ECONOMICS – WORKING PAPERS 2025/02

How do macroprudential policies affect corporate investment? Insights from EIBIS data

February 2025

European Investment Bank

How do macroprudential policies affect corporate investment? Insights from EIBIS data

February 2025

European Investment Bank

How do macroprudential policies affect corporate investment? Insights from EIBIS data

EIB Working Paper 2025/02
February 2025

European Investment Bank
98-100, boulevard Konrad Adenauer
L-2950 Luxembourg

This is a publication of the EIB Economics Department.
economics@eib.org
www.eib.org/economics

About the Economics Department
The mission of the EIB Economics Department is to provide economic analyses and studies to support the Bank in its operations and in the definition of its positioning, strategy and policy. The department and its team of economists is headed by Debora Revoltella, director of economics.

Disclaimer
The views expressed in this publication are those of the authors and do not necessarily reflect the position of the European Investment Bank. EIB working papers are designed to facilitate the timely exchange of research findings. They are not subject to standard EIB copyediting or proofreading.

For further information on the EIB's activities, please consult our website, www.eib.org. You can also contact our Info Desk, info@eib.org.

Published by the European Investment Bank.

Printed on FSC® Paper.

pdf: QH-01-25-002-EN-N ISBN 978-92-861-5900-8 ISSN 2599-736X doi: 10.2867/2193600

How do macroprudential policies affect corporate investment? Insights from EIBIS data *

Koray Alper† Soner Baskaya‡ Shuren Shi§

January 24, 2025

Abstract

This study investigates the influence of macroprudential policies (MaPs) on corporate investment, employing firm-bank level microdata from the European Investment Bank Investment Survey (EIBIS) for the period 2015-2022. We initially document that MaP tightening, particularly through supply-based MaPs, leads to a reduction in corporate investment. We then delve into the transmission mechanism of MaPs. Our analysis suggests that MaPs affect corporate investment through bank lending decisions. MaP tightening correlates with greater reliance on internal finance and reduced use of external finance. Further, we find that both bank and firm characteristics significantly contribute to the effect of MaPs on corporate investment. Specifically, we observe that financially weaker banks are more likely to restrict credit in response to MaP tightening. Moreover, firms that are heavily reliant on external finance for investment, as well as those that are financially weaker, appear to be more adversely affected by a reduced credit supply. Lastly, we find that MaPs exert a stronger impact on tangible investments, whereas intangible investments are less sensitive to MaPs. Our finding suggests that the insignificance is due to the lower reliance of intangible investments on external finance, verifying the presence of the bank lending channel of MaP transmission.

*We thank Selim Elekdag, Sizhe Hong, Jonathan Lee, Rozalia Pal, Hormoz Ramian, Serafeim Tsoukas, and an anonymous referee. We also thank the participants at European Investment Bank seminar and the 2024 International Conference in Banking and Financial Studies (ICBFS2024) in Italy for their comments and suggestions. This article is the exclusive responsibility of its authors and does not necessarily reflect the official views of the European Investment Bank or its staff. Baskaya and Shi thank the European Investment Bank for the access to the EIBIS data.

†European Investment Bank, Luxembourg. e-mail: k.alper@eib.org

‡University of Glasgow, UK. e-mail: soner.baskaya@glasgow.ac.uk

§University of Glasgow, UK. e-mail: shuren.shi@glasgow.ac.uk

JEL: D22, E22, E58, G28

Keywords: Macroprudential policies, bank lending, tangible investments, intangible investments, financial stability

1. Introduction

In the aftermath of the Global Financial Crisis (GFC), policies focusing on financial stability have been more common across the globe. These included formalisation of macroprudential policy framework aiming at reducing systemic risks, by utilizing a set of novel tools to preempt the adverse effects of excessive credit growth on financial and macroeconomic stability. As documented by Claessens (2015), Freixas et al. (2015), Forbes (2021), and Biljanovska et al. (2023), Macroprudential Policies (MaPs) have been increasingly implemented by policymakers to dampen the credit cycles, mitigate systemic risk, and enhance financial stability.

The existing literature has documented that MaPs can affect macroeconomic aggregates such as credit growth, real GDP growth, capital inflows, and price level (Kuttner and Shim, 2016; Bruno et al., 2017; Boar et al., 2017; Cerutti et al., 2017; Akinci and Olmstead-Rumsey, 2018; Kim and Mehrotra, 2018; Richter et al., 2019; Baskaya and Shim, 2024). However, a relatively less explored topic is the impact of MaPs on corporate investment at firm level and its transmission channel.

Non-financial firms' investment behavior can potentially be affected by MaPs, especially in economies where the banking system plays a crucial role in providing finance to businesses. However, an area not yet addressed by the literature is documenting the type of MaPs that affect firms' investment outcomes, the role of bank and firm financial characteristics for the transmission, and the potential heterogeneities in the response of different types of capital investments. For example, a MaP tightening shock may affect firms' access to financial sources and/or reduce aggregate demand, both of which can potentially curb corporate investment. However, a more fine-tuned approach to assess policy effectiveness may require identifying transmission channels. On one side, the supply-based MaPs, i.e. those targeting financial institutions such as capital requirement (Van den Heuvel, 2008; Aiyar et al., 2014; Gropp et al., 2019; De Jonghe et al., 2020; Fraisse et al., 2020; Juelsrud and Wold, 2020; De Marco et al., 2021; Bednarek et al., 2023), dynamic provisioning (de Lis and Herrero, 2010; Jiménez et al., 2017), and charges for systemically important financial institutions (Violon et al., 2020; Favara et al., 2021; Degryse et al., 2023), can affect banks' lending capacity. This is reflected as tightening lending conditions or higher loan rates.[1] As a result, these measures constrain firms' financing choices and investment decisions. On the other side, the demand-based MaPs aim at affecting financial conditions through policy actions targeting the borrowers such as limits on loan-to-value ratio and debt-to-

[1] Certainly, depending on its type, MaPs can have different effects on different loan types. For instance, the effect of MaPs targeting funding stability might be more pronounced on longer-term loans.

income ratios (see Korinek and Simsek (2016); Acharya et al. (2022a); Van Bekkum et al. (2024); Peydró et al. (2024)). In this sense, these set borrowing constraints by linking borrowing capacity to the market value of collateral assets and by linking borrowing capacity to the firms' core profitability (see Bianchi and Mendoza, 2018; Acharya et al., 2022a; Drechsel, 2023; Drechsel and Kim, 2024). Finally, corporate investment can be affected by the response of aggregate demand (or the expectations thereof) to the reduction in credit volume in the economy. These imply that understanding how macroprudential policies affect the firms' investment through a bank lending channel requires the incorporation of detailed information on the types of macroprudential policies, the nature of bank-firm relationships as well as characteristics of firms' financial constraints.

This paper seeks to fill a gap in the literature by assessing the channels through which MaPs affect corporate investment. We do so by investigating firm-level data on investment and financing choices from the European Investment Bank Investment Survey (EIBIS) database. We merge firm-level information with the International Monetary Fund's Integrated Macroprudential Policy (iMaPP) database (Alam et al., 2024), which provides granular information on the use of MaPs. The iMaPP database provides country-level monthly dummy-type (1 for tightening actions, 0 for no change, and -1 for loosening actions) policy action indices for 17 macroprudential tools.

While changes in MaPs are likely not be driven by the individual firm's investments, economic conditions can influence both corporate investment and macroprudential decision-making. Therefore, to estimate the causal effect of MaPs on corporate investment, we first identify MaP shocks that are orthogonal to unexpected changes in credit growth and GDP growth using the approach developed by Auerbach and Gorodnichenko (2012). Second, we present a general picture for the impact of MaP shock on the total amount of corporate investment.

Our baseline results show that the MaP tightening declines corporate investment. We further assess the role of MaP-induced restrictions in credit supply as a factor that potentially limits corporate investment. For this, we first document the stronger role of supply-based MaPs, rather than the demand-based, as a factor that reduces firms' investments. In particular, we show that almost entire effect of MaP tightening on firms' investment is due to tightening of supply-based MaPs that are designed for affecting the banks' ability and/or willingness to lend to the non-financial corporate sector.

To understand the transmission mechanism of MaPs better, one needs a deeper analysis about the behavior of banks which matter for credit supply. From the EIBIS dataset, we identify 608 main banks that have credit relationship with the firms in our sample. Then, we first show that MaPs lead to a reduction in banks' lending activities, and an increase in

bank capital without hurting profitability. As a further step, we incorporate the bank-firm relationship for the key question of how macroprudential policies affect investment outcomes. Our results show that the effect of MaPs is even larger when we control firm-bank fixed effect, verifying the existence of bank lending channel of MaPs transmissions. However, more importantly, when we further control bank-year fixed effect or time-varying bank characteristics, the effect of MaPs fades away. This result indicates that the effect of MaPs on corporate investment should be channeled mainly by the banks' credit supply rather than the demand side factors.

To understand further the effect of supply-based MaPs in firms' behavior, we turn to study how firms' financing choices respond to MaP tightening. First, we document that in response to MaP tightening, firms tend to increase the share of internal funds and reduce that of external funds. Second, we investigate the effect of MaPs on firms' loan application outcomes and their satisfaction level on some key elements of the loan contract. Our results show that MaPs increase the possibility of rejection of loan applications and worsen the degree to which the firms are satisfied with loan terms. The latter is particularly related to the loan amounts firms obtained.

Lastly, considering financial frictions in the credit market, we uncover significant heterogeneity in firms' financial positions and gauge the differential impact of MaPs on firms of different riskiness.[2] We find that the effect of MaPs are more pronounced on small and medium firms. We then interact MaPs with firms' dependence on external finance and financial health measures and verify that firms' external finance dependence (EFD) and financial constraints amplify the adverse effect of MaPs on corporate investment. This finding verifies the role of the bank lending channel. Notably, we try to identify whether the earning-based or the asset-based borrowing constraint can channel this effect. We find that firms with higher value of fixed assets are less affected by the MaPs but firms' profitability does not play a significant role. This finding reflects the pivotal role of the pledgeability of hard assets in the bank lending channel (see empirical evidences in Berger and Udell (1990); Jiménez et al. (2020); Lian and Ma (2021); Ivashina et al. (2022)). Firms can pledge tangible capital as collateral and therefore, they are less exposed to the adverse effect of MaP tightening.

