



EUROPEAN CENTRAL BANK
EUROSYSTEM

Working Paper Series

Annalisa Ferrando, Sara Lamboglia, Eric Offner

Monetary policy transmission to
investment: evidence from a survey
on enterprise finance



No 3150

Disclaimer: This paper should not be reported as representing the views of the European Central Bank (ECB). The views expressed are those of the authors and do not necessarily reflect those of the ECB.

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 Papoutsis 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

We study how survey-based measures of funding needs and availability influence the transmission of euro area monetary policy to investment. We first provide evidence that funding needs are primarily driven by fundamentals, while perceived funding availability captures financial conditions. Using these two measures, we assess how the effectiveness of monetary policy varies with fundamentals and financial conditions. Our results indicate that monetary policy is most effective when firms' fundamentals are strong. In contrast, firms with favorable financial conditions exhibit a more muted investment response to monetary policy. By combining these two survey-based measures, we construct an indicator of financial constraints and show that financially constrained firms are more sensitive to monetary policy. These findings offer new light on the transmission of monetary policy to corporate investment, emphasizing not only the role of financial conditions, but also the importance of fundamentals, which are beyond the direct influence of central banks.

Keywords: Central banking, firm heterogeneity, investment opportunities, financial conditions, survey data

JEL Classifications: C83, E22, E52

Non-technical Summary

This paper aims to understand how monetary policy affects business investment across firms. Economic theory highlights two fundamental factors that drive investment decisions: Whether a firm wants to invest (it has identified investment opportunities) and whether it can invest (it has access to the necessary funding). Since these two factors are central to investment behavior, this paper examines how each contributes to the transmission of monetary policy to investment.

Separating these two components is often difficult. This paper takes a novel approach by leveraging direct firm-level survey data. We use responses from the European Central Bank's Survey on the Access to Finance of Enterprises to construct two key indicators: one based on firms' answers about their funding needs, reflecting their investment opportunities, and another based on answers about funding availability, capturing whether firms perceive external financing to be accessible. Through a series of statistically robust empirical exercises, we confirm that responses on funding needs accurately capture firms' investment opportunities, while responses on funding availability reflect their actual access to external finance.

The paper finds that funding needs and funding availability play distinct roles in shaping how firms respond to monetary policy. When the European Central Bank eases monetary policy, the investment response is strongest among firms with high investment opportunities. In contrast, firms with more favorable financial conditions tend to react less. Importantly, the interaction between these two dimensions helps explain the behavior of firms that are constrained in their ability to invest due to limited access to external finance. Our empirical results show that monetary policy has the greatest impact on these constrained firms. This is likely because monetary easing, such as lowering interest rates or signaling lower future rates, primarily improves firms' access to external funding. By easing policy, central banks help relax these financial constraints, enabling firms to pursue investment opportunities they would otherwise be unable to finance.

Overall, the paper contributes to a better understanding of how monetary policy affects real economic activity at the firm level. Our findings also have practical relevance for monetary policymakers: improving financial conditions through easing unlocks investment potential among firms that are otherwise held back. In addition, when investment is held back by global factors such as political uncertainty or overregulation, the ability of central banks to offset these effects through monetary policy is limited.

1 Introduction

Private investment is a key driver of GDP growth. Studies have shown that monetary policy can significantly impact aggregate capital investment, thereby shaping the overall response of an economy to policy changes (Cloyne et al., 2023). Recently, policymakers have expressed concerns about the effectiveness of monetary policy in stimulating investment under certain economic conditions. For example, in the ECB’s Monetary Policy Accounts from October 2024, the Governing Council noted that investment remained subdued due to structural factors, such as geopolitical tensions, trade uncertainty, and overregulation.¹ As a result, policymakers concluded that monetary easing alone would be insufficient to trigger a significant rebound in investment. In other words, the impact of monetary policy appeared to be constrained by fundamental issues which are beyond the control of a central bank.

Indeed, in complete frictionless markets, investment should be determined solely by economic fundamentals. According to traditional Q-theory, firms make their investment decisions based only on marginal product of capital, with Tobin’s Q serving as a sufficient statistic for these investment opportunities.² However, a vast body of research suggests that financial frictions also play a crucial role, meaning that financial variables will impact investment outcomes, and in turn, affect the transmission of monetary policy (Bernanke and Gertler, 1989; Bernanke et al., 1999). With this in mind, the key question we seek to answer is: How do fundamentals and financial conditions shape the transmission of monetary policy to investment?

The main empirical challenge in addressing this question is disentangling the effects of investment opportunities and financial conditions on investment decisions. Early studies, guided by economic models that often assume rational expectations and complete information, attempted to separately proxy these two factors using accounting data (Fazzari et al., 1988; Gilchrist and Himmelberg, 1998; Love and Zicchino, 2006). However, isolating their effects has proved difficult. For example, the marginal Tobin’s Q, which Q-theory suggests as a measure of investment opportunities, is not observable, and commonly used proxies, such as the average Tobin’s Q, are confounded by the financial health of the firms. Furthermore, a major constraint is that capital

¹See the account of the monetary policy meeting of the Governing Council from 16-17 October 2024: <https://www.ecb.europa.eu/press/accounts/2024/html/ecb.mg241114~c0e6f53cf7.en.html>

²In this paper, we use the terms “investment opportunities” and “fundamentals” interchangeably, as is common in the literature (Love and Zicchino, 2006). Similarly, we use the term “structural factors” to refer to economic drivers that primarily influence fundamentals, as in the ECB monetary policy meeting account of 16-17 October 2024.

market valuations are not available to small and medium-sized enterprises (SMEs). As a result, even if Tobin's Q was a reliable measure, its application would be restricted to larger firms.

To tackle the challenge of distinguishing between investment opportunities and financial conditions, we directly use firms' assessments from the ECB's Survey on Access to Finance and Enterprise (SAFE). Our goal is to examine investment behavior by analyzing firms' responses to questions regarding their funding needs and perceived availability of external financing. A key advantage of the survey data is its broad coverage, encompassing both large firms and SMEs. Since the survey is completed by business owners, CEOs, or CFOs, they offer direct insight into the decision-making process behind investment choices, also reflecting behavioural biases that might not be accounted for when working solely with accounting variables.

We begin by offering an economic interpretation of funding needs and funding availability, as well as their connection to investment. Specifically, we provide evidence that external funding needs are primarily driven by fundamentals, while funding availability is largely influenced by financial conditions. Intuitively, assuming that a firm has a given level of internal funding, the amount of external funding it seeks will depend mainly on its expectations for future growth—a reflection of economic fundamentals. In contrast, a firm's perception of the availability of external financing will be shaped primarily by current financial conditions. Therefore, by examining the role of funding needs and availability in monetary policy transmission, while controlling for key firm-level variables, we can provide deeper insights into how fundamentals and financial conditions shape the impact of monetary policy on investment.

We first examine the contemporaneous correlation between funding needs and availability and accounting variables. Our findings indicate that funding availability is strongly linked to firm-level financial conditions, particularly leverage, which is often seen as a proxy for asset-based collateral, and internal funding, which can be interpreted as earnings-based collateral. We observe a negative correlation between funding availability and leverage, and a positive correlation between funding availability and internal funding, suggesting that firms with higher leverage or lower internal funding perceive external financing as less accessible. In contrast, funding needs exhibit a positive correlation with leverage and a negative correlation with internal funding and liquidity, implying that an increase in internal funding and liquidity is associated with a lower demand for external funding.

Second, we demonstrate that funding needs and availability influence investment in different ways, with varying effects across different types of firms. Our findings indicate that the effect

of funding needs on investment does not differ based on a firm's size, leverage, or debt burden, suggesting that investment decisions are similarly influenced by funding needs across firms. In contrast, funding availability exhibits significant disparities in its impact on investment. Specifically, availability plays a crucial role in determining future investment for smaller firms, as well as for firms with high leverage or greater debt burdens—characteristics commonly associated with poor financial health. This shows that investment decisions for financially distressed firms are driven significantly more by the perception of the availability of external funding.

Our third piece of evidence supporting our hypothesis about the distinct roles of funding needs and availability is based on a quasi-natural experiment. We examine the development of the amount of bank branches in subregions in Portugal, drawing on established research that shows that the number of bank branches significantly impact credit lending ([Morgan et al., 2016](#); [Nguyen, 2019](#)). More recently, [Bonfim et al. \(2021\)](#) argued that bank branch closures in Portugal during the early 2010s were primarily driven by restructuring efforts unrelated to local profitability. As a result, the number of bank branches varied exogenously with respect to investment opportunities in certain subregions. Building on this insight, we examine how the number of bank branches affects the average reported funding needs and availability among Portuguese firms in our sample. Our findings indicate that an increase in bank branches in a specific subregion significantly enhances the perceived availability of external funding, while funding needs remain unchanged. This supports our hypothesis that shocks to financial conditions primarily influence firms' perceptions of external funding availability, without affecting their fundamental demand for external financing.

Our main empirical contribution aims to understand the transmission of monetary policy with respect to fundamentals and financial conditions. To analyze the effects of monetary policy, we adopt the high-frequency identification approach widely used in the literature, measuring policy surprises through changes in OIS rates within a 30-minute window around ECB Governing Council announcements. We use the monetary policy surprises constructed by [Altavilla et al. \(2019\)](#) and [Jarociński and Karadi \(2020\)](#) from changes in OIS rates up to ten years around the ECB's press conference. We focus on the forward guidance factor because it has a higher impact on longer-maturity yields which are more relevant for firms' long-term borrowing. Additionally, a significant portion of our sample falls within the zero lower bound (ZLB) period, during which the target rate exhibited minimal movement.

Using funding needs and funding availability, we estimate the impact of monetary policy

surprises on investment through local projections. Our results confirm that fundamentals and structural factors driving investment opportunities play a crucial role in the transmission of monetary policy. For example, we find that a one basis point increase in forward guidance surprise leads to a 10 basis points greater reduction in investment for a firm that reported increased external funding needs, compared to a firm whose funding needs remained unchanged over the past six months. This finding suggests that the effectiveness of monetary policy is significantly weaker when investment is constrained by structural factors, reinforcing the idea that easing monetary policy alone may not be sufficient to stimulate investment under such conditions.

Likewise, our analysis of the effects of monetary policy on investment through the availability of funding suggests that tighter financial conditions amplify the impact of monetary policy on investment. We find that the difference in investment response to monetary policy can be as large as 15 basis points between firms that experienced an increase in funding availability and those whose availability remained unchanged over the previous six months. We also show that our main results on funding needs and availability are not confounded by balance-sheet characteristics—such as leverage, liquidity, or firm size—which the literature has identified as key factors in the transmission of monetary policy to investment. Our findings remain mostly unchanged when controlling for these variables interacted with monetary policy surprises.

While our results so far shed light on the separate roles of fundamentals and financial conditions in the transmission of monetary policy, they offer limited insight into potential interactions between the two. In practice, smaller firms often have greater investment opportunities but may also face tighter financial conditions compared to their larger counterparts ([Gomes, 2001](#)). To account for this, we extend our analysis to examine the joint influence of fundamentals and financial conditions. Specifically, we construct a dummy variable that takes the value of 1 if a firm increased funding needs and perceived a decrease in funding availability. We interpret this dummy as a survey-based measure of financial constraints. According to our definition, a firm is financially constrained only when high funding needs coincide with limited access to external finance. The group-specific local projection estimates confirm that financially constrained firms are significantly more responsive to monetary policy shocks than other firms, with peak effects nearly twice as large. Our results confirm the conclusion of other empirical studies such as [Durante et al. \(2022\)](#) and [Cloyne et al. \(2023\)](#), as well as predictions of theoretical models including [Kiyotaki and Moore \(1997\)](#) and [Bernanke et al. \(1999\)](#).

What do these results reveal about the main transmission channels of monetary policy? Our findings suggest that the credit channel plays a central role in explaining how monetary policy affects firm behavior. Monetary easing is expected to improve the financial conditions of firms by easing borrowing restrictions via the balance sheet channel and facilitating lending through the bank lending channel (Bernanke and Gertler, 1995). On the one hand, if structural weaknesses—such as overregulation and economic uncertainty—keep credit demand low, these channels, which mainly operate through credit supply, will do little to stimulate investment. In such cases, the ability of central banks to boost investment and economic growth through monetary policy remains highly limited. On the other hand, if financial conditions are excessively tight, then, all else equal, easing them would lead to increased investment, particularly for firms, that might have less access to external finance, such as small enterprises and highly leveraged firms. This mechanism is particularly evident at the firm level. When firms have high investment opportunities but limited access to finance, monetary policy easing has a substantial positive effect on their investment. This interpretation through the credit channel is consistent with a growing body of literature emphasizing the importance of financial conditions in the transmission of monetary policy (Caballero et al., 2024, 2025). These studies argue that monetary policy primarily affects the real economy through its impact on financial conditions—a view often reiterated by central bank governors.³ Our findings confirm the central role of financial conditions, showing that they are also crucial for understanding how monetary policy affects firms across the corporate sector.

