working capital exposure 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). The working capital exposure of firms is considered in the month in which they reply to the SAFE survey, when these months overlap with ECB Governing Council meetings. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 5: Characteristics of working capital related bank loans of firms replying before and after the ECB Governing Council meetings

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

Notes: The table shows the characteristics of working capital related bank loans characteristics of firms with working capital exposure 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). The working capital exposure of firms is considered in the month in which they reply to the SAFE survey, when these months overlap with ECB Governing Council meetings. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 6: The impact of monetary policy shocks on firms' one-year-ahead selling price expectations in a short time window around the event for *firms with working capital exposure*

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
MPS × Post	-0.0346	0.0261	-0.1119
	(0.0808)	(0.0728)	(0.0698)
MPS × Post × WK_ALL	0.2725*		
	(0.1402)		
MPS × Post × WK_ONBS		0.1528	
		(0.1322)	
MPS × Post × WK_OFFBS			0.3647***
			(0.1043)
N	2052	1983	1818
R^2	0.082	0.090	0.075
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	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. The regressions take into consideration firms' working capital share in the month before they reply to the survey. In column 1, the share of working capital is defined as on- and off-balance sheet working capital to total debt, in column 2 as on-balance working capital to total debt whereas in column 3 as off-balance working capital to total debt. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 7: Heterogeneous impact of monetary policy shocks on firms' one-year-ahead selling price expectations

	(1) SME	(2) Large	(3) Manuf	(4) Other ind.	(5) Old	(6) Young	(7) Single own.	(8) Mult. own.
MPS × Post	0.1591*	-0.1059	-0.1819	0.1002	-0.0246	0.1921	-0.0070	-0.0346
	(0.0816)	(0.1245)	(0.1256)	(0.1215)	(0.0831)	(0.5128)	(0.1712)	(0.0874)
MPS × Post × WK	-0.1209	0.4992**	0.7534***	0.0225	0.2636*	0.2835	0.0103	0.3282**
	(0.1358)	(0.2412)	(0.2168)	(0.2084)	(0.1440)	(1.0392)	(0.2938)	(0.1631)
N	1731	319	823	750	1985	62	517	1473
R^2	0.050	0.198	0.144	0.127	0.087	0.388	0.112	0.119
Size FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm control	Yes	Yes	Yes	Yes	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. Non-industrial firms are those in services, trade and construction. Old firms are those which are at least 10 years old. Non-single owner firms are those owned by shareholders or families. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 8: The impact of monetary policy shocks on firms' one-year-ahead selling price expectations in a short time window around the event for *firms with working capital exposure* - market concentration

	(1) HI < MED	(2) HI≥ *MED*	(3) TOP5 < MED	(4) TOP5≥ *MED*	(5) TOP10 < MED	(6) TOP10 ≥ *MED*
MPS × Post	-0.1744*	0.1123	-0.1364	0.0756	-0.1597	0.1044
	(0.1022)	(0.1067)	(0.1077)	(0.1052)	(0.1068)	(0.1014)
MPS × Post × WK_ALL	0.4761***	0.0370	0.4115**	0.1196	0.4454**	0.0616
	(0.1829)	(0.1853)	(0.1877)	(0.1804)	(0.1841)	(0.1726)
N	1159	893	1131	921	1163	889
R^2	0.104	0.142	0.096	0.149	0.102	0.146
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm control	Yes	Yes	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. The regressions take into consideration firms' total working capital share in the month before they reply to the survey. Columns (1) and (2) split the sample by median Herfindahl-index defined using sales on the 2-digit NACE2 level. Columns (3) and (4) use a median cutoff on the industry level based on the concentration of top 5 firms, whereas columns (5) and (6) based on the concentration of top 10 firms. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 9: The impact of monetary policy shocks on firms' one-year-ahead selling price expectations in a short time window around the event for *firms with working capital exposure* - market concentration and costs