The previous finding motivates us to investigate the heterogeneous effect of MaPs on different types of corporate investment. Our final analysis concerns the analysis of how

[2]Bank funding shocks affect firms disproportionally. Research on firm heterogeneity suggests that financial constraints are often linked to higher degree of information asymmetry, limiting firms' access to external finance. See empirical results in Cingano et al. (2016); Balduzzi et al. (2018); Popov and Rocholl (2018); Farinha et al. (2019).

the different type of investments, namely, tangible and intangible capital investments responds to macroprudential policies. This question bears a particular interest, especially because recent increase in the relative share of intangible investments. However, due to the difficulties in obtaining qualitative information on intangible investments, the empirical evidence on the response of intangible investments to monetary and financial conditions have not been investigated. We overcome this by EIBIS, which provides quantitative information on intangible investments. Our findings show that tangible capital investments decline in response to MaP tightening whereas the response of intangible capital investments is not statistically significant. We explain it by two facts: (1) firms cannot pledge intangible capital as collateral; and (2) firms mainly finance tangible capital investment with external sources and intangible capital investment with internal sources. Therefore, the intangible capital investment is less dependent on traditional bank lending channel.

This paper contributes to two strands of literature. First, this paper contributes to the literature on the use and effectiveness of prudential policies. The majority of the literature investigates the response of macroeconomic indicators. MaPs help limit credit growth, manage the financial cycles, and alleviate the financial consequences when credit booms end up in busts (Dell'Ariccia et al., 2016; Cerutti et al., 2017; Cizel et al., 2019; Baskaya and Shim, 2024). Richter et al. (2019) and Mendicino et al. (2020) document the unintended cost of prudential policies in the short run.

Some papers also use microdata to show the responses of individual banks and firms. Using European credit registry data, Altavilla et al. (2020) finds that an easing in monetary and macroprudential policies increases the amount of corporate loans. Ćehajić and Košak (2022) find that MaP tightening limits small and medium-sized enterprises' access to finance. Altunbas et al. (2018) suggest that MaPs limit banks' risk-taking behaviour and that small and weakly capitalised banks respond more strongly to MaPs. Anguren et al. (2024) study the effect of bank capital requirement on bank risk-taking and find that those banks most influenced by the tighter Basel III capital requirements prioritize credit to firms that are ex-ante riskier to prevent their closure.[3] Calem et al. (2020) find that the tightening of capital requirement slow down the mortgage lending by banks that participate in the annual Comprehensive Capital Analysis and Review (CCAR) stress tests. The effects are more pronounced on stress-tested banks with inadequate capital buffers. Claessens et al. (2013) analyze the effect of MaPs on the change of balance sheets of 2800 banks in 48 countries

[3] See Caballero et al. (2008); Acharya et al. (2019, 2022b); Becker and Ivashina (2022); Bonfim et al. (2023); Albuquerque and Iyer (2024); De Jonghe et al. (2024) for more examples of the bank risk-taking behavior, consistent with loan evergreening or zombie lending purposes.

and suggest some MaP tools (such as limits on loan-to-value ratio and limits on credit growth) are effective in mitigating financial system vulnerabilities by curbing the growth in banks' leverage and core liabilities. Ayyagari et al. (2018) show a negative association of the MaP tightening and firms' credit and sales growth. They find that younger firms that are more dependent on relationship lending experience a larger decline in credit growth. Jiménez et al. (2017) and Gropp et al. (2019) identify the banks' balance sheets channel of capital requirement transmission. Baskaya et al. (2024) study the bank lending channel of the transmission of the provisioning requirements regarding non-performing loans (NPL) using Spanish credit registry. Banks that were more heavily exposed to the NPL policy shock tightened their lending standards, especially for risky firms. Acharya et al. (2022a) verify the bank portfolio reallocation channel of the loan-to-value (LTV) measures using Irish credit registry. We incorporate bank-firm relationship and show that (1) the effect of MaPs is becoming weak if we explicitly control core bank characteristics for profitability and financial health; (2) firms affiliated with large and well-capitalized banks are less exposed to MaPs.

One close paper is Fraisse et al. (2020). Using the French credit national register, Fraisse et al. (2020) investigate the effect of Basel II capital requirement on corporate investment and employment in France from 2008 to 2011. Our paper is different from theirs in several dimensions. First, different from their use of the change in the fixed asset position as the proxy of corporate investment, our data provide us with both tangible and intangible investments. We can understand the transmission of the effect of macroprudential policy on corporate investment more precisely. Our results show that MaP tightening decreases corporate investment mainly by affecting corporate tangible capital investment. In addition, the pledgeability of hard assets can attenuate this adverse effect. Second, we exploit the variation in country-level macroprudential policy for EU 28 to identify the effect on the corporate investment from 2015 to 2022. The period they focus is overlapped with the 2008 banking crisis. In their loan-level analysis, the use of bank-year fixed effects can be valid only based on the assumption that bank-specific shocks affect all corporate lending equally within banks. However, if the banking crisis led the most affected banks to shift their lending activity away from high-credit-risk firms, this could introduce bias into the estimations. Therefore, the optimal way is to avoid the period of banking crisis. Otherwise, we cannot isolate the effect of banking crisis from that of prudential policies. Third, in their subsequent analysis on the effect of bank-specific capital requirement on corporate investment using data aggregated at firm level, they cannot control either firm-year fixed effect or bank-year fixed effect as firm-level corporate investment and bank-level capital requirement will be absorbed, respectively. The natural drawback in this test may

lead to biased results for the effect of the capital requirement as they do not differentiate between the effect of credit demand and supply. However, in our case, as we exploit the variation in the country-level macroprudential policies, we can take advantage of using bank-year fixed effect to control the effect of credit supply. If we control bank-year fixed effect and the significant results hold, then we conclude that MaP tightening affects corporate investment also through reducing credit demand. However, if the effect fades away, we can rule out the role of credit demand and claim that MaP tightening affect corporate investment mainly through containing credit supply.

Another close paper is De Marco et al. (2021), with a focus on the effects of bank-level capital requirement on corporate investment in the United Kingdom from 1998 to 2006. Using UK firm-level balance sheet data, De Marco et al. (2021) find an increase in the bank-specific capital requirement contains corporate investment. Again, our most important difference is that we differentiate between tangible and intangible capital investments. Moreover, the drawback of their identification strategy, as they state, is that they cannot control firm-year fixed effects for time-varying credit demand (Khwaja and Mian, 2008) given their firm-level dataset does not include loan-level data. We utilize two strategies to verify that the effect is really coming from bank credit supply rather than other factors such as credit demand. First, we employ the firms' loan application outcomes to identify that MaP tightening increases the probability of a firm becoming credit constrained for bank loans. Second, after we control for bank-firm fixed effect and bank-year fixed effect, the adverse effect fades away, ruling out the credit demand channel of MaP transmission. Our paper isolates the effect of credit supply and demand on corporate investment and verify the presence of the bank lending channel of MaP transmission.

It is always challenging work to control the credit demand when identifying the effect of credit supply. To date, there are two main identification strategy in the literature. The first one is to control for firm-year fixed effect, relying on firms borrowing from multiple banks (Khwaja and Mian, 2008), which is not the case in most European countries. Specifically, for firms, in particular SMEs in European countries, single-bank firms are the majority of firms and most exposed to credit supply shocks (Ongena and Smith, 2001; Degryse et al., 2009; Kysucky and Norden, 2016; Degryse et al., 2019). An alternative identification strategy is to employ industry–location–size–time (ILST) fixed effects to control the credit demand (Popov and Van Horen, 2015; Acharya et al., 2019; Degryse et al., 2019; Berg et al., 2021). This method can be applied on single-bank firms and is based on the assumption that firms in the same industry, located in the same area, which are of comparable size, have the same credit demand. However, different from the literature that focus on a specific microprudential policy designed to curb each bank's credit supply (for example

capital requirement changes in a partial equilibrium regression framework), we consider both the demand and supply side effect of macroprudential policy and try to figure out the dominant channel of MaP transmission.

Second, we contribute to the literature on the relationship between firms' financing choices and investment decisions and the financial constraint channel of the macroeconomic policy transmission. Due to data availability, the majority of corporate investment research concentrates on total investment, primarily reflected by changes in fixed assets. Only a limited number of studies explore how different types of investments are influenced by different types of financing sources. Grundy and Verwijmeren (2020) observe that investments characterized by higher cash flow volatility, such as R&D expenditures, are typically financed through equity. Conversely, investments in tangible assets are more frequently financed through the issuance of corporate bonds. However, the authors primarily focus on the issuance of debt and equity securities for new investments, without considering internal finance through parent companies or external finance through bank loans and credit lines. Ferrando and Preuss (2018) investigate the link between corporate financing and investment decisions of European firms by using the EIBIS database and show that small and medium-sized enterprises (SMEs) typically rely on bank financing for investments in tangible assets, whereas they prefer internal financing for investments in intangible assets. Bauer et al. (2024) document the role of credit constraint in amplifying the adverse effect of COVID-19 on corporate tangible and intangible investments. Almeida and Campello (2007) suggest that the tangibility of firms' assets increase investment-the cash flow sensitivities of financially unconstrained firms.

Fazzari et al. (1988) highlight that the information-related financial constraints play an important role in the transmission of public policies on corporate investment. Gómez (2019) assess the impact of firms' credit constraints on corporate investment based on ECB's Survey on the Access to Finance of Enterprises (SAFE) dataset. They use the allocation rule of an unconventional monetary policy, namely the ECB's Targeted Longer-Term Refinancing Operations (TLTROs), as the instrumental variable for firms' credit constraints to disentangle the causal effect of credit constraints on corporate investment. They show that unconventional monetary policy stimulate the investment through alleviating firms' credit constraints. Laeven and Valencia (2013) investigate the real effect of financial sector policy intervention measures during the GFC and show that firms that are more financially dependent experienced higher value-added growth due to bank recapitalization policies, highlighting the significant role of supply-based financial frictions in influencing real economic activity. Döttling and Ratnovski (2023) suggest that firms' intangible investment responds less to monetary policy compared to tangible investment

and that firms with a higher proportion of intangible assets show less sensitivity in their investment and stock prices to monetary policy shocks. These effects are particularly significant among financially constrained firms, suggesting that corporate intangible capital diminishes the effectiveness of the credit channel in monetary policy transmission. They explain this finding by showing that the intangible investment is not financed by external sources and that monetary policy can not affect the collateral value of firm assets for firms with higher intangibles. In this paper, we show that MaP tightening affects total investments mainly through its effect on tangible capital investments and that MaP tightening decreases the share of the use of external funds and increases that of internal funds, which is in line with both Ferrando and Preuss (2018) and Döttling and Ratnovski (2023). We also show that smaller and more financially constrained firms decrease their investments more, which is in line with Laeven and Valencia (2013) and Gómez (2019).