This paper contributes to the literature on monetary policy transmission channels to investment using firm-level data. This line of research dates back to Gertler and Gilchrist (1994), who showed that the sales and inventories of small firms are more sensitive to monetary policy. More recently, Cloyne et al. (2023) found that the investment of financially constrained firms—defined as young firms that do not pay dividends—reacts more strongly to monetary policy. Similarly, Jeenas (2024) documented that monetary policy shocks lead to larger fluctuations in fixed capital formation, inventories, and sales growth for firms with high leverage and low liquid assets. Ottonello and Winberry (2020) showed that firms with low default risk and low leverage are more responsive to monetary policy, a finding that appears to contrast with the

³See, for example, the monetary policy statement of the ECB on January 30th, 2025: <https://www.ecb.europa.eu/press/pr/date/2025/html/ecb.mp250130~530b29e622.en.html> or the speech of the Federal Reserve Chair, Jerome Powell, at the Economic Club of New York Luncheon on October 19th, 2023: <https://www.federalreserve.gov/newsevents/speech/powell120231019a.htm>

research emphasizing the stronger reactions of financially constrained firms. Our findings align with [Durante et al. \(2022\)](#), who report significant cross-sectional effects of monetary policy on firm investment in the euro area.

A key contribution of our study is the novel use of survey data to disentangle investment opportunities from financial conditions. While a few studies have attempted this separation using accounting variables ([Gilchrist and Himmelberg, 1998](#); [Love and Zicchino, 2006](#)), our approach is the first to leverage direct survey-based measures. Moreover, we are the first to use these separate proxies of investment opportunities and financial conditions to analyze the transmission of monetary policy. Beyond this, we introduce a new measure of financial constraints that improves upon standard proxies for financial constraints—such as cash flow, leverage, firm size, or combinations thereof. Several empirical studies have used cash flow as a proxy of for financial constraints, arguing that the sensitivity of investment to cash flow indicates limited access to external finance ([Fazzari et al., 1988](#); [Blundell et al., 1992](#); [Gilchrist and Himmelberg, 1995](#)). However, [Kaplan and Zingales \(1997\)](#) challenged this view, arguing that cash flow sensitivity alone is not sufficient to identify financial constraints. [Erickson and Whited \(2000\)](#) further showed that, once accounting for measurement error in investment opportunities, unconstrained firms can have higher cash flow sensitivity. Similarly using a structural model, [Gomes \(2001\)](#) demonstrated that investment is not sensitive to cash flow once investment opportunities are properly controlled for.

Leverage is also commonly associated with greater financial constraints ([Kaplan and Zingales, 1997](#); [Whited and Wu, 2006](#)). The rationale is that highly leveraged firms face higher default risk that may limit their access to external finance ([Ottonello and Winberry, 2020](#)). However, high leverage can also reflect greater access to external funding in the past, suggesting that some unconstrained firms may have higher leverage precisely because they could borrow more. This dual interpretation makes leverage an imperfect measure of financial constraints.⁴

Firm size has been argued to be a more robust proxy for financial constraints ([Gertler and Gilchrist, 1994](#); [Gopinath et al., 2017](#)). The presumption is that smaller firms, which tend to be riskier, face tighter financial conditions and potentially more investment opportunities due to decreasing returns to scale ([Gomes, 2001](#)). However, firms of similar size can still differ significantly in terms of risk profiles and creditworthiness. Investment opportunities may also

⁴In a related argument, [Caglio et al. \(2021\)](#) show that the sensitivity of investment to monetary policy—conditional on leverage—depends on the type of collateral pledged. This further suggests that leverage alone is insufficient to explain firms’ investment responses to monetary policy.

vary across other dimensions, such as industries and business models. Finally, some studies have developed firm-level financial constraints indices, constructed from combinations of accounting variables. Three prominent examples are the Kaplan-Zingales (KZ), Whited-Wu (WW), and Hadlock-Pierce (HP) indexes (Baker et al., 2003; Whited and Wu, 2006; Hadlock and Pierce, 2010). However, Farre-Mensa and Ljungqvist (2016) challenge the validity of these measures by exploiting a natural experiment, showing that firms classified as financially constrained by these indices do not face difficulties in obtaining credit when their demand for debt increases exogenously.

Overall, measuring financial constraints using accounting variables is challenging, as these variables reflect equilibrium outcomes shaped by both firm decisions and the actions of external funding providers. In contrast, our survey-based measures capture firms' funding needs and perceived availability before investment decisions are finalized. Firms report the financing they desire to support growth expectations, regardless of whether this funding will ultimately materialize. This distinction makes our survey-based indicators cleaner proxies for investment opportunities and financial conditions. By combining both, we construct a measure of financial constraints that avoids the ambiguity inherent in traditional proxies like leverage or cash flow sensitivity, and more accurately identifies firms that require external funding but do not have access to it—regardless of firm size.

The remainder of the paper is structured as follows: Section 2 introduces the dataset and presents descriptive statistics. Section 3 investigates the relationship between funding needs, funding availability, and investment, showing that funding needs are primarily linked to firm fundamentals, while funding availability is more closely associated with financial conditions. Section 4 presents our main empirical findings on monetary policy transmission, highlighting the distinct roles of funding needs and availability. Section 5 analyzes the effect of monetary policy on investment by grouping firms based on whether the availability of external funding aligns with their funding needs. Section 6 concludes the paper.

2 Data and Summary Statistics

Our primary dataset, SAFE-ORBIS, is proprietary and created by integrating firms from the Survey on the Access to Finance of Enterprises (SAFE)—conducted jointly by the European Central Bank and European Commission—with the ORBIS database supplied by Bureau van

Dijk (BvD), a Moody’s Analytics subsidiary. The SAFE is a comprehensive European firm-level survey covering more than 11,000 firms. Launched in 2009, the survey was initially conducted bi-annually and has shifted to a quarterly schedule starting in 2024.⁵ Our paper examines all survey rounds from 2010 to 2022.⁶ The survey targets a representative sample of non-financial firms across the 20 euro area countries, spanning the four primary sectors: manufacturing, construction, trade, and services. It assesses recent changes in firms’ access to finance and their perceptions of the broader economic environment while collecting detailed firm-level information, including size, ownership, age, sector, and financial position. To ensure that the survey results are representative of the entire population of euro area firms, the survey provides weights that adjust for the economic importance of each size class, sector, and country. We incorporate these weights in our empirical analysis.

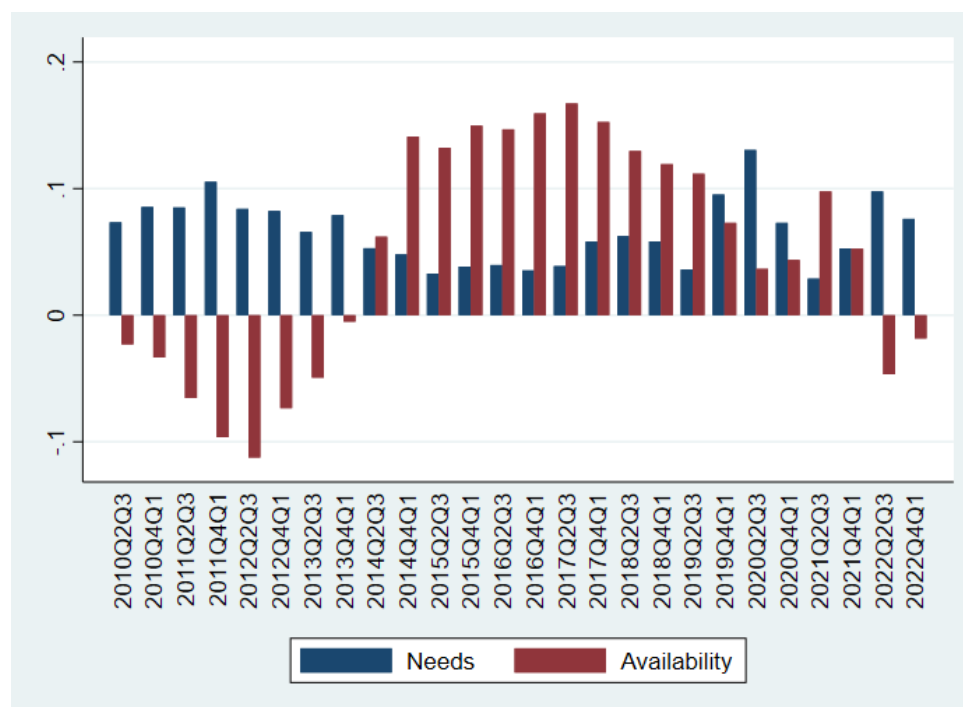
Our analysis focuses on survey questions related to firms’ external financing needs and their perceived availability of various financing sources: bank loans, credit lines, trade credit, equity and debt security issuance. Specifically, each firm is asked the following question: *“For each of the following types of external financing—bank loans, credit lines, trade credit, equity and debt security issuance—please indicate whether your needs (availability) increased, remained unchanged, or decreased during the previous and current quarter”*. The responses to these questions are used to create a discrete variable for each type of financing, assigned a value of 1 if the firm reports an increase, -1 for a decrease, and 0 if unchanged. The firm-level average of these values in a given period t generates two key indicators: Needs_t and Avail_t . A positive value for Needs_t or Avail_t indicates that the firm reported an increase in external financing needs or availability for the majority of instruments.⁷

⁵For further details, see https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html.

⁶Specifically, we analyze survey rounds 3 to 27, covering the period from Q2-Q3 2010 to Q4 2022-Q1 2023.

⁷As an example, a firm that reports increasing need for bank loans, credit lines and trade credit while decreasing equity and debt security issuance will have $\text{Needs}_t = \frac{1+1+1-1-1}{5} = 0.2$.

Figure 1: Aggregate needs and availability for external finance



The figure shows the weighted average of the two indicators, $Needs_t$ and $Avail_t$, for each survey round for the complete sample of the survey. The weights, included in the SAFE dataset, restore the proportions of the economic importance of each size class, economic activity, and country. Sample period: April 2010 to January 2023.

Figure 1 presents the average values of $Needs_t$ and $Avail_t$ by survey round. $Needs_t$ is predominantly positive, peaking before the euro area recession triggered by the sovereign debt crisis in 2011 and again in early 2020, just before the COVID-19 outbreak. Between 2010 and early 2014, $Avail_t$ remained mostly negative, primarily due to declining bank loan availability following the sovereign debt crisis. However, from 2014 onward, availability improved, turning positive and peaking in the years leading up to COVID-19, coinciding with the ECB's expansion of its monetary policy toolkit to ease financing conditions and strengthen policy transmission.

To complement our analysis, we use the ORBIS dataset, which provides annual balance sheet as well as profit-and-loss account information for firms. From this dataset, we construct a variety of firm-level financial variables. Our dependent variable, the investment rate, is measured as the annual growth rate of fixed capital. Additionally, we include key financial indicators such as financial leverage, debt burden ratio, liquidity ratio, return on equity (ROE), internal funding, and sales growth. We also create two measures of firm size: an SME dummy based on the

number of employees and a continuous variable based on total assets.⁸ To ensure data quality, we follow [Kalemli-Özcan et al. \(2022\)](#) and exclude firms reporting negative total assets, sales, or age (measured as years since incorporation). We also drop observations where fixed assets are negative or missing. Finally, we winsorize the bottom 5% of each variable by country, year and sector, thereby reducing the influence of extreme outliers. Due to potential data quality issues among firms with unusually high investment levels, we trim the investment variable at the 95th percentile. For all our variables of interest the kurtosis remains below 10.

To match the semi-annual SAFE data with the annual ORBIS data, we align each SAFE observation with the most recent ORBIS observation that precedes the SAFE reference period.⁹ Our final sample consists of 27,439 firms and 71,301 observations. Table 1 presents the descriptive statistics of the variables used in our analysis.

Our analysis of monetary policy transmission builds on the literature on monetary economics that identifies the causal effects of monetary policy using high-frequency movements in interest rates around central bank announcements ([Kuttner, 2001](#); [Gürkaynak et al., 2005](#)). The key assumption is that within a sufficiently short window, typically 30 minutes, these interest rate movements are driven solely by central bank announcements, provided no other major events occur within the window. We obtain monetary policy surprises from the Euro Area Monetary Policy Event-Study Database (EA-MPD), compiled by [Altavilla et al. \(2019\)](#). They extract monetary policy surprises from changes in OIS rates at 1, 3, and 6-month maturities, as well as 1, 2, 5, and 10-year maturities, measured around the ECB press release and press conference window.¹⁰ For our analysis, we focus on the forward guidance surprise, which is derived from the press conference window and has been shown to have the strongest effects on yields with maturities between 1 and 5 years which are those more relevant for firms' long-term borrowing. To align these high-frequency monetary policy surprises with our lower-frequency firm-level data, we follow [Bauer and Swanson \(2023b\)](#) and aggregate the surprises by summing them over each

⁸Table A.1 provides a detailed overview of the variable definitions.