	(1) HI<MED, low cost	(2) HI<MED, high cost	(3) TOP5<MED, low cost	(4) TOP5<MED, high cost	(5) TOP10<MED, low cost	(6) TOP10<MED, high cost
MPS × Post	0.3684	-0.2246*	0.1838	-0.1810	-0.1002	-0.2135
	(0.3008)	(0.1265)	(0.3341)	(0.1305)	(0.3525)	(0.1315)
MPS × Post × WK_ALL	-0.2328	0.5284**	-0.1153	0.4614**	0.4114	0.4938**
	(0.6257)	(0.2095)	(0.7406)	(0.2121)	(0.7650)	(0.2154)
N	410	749	376	755	392	771
R^2	0.125	0.143	0.146	0.139	0.154	0.159
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm control	Yes	Yes	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. The regressions take into consideration firms' total working capital share in the month before they reply to the survey. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 10: The impact of monetary policy shock on firms' one-year-ahead labour cost expectations

	(1) Δ wage	(2) Δ wage	(3) Δ wage
MPS × Post	-0.0419	-0.0306	-0.0026
	(0.0414)	(0.0340)	(0.0451)
MPS × Post × WK_ALL	0.0943		
	(0.0749)		
MPS × Post × WK_ONBS		0.0586	
		(0.0683)	
MPS × Post × WK_OFFBS			0.0301
			(0.0669)
N	2130	2064	1877
R^2	0.178	0.175	0.183
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead labor cost expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 11: The impact of monetary policy shock on firms' one-year-ahead employment expectations

	(1) Δ empl.	(2) Δ empl.	(3) Δ empl.
MPS × Post	0.2917	0.1878	0.0459
	(0.1870)	(0.1579)	(0.1457)
MPS × Post × WK_ALL	-0.6252*		
	(0.3394)		
MPS × Post × WK_ONBS		-0.4041	
		(0.2950)	
MPS × Post × WK_OFFBS			-0.2131
			(0.2995)
N	1511	1461	1333
R^2	0.108	0.107	0.106
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead employment expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 12: The impact of monetary policy shocks on firms' one-year-ahead non-labour input cost expectations

	(1) Δ cost	(2) Δ cost.	(3) Δ cost
MPS × Post	-0.0061	-0.1425	0.0088
	(0.1805)	(0.1549)	(0.1642)
MPS × Post × WK_ALL	0.0812		
	(0.3315)		
MPS × Post × WK_ONBS		0.5189*	
		(0.2648)	
MPS × Post × WK_OFFBS			-0.0099
			(0.2725)
N	1485	1434	1311
R^2	0.085	0.089	0.076
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead non-labor input cost expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 13: Placebo period: The impact of monetary policy shock on firms' one-year-ahead selling price expectations

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
MPS × Post × WK_ALL	2.6190		
	(2.0061)		
MPS × Post × WK_ONBS		2.1667	
		(1.8546)	
MPS × Post × WK_OFFBS			-0.0531
			(1.6365)
N	554	534	500
R^2	0.128	0.128	0.159
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. November 23, 2023 is considered as a mock date for ECB Governing Council meeting while firms' replies for selling price expectation are used for wave 31 of the Survey, run between 13 November and 13 December 2023, the only Survey which does not overlap with a Governing Council meeting, but has information on firms' selling price expectations. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 14: The impact of monetary policy shock on firms' one-year-ahead selling price expectations - 3 days time window

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
MPS × Post	-0.0609	0.0104	-0.1061
	(0.1268)	(0.1062)	(0.1193)
MPS × Post × WK_ALL	0.2110		
	(0.2169)		
MPS × Post × WK_ONBS		0.0884	
		(0.1797)	
MPS × Post × WK_OFFBS			0.2730
			(0.1746)
N	1213	1178	1080
R^2	0.090	0.095	0.066
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and a 3-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 15: The impact of monetary policy shock on firms' one-year-ahead selling price expectations - 8 days time window

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
MPS × Post	0.0314	0.1051	-0.0845
	(0.0745)	(0.0723)	(0.0632)
MPS × Post × WK_ALL	0.1711		
	(0.1235)		
MPS × Post × WK_ONBS		0.0227	
		(0.1205)	
MPS × Post × WK_OFFBS			0.3456***
			(0.1006)
N	2596	2503	2313
R^2	0.081	0.085	0.084
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and an 8-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 16: The impact of monetary policy shock on firms' one-year-ahead selling price expectations - considering firm liquidity