The rest of this paper is structured as follows. Section 2 gives an overview of data. Section 3 provides our empirical analysis and shows the results. Section 4 conducts the robustness checks. Section 5 provides further discussion and section 6 concludes.

2. Data

We use a linked micro-macro dataset for 29 countries (EU28 and the US) over the 2015-2022 period.[4] Country-level MaPs data are from International Monetary Fund's integrated Macroprudential Policy (iMaPP) database. Firm-level investment and finance information are from the European Investment Bank Investment Survey (EIBIS) database. Bank-level balance sheet and income statement data are derived from BvD BankFocus dataset. Variable descriptions and descriptive statistics of the variables used in the analysis are given at Table 1 and 2, respectively.

2.1 iMaPP: Macroprudential regulations

The integrated Macroprudential Policy (iMaPP) database introduced by International Monetary Fund (Alam et al., 2024) provides monthly dummy-type (1 for tightening actions, 0 for no change, and -1 for loosening actions) policy action indices for 17 macropru-

[4]European Union member states (AT: Austria, BE: Belgium, BG: Bulgaria, CY: Cyprus, CZ: Czech Republic, DE: Germany, DK: Denmark, EE: Estonia, ES: Spain, FI: Finland, FR: France, GB: United Kingdom, GR: Greece, HR: Croatia, HU: Hungary, IE: Ireland, IT: Italy, LT: Lithuania, LU: Luxembourg, LV: Latvia, MT: Malta, NL: Netherlands, PL: Poland, PT: Portugal, RO: Romania, SE: Sweden, SI: Slovenia, SK: Slovakia)

dential tools at country level.[5] As Forbes (2021) states, it is difficult to measure the intensity of MaPs, including the intensity of the same tool implemented in different countries and that of different tools adopted in the same country. However, the discrete information may help us to capture average effects.

We create a simple index of Macroprudential policy stance based on the number of these 17 measures. First, we aggregate the monthly indicators to create quarterly series. Then, we follow Altavilla et al. (2020); Ahnert et al. (2021); Chari et al. (2022); Bergant et al. (2024); Cecchetti et al. (2023), and construct our accumulated quarterly MaP stance index by aggregating the changes in each country's MaP tools since 2000 (Chari et al., 2022), when each sample country starts from a neutral stance. Figure 1a, 1c, and 1e plot the evolution of MaP stance from 2008 to 2022 for each country in our sample. The resulting stances range from -5 to 28 across 29 countries, with a higher value indicating a tighter stance and a panel median of 1 and mean of 3.313. Across our entire sample, Denmark has the tightest stance (28), followed by Poland (27) and Hungary (26). In general, the MaPs are countercyclical tools, designed to restrict excessive growth in domestic credit. Both advanced and emerging economies have used MaPs far more frequently after the GFC and the number of tightening actions of MaPs significantly outweigh the loosening actions (Akinci and Olmstead-Rumsey, 2018; Forbes, 2021).

MaPs are adopted in response to credit cycle. We address concerns about the potential endogeneity problems across two dimensions. First, we take advantage of the firm-level information. Galati and Moessner (2018) point that this approach can potentially avoid reverse causality, as MaPs may not be changed in response to the development of finance and investment behavior of an individual firm. Second, we use a two-step procedure to identify policy shocks along the lines of some recent papers including Auerbach and Gorodnichenko (2012); Iacoviello and Navarro (2019); Altavilla et al. (2020); Ahnert et al. (2021); Chari et al. (2022) and Caldara et al. (2024). We predict the macroprudential policy shock by purging the accumulated macroprudential stance index from the lagged value of the accumulated macroprudential stance index, credit growth, and GDP growth country by country. We use four lags for all variables. Then at the second stage, we regress corporate investment variables against the residuals extracted from such regression to identify

[5] They are countercyclical capital buffers (CCB), capital conservation buffers (Conservation), capital requirements (Capital), leverage ratios (LVR), loan loss provision requirements (LLP), limits on credit growth (LCG), loan restrictions (LoanR), limits on foreign currency lending (LFC), limits to loan-to-value ratio (LTV), limits to debt-to-income ratio (DSTI), taxes and levies (Tax), liquidity requirements (Liquidity), limits to loan-to-deposit ratio (LTD), limits on foreign exchange positions (LFX), reserve requirements (RR), surcharges for systemically important financial institutions (SIFI), and other measures (Other). Table A1 presents the detailed definition of each tool.

the effect of the macroprudential shock.

2.2 EIBIS: Firm-Level Survey-Based Information

The EIBIS documents annual firm-level investment and financing behavior for a representative sample of 12500 firms in 29 countries (EU28 and the United States from 2019 onwards) from 2015 to 2022.[6] The survey is carried out through telephone (CATI) interviews in the local language.[7] It covers both SMEs and large corporations in the NACE categories C to J.[8] The chosen sampling frame for all countries in this database is based on the BvD ORBIS dataset, capturing the business population of interest well (Brutscher et al., 2020).[9] It allow us to link the survey answers to firms' financial and other administrative characteristics. Our firm-level dataset offers both qualitative and quantitative survey-based information for firms' investment decisions and different sources of finance.

The data has some advantages compared to the balance-sheet based datasets. First, instead of calculating the investment rate out of fixed assets, the direct information on corporate investment goes beyond the scope of accounting principles for investment. The EIBIS provides detailed information about how much the firms invested in different types of tangible and intangible assets.[10] The survey defines investment from a broader perspective, incorporating novel elements such as intellectual property and economic competencies rather than only focus on fixed assets. Corrado et al. (2005) propose a conceptual framework aimed at integrating intangible assets into accounting methodologies to more effectively capture sources of growth and measure economic activity. This reclassification encompass expenditures on computerized information, such as software and databases, as well as innovative intellectual property, including scientific research and de-

[6] Notably, our firm sample coverage and firm size and industry distribution are in line with Kalemli-Özcan et al. (2024), ensuring firm representativeness. The aggregate survey data, questionnaire, as well as a detailed account of the survey methodology, are available at www.eib.org/eibis.

[7] Consistent with the design of the survey data used in Campello et al. (2010), the respondent should be the most senior person at the firm with responsibility for corporate investment and finance decisions. This person could be the owner, a Finance Manager, the Finance Director or Head of Accounts, the Chief Financial Officer or the Chief Executive Officer.

[8] Firms are from the following industries: C: manufacturing; D: electricity, gas, steam and air conditioning supply; E: water supply; sewerage, waste management and remediation activities; F: construction; G: wholesale and retail trade; repair of motor vehicles and motorcycles; H: transportation and storage; I: accommodation and food service activities; J: information and communication.

[9] ORBIS is a cross-country longitudinal dataset of both listed and unlisted companies provided by Bureau van Dijk. ORBIS provides detailed balance sheet and income statements information for our sample firms.

[10] Tangible investment includes land, business buildings and infrastructure, and machinery and equipment. Intangible investment includes research and development (R&D) (including the acquisition of intellectual property), software, data, IT networks and website activities, training of employees, and organisation and business process improvements (including restructuring and streamlining)

velopment (R&D), as well as non-scientific inventive and creative endeavors. Additionally, they suggest the inclusion of economic competencies, which encapsulate the knowledge embedded within firm-specific human and structural resources, such as organizational structures or training activities, as investment assets. This comprehensive approach underscores the importance of acknowledging and quantifying the contribution of intangible assets to economic growth and productivity. In this sense, we can measure corporate investment more accurately.

Second, information on firms' finance sources cannot be obtained from traditional balance sheet data. In the survey, firms are asked to provide the proportions of their finance for investment coming from the following three sources of finance: (1) internal finance or retained earnings (e.g. cash or profits), (2) intra-group lending (e.g. loans from parent company), and (3) external financing sources. We use this information to find how firms' financing choices respond to MaPs.

Third, this database provides rich qualitative survey-based information such as loan application results and firms' satisfaction on specific loan terms (obtained amount, loan price, maturity, collateral requirement, etc.). The majority of the literature, such as di Giovanni et al. (2022); Jiménez et al. (2012); Ioannidou et al. (2014) using credit registry data to analyze the corporate credit transactions, cannot study informal credit constraints, which has been shown to be more important than the formal ones in some countries (Brown et al., 2014). Popov (2016) investigates the bank balance sheet channel using data on discouraged and informally rejected firms and find the informal credit constraints vary systematically across countries which can bias the results. The credit registry only records the details of the transaction such as the cost of financing, maturity, size of the loan, collateral requirement, and guarantee requirement but ignore the firms those are discouraged from applying for bank loans or have been informally rejected by the loan officers. In the survey we define a firm as credit-constrained in four different cases: (1) the firm was dissatisfied with the amount of finance obtained (received less), (2) the firm sought external finance but did not receive it (rejected), (3) the firm did not seek external finance because it thought borrowing costs would be too high (too expensive), (4) it would be turned down (discouraged). In addition, firms those have obtained the external finance are also required to report how satisfied or dissatisfied they are with the four key items within loan contracts: (1) the amount that the firm obtained, (2) the cost of the external finance that it obtained, (3) the length of time over which the loan has to be repaid, (4) the collateral required. Firms have five choices: very satisfied, fairly satisfied, neither satisfied nor dissatisfied, fairly dissatisfied, very dissatisfied. In our subsequent analysis, we create a dummy variable for constrained firms. We further define another four dummy variables

which are equal to 1 if a firm is fairly/very dissatisfied with amount, price, maturity, or collateral.