⁹For our main dependent variable, investment rate, the match differs depending on the reference period of the SAFE rounds. In the survey rounds covering the second and third quarter of the year, we assign to each firm the average investment rate over the two years following the SAFE reference period. In the survey rounds covering the fourth quarter of the year Y and the first quarter of the year $Y + 1$, we assign the investment rate of the year $Y + 1$. This approach prevents the same investment rate from being matched to survey responses from multiple periods.

¹⁰[Altavilla et al. \(2019\)](#) follow the methodology of [Gürkaynak et al. \(2005\)](#) and [Swanson \(2021\)](#) to identify three latent factors from the OIS rates over their full sample. To provide an economic interpretation, they impose restrictions on how these factors influence the OIS rates using a rotation matrix, which results in three distinct policy surprises: the target factor, the forward guidance factor, and the QE factor.

Table 1: Summary Statistics

Variable	Mean	SD	p25	p50	p75	Min	Max	N
<i>(A) Survey variables</i>								
Needs	0.09	0.49	0.00	0.00	0.33	−1.00	1.00	71,301
Avail	0.12	0.48	0.00	0.00	0.33	−1.00	1.00	71,301
<i>(B) Accounting variables</i>								
Investment	0.05	0.28	−0.07	−0.00	0.11	−0.93	1.23	71,301
Leverage	0.21	0.21	0.02	0.16	0.33	0.00	1.38	71,301
ROE	0.09	0.39	0.01	0.08	0.18	−1.61	1.69	71,301
Internal fund	0.17	0.17	0.07	0.14	0.23	−0.34	1.09	71,301
Liquidity	1.47	1.44	0.68	1.07	1.64	0.03	8.09	71,301
Sales growth	0.06	0.29	−0.06	0.03	0.12	−0.84	1.73	71,301
SME	0.57	0.49	0.00	1.00	1.00	0.00	1.00	71,301
Size	16.04	2.39	14.18	16.20	17.81	6.78	24.63	71,301
Debt burden	0.17	0.17	0.03	0.11	0.29	0.00	0.61	65,019
Dividend payment	0.44	0.49	0.00	0.00	0.00	1.00	1.00	71,301
Age	37.98	20.68	21.00	30.00	41.00	2.00	756	71,301
KZ index	−0.57	0.48	−0.96	−0.92	0.00	−1.00	0.12	71,301
WW index	−0.61	0.10	−0.64	−0.57	−0.50	−1.00	−0.04	71,301
<i>(C) Monetary policy</i>								
Forward guidance	1.14	6.84	−1.62	0.68	3.20	−17.45	20.05	29
Forward guidance (PM)	1.19	6.38	−1.52	0.21	2.71	−16.78	15.45	29

Summary statistics for SAFE survey variable, accounting variables from ORBIS, and monetary policy surprises. Forward guidance (PM) stands for the poor man’s procedure from [Jarociński and Karadi \(2020\)](#). KZ (Kaplan-Zingales) index and WW (Whited-Wu) index are adapted to reflect our mostly private-firm sample. The statistics from the SAFE survey and ORBIS are weighted according to the SAFE weights that restore the proportions of the economic importance of each size class, economic activity and country. For a detailed description of the variables see Table A.1. Sample period: April 2010 to January 2023.

six-month SAFE reference period.

A growing body of literature on monetary policy highlights the importance of central bank information effects—namely, the idea that central banks convey not only changes in the policy stance but also information about the future state of the economy ([Nakamura and Steinsson, 2018](#)). What may appear to be a tightening shock could, in fact, have expansionary effects on asset prices and other economic variables if agents interpret the announcement as a response to improving economic conditions. To account for this, we conduct a robustness check using the “poor man’s sign restriction” approach from [Jarociński and Karadi \(2020\)](#) applied to our forward guidance surprises. Specifically, we restrict the sample to ECB press conferences where the forward guidance surprise and the Eurostoxx 50 index moved in opposite directions within the 30-minute window around the announcement, helping to isolate genuine policy shocks from

those confounded by information effects. Appendix Figure A.1 shows the high-frequency monetary policy surprises—the simple forward guidance surprise and the forward guidance surprise adjusted using the poor man’s sign restriction—over our sample period.

3 An Economic Interpretation of Funding Needs and Availability

3.1 Factors Related to Needs, Availability and Investment

In this section, we examine the relationships between Needs_t and Avail_t and other firm characteristics. First, we compare the average values of needs and availability across firms’ responses to various survey questions. Table 2 presents the results, beginning with discouraged borrowers—firms that did not apply for external funding due to fear of rejection and its adverse consequences. These firms report significantly higher funding needs, indicating that past financial tightening does not necessarily lead to a reduction in desired needs. This supports the idea that funding needs are not reflective of a firm’s current financial health. At the same time, discouraged firms report substantially lower funding availability, consistent with their reluctance to seek external finance.

The second row of Table 2 corresponds to firms that chose not to apply for bank loans due to ample internal funding, while the third row focuses on firms that similarly chose not to draw on their existing credit lines. These cases are particularly important because they highlight a potential alternative explanation for lower reported funding needs. As the table shows, firms that abstained from external borrowing because of sufficient internal resources report significantly lower funding needs. This underscores the importance of accounting for internal funding when interpreting Needs_t as a proxy for investment opportunities. Low reported needs may, in fact, reflect financial self-sufficiency rather than a lack of limited investment demand.

Rows 4 and 5 of Table 2 refer to whether a firm reported increased investment in property, plant, and equipment, or inventories and working capital during the relevant survey period. These firms report substantially greater funding needs. These findings suggest that reported funding needs capture both long-term investment intentions and short-term liquidity requirements. Finally, the last two rows ask whether a firm faced financing obstacles, such as high interest rates or other funding costs, such as fees. The results in Table 2 show that firms experi-

encing higher borrowing costs also report significantly lower funding availability. This suggests that perceived availability is closely aligned with actual borrowing conditions, including both interest rates and associated costs.

Table 2: Relation of needs and availability to other SAFE survey questions

	Mean Needs			Mean Availability		
	Yes	No	SE	Yes	No	SE
Was the firm discouraged?	0.17	0.06	0.01	−0.24	0.10	0.01
Did the firm have ample internal funding (Bank loan)?	−0.10	0.19	0.01	0.13	0.06	0.01
Did the firm have ample internal funding (Credit line)?	−0.06	0.17	0.01	0.11	0.04	0.01
Did investment in property, plant or equipment increase?	0.13	0.04	0.01	0.20	0.07	0.01
Did investment in inventories and working capital increase?	0.13	0.04	0.01	0.19	0.08	0.01
Did the firm face high interest rates?	0.26	0.20	0.01	0.03	0.33	0.02
Did the firm face other funding costs?	0.25	0.18	0.02	0.07	0.47	0.02

Mean values of funding needs and availability based on responses to SAFE survey questions. The questions refer to the six months period preceding the survey wave. The “Yes” column reports the average needs and availability for firms that answered “yes” to each question; the “No” column shows the corresponding averages for firms that answered “no.” The standard error (SE) of the difference is clustered at the firm and wave level.

Next, we compare our two survey measures with different accounting variables. Leverage and debt burden can be used to assess balance sheet vulnerabilities, serving as proxies for specific financial frictions related to credit risk. The liquidity ratio can indicate a firm’s ability to meet its current debt obligations without relying on external capital or serve as internal funding. Similarly, ROE and our internal funding indicator can reflect a firm’s broader capacity to finance its business projects independently. Sales growth can be an indicator of the firm’s potential for expansion. Finally, we consider firm’s size based on the number of employees and total assets, following [Gertler and Gilchrist \(1994\)](#) who show that smaller firms face greater financial constraint.

Table 3 displays the pairwise conditional correlations of all variables used in the econometric analysis with our survey-based funding needs and availability.¹¹ The correlations are conditioned on sector and time by country fixed effects. The interpretation of needs and availability becomes

¹¹See Appendix Table A.1 for the unconditional correlations.

clearer, when compared with other financial ratios. Specifically, firms' reported needs for external finance are negatively correlated with ROE, liquidity, and internal funding—an indication that, when internal funds are abundant, firms tend to turn less to external funds, in line with the Pecking Order Theory. In contrast, funding needs are positively correlated with leverage. This is plausible in the sense that higher external funding needs should increase leverage. The correlation between reported funding availability and financial ratios indicates that firms perceive greater access to external financing when their performance improves and their financial position strengthens. This is reflected in the positive correlation with ROE and sales growth, as well as the negative correlation with leverage and debt burden, suggesting that firms with stronger financial health report higher funding availability.

Table 3: Correlation of needs and availability with accounting variables

	Needs _{<i>t</i>}	Avail _{<i>t</i>}
Leverage _{<i>t</i>}	0.15***	−0.07***
Investment _{<i>t</i>+1}	0.08***	0.08***
ROE _{<i>t</i>}	−0.02***	0.06***
Internal fund _{<i>t</i>}	−0.15***	0.12***
Liquidity _{<i>t</i>}	−0.02***	0.00
Sales growth _{<i>t</i>}	0.03**	0.10***
SME-dummy	−0.03**	−0.06***
Size _{<i>t</i>}	0.01***	0.02***
Debt burden _{<i>t</i>}	0.22***	−0.38***

The table shows the pairwise correlations between funding needs and availability with leverage, investment, ROE, internal funding, liquidity, sales growth, SME-dummy, size, and debt burden. Correlations are weighted (see notes to Table 1) and conditional to sector and country times wave fixed effects. Standard errors are clustered at firm and wave level. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

This initial piece of evidence highlights that firms' responses to funding needs and availability capture distinct information sets, each correlated differently with firms' financial variables. While Table 3 only provides conditional contemporaneous correlations, our findings suggest that availability reflects financial conditions, whereas needs are rather linked to investment oppor-

tunities. In the following sections, we enhance our empirical analysis by introducing a more structured approach that extends beyond correlations.

3.2 Effects of Funding Needs and Availability on Investment

In this section, we examine how information from the survey affects firms' investment decisions. We begin with a straightforward investment equation that incorporates the set of financial ratios introduced in the previous section, $X_{i,t}$, supplemented by funding needs and availability:

$$\text{Inv}_{i,t+1} = \beta_1 \text{Needs}_{i,t} + \beta_2 \text{Avail}_{i,t} + \gamma X_{i,t} + \text{Inv}_{i,t} + \alpha_{i,s,t} + \epsilon_{i,t} \quad (1)$$

Depending on the specification, the set of fixed effects, $\alpha_{i,s,t}$, used to control for potential omitted variable biases are: time and sector, country-by-time fixed effects, and firm fixed effects. However, the use of firm fixed effects significantly reduces the number of observations, as relatively few firms participate in the survey across multiple years. We cluster standard errors at firm and time levels.

Table 4 presents the estimated coefficients from the investment function. Focusing on columns 1 and 2, we find that the signs and significance levels of the coefficients remain consistent regardless of whether time and sector fixed effects are included in the specification. Future investment increases on average for firms that have previously invested and experienced high sales growth. Conversely, having high leverage or being a small firm reduces investment. While availability of internal funds does not seem to play a role, the investment rate of firms with higher liquidity is higher. In the last column, we include firm fixed effects to remove firm-specific unobserved effects, such as firms' average investment. In this case, firms that have already invested tend to invest less in the subsequent period, in line with the literature on lumpy investment (DeAngelo et al., 2011; Im et al., 2020).