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
Internal funds	-1.1408***	-0.9969**	-1.2837***
	(0.4105)	(0.4127)	(0.4434)
MPS × Post	-0.0432	0.0200	-0.1295*
	(0.0808)	(0.0733)	(0.0694)
MPS × Post × WK_ALL	0.2805**		
	(0.1372)		
MPS × Post × WK_ONBS		0.1518	
		(0.1307)	
MPS × Post × WK_OFFBS			0.3883***
			(0.1034)
N	2052	1983	1818
R^2	0.090	0.096	0.085
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 17: The impact of monetary policy shock on firms' one-year-ahead selling price expectations - considering gas prices

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
TTF	-0.0187	0.0053	-0.0049
	(0.0514)	(0.0507)	(0.0556)
MPS × Post	-0.0411	0.0282	-0.1139
	(0.0815)	(0.0735)	(0.0716)
MPS × Post × WK_ALL	0.2720*		
	(0.1402)		
MPS × Post × WK_ONBS		0.1524	
		(0.1321)	
MPS × Post × WK_OFFBS			0.3650***
			(0.1043)
N	2052	1983	1818
R^2	0.082	0.090	0.075
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	No	No	No
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 18: The impact of monetary policy shock on firms' one-year-ahead selling price expectations - considering oil prices

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
Brent	-0.0858***	-0.0865***	-0.0957***
	(0.0224)	(0.0226)	(0.0239)
MPS × Post	-0.1224	-0.0623	-0.1963***
	(0.0818)	(0.0732)	(0.0705)
MPS × Post × WK_ALL	0.2997**		
	(0.1383)		
MPS × Post × WK_ONBS		0.1777	
		(0.1310)	
MPS × Post × WK_OFFBS			0.3594***
			(0.1011)
N	2052	1983	1818
R^2	0.094	0.101	0.089
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	No	No	No
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 19: The impact of euro area CPI final release on firms' one-year-ahead selling price expectations

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
EA CPI × Post	-0.0529	-0.0979	-0.2546
	(0.1861)	(0.1789)	(0.1797)
EA CPI × Post × WK_ALL	0.0812		
	(0.3765)		
EA CPI × Post × WK_ONBS		0.1573	
		(0.3865)	
EA CPI × Post × WK_OFFBS			0.2219
			(0.3239)
N	4108	3932	3454
R^2	0.065	0.068	0.060
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the release and a 6-day time window before and after the release. EA CPI is the year-on-year growth rate for inflation all-items. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 20: The impact of euro area CPI final release on firms' one-year-ahead selling price expectations

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
EA CPI surprise × Post	0.0136	0.0245	0.0527**
	(0.0231)	(0.0228)	(0.0236)
EA CPI surprise × Post × WK_ALL	0.0101		
	(0.0436)		
EA CPI surprise × Post × WK_ONBS		-0.0086	
		(0.0431)	
EA CPI surprise × Post × WK_OFFBS			-0.0473
			(0.0430)
N	4108	3932	3454
R^2	0.870	0.869	0.870
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of monetary policy shocks on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the release and a 6-day time window before and after the release. EA CPI surprise is the difference between the realised year-on-year growth rate for inflation all-items and the one-year-ahead selling price expectations reported by SAFE respondents. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

Table 21: The impact of DFR change on firms' one-year-ahead selling price expectations

	(1) Δ sellp.	(2) Δ sellp.	(3) Δ sellp.
DFR × Post	-2.8607	0.8857	-5.0902
	(4.3633)	(3.6454)	(3.7180)
DFR × Post × WK_ALL	13.6944*		
	(7.4026)		
DFR × Post × WK_ONBS		4.1606	
		(6.4629)	
DFR × Post × WK_OFFBS			15.7422***
			(5.3887)
N	2052	1983	1818
R^2	0.081	0.089	0.074
Size FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Firm control	Yes	Yes	Yes

Notes: The table shows the effect of change in the DFR on firms' one-year-ahead selling price expectations considering firms' working capital exposure one month before the survey and a 6-day time window before and after the Governing Council meetings of the ECB. Further controls included as discussed in the main text, not shown. *** = significant at 1-percent level; ** = significant at 5-percent level; * = significant at 10-percent level.

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