2.3 Matching Firm- and Bank-Level Data

The survey asks the firms to report their main banks. We create a variable called *bank* showing the name of the firm's main bank following the literature on firm-bank lending relationships such as Ongena and Smith (2000, 2001); Giannetti and Ongena (2012); Ferrando et al. (2017); Poelhekke et al. (2021); Ferrando et al. (2022) and Kalemli-Özcan et al. (2022). If the panel respondents report more than one bank, the survey asks them for the main bank. We check the stability of firms' banking relationships and find the relationships are stable over our sample periods. Then, for each main bank, we get the bank balance sheet information from BankFocus database provided by BvD. Notably, around 13% of our sample firms are defined as large firms, and around 1.6% are listed firms. Our data shows that small firms have more stable relationships with their banks. Stiglitz and Weiss (1981) suggest that small firms may be particularly vulnerable to financial frictions resulting from information asymmetries. As a result, small firms rely more on financial institutions for external finance and relationship lending. (Berger and Udell, 1998, 2002, 2006). Ongena et al. (2012) document that in Germany, corporate borrowing from banks is often concentrated and the exclusiveness is often regarded as a close bank relationship. We take advantage of this information and incorporate bank-firm relationship following the previous literature.

To sum up, this dataset make it possible to show the linkages of bank to firm, and firm finance to investment. The information goes far beyond the information provided by balance sheet data and it allows us to disentangle the response of firms' financing choices to MaPs and the real effects of MaPs on firms' investment dynamics.

3. Empirical Analysis

3.1 The Effect of Macroprudential Policy on Investment

We estimate the effect of MaP stance on corporate investment as follows:

$$Y_{f,s,c,t} = \alpha_{f,s,c} + \theta_{s,t} + \beta MaPstance_{c,t-1} + \gamma Z_{c,t-1} + \zeta X_{f,s,c,t-1} + \epsilon_{f,s,c,t} \quad (1)$$

where $Y_{f,s,c,t}$ is the corporate investment of firm f from sector s in country c at time

t as a ratio to its total assets. We include the country-sector-firm ($\alpha_{f,s,c}$) and sector-year fixed effects ($\theta_{s,t}$), to account for unobserved time-invariant firm characteristics and time-varying industry heterogeneity, respectively. $MaPstance_{c,t-1}$ is the variable of interest, indicating the net tightening of MaP stance in year $t-1$. $Z_{c,t-1}$ is a set of macroeconomic control variables, and $X_{f,s,c,t-1}$ is a set of firm covariates to control for observable firm-level heterogeneity such as size, age, turnover, etc. We take lagged terms of macroprudential stances, country and firm controls to avoid simultaneity. $\epsilon_{f,s,c,t}$ is the error term.

3.1.1 Identification of Macroprudential Shocks

We begin with the accumulated MaP stance index from 2000 to 2022 and follow Auerbach and Gorodnichenko (2012); Iacoviello and Navarro (2019); Altavilla et al. (2020); Caldara et al. (2024) to identify MaP shocks. We regress the country-by-country MaP stance index on a set of macroeconomic controls and use the residuals of this regression as the identified shocks, as they are orthogonal to changes to macroeconomic and financial conditions. Specifically, we estimate the country-level shocks as the residual in the following regression:

$$MaPstance_{c,t} = \alpha_c + \beta Z_{c,t} + u_{c,t} \tag{2}$$

where $MaPstance_{c,t}$ is the accumulated MaP stance index in country c at time t. The set of controls $Z_{c,t}$ includes four lags of credit growth, GDP growth, and the MaP stance index, where we use Akaike Information Criteria and Schwartz Information Criteria to choose optimal number of lags.[11] Figure 1a, 1c, and 1e show the data on actual macroprudential stance and Figure 1b, 1d, and 1f show macroprudential shocks estimated using Equation 2. It is worth noting that we obtain similar shocks to the results presented in Altavilla et al. (2020).

3.1.2 Baseline Results

Having identified macroprudential shocks, we revisit our baseline model and estimate the effect of MaP shocks on the corporate investment. We report the results in Table 3. In the first three columns, MaP_{stance} represents the net tightening/loosening of MaP stance, whereas in columns 4-6, MaP_{shock} represents macroprudential shocks. The results consistently support the hypothesis that tightening in macroprudential policies reduces firms' investments. The coefficient in column 6, obtained from the most saturated specification, suggests that one standard deviation increase in macroprudential shocks is associ-

[11] Results for the analysis in the rest of the paper are similar when we use macroprudential policy shocks obtained by using different lags of macroeconomic indicators.

ated with a 4.5 (0.0236 × 1.9) percentage points decline in firms' investment to asset ratio. We also find that the coefficient of MaP_{shock} in columns 6 is almost two times larger than the one in column 3, suggesting that using macroprudential stance index as it stands leads to underestimation of the effects of MaPs, which is in accordance with the findings of Kuttner and Shim (2016).[12]

3.2 Supply-based vs Demand-based MaPs

In the previous specification, the 'MaP' has been constructed by incorporating all 17 types of MaPs into a single index. In doing so, we do not distinguish between the policies aiming at limiting the ability and/or willingness of banks to lend, and the policies aiming at borrowers' ability to borrow. Therefore, as it stands, the earlier analysis provides a limited scope on whether the MaP affects the firms' investment by affecting credit supply. To provide deeper insights into the transmission channel, we group the MaP policies as 'supply-based' and 'demand-based' tools. demand-based tools are designed to capture the demand for financing, while supply-based MaPs are aimed at enhancing the resilience of financial institutions by preventing their tendency to lend excessively. We use the same method to get the supply-based macroprudential shocks (denoted by MaP^{supply}_{shock}) and demand-based macroprudential shocks (denoted by MaP^{demand}_{shock}). We maintain the same specification, but rerun the regression separately for supply-based and demand-based macroprudential shocks to better capture the differential impacts of these two categories of tools. Table 4 shows that the effect of MaPs on firms' investment is mainly driven by supply-based MaPs. We first regress corporate investment on MaP^{supply}_{shock} (column 1), and MaP^{demand}_{shock} (column 2) separately and control for MaP^{supply}_{shock} and MaP^{demand}_{shock} simultaneously (column 3). In column 3, the coefficient of MaP^{supply}_{shock} is negative and significant at 1% level, suggesting that one standard deviation increase in supply-based macroprudential shocks is associated with a 4.3 (0.0246 × 1.76) percentage points decline in firms' investment to asset ratio. However, the effect of MaP^{demand}_{shock} is insignificant, indicating that supply-based factors may play a dominant role.

[12] As Kuttner and Shim (2016) state, the omitted variables may lead to the underestimation of the effects of MaPs. In their paper, they take limits to Loan-to-value as an example. When policymakers tighten the LTV, i.e., a reduction in the maximum LTV ratio (or in this paper's case, a positive MaP stance value), the intended outcome is a reduction in housing credit ceteris paribus. However, if such tightening action responds to rapid excessive growth of housing credit (policymakers tended to tighten the LTV when housing credit was already expanding rapidly), this can raise a positive correlation between the LTV variable and credit, potentially offsetting the policy's intended effect. In the extreme case where policymakers perfectly adjust the LTV to stabilize credit, the regression coefficient on the LTV would be zero.

3.3 Role of Banks

In this section, we incorporate banks to our analysis to understand how banks respond to MaP tightening. Boissay et al. (2019) collect the majority of literature on the impact of financial regulations and highlight the significant effect on bank lending. We further incorporate information on the match between firms and their primary banks in order to test (1) whether banks' financial characteristics play any role in the transmission on MaPs on investment as well as (2) whether the effect of MaPs on investment becomes insignificant if we explicitly control for time-varying unobserved heterogeneity at bank-level, which shuts down the credit supply channel.

In the subsequent analysis, we first employ bank-level data to scrutinize the impact of macroprudential shocks on banks' credit activities, performance, and financial health. Furthermore, we examine whether a bank's response to macroprudential shocks is contingent upon its financial soundness.

3.3.1 Bank-level Evidence on the Effects of Macroprudential Shocks on Bank Credit

In this section, we incorporate firm-bank relationship. Firms are asked to provide their main bank's name. In cases where respondents mention multiple banks, they are asked to designate only their main bank.[13] We identified and retrieved data on 608 distinct banks from the Bankscope database. These banks are all linked through credit relationships with firms in our EIBIS database. As a preliminary step, we investigate the effect of the MaPs on credit activities, performance, and financial health of these 608 European banks.

In order to understand how banks respond to macroprudential shocks by changing their total lending, we first estimate

$$Bank_{b,c,t} = \alpha_{b,c} + \lambda_t + \beta MaPshock_{c,t-1} + \gamma Z_{c,t-1} + \zeta X_{b,c,t-1} + \epsilon_{b,c,t} \tag{3}$$

where $Bank_{b,c,t}$ is the credit stock, financial performance, and other financial characteristics of interest for the bank b in country c in year t, depending on the specification. We include country-bank fixed effects ($\alpha_{b,c}$) to account for time-invariant country and bank characteristics, and all factors associated with a particular bank operating in a specific country. We also include year fixed effects (λ_t). $MaPshock_{c,t-1}$ is the variable of interest, indicating macroprudential shocks in year $t-1$. $Z_{c,t-1}$ is the lagged terms of a set of macroeconomic control variables, and $X_{b,c,t-1}$ is the lagged terms of a set of bank

[13] To ensure the accuracy of the bank-firm relationship, the survey instructs staff not to prompt respondents with answers from previous waves. If a respondent mentions a different bank name, the response is verified for consistency.

covariates to control for observable bank-level heterogeneity.