Table 4: Effects of funding needs and availability on future investments

	(1)	(2)	(3)
	Inv _{t+1}	Inv _{t+1}	Inv _{t+1}
Needs _t	3.45*** (0.47)	3.45*** (0.45)	1.74*** (0.39)
Avail _t	2.91*** (0.38)	2.59*** (0.40)	1.59*** (0.48)
Inv _t	0.06*** (0.01)	0.05*** (0.01)	−0.13*** (0.01)
Leverage _t	−4.85*** (0.87)	−4.64*** (0.89)	−24.42*** (3.06)
ROE _t	4.47*** (0.56)	4.47*** (0.57)	3.10*** (0.66)
Internal Fund _t	−1.83 (1.13)	−1.54 (1.22)	7.21** (3.02)
Liquidity _t	0.92*** (0.13)	0.97*** (0.14)	2.08*** (0.30)
Sales growth _t	5.49*** (0.94)	5.77*** (0.96)	0.84 (0.86)
SME-dummy	−1.12*** (0.39)	−1.25** (0.45)	−0.67 (1.18)
Observations	71,301	71,301	59,275
R-squared	0.02	0.04	0.48
Firm FE	N	N	Y
Time FE	N	N	Y
Sector FE	N	Y	N
Country × Time FE	N	Y	N

The table reports estimated coefficients of a regression of future investment on needs, availability, and controls. All regressions are weighted using the SAFE weights (see notes to Table 1). Standard errors are clustered at firm and wave level. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

Our primary interest is to assess the additional role of funding needs and funding availability as predictors of investment. In Table 4, both variables exhibit a similar positive impact on investment, even after controlling for firm-level financial variables. This finding suggests that our survey-based measures capture valuable information beyond traditional accounting variables, highlighting their importance in explaining future investment decisions. To assess the economic relevance of the two variables, we consider how much is the increase in future investment for firms that move from the 25th percentile (no changes in needs/availability) to the 75th percentile (equivalent to a moderate increase of needs/availability of 0.33). According to column 2 this increase leads to an increase in investment of approximately 1.1 percentage points for needs and 0.8 percentage points for availability.¹²

Having established that funding needs and availability play a significant role in driving investment, we now aim to disentangle potential differences in the channels through which funding needs and availability affect investment. We adopt an alternative specification that exploits firm-level heterogeneity. In Table 5, we interact $Needs_t$ and $Avail_t$ with firm characteristics commonly used as proxies for financial constraints (FC). The first two columns examine size-based constraints, following Gertler and Gilchrist (1994) and Perez-Quiros and Timmermann (2000). Column 1 includes an SME dummy, which equals one if the firm has fewer than 250 employees. Column 2 uses an alternative size dummy that equals one if the firm's total log assets are below the 75th percentile. The third and fourth columns focus on debt-based financial constraints, in line with the financial accelerator literature. Column 3 defines a high-leverage dummy, which equals one if the firm's leverage ratio is above the 75th percentile (equivalent to 32% leverage). Column 4 introduces a high debt burden dummy, which is equal to one if the debt burden ratio exceeds 27% (the 75th percentile).

The interaction of needs and FC is statistically insignificant, implying that external funding needs drive investment similarly for small and large firms, as well as for firms with high and low leverage. However, funding availability exhibits a stronger effect on investment for financially constrained firms, with all estimated availability interaction coefficients being positive and mostly statistically significant. This finding implies that investment in small firms and those with high leverage or debt burden is more sensitive to changes in funding availability. Our results align with Love and Zicchino (2006), who finds that financial factors play a larger role

¹²Alternatively, in terms of standard deviations, our estimates imply that a one standard deviation increase in needs and availability implies an increase in investment by 1.6 percent and 1.2 percentage points, respectively.

in investment decisions in countries with less developed financial systems.

Our results also suggest that large firms and firms with low leverage, which typically have strong economic and financial performance, are less dependent on the availability of external funding. Instead, their investment decisions are primarily driven by investment opportunities, reinforcing the idea that financially stable firms can fund their investment opportunities regardless of credit market conditions.

Table 5: Link of financial constraints and the effects of needs and availability on investment

	Size-based financial constraints		Debt-based financial constraints	
	Inv _{t+1}	Inv _{t+1}	Inv _{t+1}	Inv _{t+1}
	FC=SME	FC=Low LogTA	FC=High Lev.	FC=High Debt Burd.
Needs _t	3.876*** (0.736)	3.652*** (0.664)	3.216*** (0.515)	3.591*** (0.475)
Avail _t	1.734** (0.817)	1.913*** (0.508)	2.287*** (0.414)	1.930*** (0.443)
FC	-1.923*** (0.622)	1.110* (0.614)	-2.008*** (0.439)	-3.514*** (0.541)
FC×Needs _t	-0.770 (0.762)	-0.318 (0.635)	0.753 (0.811)	-0.305 (0.810)
FC×Avail _t	1.440 (0.848)	0.989* (0.573)	1.086* (0.602)	1.732** (0.680)
Observations	71,301	71,301	71,301	65,019
R-squared	0.03	0.03	0.03	0.04
Sector FE	Y	Y	Y	Y
Country × Time FE	Y	Y	Y	Y

The table reports the estimated coefficients of a regression of future investment on needs, availability, and their interaction with different proxies for accounting-based financial constraints measures. All regressions are weighted using the SAFE weights (see notes to Table 1). Controls include past investment, ROE, liquidity, internal funding, leverage, and sales growth. Standard errors are clustered at firm and wave level. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

3.3 A Quasi-Natural Experiment: Portuguese Bank Branches

In this section, our objective is to further support our assumption that reported funding availability is primarily linked to financial conditions, while reported funding needs are mainly associated with investment opportunities. We use a quasi-natural experiment that we draw from the literature on bank branch closures and their effects on credit lending. Specifically, we build on the insights of Bonfim et al. (2021), who argue that the decline in the number of bank branches in Portugal after the financial crisis was not driven by profitability considerations but was instead “forced upon banks.” Especially between 2012 and 2015, the density of branches in Portugal decreased significantly in different regions, in part due to restructuring agreements with the European Commission. This exogenous variation in bank branches provides a natural setting to examine how changes in credit supply conditions influence firms’ perceived funding availability while leaving investment opportunities largely unaffected.

To evaluate the impact of bank branch closures on funding needs and availability, we collect data on the annual number of local bank branches at the NUTS3 subregion level in Portugal from the Portuguese Banking Association (APB).¹³ We merge these data with our SAFE-ORBIS dataset by averaging the funding needs and availability of Portuguese firms within each subregion. Analogously, we aggregate the usual balance sheet variables within the subregions.

While the variation in bank branch density arguably provides an exogenous source of changes in current financial conditions, it could still be influenced by variables correlated with past investment opportunities in specific regions. To address potential endogeneity concerns, we control for lagged funding needs and availability, along with our control variables, SME, leverage, ROE, sales growth, internal funding, and liquidity. We also include subregional and time-fixed effects to account for unobserved regional and time-specific factors.

We then run two-way fixed effects regressions of funding needs and availability controlling for firm-level variables with our sample going from 2010 to 2023. Here, we face a trade-off: Including the whole sample increases the number of observations and helps increase the statistical power of the test. However, because the natural exogeneity coming from the financial crisis took place in the first half of the 2010 to 2020 decade, including the whole sample could potentially relate the closure of bank branches to other factors, not only related to financial conditions. To address this concern, we present results for both the full sample period (2010–2023) and the subperiod

¹³The data is publicly available at apb.pt/pt/publicacoes/estatisticas.

most relevant to banking distress (2011–2015). Due to possible stationarity issues we present results on levels using time-fixed effects and using first differences.

Another important consideration is that not all banks were equally affected by the financial crisis. For instance, only three major national banks—Caixa Geral de Depósitos (CGD), Banco BPI (BPI), and Banco Comercial Português (BCP)—were required to close bank branches as part of restructuring agreements with the IMF, the ECB, and the European Commission in exchange for bailout support.¹⁴ Accordingly, in a third robustness exercise, we restrict the sample to branches operated by these three banks.

Table 6 presents our main findings. Columns 1 to 2 examine the relationship between the number of bank branches and funding needs with time-fixed effects and first differences, respectively. Panel A presents the results for the full sample. The results show that the number of bank branches in Portugal is largely unrelated to firms’ funding needs, suggesting that these are not influenced by changes in financial conditions. Columns 3 and 4 repeat the analysis with funding availability as the dependent variable. In contrast to the results for funding needs, the coefficients here are positive and statistically significant, indicating that changes in financial conditions do affect firms’ perceived access to external funding. Specifically, a higher number of bank branches is associated with greater reported funding availability by firms in the same regions. These findings reinforce the idea that financial conditions primarily shape firms’ perceptions of funding availability, while need for external financing remains unchanged in response to such changes.

Panel B restricts the sample to the core period of the banking crisis (2011–2015). Although the coefficients are somewhat weaker—probably due to the reduced sample size—the effect of bank branches on funding availability remains statistically significant in the first-difference specifications, whereas no significant relationship is found for funding needs. Panel C further narrows the analysis to include only the subset of banks that closed branches as part of restructuring agreements. In this case, an increase in the number of bank branches is again strongly associated with higher reported funding availability, but not with funding needs. Notably, the coefficients on funding availability are substantially larger than those observed in the full-sample regression.

Following forced closure of bank branches unrelated to profitability, Portuguese firms perceived the availability of funding to decrease substantially, without having an effect on their

¹⁴See the European Commission Press Release from July 24, 2013: https://ec.europa.eu/commission/presscorner/detail/en/ip_13_738.

investment opportunities. These results highlight that exogenous variation in financial conditions alone has a large effect on availability of funding reported by firms, while funding needs are not affected by financial conditions.

Overall, our findings indicate that both funding needs and funding availability are important drivers of future investment, even after controlling for accounting variables. In addition, these variables capture fundamentally different information, allowing us to better distinguish between the roles of investment opportunities and financial conditions in shaping firms' investment decisions.

Table 6: Impact of bank branches on needs and availability

Panel A: Full sample (2011 - 2023)				
	Needs		Availability	
	(1)	(2)	(3)	(4)
Bank branches	-0.02 (0.01)	-0.09 (0.06)	0.08*** (0.02)	0.07*** (0.02)
Observations	132	121	132	121
R ²	0.49	0.48	0.81	0.30
Panel B: Short sample (2011 - 2015)				
Bank branches	-0.04 (0.03)	-0.01 (0.01)	0.02 (0.02)	0.03*** (0.01)
Observations	55	44	55	44
R ²	0.18	0.78	0.86	0.61
Panel C: Full sample with selected banks				
Bank branches	0.03 (0.05)	0.01 (0.06)	0.16*** (0.02)	0.37*** (0.10)
Observations	130	119	130	119
R ²	0.49	0.46	0.81	0.38

The table presents the estimated coefficients from a linear regression of needs and availability on bank branches and further controls. Columns 1 and 2 show the regression of funding needs on lagged bank branches with region and time fixed effects and first differences regression, respectively. Column 3 and 4, repeat the regressions for funding availability. Panel A shows the results for the full sample period. Panel B uses the short sample, from 2011 to 2015, and panel C restricts the sample to branches of three banks: CGD, BPI, and BCP. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

4 Monetary Policy Transmission

In this section, we examine how the response of firms' investment to monetary policy depends on their needs and availability of external funding. Addressing this question will help clarify the distinct roles that structural factors and financial conditions play in the transmission of monetary policy.

4.1 Unconditional Monetary Policy Transmission

We begin by analyzing the average effect of monetary policy on firm-level investment, which provides a benchmark for assessing the contribution of our cross-sectional results in a subsequent analysis. To estimate the impulse response functions (IRFs) of monetary policy on investment, we use local projections, following [Jordà \(2005\)](#). Specifically, we regress future firm-level investment on monetary policy surprises while controlling for firm-level accounting variables and macroeconomic conditions. In addition, we incorporate sector- and country-fixed effects to account for possible industry-specific and regional unobserved effects:

$$I_{i,t+h} = \alpha_h + \beta_h \cdot mps_t + \theta_h I_{i,t-1} + \Gamma_h X_{i,t-1} + \gamma_c + \delta_s + \varepsilon_{i,t+h} \quad (2)$$

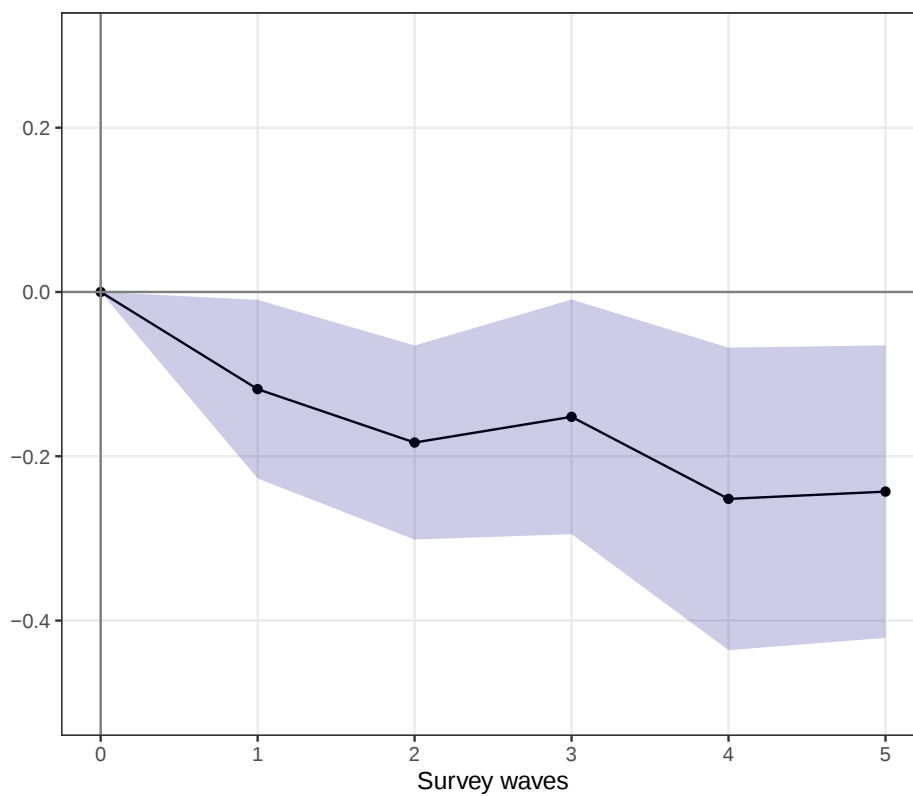
where $I_{i,t+h}$ represents the investment rate of firm i at horizon h , mps_t the monetary policy surprises at time t , $X_{i,t-1}$ firm-level controls measured before the monetary policy surprises, γ_c and δ_s are country and sector fixed effects.¹⁵ $X_{i,t-1}$ contains the variables used in the analysis of Table 4 and lagged values of funding needs and availability. Due to the rotating participation of firms in the SAFE survey, relatively few firms remain in the sample in several consecutive survey rounds. As a result, including lagged survey variables leads to a substantial loss of observations in our regressions. To mitigate this issue, we impute missing lagged values of needs and availability by replacing them with the average for firms in the same sector, country, size category that are interviewed in the corresponding period. Due to data limitations, we restrict our analysis to a maximum horizon of five survey rounds—equivalent to two and a half years. In our judgment, this window is sufficient to capture potential lagged effects of monetary policy on real investment, while avoiding a substantial reduction in sample size.¹⁶

¹⁵Since the data is structured to align with survey rounds, the time periods correspond to the six-month intervals in which the survey takes place.

¹⁶In our analysis, we use the full sample available at each horizon. However, our results remain robust when restricting the sample only to firms present for five consecutive survey waves.

Figure 2 presents the results of our local projection analysis. We find that a 1 basis point increase in monetary policy surprises leads to an average decline in investment of 0.2 percentage points after one year and 0.25 after two years. The effect is statistically significant and persists for several periods. Our findings closely align with [Durante et al. \(2022\)](#), who report that a monetary policy surprise reduces investment by 0.3 percentage points after one year in the euro area. This similarity highlights the validity of our results, especially given the differences in the sample coverage and institutional settings. Moreover, our estimated effect is substantially larger than that found by [Cloyne et al. \(2023\)](#) for the U.S. and U.K., likely due to their focus on publicly listed firms, whereas our sample includes a broader set of private companies. Additionally, we observe a peak effect of monetary policy after 2 years, consistent with the U-shaped response of investment to monetary policy ([Christiano et al., 2005](#)).

Figure 2: Impact of monetary policy on firm-level investment



Local projection estimates of the effects of monetary policy on future investment. The regression includes sector and country fixed effects and controls for past investment, leverage, ROE, sales growth, internal funding, liquidity, and past funding needs and availability. Each observation is weighted according to its economic significance. 90% confidence intervals are shown in blue, calculated using Driscoll-Kraay standard errors clustered at the firm and time levels. Sample period: April 2010 to January 2023.

4.2 The Role of Funding Needs and Availability in Monetary Policy Transmission

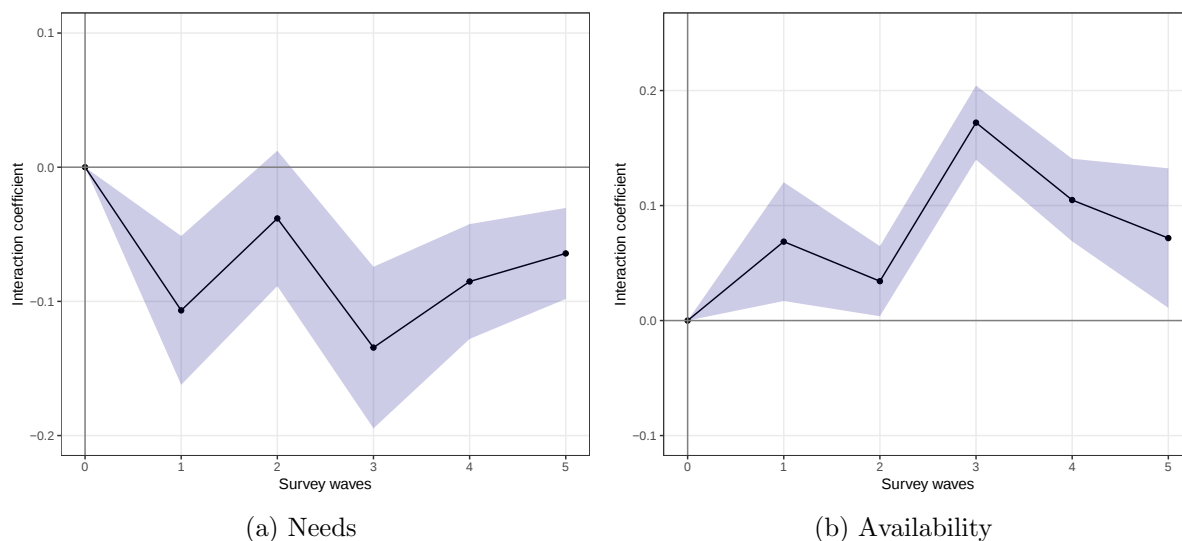
As demonstrated earlier, funding needs are closely tied to fundamentals, while funding availability is strongly associated with financial conditions. We now seek to understand how they influence the transmission of monetary policy to investment. To achieve this, we extend Equation 2 by incorporating interaction terms with needs and availability. Specifically, we estimate the following extended local projection model:

$$I_{i,t+h} = \alpha_h + \beta_h \cdot mps_t + \phi_h \cdot mps_t \cdot Z_{i,t-1} + \theta_h I_{i,t-1} + \Gamma_h X_{i,t-1} + \gamma_{t,c} + \delta_s + \varepsilon_{i,t+h} \quad (3)$$

where Z represents either funding needs or funding availability at the firm-level. In empirical macroeconomics, it is common to include time fixed effects in local projection models with interaction terms to address potential endogeneity, as monetary policy surprises have been shown to correlate with past macroeconomic indicators such as GDP growth and inflation (Miranda-Agrippino and Ricco, 2021; Bauer and Swanson, 2023a). However, in the euro area, macroeconomic dynamics are largely country-specific. To control for unobserved heterogeneity stemming from country-level macroeconomic conditions, we include country-by-time fixed effects. A key implication of this approach is that the main effect of monetary policy (β_h) becomes non-identifiable. This highlights the importance of the unconditional estimates presented in the previous section, which provide a benchmark for interpreting the interaction effects. Since needs and availability vary across firms and over time, this specification still allows for the identification of ϕ_h in equation 3.

The fact that we find a negative effect of monetary policy on investment unconditionally as shown in Figure 2, is crucial for interpreting our key parameter, ϕ_h . Specifically, a positive estimate of ϕ_h implies that the effect of monetary policy on investment is weaker for firms with higher Z , which means that firms with greater funding needs or greater availability experience a more muted response to monetary shocks. In contrast, a negative estimate of ϕ_h suggests a stronger monetary policy effect for firms with higher Z , indicating that these firms are more responsive to policy changes.

Figure 3: Effects of monetary policy on investment conditioned on needs and availability



Local projection estimates of the effects of monetary policy interacted with past external funding needs (left panel) and availability (right panel) on future investment. The regression includes sector and country-by-time fixed effects and controls for past investment, leverage, ROE, sales growth, internal funding, liquidity, and past funding needs and availability. Each observation is weighted according to its economic significance. 90% confidence intervals are shown in blue, calculated using Driscoll-Kraay standard errors clustered at the firm and time levels. Sample period: April 2010 to January 2023.

Figure 3 presents the interaction effect ϕ_h from our local projection analysis. Panel A shows the IRF conditioned on funding needs. Our findings indicate that firms with higher funding needs respond significantly more to monetary policy shocks. Specifically, a one basis point increase in monetary policy surprises leads to an additional 0.1 percentage point decline in investment after six months, provided that funding needs have increased during the last six months (i.e., when needs = 1). From the opposite perspective, i.e. following a monetary easing surprise, firms that reported an increase in funding needs experience, on average, a 0.1 percentage point larger investment increase compared to firms whose funding needs remained unchanged. This effect is also statistically significant for up to 2.5 years after the shock.

As we have shown, external funding needs are driven primarily by structural factors. Hence, Figure 3 Panel A provides evidence that fundamentals play a key role in the transmission of monetary policy. In particular, our findings indicate that monetary easing is most effective for firms with strong fundamentals. By easing monetary policy, central banks can support investment by loosening financial conditions. From a time-series perspective, this also implies

that weak macroeconomic fundamentals hinder the effectiveness of monetary policy. Although easing monetary policy may provide some relief, it cannot resolve structural barriers, such as regulatory constraints or uncertainty, that fundamentally shape investment incentives.

To assess whether financial conditions also influence the investment response to monetary policy, we repeat our local projection analysis, this time interacting monetary policy surprises with external funding availability. Figure 3 Panel B presents the interaction coefficient estimated from this specification. Our results indicate that the interaction coefficient between monetary policy surprises and external funding availability is positive, suggesting that firms with greater access to external funding are less affected by monetary policy. Specifically, a one basis point increase in monetary policy surprises leads to a smaller decline in investment for firms that perceived an increase in funding availability, compared to those for which funding availability remained unchanged. This difference in the investment response amounts to 0.15 percentage points after three periods, which is almost the entire effect on investment observed in Figure 2.

Since availability serves as a proxy for financial conditions, we interpret these results as evidence that firms with better financial conditions—or firms with easier access to external funding—are less responsive to monetary policy. The intuition behind this result is the following: all else equal, monetary easing is most effective when financial conditions are particularly tight and vice versa. Changes in borrowing costs should have little impact on the investment decisions of firms that consistently secure the funding they need thanks to their strong financial positions.

A potential concern with our analysis is the role of information effects. In the context of investment decisions, firms might interpret a monetary tightening surprise as a signal of improved future economic conditions, such as stronger aggregate demand, and respond by increasing rather than decreasing investment. To address this, we re-estimate the impulse response functions conditional on funding needs and availability using the forward guidance surprises with sign restrictions from [Jarociński and Karadi \(2020\)](#). The results, presented in Appendix Figure A.2, show that our main findings are robust to information effects. That is, information released during the press conference about the future state of the economy does not drive the observed responses. Firms do not appear to interpret tightening surprises as indicative of improved growth prospects. In fact, the impact of monetary policy on investment conditioned on funding availability is even more pronounced with the adjusted forward guidance surprise.

4.3 Monetary Policy Effects Conditional on Funding Needs and Availability with Interacted Controls

A growing body of research has documented that the transmission of monetary policy to investment varies with other firm-level characteristics (e.g. [Durante et al., 2022](#); [Cloyne et al., 2023](#); [Jungherr et al., 2024](#)). This raises the question of whether the heterogeneity we observe—captured through funding needs and availability—reflects distinct transmission channels or simply proxies for underlying firm characteristics. To address this, we estimate the local projections for funding needs and availability while controlling for firm-level variables interacted with monetary policy surprises. Specifically, alongside the interaction terms between monetary policy surprises and funding needs and availability, we include interactions with past investment, SME, leverage, ROE, liquidity, internal funding, and sales growth.

Table 7 presents the estimates from the local projection, covering the first to the fifth period after a monetary policy shock. The period corresponds to a bi-annual wave so we show results from 6 months to 2.5 years after the shock. The first two rows of the table highlight that higher funding needs amplify the effect of monetary policy on investment, with coefficients statistically significant in all periods except the second. Similarly, monetary policy has a stronger impact on investment when perceived funding availability is low, as shown in the second row. The magnitude of the coefficients is comparable to those obtained without interacted controls. These results therefore confirm that the effects attributed to funding needs and availability are not confounded by other firm-level sources of heterogeneity.

Rows 3 to 9 of Table 7 report the coefficients on the interaction terms between firm-level control variables and the monetary policy shock. A few characteristics appear to shape the transmission of monetary policy to investment. Surprisingly, leverage does not show a significant effect—potentially because financial conditions are already captured by the perceived availability of funding.¹⁷ Similarly, SME and internal funding do not yield consistent or significant effects across most horizons.

Three variables show clearer patterns: past investment, ROE, and liquidity. Firms with higher past investment tend to respond less to monetary policy, possibly because monetary policy should play a diminished role, once firms are already committed to an investment path.

¹⁷The role of leverage in the transmission of monetary policy remains contested in the literature. While some studies find that high leverage amplifies the effect of monetary policy ([Durante et al., 2022](#)), others suggest that its influence is more limited ([Ottonello and Winberry, 2020](#)).

Both ROE and liquidity are associated with a stronger response to monetary policy, as reflected in their negative interaction coefficients. However, interpreting this result is difficult given the endogeneity of these variables. Although ROE could be highly correlated with Tobin's Q, it is also a proxy for internal funding. Similarly, while one might expect that high liquidity allows firms to self-finance investment, and thus reduces sensitivity to interest rates, empirical evidence suggests otherwise. Cash reserves are often held as precautionary balances to cover unforeseen expenses, rather than being readily available for investment purposes ([Acharya et al., 2013](#)).