A priori, it stands to reason that adjustments in response to supply-based MaPs mainly operates through affecting banks' lending volumes. Therefore, we first check whether macroprudential shocks also affect bank loan volumes. We test this conjuncture directly by running bank loan volumes, as a share of total assets and then as a ratio to deposits, respectively. Table 5 reports regression estimates of bank credit measures (total loan normalized by total asset, total loan normalized by total deposit, net loan normalized by total asset) on MaPs. The estimates imply that macroprudential shocks indeed reduce credit volume, in line with the aggregate level evidence in the literature (see Cerutti et al. (2017); Alam et al. (2024)). Table 6 shows the effect of MaPs and supply-based (financial institutions-targeted) MaPs on banks' performance and financial strength. Columns 1-4 show that MaPs do not affect bank performance significantly. To measure whether MaPs affect banks' capitalization ratio, we use Tier 1 core capital ratio, which is the variable most often used in empirical work as a proxy for the bank's net worth and financial strength (Jiménez et al., 2012, 2014; Carlson et al., 2013; Popov, 2016). The estimation output in columns 5 and 6 shows that banks' Tier1 ratio is increasing in response to macroprudential tightening.

3.3.2 Role of Banks' Supply Responses to Macroprudential Policy in Firms' Investment

After doing bank-level analyses, we revisit our baseline regression, but with the presence of bank-firm relationship. In table 7, we show results for the following three specifications for the effect of MaP on corporate investment:

$$Y_{f,s,b,c,t} = \alpha_{f,s,c} + \theta_{b,c} + \lambda_{s,t} + \beta MaPshock_{c,t-1} + \gamma Z_{c,t-1} + \zeta X_{f,s,c,t-1} + \epsilon_{f,s,b,c,t} \quad (4)$$

where $Y_{f,s,b,c,t}$ is the corporate investment as a ratio to its total assets for the firm i from sector s in country c borrowing from bank b at time t. We include country-sector-firm fixed effects ($\alpha_{f,s,c}$), and country-bank fixed effects ($\theta_{b,c}$), and sector-year fixed effects ($\lambda_{s,t}$). $MaPshock_{c,t-1}$ is the variable of interest, indicating macroprudential shocks in year $t-1$. $Z_{c,t-1}$ is the lagged terms of a set of macroeconomic control variables, and $X_{f,s,c,t-1}$ is the lagged terms of a set of firm covariates to control for observable firm-level heterogeneity such as size, age, turnover, etc.

However, the specification in Equation 4 does not take into account unobservable characteristics about bank-firm matches, such as long-term banking relationships, geographic proximity, etc. In Equation 5, we further incorporate the endogenous bank-firm

matches by including country-sector-firm-bank fixed effects, denoted by $\alpha_{f,s,b,c}$.

$$Y_{f,s,b,c,t} = \alpha_{f,s,b,c} + \lambda_{s,t} + \beta MaPshock_{c,t-1} + \gamma Z_{c,t-1} + \zeta X_{f,s,c,t-1} + \epsilon_{f,s,b,c,t} \quad (5)$$

However, Equation 5 still does not control for time-varying unobserved variations in banks' lending behavior. Therefore, we include bank-year fixed effects in Equation 6, denoted by $\sigma_{b,t}$. Notably, in this equation, the bank-year fixed effect can help us control credit supply.

$$Y_{f,s,b,c,t} = \alpha_{f,s,b,c} + \sigma_{b,t} + \lambda_{s,t} + \beta MaPshock_{c,t-1} + \gamma Z_{c,t-1} + \zeta X_{f,s,c,t-1} + \epsilon_{f,s,b,c,t} \quad (6)$$

In particular, if the coefficient on macroprudential shocks is still significant after controlling for bank-time fixed effects, we can argue that MaPs affect firms' investments also through affecting firms' investment demand directly. This could happen for instance if the implementation of MaP deteriorates firms' expectations or uncertainty perceptions about the overall demand in the economy, which in turn will affect firms' investment decisions.

Compared to our baseline regression, we can control with bank-level information the supply-based dynamics to test if the MaPs affect the investment through their effect on the firms' investment demand. If the effect of MaPs on investment, captured by parameter β, is still negative and significant, then we can argue that MaPs work through firm demand, although we can not rule out the bank lending channel. However, if β becomes insignificant after controlling for $\sigma_{b,t}$, this suggests that the aggregate demand plays an insignificant role for the transmission of MaPs on corporate investment.

We present the effect of MaP_{shock} and MaP_{shock}^{supply} on corporate investment in Table 7. First, in columns 1 and 2, we employ country-firm fixed effect and country-bank fixed effect, without linking firms with bank. It shows that macroprudential shocks and supply-based macroprudential shocks lead to a decline in corporate investment. Second, in columns 3 and 4, we use country-firm-bank fixed effect, controlling bank-firm relationship. It shows that the effect of macroprudential shocks and supply-based macroprudential shocks become stronger. Third, in columns 5 and 6, we further use bank-year fixed effect, controlling all time-varying bank-level characteristics. It shows that the adverse effect of MaPs fades away when we control supply-based time-varying bank-level characteristics. We rule out the credit demand channel and verify the bank lending channel of MaPs transmission.

3.3.3 Role of Banks' Characteristics

We next explore whether the effect of macroprudential shocks on corporate investment is transmitted differently by banks with different characteristics. This question is motivated by earlier findings in the literature suggesting that banks with different financial health react differently to prudential policies. Altunbas et al. (2018) suggest that MaPs limit banks' risk-taking behaviour and that small and weakly capitalised banks respond more strongly to MaPs. Baskaya et al. (2024) find that in response to the prudential provisioning shock of non-performing loans (NPLs), banks with higher levels of vintage NPL tightened their lending and required higher levels of collateral, especially for risky firms. Now, given we have identified the bank lending channel, the question for Table 8 is to test whether bank characteristics, which we have controlled in the previous table, matter for MaP transmission. For this, we estimate:

$$\begin{aligned} Y_{f,s,b,c,t} = \alpha_{f,s,b,c} + \lambda_{s,t} + \beta_1 MaPshock_{c,t-1} + \beta_2 MaPshock_{c,t-1} \times Bank_{b,c,t-1} \\ + \beta_3 Bank_{b,c,t-1} + \gamma Z_{c,t-1} + \zeta X_{f,s,c,t-1} + \eta C_{b,c,t-1} + \epsilon_{f,s,b,c,t} \end{aligned} \tag{7}$$

where $Y_{f,s,b,c,t}$ is the corporate investment of firm i from sector s in country c at time t as a ratio to its total assets. We include country-sector-firm-bank fixed effects ($\alpha_{f,s,b,c}$) and industry-year fixed effects ($\lambda_{s,t}$). $MaPshock_{c,t-1}$ is the variable of interest, indicating macroprudential shocks in year $t-1$. $Bank_{b,c,t-1}$ is bank performance and financial health measures. $Z_{c,t-1}$ is the lagged terms of a set of macroeconomic control variables, and $X_{f,s,c,t-1}$ is the lagged terms of a set of firm covariates to control for observable firm-level heterogeneity such as size, age, turnover, etc. $C_{b,c,t-1}$ is the lagged terms of a set of bank controls.

Results in Table 8 suggest that firms working with larger, more profitable, and better capitalized banks are better insulated from the adverse effects of macroprudential shocks. As for the mitigating effect of bank size on the adverse effects of MaP tightening on firms' investment, presented in column 3, the result is consistent with the hypothesis that larger banks may more easily raise capital or have access to alternative stable funding sources. The findings presented in columns 4-6 are in line with the conjecture that the banks with higher profitability and capital adequacy can mitigate the adverse effects of macroprudential tightening on bank lending. Alternatively, the MaP tightening may not be binding for well-capitalized banks such that the credit supply response of such banks may be lower than the banks with lower capital adequacy rate.

3.4 Firm Characteristics and Effects of MaPs on Investment

So far, we have shown the importance of the bank lending channel for the transmission of the macroprudential policy. Our earlier results support the hypothesis that MaPs are affecting corporate investment, and that the transmission is also affected by bank characteristics. Modigliani and Miller (1958) suggests that in perfect capital markets, a firm's capital structure does not affect its value, implying that firms' financing decisions are irrelevant to its investment decisions. Internal and external funds are considered perfect substitutes, and financial factors such as firm liquidity, leverage, or dividend payments, do not affect real firm decisions. However, financial frictions in the credit market such as transaction costs, taxation, market liquidity, agency costs, and costs of financial distress disrupt the perfect substitutability between internal and external funds, leading to an external finance premium (Bernanke and Gertler, 1995). Financial constraints may adversely impact corporate investment decisions, especially for firms lacking sufficient internal funds. Therefore, in this section, we turn to investigate firms' financing behavior and provide more evidence on the effect of MaP tightening on firms' financing choices and investment decisions.

3.4.1 Firm Financing Choices and Outcome of Loan Applications

In the subsequent analysis, we explore the effects of MaPs from firms' angle. To this effect, first, we check whether firms' financing sources change in response to an adjustment in MaPs. Firms are asked to provide the share of three sources of finance: internal sources (such as internal funds, retained earnings), intra-firm sources (such as loans from parent company), and external sources (such as bank credit) for the funding of their investments.

The results of the regression are presented in Table 9. We find that a tightening in MaP is strongly associated with an increase in the share of internal finance and a decline in external finance, implying that access to external finance gets more difficult under a tighter MaP. This result mirrors the previous analysis which indicates that MaPs dampen bank lending.

Secondly, by making use of the survey questions that explore the outcome of firms' loan applications, we shed light on bank behaviour again from firms' perspectives. In Table 10, the dependent variables investigate whether a tightening in MaP affects loan application results. For the results in columns 1 and 2, our dependent variable is a dummy variable equal to one if in the past year (1) the firm did not apply for any external fund as it would be turned down (discouraged), (2) the firm sought external finance but did not receive it (rejected), (3) the firm did not seek external finance because they thought

borrowing costs would be too high (price-constrained), (4) the firm received less than its expected amount (quantity-constrained). For columns 3-10, we focus on the firms that obtained the loan they applied. Firms are asked:“ Thinking about the external finance you were offered, how satisfied or dissatisfied were you with it in terms of a. the amount you were offered, b. cost of external finance, c. maturity, d. collateral requirement."[14] Our dependent variables are dummy variables equal one if a firm reports that it is very dissatisfied or fairly dissatisfied with the four items within a loan contract.

The regression results, presented in Table 10, indicate that MaP is operating through credit supply: a tightening in MaP brings about an increase in loan rejections (column 1) and increases the number of firms dissatisfied with the size of the loans (relative to what they demanded) they could get (column 2). Results also suggest that banks' loan pricing, maturity of loans, and collateral requirements remain unaffected. These results are again consistent with the results coming from the bank level analysis, as they imply that banks become less willing to extent loans in periods of tight macroprudential policy.