Table 7: Response of investment to monetary policy conditioned on needs, availability, and accounting variables

	I_{t+1} (6 months)	I_{t+2} (1 year)	I_{t+3} (1.5 year)	I_{t+4} (2 years)	I_{t+5} (2.5 years)
FG*Needs	−0.11*** (0.03)	−0.04 (0.03)	−0.14*** (0.05)	−0.10*** (0.03)	−0.08*** (0.02)
FG*Avail	0.07* (0.04)	0.08*** (0.02)	0.14*** (0.03)	0.10*** (0.03)	0.03 (0.03)
FG*Inv	0.14** (0.06)	0.11 (0.12)	0.06** (0.03)	0.28*** (0.05)	0.23*** (0.07)
FG*SME	0.01 (0.06)	0.14* (0.07)	−0.12 (0.08)	−0.08 (0.09)	−0.19*** (0.02)
FG*Lev	0.10 (0.13)	−0.003 (0.03)	−0.05 (0.13)	0.23*** (0.05)	0.10 (0.13)
FG*ROE	−0.06** (0.02)	−0.10*** (0.02)	−0.04 (0.03)	−0.12*** (0.04)	−0.33*** (0.03)
FG*Liq	−0.01 (0.03)	−0.07*** (0.02)	−0.06*** (0.004)	−0.04** (0.02)	−0.06*** (0.01)
FG*Internal fund	−0.04 (0.05)	0.21 (0.17)	−0.15** (0.06)	−0.02 (0.19)	0.42*** (0.10)
FG*Sales growth	−0.03*** (0.01)	0.06 (0.04)	0.06 (0.05)	0.08*** (0.01)	0.11*** (0.01)
Observations	87,693	73,261	62,803	53,233	43,909
R ²	0.02	0.02	0.02	0.02	0.02

Estimated coefficients of a regression of investment on monetary policy surprises interacted with lagged values of needs, availability, investment, SME dummy, leverage, return on equity, liquidity, internal funding, and sales growth. Coefficients of uninteracted variables are omitted. The regression includes sector and country-by-time fixed effects. Driscoll-Kraay standard errors, clustered at the firm and time levels, are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

Overall, we document substantial heterogeneity in the response of euro area investment to

monetary policy surprises. Although some firm characteristics contribute meaningfully to this variation, the differential sensitivity of investment based on funding availability and funding needs is robust and not confounded by other firm characteristics.

5 Joint Effects of Needs and Availability on Investment Response to Monetary Policy

Building on the previous results from local projections conditioned separately on funding needs and availability, an important question is how these effects interact when both dimensions are considered jointly at the firm level. Specifically, if firms with either high financing needs or low funding availability are more sensitive to monetary policy, are firms exhibiting both high needs and low availability significantly more responsive than others?

Addressing this question not only enhances our understanding of the heterogeneous responses of individual firms to monetary policy, but also contributes to the broader debate in the literature on whether financially constrained firms are more or less sensitive to monetary policy. In several economic models, financial constraints are typically represented as an upper bound on the amount a firm can borrow. The constraint becomes binding when a firm's demand for external finance exceeds its available supply (Kiyotaki and Moore, 1997). Within our framework, we define financial constraints as a combination of increasing financing needs and decreasing funding availability.

To analyze the investment response conditional on both financing needs and availability, while avoiding too many interaction terms, we classify firms into distinct groups based on two dimensions. Specifically, we construct two dummy variables: the first equals one for firms with $needs > 0$ and $availability < 0$, and the second equals one for firms with $needs < 0$ and $availability > 0$. The first group likely comprises firms with strong investment opportunities that wish to invest but are constrained by limited access to external finance. We refer to these as “financially constrained firms”. The second group includes firms with limited investment opportunities, but that perceive an increased availability of external funding. We refer to these as “unconstrained firms”. Firms not falling into either category are classified as “others”.

Table 8: Summary statistics for financial constraints dummies

<i>(A) Summary statistics</i>			
	Mean	SD	Nr. of firms
F. Constrained	0.06	0.23	4,423
F. Unconstrained	0.04	0.20	3,568
Others	0.90	0.30	34,913
<i>(B) Correlation with other financial constraints measures</i>			
	F. Constrained	F. Unconstrained	Others
KZ index	0.01** (0.00)	−0.02*** (0.01)	0.01* (0.01)
WW index	0.03 (0.05)	−0.019*** (0.04)	0.16*** (0.06)
Young/no-dividend	−0.00 (0.00)	−0.03*** (0.01)	0.03*** (0.01)
Survey-based	0.07*** (0.01)	−0.03*** (0.01)	−0.04*** (0.01)
Leverage	0.02*** (0.01)	−0.01 (0.01)	−0.00*** (0.00)

Panel A reports summary statistics of the financially constrained, unconstrained, and others dummies. Panel B reports the estimated coefficients from contemporaneous regressions of the financially constrained, unconstrained, and other dummies on various financial constraints proxies, estimated separately for each proxy. Young/no-dividend and survey-based financial constraints are binary indicators. All regressions include sector and country fixed effects, and observations are weighted by their economic significance. Standard errors are clustered at the firm and wave level. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

Table 8 Panel A, presents summary statistics for firms classified as “financially constrained,” “unconstrained,” and “others.” Approximately 3,568 firms—or about 4% of the sample—are classified as unconstrained, while 4,423 firms (around 6%) are classified as constrained. The majority of firms fall into the “others” category, primarily because most firms report no changes in their funding needs or availability. In this sense, our financial constraints measure can be

viewed as relatively conservative compared to commonly used proxies in the literature.

To assess how our classification aligns with existing measures, Panel B of Table 8 reports correlations between our constraint dummies and several well-known financial constraints indicators. We compare our survey-based measure to the Kaplan-Zingales (KZ) and Whited-Wu (WW) indexes, both widely used in empirical work (Baker et al., 2003; Whited and Wu, 2006).¹⁸ Given the similarity of our study to Ottonello and Winberry (2020), Durante et al. (2022), and Cloyne et al. (2023), we also include leverage and a dummy variable indicating whether a firm is younger than 30 years and does not pay dividends, following Cloyne et al. (2023).¹⁹ Finally, we compare our measure to the SAFE financial obstacles indicator, which is regularly reported in the SAFE reports since 2010 (Ferrando and Mulier, 2015). According to this indicator, firms face financial obstacles if they report (i) loan applications that resulted in an offer that was declined by the enterprise because the borrowing costs were too high, (ii) loan applications that were rejected, (iii) a decision not to apply for a loan for fear of rejection (discouraged borrowers), and (iv) loan applications for which only a limited amount was granted.

Our novel financial constraints measures exhibit patterns broadly consistent with established proxies in the literature. The financially constrained dummy is positively correlated with the KZ index, the survey-based financial obstacles indicator, and leverage. In contrast, the unconstrained dummy is negatively correlated with the KZ index, the WW index, the young non-dividend-paying firm indicator, and the survey-based financial constraints measure. Overall, our survey-based classification exhibits notable similarities to existing measures in the literature. However, it offers a key advantage: it provides a cleaner and more direct interpretation of financial constraints—capturing firms that express a desire to access external funding but report limited availability.

To study the transmission of monetary policy to financially constrained firms, we estimate local projections interacting monetary policy surprises with the two dummy variables capturing financial constrained and unconstrained firms. To allow a full comparison of the responses of constrained and unconstrained firms relative to the “others” group (baseline group), we omit time-fixed effects, allowing us to directly plot the estimated coefficients on the monetary policy

¹⁸To enhance comparability, we apply max-absolute scaling to both indexes, rescaling them to range between -1 and 1 . This scaling preserves the sign of the mean and continues to reflect both the direction and intensity relative to the maximum possible absolute value.

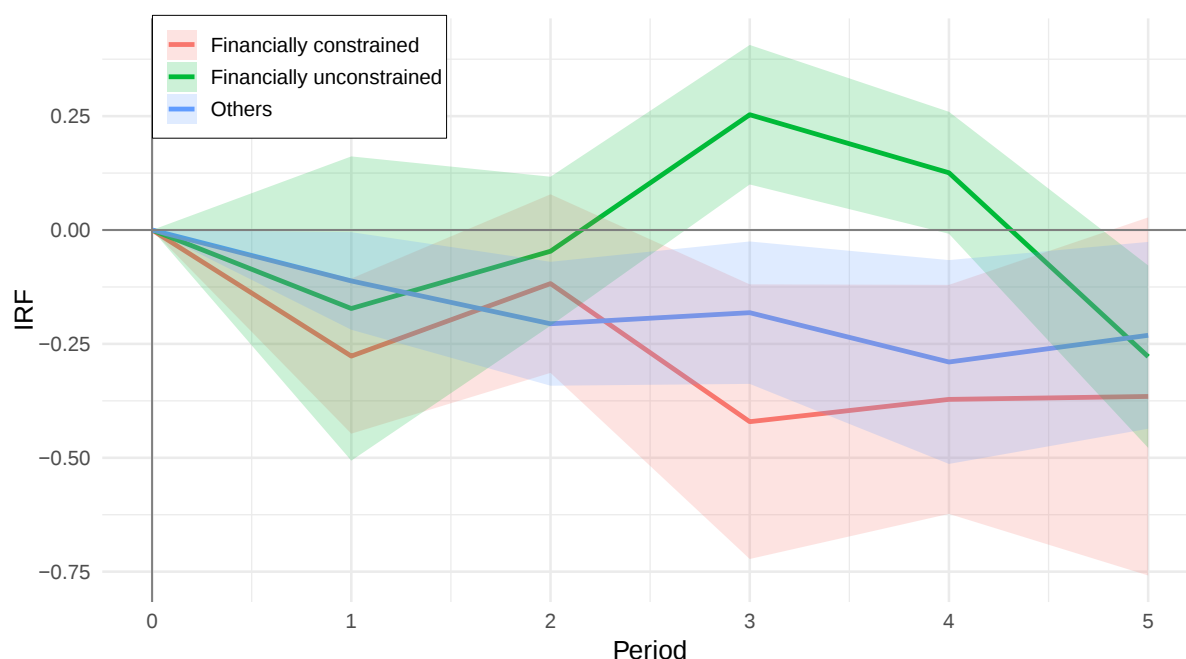
¹⁹Because most firms in our sample are not publicly listed, direct information on dividend payments is unavailable. As a simplifying assumption, we classify a firm as paying dividends if its after-tax profits are larger than the industry median in a given year (Asdrubali et al., 2022).

surprise without any interaction. Our specification is given below, where the superscript U stands for unconstrained and C for constrained.

$$I_{i,t+h} = \alpha_h + \beta_h mps_t + \phi_h^U mps_t \mathbb{1}_{i,t-1}^U + \phi_h^C mps_t \mathbb{1}_{i,t-1}^C + \theta_h I_{i,t-1} + \Gamma_h X_{i,t-1} + \gamma_c + \delta_s + \varepsilon_{i,t+h} \quad (4)$$

The estimated effect of monetary policy on investment for firms classified as “others” is given by β_h . For unconstrained firms, the effect is $\beta_h + \phi_h^U$, and for financially constrained firms, it is $\beta_h + \phi_h^C$. Figure 4 presents the overall impulse response functions for each firm group. Firms with high financing needs and low availability—those classified as financially constrained—exhibit a significantly larger decline in investment following a positive monetary policy surprise. This effect becomes particularly pronounced after three periods (approximately 1.5 years), with investment falling by 0.42 percentage points—more than twice the magnitude observed for the “others” group. In contrast, firms with low needs and high availability—firms classified as unconstrained—show the opposite pattern. Consistent with previous findings, these firms display a markedly muted response to monetary policy shocks; notably, their investment response in period three is slightly positive.

Figure 4: Response of investment to monetary policy based on needs and availability jointly



Local projection estimates of the effects of monetary policy on investment, conditional on whether a firm is classified as “financially constrained,” “unconstrained,” or “others.” The regression includes sector and country fixed effects, and controls for past investment, leverage, return on equity (ROE), sales growth, internal funding, liquidity, and past funding needs and availability. Observations are weighted by their economic significance. 90% confidence intervals are shown in blue, red, and green and are calculated using Driscoll-Kraay standard errors clustered at the firm and time levels. Sample period: April 2010 to January 2023.

While Figure 4 is useful for visualizing the dynamics of the impulse response functions across groups, it does not provide evidence on whether these differences are statistically significant. To address this, Table 9 presents the estimated coefficients from model 4. The results confirm that positive monetary policy surprises have an overall negative effect on investment. This effect is significantly stronger for firms with high needs and low availability, with the estimated coefficient being both economically large and statistically significant. In contrast, the impact on firms with low needs and high availability is considerably weaker, as indicated by the positive and statistically significant coefficient. Consistent with the previous section, the largest difference in responses between groups occurs approximately 1.5 years after the shock.

Table 9: Response of investment to monetary policy based on needs and availability jointly

	I_{t+1} (6 months)	I_{t+2} (1 year)	I_{t+3} (1.5 year)	I_{t+4} (2 years)	I_{t+5} (2.5 years)
FG	−0.11** (0.05)	−0.21*** (0.07)	−0.18** (0.08)	−0.29** (0.11)	−0.23** (0.10)
FG*1 ^C	−0.17*** (0.06)	0.09 (0.05)	−0.24*** (0.08)	−0.08** (0.04)	−0.13 (0.10)
FG*1 ^U	−0.06 (0.13)	0.16*** (0.05)	0.43*** (0.03)	0.42*** (0.06)	−0.05 (0.03)
Observations	87,631	73,212	62,763	53,203	43,883
R ²	0.01	0.01	0.01	0.01	0.01

Estimated coefficients of a regression of firm-level investment on monetary policy surprises interacted with unconstrained and constrained group indicators. The regression includes sector and country-by-time fixed effects and controls for past investment, leverage, ROE, sales growth, internal funding, and liquidity. Driscoll-Kraay standard errors, clustered at the firm and time levels, are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively. Sample period: April 2010 to January 2023.

These results suggest that financially constrained firms are significantly more sensitive to monetary policy shocks. This finding is consistent with the view that monetary policy can alleviate borrowing constraints. Firms facing increasing investment needs but limited access to external finance are likely to be constrained in their ability to invest. An expansionary monetary policy can relax these constraints, allowing greater investment. This may occur through the balance sheet channel, as improved collateral valuations improve firms' borrowing capacity, or through the bank lending channel through greater loan availability. However, among financially constrained firms, those with greater investment opportunities will benefit the most from easier access to credit.

The fact that financially constrained firms respond more strongly to monetary policy is consistent with a range of economic models. For example, [Bernanke et al. \(1999\)](#) extend their financial accelerator model to a two-sector framework, where firms face different costs of external finance, with constrained firms experiencing higher borrowing costs. They show that the investment of firms with limited access to external credit markets increases nearly three

times more than the investment of firms with better credit access following a monetary policy shock. Similarly, models with binding credit constraints, such as [Kiyotaki and Moore \(1997\)](#), imply that monetary easing relaxes borrowing constraints, expanding firms' credit capacity and thereby stimulating investment.

6 Conclusion

Leveraging data from the ECB's Survey on Access to Finance and Enterprise (SAFE), we created two proxies, firms' funding needs and availability, for fundamentals and financial conditions across the euro area. Using these survey-based measures, our study provided novel insights into how monetary policy transmission to investment is influenced by both fundamental and financial conditions. Our approach provides a unique perspective on firms' investment behaviour, complementing traditional accounting-based analyses.

Our analysis shows that monetary policy is most effective on investment when fundamentals are strong, underscoring the critical role of structural factors, such as economic growth prospects and investment opportunities. In particular, our findings indicate that following a one basis point monetary easing surprise, firms that reported an increase in funding needs experience, on average, a 0.1 percentage point larger investment increase compared to firms whose funding needs remained unchanged. This suggests that in environments where fundamentals are weak, efforts by the central banks to stimulate investment through monetary easing may face limitations.

In contrast, we observe that firms with favorable financial conditions, characterized by high funding availability, exhibit a muted response to monetary policy changes. This attenuated reaction points to the fact that for firms already experiencing ease in obtaining external finance, additional monetary accommodation may not significantly influence their investment behaviour. Specifically, a one basis point increase in monetary policy surprise leads to a decline in investment of 0.15 percentage points less, almost half of the total average effect, for firms that perceived an increase in funding availability, compared to those for which funding availability remained unchanged.

By jointly examining funding needs and availability, we find that firms experiencing both rising financing needs and declining funding availability—those that we characterize as financially constrained—are the most responsive to monetary policy. Using survey-based data rather than financial data, our finding reinforces existing empirical evidence while offering a clear economic

mechanism: credit channel-driven improvements in financial conditions, triggered by monetary easing, can significantly stimulate investment activity, particularly among firms with stronger investment opportunities.

To conclude, our research underscores the complexity of monetary policy transmission to investment, influenced by a combination of fundamental and financial factors. By highlighting the importance of these factors, we provide additional evidence that can inform more effective policy design, ultimately supporting economic growth and stability.

Appendix

Table A.1: Description of variables

Variable	Type	Description	Source
Needs	Index(-1,1)	Composite needs for external funding	SAFE
Availability	Index(-1,1)	Composite availability of external funding	SAFE
Investment	Continuous (percentage)	Annual growth rate of fixed capital	ORBIS
Leverage	Continuous (percentage)	Total debt divided by total assets	ORBIS
ROE	Continuous (percentage)	Net income divided by equity	ORBIS
Internal funding	Continuous (percentage)	Capital plus cash flow divided by total assets	ORBIS
Liquidity	Continuous (percentage)	Current assets minus inventories divided by current liabilities	ORBIS
Sales growth	Continuous (percentage)	Log first difference in sales	ORBIS
SME	Dummy	Equal to 1 for firms with less than 250 employees	ORBIS
Log TA	Continuous (percentage)	Logarithm of total assets	ORBIS
Debt Burden	Continuous (percentage)	Interest expenses divided by earnings before interest and taxes	ORBIS
Dividend payment	Dummy	Equal to 1 if cash dividends for firms is larger than the median after-tax profit within each period and sector	ORBIS
Age	Continuous (Years)	Observation date minus date of incorporation	ORBIS
KZ index	Continuous (Index)	Computed as $-1 \times \text{cash flow} / \text{total assets} + 3.12 \times \text{leverage} - 39.37 \times \text{dividend payment} - 1.31 \times \text{cash} / \text{total assets}$ (Baker et al., 2003)	ORBIS
WW index	Continuous (Index)	Computed as $-0.091 \times \text{cash flow} / \text{total assets} - 0.062 \times \text{dividend payment} + 0.21 \times \text{leverage} - 0.044 \times \text{size} + 0.102 \times \Delta \log \text{ sales of 2-digit NACE sector} - 0.035 \times \Delta \ln \text{ sales}$ (Whited and Wu, 2006)	ORBIS

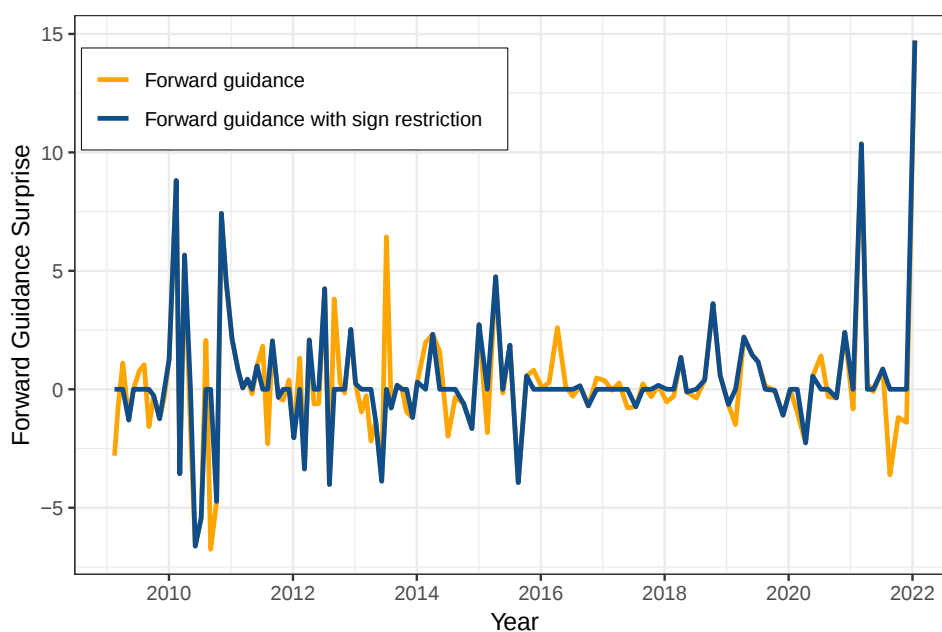
Overview of the survey-based and accounting variables used in the analysis, including data type, a brief description, and the corresponding data source.

Table A.2: Correlation of needs and availability with accounting variables

	Inv	Needs	Avail	Lev	ROE	Int. fund	Liq	Sales gr	SME	Log TA
Needs	0.05									
Avail	0.06	−0.05								
Lev	−0.05	0.06	−0.02							
ROE	0.07	−0.02	0.06	−0.03						
Int. fund	0.01	−0.05	0.05	−0.12	0.12					
Liq	0.05	−0.07	0.01	−0.16	0.02	0.09				
Sales gr	0.08	0.01	0.07	−0.03	0.12	0.08	−0.03			
SME	−0.01	−0.01	−0.04	0.01	−0.01	−0.04	0.03	−0.01		
Log TA	0.02	0.02	0.07	0.05	−0.01	0.01	−0.06	0.00	−0.51	
Debt Burden	−0.11	0.07	−0.12	0.33	−0.28	−0.23	−0.17	−0.16	0.07	−0.10

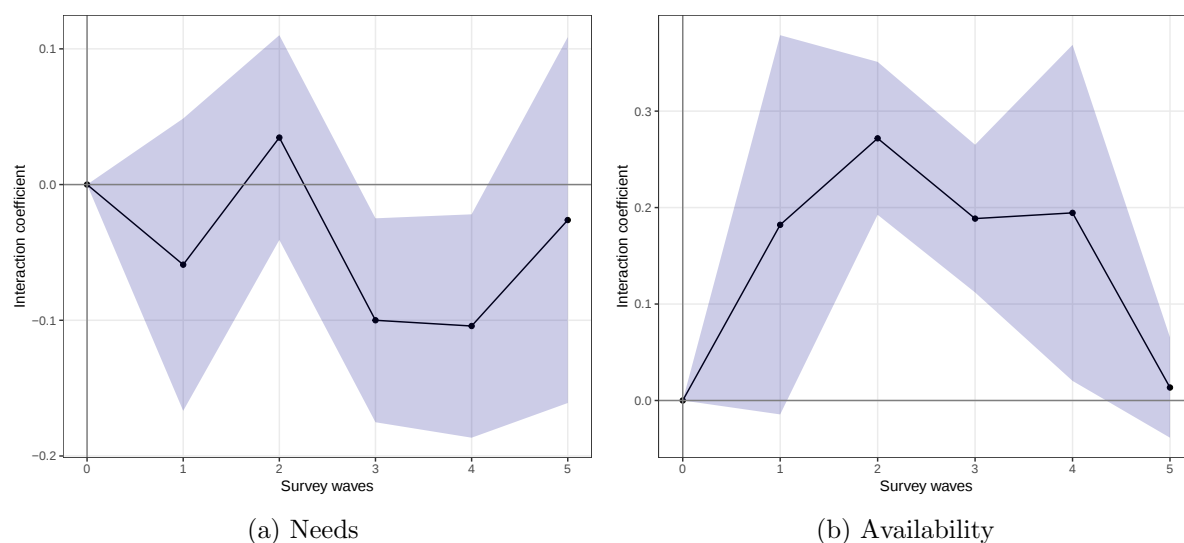
Weighted correlations among different survey and accounting variables (see notes to Table 1 for details on the weights). Sample period: April 2010 to January 2023.

Figure A.1: Monetary policy surprises



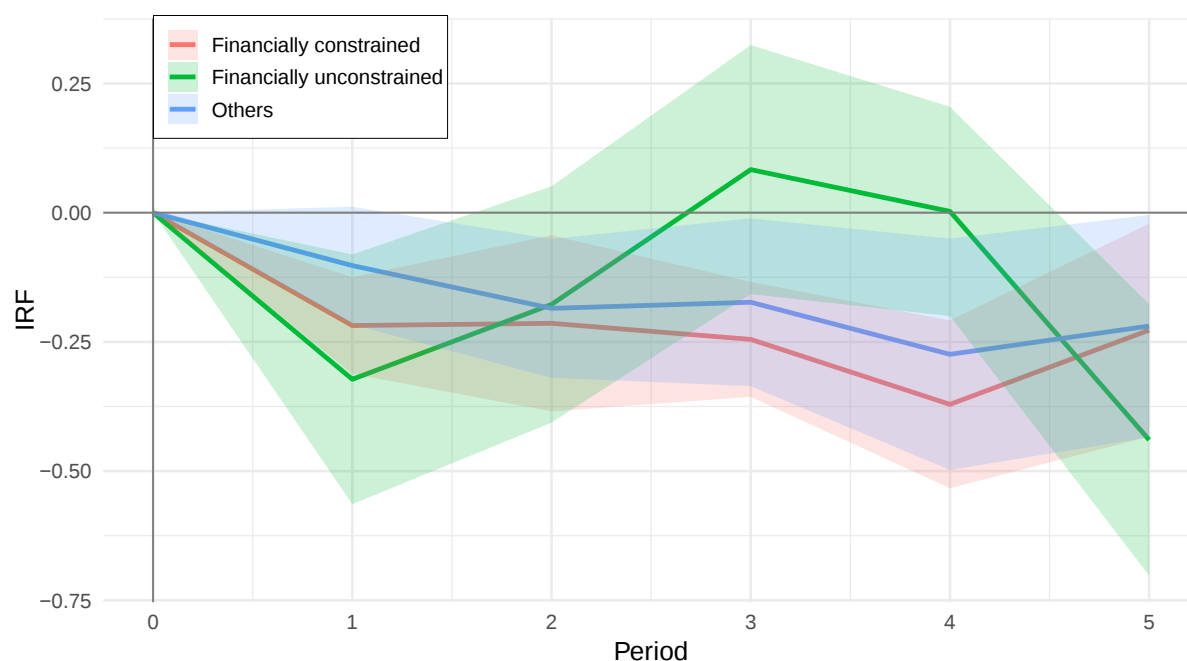
The figure shows the high-frequency forward guidance surprises. The forward guidance surprise (yellow line) is constructed according to [Altavilla et al. \(2019\)](#). The blue line shows the forward guidance surprise with the poor man's sign restriction following [Jarociński and Karadi \(2020\)](#).