3.4.2 Results by Firm Size

Which firms decrease investments most when credit access deteriorates? We use firm size as a proxy of firms' risk, which has been both empirically and theoretically justified (see also in Ferrando et al. (2017, 2019)). For this, we divide the sample firms into four categories based on the turnover (micro (0-€2M), small (€2-€10M), medium (€10-€50M), and large (€50M+)) following the categorization by the European Commission. Table 11 presents the estimation results of this exercise, which shows that small and medium firms are more exposed to the adverse effects of MaPs. On the other hand, the MaPs do not affect micro firms and large firms.

3.4.3 Results by Firms' Financial Positions

A natural follow-up question is whether firms' characteristics, such as their external finance dependence and financial health, matter for how much they are affected by MaP tightening. For firms' dependence on external finance, our previous analysis (see Table 9 in section 3.4.1) has demonstrated that MaP tightening prompts firms to shift their financing choices for investments from external to internal sources. This observation raises a critical question: does external finance dependence exacerbate the adverse effects of MaP tightening on firms' investment activities? Specifically, do firms that are more re-

[14] Respondents can answer 1 for very satisfied, 2 for fairly satisfied, 3 for neither satisfied nor dissatisfied, 4 for fairly dissatisfied, and 5 for very dissatisfied.

liant on external finance experience a larger drop in their investment due to MaP tightening? For firms' financial health, previous regressions with different firm size categories provided some circumstantial evidence that this could be the case, as small and medium-sized firms are more financially vulnerable than large ones (see Table 11 in section 3.4.2).

We first follow Rajan and Zingales (1998) and Claessens et al. (2012) to define the External Finance Dependence (EFD) as one minus cash flow / total investment. We then analyse whether firms' risk matter for whether MaP tightening affects their investment. While MaP would support the banks' capital and/or liquidity buffers, they should do it also by supporting the asset quality of banks. Nevertheless, the very regulations that push the banks to decelerate loan growth might also cause an increase in risk-taking, if banks try to recover their declining revenues. To this end, we use an alternative specification where firms' investment decisions depend on financial characteristics and their interaction with MaPs.

In particular, we estimate

$$\begin{aligned} Y_{f,s,c,t} = \alpha_{f,s,c} + \theta_{s,t} + \beta_1 MaPshock_{c,t-1} + \beta_2 MaPshock_{c,t-1} \times Firm_{f,s,c,t-1} \\ + \beta_3 Firm_{f,s,c,t-1} + \gamma Z_{c,t-1} + \zeta X_{f,s,c,t-1} + \epsilon_{f,s,c,t} \end{aligned} \tag{8}$$

where $Y_{f,s,c,t}$ is the corporate investment of firm i from sector s in country c at time t as a ratio to its total assets. We include country-sector-firm fixed effects ($\alpha_{f,s,c}$) and sector-year fixed effects ($\theta_{s,t}$). $MaPshock_{c,t-1}$ is the variable of interest, indicating the macroprudential shocks in year $t-1$. $Firm_{f,c,t-1}$ is firm characteristics in year t-1. $Z_{c,t-1}$ is the lagged terms of a set of macroeconomic control variables, and $X_{f,s,c,t-1}$ is the lagged terms of a set of firm covariates to control for observable firm-level heterogeneity.

Results in Table 12 present the role of firms' financial characteristics. First, results in column 1 reflect the important role of bank lending channel. A higher EFD value suggests that a firm is more dependent on external finance for investment. The interaction term between $MaP_{shock} \times EFD$ is negative and significant, indicating that the firms that rely more on external finance invest less. This finding is consistent with our results in section 3.3, where we highlight the role of the bank lending in channeling the effect of MaPs.

Second, We use SA index, liquidity ratio, leverage ratio, and interest coverage ratio as measures for firms' financial positions in columns 2-5, respectively. Majority of the firm financials- MaP interaction variables have significant coefficients.[15] A lower SA Index value suggests that a firm has greater difficulty in obtaining external funds to finance its operations and growth initiatives. Liquidity ratio measures a company's ability to pay

[15] SA index is calculated by -0.737 × size + 0.043 × size^2 − 0.04× age, see details in Hadlock and Pierce (2010)

off its current liabilities using its liquid assets.[16] The leverage ratio measures the proportion of a company's assets which are financed by debt.[17] Interest coverage measures a company's ability to meet its interest payment obligations.[18] A higher leverage ratio and a lower SA index, liquidity ratio, and interest coverage ratio indicate a more weakened financial position for the firm. The interaction term between MaPs × SA index is positive and significant, suggesting that firms with greater access to finance exhibit higher levels of investment. The interaction term MaPs × Liquidity ratio is positive and significant, indicating that firms with healthier liquidity conditions invest more. The interaction term MaPs × Interest coverage ratio is positive and significant, indicating that the ability of firms to cover interest obligations from the operating income limits the adverse effect of MaPs. Our finding is consistent with Baskaya et al. (2024), who find that risky firms experience a stronger decrease in total borrowing, sales, number of workers, and investment following policy actions affecting credit conditions.[19]

Third, we test whether the results are driven by earning-based or asset-based borrowing constraints. For columns 6 and 7, we interact MaPs with two other important measures: profitability (EBITDA / Total asset) and fixed assets (Fixed asset / Total asset). Lian and Ma (2021) investigate the corporate debt for U.S. non-financial firms and find that 80% of debt by value in the U.S. is based predominantly on cash flows from firms' operations. They also find that cash flow–based lending is uncommon among small, young, and low-profit firms due to their limited cash flow generation capacity or ongoing losses.[20] In our sample, around 13% are large firms and around 1.6% are listed firms. Our results highlight the important role of firms' asset-based borrowing constraints for SMEs. As shown in column 7 of Table 12, firms with higher value of fixed assets are less exposed to the effect of MaPs, indicating the role of collateral-based borrowing constraints. This finding is consistent with Almeida and Campello (2007) suggesting that the pledgeable assets support more investments for financially constrained firms. We underscore the important role of the pledgeability of hard assets in the bank lending channel (see empirical evidences also in Berger and Udell (1990); Jiménez et al. (2020); Lian and Ma (2021); Ivashina et al. (2022)). Firms that can pledge more tangible capital as collateral are more resilient to the negative impacts of MaPs.

[16] Liquidity ratio is calculated by (current assets - stocks) / current liabilities.

[17] Leverage ratio is calculated by total debt / total asset.

[18] Interest coverage is calculated by EBITDA / interest expense.

[19] They follow Gertler and Gilchrist (1994) and employ the interest coverage ratio as a measure of firms' financial riskiness.

[20] Notably, in their paper, the median EBITDA for U.S. small firms in Compustat is approximately zero.

3.5 Tangible vs Intangible Investment

Previous results in section 3.4 indicate the pivotal role of the pledgeability of tangible capital investment in the MaPs transmission. In this section, we investigate whether tangible and intangible investments are affected differently from MaPs. The distinction between tangible and intangible capital became increasingly important, as it is well-documented that intangible capital is key for long-term economic performance as it matters for growth and productivity both at the firm level and the aggregate level in an economy (Van Ark et al., 2009; Corrado et al., 2009; Corrado and Hulten, 2010) Tangible capital refers to physical assets that a firm owns and uses in the production process. This mainly includes land, business buildings, infrastructure, machinery and equipment. These assets have a clear, measurable value and are often used as collateral in financial transactions. Intangible capital refers to non-physical assets that represent potential value for a firm. It includes the knowledge derived from R&D, intellectual property (patents, trademarks, copyrights), human capital (skills, knowledge), organizational structure (business processes, company culture), software and data, and brand value. Despite their importance since they do not have a physical presence, valuing intangible assets is complex and often involves subjective measures such as future earning potential and brand recognition. EIBIS provides quantitative information on both tangible and intangible investments.

In addition to importance of distinguishing the two types of capital, there are good reasons to conjecture that they might be affected differently from a change in financial conditions. Literature shows that, due to their nature, firms finance these two types of investments in different ways. Ferrando and Preuss (2018) study the link between firms' investment and financing choices using the EIBIS database and find that external funds are preferred for tangible asset investment while internal funds are positively correlated with intangible asset investment. In fact, a recent paper, Döttling and Ratnovski (2023), finds that intangible investment responds less to monetary policy shocks than tangible investment.

Given the importance of the distinction between the tangible and intangible capital and that some recent evidence suggests that these investments can have different sensitivities to changes in financial conditions, we have rerun the previous regressions separately for the two type of investments. The results presented in Table 13 show that the effects of MaPs on the two types of investments are significantly different. Intangible investments are found to be insensitive to MaPs. Hence, the adverse effects of MaPs on investments do arise completely through tangible investments. This finding accords with Döttling and Ratnovski (2023).

The result might, however, be reflecting a possible correlation between tendency to invest in intangible and firm characteristics. For instance, assume that intangible investments are mostly done by large firms, which according to our previous results, seems to be better insulated from the effects of the MaPs. To refine our investigation, we first check whether firm size matters for the results, we estimate the previous regressions separately for four firm size categories. The results in Table 14 show that large firms do not adjust either tangible or intangible investments due to a change in MaP. On the other hand, small and medium-sized firms reduce tangible capital investments but without changing their intangible investments. Micro firms seem to behave like large firms. However, this is most likely be driven by the fact that those firms have very limited access to external finance, thus they are not sensitive to the financial conditions.

Secondly, to exclude the probability that the insensitivity of the intangible capital to MaPs is related to bank or firm characteristics, we repeated the previous regressions that check the role of bank and firm characteristics on the transmission of MaPs for the two different investment types separately. Additionally, we run the each regressions two times; first with overall MaP, then with supply-based MaP. The results for tangible capital are presented from Table A2 to Table A5. As expected, the regressions with tangible capital mirrors our results from the previous regressions where the dependent variable is total investments. Specifically, the results confirm that both bank and firm characteristics play a role in the transmission of MaPs. One notable difference is that in the latter, MaP has a larger coefficient, that is, they have a stronger effect on tangible investments compared to total investments. This is not surprising as our previous estimations showed that the MaPs' effects on investments arise solely due to tangible investments.