Figure A.2: Response of investment to monetary policy conditioned on needs and availability, adjusted for information effects



Local projection estimates of the effects of monetary policy interacted with past external funding needs (left panel) and availability (right panel) on future investment. Monetary policy surprise is the forward guidance surprise with poor man's sign restriction. The regression includes sector and country-by-time fixed effects and controls for past investment, leverage, ROE, sales growth, internal funding, liquidity, and past funding needs and availability. Each observation is weighted according to its economic significance. 90% confidence intervals are shown in blue, calculated using Driscoll-Kraay standard errors clustered at the firm and time levels. Sample period: April 2010 to January 2023.

Figure A.3: Response of investment to monetary policy based on needs and availability jointly, adjusted for information effects



Local projection estimates of the effects of monetary policy on investment, conditional on whether a firm is classified as “financially constrained,” “unconstrained,” or “others.” Monetary policy surprise is the forward guidance surprise with poor man’s sign restriction. The regression includes sector and country fixed effects, and controls for past investment, leverage, return on equity (ROE), sales growth, internal funding, liquidity, and past funding needs and availability. Observations are weighted by their economic significance. 90% confidence intervals are shown in blue, red, and green and are calculated using Driscoll-Kraay standard errors clustered at the firm and time levels. Sample period: April 2010 to January 2023.

References

- Acharya, Viral V, Heitor Almeida, and Murillo Campello (2013) “Aggregate risk and the choice between cash and lines of credit,” *The Journal of Finance*, 68 (5), 2059–2116.
- Altavilla, Carlo, Luca Brugnolini, Refet S Gürkaynak, Roberto Motto, and Giuseppe Ragusa (2019) “Measuring euro area monetary policy,” *Journal of Monetary Economics*, 108, 162–179.
- Asdrubali, Pierfederico, Issam Hallak, and Péte Harasztosi (2022) “Financial Constraints of EU firms: A Sectoral Analysis,” Discussion Paper 173, European Commission.
- Baker, Malcolm, Jeremy C Stein, and Jeffrey Wurgler (2003) “When does the market matter? Stock prices and the investment of equity-dependent firms,” *The Quarterly Journal of Economics*, 118 (3), 969–1005.
- Bauer, Michael D and Eric T Swanson (2023a) “An alternative explanation for the “fed information effect”,” *American Economic Review*, 113 (3), 664–700.
- (2023b) “A reassessment of monetary policy surprises and high-frequency identification,” *NBER Macroeconomics Annual*, 37 (1), 87–155.
- Bernanke, Ben S and Mark Gertler (1989) “Agency costs, collateral, and business fluctuations,” *American Economic Review*, 79 (1), 14–31.
- (1995) “Inside the black box: the credit channel of monetary policy transmission,” *Journal of Economic Perspectives*, 9 (4), 27–48.
- Bernanke, Ben S, Mark Gertler, and Simon Gilchrist (1999) “The financial accelerator in a quantitative business cycle framework,” *Handbook of Macroeconomics*, 1, 1341–1393.
- Blundell, Richard, Stephen Bond, Michael Devereux, and Fabio Schiantarelli (1992) “Investment and Tobin’s Q: Evidence from company panel data,” *Journal of Econometrics*, 51 (1-2), 233–257.
- Bonfim, Diana, Gil Nogueira, and Steven Ongena (2021) ““Sorry, we’re closed” bank branch closures, loan pricing, and information asymmetries,” *Review of Finance*, 25 (4), 1211–1259.
- Caballero, Ricardo J, Tomás E Caravello, and Alp Simsek (2024) “Financial conditions targeting,” Technical report, National Bureau of Economic Research.
- (2025) “FCI-star,” Technical report, National Bureau of Economic Research.
- Caglio, Cecilia R, R Matthew Darst, and Şebnem Kalemli-Özcan (2021) “Collateral heterogeneity and monetary policy transmission: Evidence from loans to SMEs and large firms,” Technical report, National Bureau of Economic Research.
- Christiano, Lawrence J, Martin Eichenbaum, and Charles L Evans (2005) “Nominal rigidities and the dynamic effects of a shock to monetary policy,” *Journal of Political Economy*, 113 (1), 1–45.
- Cloyne, James, Clodomiro Ferreira, Maren Froemel, and Paolo Surico (2023) “Monetary policy, corporate finance, and investment,” *Journal of the European Economic Association*, 21 (6), 2586–2634.

- DeAngelo, Harry, Linda DeAngelo, and Toni M Whited (2011) “Capital structure dynamics and transitory debt,” *Journal of Financial Economics*, 99 (2), 235–261.
- Durante, Elena, Annalisa Ferrando, and Philip Vermeulen (2022) “Monetary policy, investment and firm heterogeneity,” *European Economic Review*, 148, 104251.
- Erickson, Timothy and Toni M Whited (2000) “Measurement error and the relationship between investment and q ,” *Journal of Political Economy*, 108 (5), 1027–1057.
- Farre-Mensa, Joan and Alexander Ljungqvist (2016) “Do measures of financial constraints measure financial constraints?” *The Review of Financial Studies*, 29 (2), 271–308.
- Fazzari, Steven, R Glenn Hubbard, and Bruce C Petersen (1988) “Financing constraints and corporate investment.”
- Ferrando, Annalisa and Klaas Mulier (2015) “Firms’ financing constraints: Do perceptions match the actual situation?” *The Economic and Social Review*, 46 (1, Spring), 87–117.
- Gertler, Mark and Simon Gilchrist (1994) “Monetary policy, business cycles, and the behavior of small manufacturing firms,” *The Quarterly Journal of Economics*, 109 (2), 309–340.
- Gilchrist, Simon and Charles Himmelberg (1998) “Investment: fundamentals and finance,” *NBER Macroeconomics Annual*, 13, 223–262.
- Gilchrist, Simon and Charles P Himmelberg (1995) “Evidence on the role of cash flow for investment,” *Journal of Monetary Economics*, 36 (3), 541–572.
- Gomes, Joao F (2001) “Financing investment,” *American Economic Review*, 91 (5), 1263–1285.
- Gopinath, Gita, Şebnem Kalemli-Özcan, Loukas Karabarbounis, and Carolina Villegas-Sanchez (2017) “Capital allocation and productivity in South Europe,” *The Quarterly Journal of Economics*, 132 (4), 1915–1967.
- Gürkaynak, Refet S, Brian Sack, and Eric T Swanson (2005) “Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements,” *International Journal of Central Banking*.
- Hadlock, Charles J and Joshua R Pierce (2010) “New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index,” *The Review of Financial Studies*, 23 (5), 1909–1940.
- Im, Hyun Joong, Colin Mayer, and Oren Sussman (2020) “Heterogeneity in investment spike financing,” *Financial Intermediation Research Society Conference 2017; FMA Annual Meeting 2017; FMA European Meeting 2017; AsFA Annual Meeting 2017; PKU-NUS Conference 2017; Australasian Finance and Banking Conference 2014*, <https://ssrn.com/abstract=2468424> or <http://dx.doi.org/10.2139/ssrn.2468424>.
- Jarociński, Marek and Peter Karadi (2020) “Deconstructing monetary policy surprises—the role of information shocks,” *American Economic Journal: Macroeconomics*, 12 (2), 1–43.
- Jeenas, Priit (2024) “Firm balance sheet liquidity, monetary policy shockss and investment dynamics,” Technical report, BSE Working Paper 1409.
- Jordà, Òscar (2005) “Estimation and inference of impulse responses by local projections,” *American Economic Review*, 95 (1), 161–182.

- Jungherr, Joachim, Matthias Meier, Timo Reinelt, and Immo Schott (2024) “Corporate debt maturity matters for monetary policy,” *International Finance Discussion Paper* (1402).
- Kalemli-Özcan, Şebnem, Luc Laeven, and David Moreno (2022) “Debt Overhang, Rollover Risk, and Corporate Investment: Evidence from the European Crisis,” *Journal of the European Economic Association*, 20 (6), 2353–2395.
- Kaplan, Steven N and Luigi Zingales (1997) “Do investment-cash flow sensitivities provide useful measures of financing constraints?” *The Quarterly Journal of Economics*, 112 (1), 169–215.
- Kiyotaki, Nobuhiro and John Moore (1997) “Credit cycles,” *Journal of Political Economy*, 105 (2), 211–248.
- Kuttner, Kenneth N (2001) “Monetary policy surprises and interest rates: Evidence from the Fed funds futures market,” *Journal of Monetary Economics*, 47 (3), 523–544.
- Love, Inessa and Lea Zicchino (2006) “Financial development and dynamic investment behavior: Evidence from panel VAR,” *The Quarterly Review of Economics and Finance*, 46 (2), 190–210.
- Miranda-Agrippino, Silvia and Giovanni Ricco (2021) “The transmission of monetary policy shocks,” *American Economic Journal: Macroeconomics*, 13 (3), 74–107.
- Morgan, Donald P, Maxim L Pinkovskiy, and Bryan Yang (2016) “Banking deserts, branch closings, and soft information,” Technical report, Federal Reserve Bank of New York.
- Nakamura, Emi and Jón Steinsson (2018) “High-frequency identification of monetary non-neutrality: the information effect,” *The Quarterly Journal of Economics*, 133 (3), 1283–1330.
- Nguyen, Hoai-Luu Q (2019) “Are credit markets still local? Evidence from bank branch closings,” *American Economic Journal: Applied Economics*, 11 (1), 1–32.
- Ottonello, Pablo and Thomas Winberry (2020) “Financial heterogeneity and the investment channel of monetary policy,” *Econometrica*, 88 (6), 2473–2502.
- Perez-Quiros, Gabriel and Allan Timmermann (2000) “Firm size and cyclical variations in stock returns,” *The Journal of Finance*, 55 (3), 1229–1262.
- Swanson, Eric T (2021) “Measuring the effects of federal reserve forward guidance and asset purchases on financial markets,” *Journal of Monetary Economics*, 118, 32–53.
- Whited, Toni M and Guojun Wu (2006) “Financial constraints risk,” *The Review of Financial Studies*, 19 (2), 531–559.

Acknowledgements

We are grateful to Ursel Baumann, Matteo Benetton, Diana Bonfim, Priit Jeenas, Philip Lane, Klaas Mulier, and participants at the ChaMP Research Network workshop, the ECB internal seminar, and the University of Hamburg PhD Seminar for their helpful comments. This work was carried out while Eric Offner was affiliated with the European Central Bank, whose financial support is gratefully acknowledged.

The views expressed here are those of the authors and do not necessarily reflect the views of others in the Eurosystem.

Annalisa Ferrando

European Central Bank, Frankfurt am Main, Germany; email: annalisa.ferrando@ecb.europa.eu

Sara Lamboglia

European Central Bank, Frankfurt am Main, Germany; Banca d'Italia, Rome, Italy; email: sara.lamboglia@ecb.europa.eu

Eric Offner (Corresponding author)

Frankfurt School of Finance & Management, Frankfurt am Main, Germany; email: e.offner@fs.de

© European Central Bank, 2025

Postal address 60640 Frankfurt am Main, Germany

Telephone +49 69 1344 0

Website www.ecb.europa.eu

All rights reserved. Any reproduction, publication and reprint in the form of a different publication, whether printed or produced electronically, in whole or in part, is permitted only with the explicit written authorisation of the ECB or the authors.

This paper can be downloaded without charge from www.ecb.europa.eu, from the [Social Science Research Network electronic library](#) or from [RePEc: Research Papers in Economics](#). Information on all of the papers published in the ECB Working Paper Series can be found on the [ECB's website](#).

PDF

ISBN 978-92-899-7511-7

ISSN 1725-2806

doi:10.2866/3930066

QB-01-25-259-EN-N