From Table A6 to Table A9, we present the same regressions but with intangible investments replacing the tangibles as the dependent variable. Table A6 and Table A7, shows the outcome of the regressions that the role of bank heterogeneity in the transmission of MaP on intangible investments. The only difference is that in the former MaP is represented by overall MaP, whereas in the latter only supply side MaPs are used. In both regressions, we fail to find a significant role of bank characteristics in the transmission. We re-run the two regressions, by replacing the bank characteristics with firm characteristics. The results presented in Table A8 and Table A9 suggest that the insensitivity of intangible investment to MaPs (or supply MaPs) is not related to a possible correlation between the tendency to invest in intangibles and firm characteristics. We do not identify the possible reasons behind the unresponsiveness of intangible investments to MaP. However, our results accord with the observation that intangibles are mostly funded by internal sources.

In summary, our findings can be interpreted in two dimensions: (1) firms are unable

to pledge intangible capital as collateral; and (2) firms predominantly finance tangible capital investments through external sources, while intangible capital investments are financed internally. Consequently, investments in intangible capital are less dependent on traditional bank lending channels.

4. Robustness check

In this section, we provide two strategies for robustness checks. First, we test if the effect of MaP stances and shocks during the COVID-19 period drives the results. We create a dummy variable for the year 2020 and 2021 and interact the MaPs with this dummy. Table 15 shows that the effect of MaP shocks during COVID-19 is not significantly different from other periods. Second, we report robust standard error clustered at the firm level for our baseline regression. Table 16 shows similar results to our baseline.

5. Discussion

Our analysis implies that macroprudential policies (MaPs) affect bank lending and, through this channel, firms' investments. Additionally, our results indicate that a tightening of MaPs leads to the largest reduction in lending by weaker banks and to weaker firms. These findings align broadly with previous literature, which documents that MaPs serve their intended purpose: credit growth is tamed, primarily through reductions in lending by risky lenders and to risky borrowers. On this premise, MaPs are seen as enhancing macrofinancial stability, and literature suggests that, from a long-term perspective, MaPs are beneficial for the availability of finance.

To better calibrate these policy tools or use them more optimally, we need better information on their effects. In this respect, this study provides useful information for these considerations. Certainly, additional research is warranted to inform a quantitative cost-benefit analysis of MaPs. Additionally, investigations about possible measures to mitigate (if exists) undue effects of MaPs on investments. Results also suggest that MaPs weigh mainly on SME investments. While SME loans (regardless of whether they are used for investment or working capital purposes) are presumably riskier than large firm loans, it stands to reason that banks' negative reaction to SME loans in the face of a tightening MaP policy intervention might be stronger than desirable. If this is really the case, regulatory authorities might consider designing policy tools that specifically take SME investments into account.

Another noteworthy and positive observation is that intangible investments, which are commonly accepted as the main drivers of productivity gains at the firm or country level, are not significantly affected by MaPs. Nevertheless, this seemingly positive result arises from firms' inability to fund these types of investments through bank loans.

6. Conclusion

This study explores the influence of macroprudential policies (MaPs) on corporate investment, utilizing firm-level data and information on their primary banks. Our findings indicate that MaPs, especially supply-side MaPs, exert a statistically and economically significant negative impact on corporate investment.

One of our key contributions is identifying the credit supply channel of macroprudential policy transmission on firms' investment decisions. We find that MaPs affect corporate investment majorly through the bank lending channel. These policies do not directly affect firm investment demand, such as by influencing expectations over economic activity or uncertainty. In response to MaP tightening, banks reduce their lending to firms, leading to a decline in investments.

Secondly, we document that banks' financial soundness is a crucial determinant of how they are affected by MaPs and how they transmit the impact of a change in MaP policy to their clients. Firms working with large, well-capitalized, and profitable banks are less exposed to the adverse effects of MaPs.

Similarly, firms' financial positions also play a role in how banks transmit the effects of MaPs to firms; firms with weaker financials experience a larger hit to their investments. Accordingly, we find that small and medium-sized enterprises (SMEs) are more sensitive to the tightening of MaPs. This sensitivity partly reflects the higher risk associated with SMEs compared to large firms and their greater dependence on banks. Interestingly, micro firms are found to be insignificantly affected by the changes in MaPs. We suggest that this is due to their lack of, or very limited access to, bank lending.

Lastly, we investigate whether MaPs affect different types of investments, namely tangible and intangible investments, differently. Our findings reveal that MaP tightening influences total investments predominantly through tangible capital investments, while intangible capital does not respond discernibly to MaPs. Based on our findings and the literature, we attribute the insensitivity of intangibles to MaPs to the fact that they are primarily financed by firms' internal funds.

References

Acharya, V. V., Bergant, K., Crosignani, M., Eisert, T., and McCann, F. (2022a). The anatomy of the transmission of macroprudential policies. *Journal of Finance*, 77(5):2533–2575.

Acharya, V. V., Crosignani, M., Eisert, T., and Steffen, S. (2022b). Zombie lending: Theoretical, international, and historical perspectives. *Annual Review of Financial Economics*, 14(Volume 14, 2022):21–38.

Acharya, V. V., Eisert, T., Eufinger, C., and Hirsch, C. (2019). Whatever it takes: The real effects of unconventional monetary policy. *Review of Financial Studies*, 32(9):3366–3411.

Ahnert, T., Forbes, K., Friedrich, C., and Reinhardt, D. (2021). Macroprudential fx regulations: shifting the snowbanks of fx vulnerability? *Journal of Financial Economics*, 140(1):145–174.

Aiyar, S., Calomiris, C. W., Hooley, J., Korniyenko, Y., and Wieladek, T. (2014). The international transmission of bank capital requirements: Evidence from the uk. *Journal of Financial Economics*, 113(3):368–382.

Akinci, O. and Olmstead-Rumsey, J. (2018). How effective are macroprudential policies? an empirical investigation. *Journal of Financial Intermediation*, 33:33–57.

Alam, Z., Alter, A., Eiseman, J., Gelos, G., Kang, H., Narita, M., Nier, E., and Wang, N. (2024). Digging deeper—evidence on the effects of macroprudential policies from a new database. *Journal of Money, Credit and Banking*, No.13130.

Albuquerque, B. and Iyer, R. (2024). The rise of the walking dead: Zombie firms around the world. *Journal of International Economics*, 152:104019.

Almeida, H. and Campello, M. (2007). Financial constraints, asset tangibility, and corporate investment. *Review of Financial Studies*, 20(5):1429–1460.

Altavilla, C., Laeven, L., and Peydró, J.-L. (2020). Monetary and macroprudential policy complementarities: evidence from European credit registers. Working Paper Series 2504, European Central Bank.

Altunbas, Y., Binici, M., and Gambacorta, L. (2018). Macroprudential policy and bank risk. *Journal of International Money and Finance*, 81:203–220.

Anguren, R., Jiménez, G., and Peydró, J.-L. (2024). Bank capital requirements and risk-taking: Evidence from basel iii. *Journal of Financial Stability*, page 101292.

Auerbach, A. J. and Gorodnichenko, Y. (2012). Measuring the output responses to fiscal policy. *American Economic Journal: Economic Policy*, 4(2):1–27.

Ayyagari, M., Beck, T., and Peria, M. M. S. M. (2018). *The micro impact of macroprudential policies: Firm-level evidence*. International Monetary Fund.

Balduzzi, P., Brancati, E., and Schiantarelli, F. (2018). Financial markets, banks' cost of funding, and firms' decisions: Lessons from two crises. *Journal of Financial Intermediation*, 36:1–15.

Baskaya, S., Gutierrez, J. E., Serena, J.-M., and Tsoukas, S. (2024). Bank supervision and non-performing loan cleansing. Working Paper Series 2428, Banco de Espana.

Baskaya, Y. S. and Shim, I. (2024). Financial development and the effectiveness of macroprudential and capital flow management measures. Working paper series, Bank for International Settlements, Monetary and Economic Department.

Bauer, P., Domnick, C., Harasztosi, P., Rückert, D., and Weiss, C. (2024). *Intangible differences: Investment during the pandemic and the role of financial constraints*. Number 2024/11. EIB Working Papers.

Becker, B. and Ivashina, V. (2022). Weak corporate insolvency rules: The missing driver of zombie lending. *AEA Papers and Proceedings*, 112:516–20.

Bednarek, P., Briukhova, O., Ongena, S., and von Westernhagen, N. (2023). Effects of bank capital requirements on lending by banks and non-bank financial institutions. Technical report, Deutsche Bundesbank Discussion Paper.

Berg, T., Saunders, A., Schäfer, L., and Steffen, S. (2021). Brexit and the contraction of syndicated lending. *Journal of Financial Economics*, 141(1):66–82.

Bergant, K., Grigoli, F., Hansen, N.-J., and Sandri, D. (2024). Dampening global financial shocks: can macroprudential regulation help (more than capital controls)? *Journal of Money, Credit and Banking*, 56(6):1405–1438.

Berger, A. N. and Udell, G. F. (1990). Collateral, loan quality and bank risk. *Journal of Monetary Economics*, 25(1):21–42.

Berger, A. N. and Udell, G. F. (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance*, 22(6-8):613–673.

Berger, A. N. and Udell, G. F. (2002). Small business credit availability and relationship lending: The importance of bank organisational structure. *Economic Journal*, 112(477):F32–F53.

Berger, A. N. and Udell, G. F. (2006). A more complete conceptual framework for sme finance. *Journal of Banking & Finance*, 30(11):2945–2966.

Bernanke, B. S. and Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic Perspectives*, 9(4):27–48.

Bianchi, J. and Mendoza, E. G. (2018). Optimal time-consistent macroprudential policy. *Journal of Political Economy*, 126(2):588–634.

Biljanovska, N., Chen, S., Gelos, M. R., Gelos, R., Igan, D., Igan, M. D. O., Peria, M. M., Peria, M. M. S. M., Nier, E., and Valencia, M. F. (2023). *Macroprudential Policy Effects: Evidence and Open Questions*. International Monetary Fund.

Boar, C., Gambacorta, L., Lombardo, G., and Pereira da Silva, L. A. (2017). What are the effects of macroprudential policies on macroeconomic performance? *BIS quarterly review September*.

Boissay, F., Cantú, C., Claessens, S., and Villegas, A. (2019). Impact of financial regulations: insights from an online repository of studies. *BIS Quarterly Review, March*.

Bonfim, D., Cerqueiro, G., Degryse, H., and Ongena, S. (2023). On-site inspecting zombie lending. *Management Science*, 69(5):2547–2567.

Brown, M., Ongena, S., Popov, A., and Yeşin, P. (2014). Who needs credit and who gets credit in Eastern Europe? *Economic Policy*, 26(65):93–130.

Bruno, V., Shim, I., and Shin, H. S. (2017). Comparative assessment of macroprudential policies. *Journal of Financial Stability*, 28:183–202.

Brutscher, P.-B., Coali, A., Delanote, J., and Harasztosi, P. (2020). Eib group survey on investment and investment finance: A technical note on data quality. Technical report, European Investment Bank.

Caballero, R. J., Hoshi, T., and Kashyap, A. K. (2008). Zombie lending and depressed restructuring in japan. *American Economic Review*, 98(5):1943–1977.

Caldara, D., Ferrante, F., Iacoviello, M., Prestipino, A., and Queralto, A. (2024). The international spillovers of synchronous monetary tightening. *Journal of Monetary Economics*, 141:127–152.

Calem, P., Correa, R., and Lee, S. J. (2020). Prudential policies and their impact on credit in the United States. *Journal of Financial Intermediation*, 42:100826.

Campello, M., Graham, J. R., and Harvey, C. R. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics*, 97(3):470–487.

Carlson, M., Shan, H., and Warusawitharana, M. (2013). Capital ratios and bank lending: A matched bank approach. *Journal of Financial Intermediation*, 22(4):663–687.

Cecchetti, S. G., Narita, M., Rawat, U., and Sahay, R. (2023). Addressing spillovers from prolonged u.s. monetary policy easing. *Journal of Financial Stability*, 64:101087.

Ćehajić, A. and Košak, M. (2022). Bank lending and small and medium-sized enterprises' access to finance–effects of macroprudential policies. *Journal of International Money and Finance*, 124:102612.

Cerutti, E., Claessens, S., and Laeven, L. (2017). The use and effectiveness of macroprudential policies: New evidence. *Journal of Financial Stability*, 28(C):203–224.

Chari, A., Dilts-Stedman, K., and Forbes, K. (2022). Spillovers at the extremes: The macroprudential stance and vulnerability to the global financial cycle. *Journal of International Economics*, 136:103582.

Cingano, F., Manaresi, F., and Sette, E. (2016). Does credit crunch investment down? new evidence on the real effects of the bank-lending channel. *Review of Financial Studies*, 29(10):2737–2773.

Cizel, J., Frost, J., Houben, A., and Wierts, P. (2019). Effective macroprudential policy: Cross-sector substitution from price and quantity measures. *Journal of Money, Credit and Banking*, 51(5):1209–1235.

Claessens, S. (2015). An overview of macroprudential policy tools. *Annual Review of Financial Economics*, 7:397–422.

Claessens, S., Ghosh, S. R., and Mihet, R. (2013). Macro-prudential policies to mitigate financial system vulnerabilities. *Journal of International Money and Finance*, 39(C):153–185.

Claessens, S., Tong, H., and Wei, S.-J. (2012). From the financial crisis to the real economy: Using firm-level data to identify transmission channels. *Journal of International Economics*, 88(2):375–387.

Corrado, C., Haltiwanger, J., and Sichel, D. (2005). *Measuring Capital in the New Economy*. University of Chicago Press.

Corrado, C., Hulten, C., and Sichel, D. (2009). Intangible capital and us economic growth. *Review of Income and Wealth*, 55(3):661–685.

Corrado, C. A. and Hulten, C. R. (2010). How do you measure a "technological revolution"? *American Economic Review*, 100(2):99–104.

De Jonghe, O., Dewachter, H., and Ongena, S. (2020). Bank capital (requirements) and credit supply: Evidence from pillar 2 decisions. *Journal of Corporate Finance*, 60:101518.

De Jonghe, O., Mulier, K., and Samarin, I. (2024). Bank specialization and zombie lending. *Management Science*. Forthcoming.

de Lis, S. F. and Herrero, A. G. (2010). Dynamic Provisioning: Some Lessons from Existing Experiences. ADBI Working Papers 218, Asian Development Bank Institute.

De Marco, F., Kneer, C., and Wieladek, T. (2021). The real effects of capital requirements and monetary policy: Evidence from the united kingdom. *Journal of Banking & Finance*, 133:106237.

Degryse, H., De Jonghe, O., Jakovljević, S., Mulier, K., and Schepens, G. (2019). Identifying credit supply shocks with bank-firm data: Methods and applications. *Journal of Financial Intermediation*, 40:100813.

Degryse, H., Kim, M., and Ongena, S. (2009). *Microeconometrics of banking: methods, applications, and results*. Oxford University Press, USA.

Degryse, H., Mariathasan, M., and Tang, H. T. (2023). Gsib status and corporate lending. *Journal of Corporate Finance*, 80:102362.

Dell'Ariccia, G., Igan, D., Laeven, L., and Tong, H. (2016). Credit booms and macrofinancial stability. *Economic Policy*, 31(86):299–355.

di Giovanni, J., Kalemli-Özcan, S., Ulu, M. F., and Baskaya, Y. S. (2022). International Spillovers and Local Credit Cycles. *Review of Economic Studies*, 89(2):733–773.

Drechsel, T. (2023). Earnings-based borrowing constraints and macroeconomic fluctuations. *American Economic Journal: Macroeconomics*, 15(2):1–34.

Drechsel, T. and Kim, S. (2024). Macroprudential policy with earnings-based borrowing constraints. *Journal of Monetary Economics*, page 103595.

Döttling, R. and Ratnovski, L. (2023). Monetary policy and intangible investment. *Journal of Monetary Economics*, 134:53–72.

Farinha, L., Spaliara, M.-E., and Tsoukas, S. (2019). Bank shocks and firm performance: New evidence from the sovereign debt crisis. *Journal of Financial Intermediation*, 40:100818.

Favara, G., Ivanov, I., and Rezende, M. (2021). Gsib surcharges and bank lending: Evidence from us corporate loan data. *Journal of Financial Economics*, 142(3):1426–1443.

Fazzari, S. M., Hubbard, R. G., Petersen, B. C., Blinder, A. S., and Poterba, J. M. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, 1988(1):141–206.

Ferrando, A., Popov, A., and Udell, G. F. (2017). Sovereign stress and SMEs' access to finance: Evidence from the ECB's SAFE survey. *Journal of Banking & Finance*, 81:65–80.

Ferrando, A., Popov, A., and Udell, G. F. (2019). Do smes benefit from unconventional monetary policy and how? microevidence from the eurozone. *Journal of Money, Credit and Banking*, 51(4):895–928.

Ferrando, A., Popov, A., and Udell, G. F. (2022). Unconventional monetary policy, funding expectations, and firm decisions. *European Economic Review*, 149:104268.

Ferrando, A. and Preuss, C. (2018). What finance for what investment? survey-based evidence for european companies. *Economia Politica*, 35:1015–1053.

Forbes, K. J. (2021). The international aspects of macroprudential policy. *Annual Review of Economics*, 13:203–228.

Fraisse, H., Lé, M., and Thesmar, D. (2020). The real effects of bank capital requirements. *Management Science*, 66(1):5–23.

Freixas, X., Peydró, J.-L., and Laeven, L. (2015). *"Systemic Risk, Crises, and Macroprudential Regulation"*. The MIT Press.

Galati, G. and Moessner, R. (2018). What do we know about the effects of macroprudential policy? *Economica*, 85(340):735–770.

Gertler, M. and Gilchrist, S. (1994). Monetary policy, business cycles, and the behavior of small manufacturing firms. *Quarterly Journal of Economics*, 109(2):309–340.

Giannetti, M. and Ongena, S. (2012). "lending by example": Direct and indirect effects of foreign banks in emerging markets. *Journal of International Economics*, 86(1):167–180.

Gómez, M. G.-P. (2019). Credit constraints, firm investment and employment: Evidence from survey data. *Journal of Banking & Finance*, 99:121–141.

Gropp, R., Mosk, T., Ongena, S., and Wix, C. (2019). Banks response to higher capital requirements: Evidence from a quasi-natural experiment. *Review of Financial Studies*, 32(1):266–299.

Grundy, B. D. and Verwijmeren, P. (2020). The external financing of investment. *Journal of Corporate Finance*, 65:101745.

Hadlock, C. J. and Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the kz index. *Review of Financial Studies*, 23(5):1909–1940.

Iacoviello, M. and Navarro, G. (2019). Foreign effects of higher us interest rates. *Journal of International Money and Finance*, 95:232–250.

Ioannidou, V., Ongena, S., and Peydró, J.-L. (2014). Monetary Policy, Risk-Taking, and Pricing: Evidence from a Quasi-Natural Experiment. *Review of Finance*, 19(1):95–144.

Ivashina, V., Laeven, L., and Moral-Benito, E. (2022). Loan types and the bank lending channel. *Journal of Monetary Economics*, 126:171–187.

Jiménez, G., Mian, A., Peydró, J.-L., and Saurina, J. (2020). The real effects of the bank lending channel. *Journal of Monetary Economics*, 115:162–179.

Jiménez, G., Ongena, S., Peydró, J.-L., and Saurina, J. (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. *American Economic Review*, 102(5):2301–2326.

Jiménez, G., Ongena, S., Peydró, J.-L., and Saurina, J. (2014). Hazardous times for monetary policy: What do twenty-three million bank loans say about the effects of monetary policy on credit risk-taking? *Econometrica*, 82(2):463–505.

Jiménez, G., Ongena, S., Peydró, J.-L., and Saurina, J. (2017). Macroprudential policy, countercyclical bank capital buffers, and credit supply: Evidence from the spanish dynamic provisioning experiments. *Journal of Political Economy*, 125(6):2126–2177.

Juelsrud, R. E. and Wold, E. G. (2020). Risk-weighted capital requirements and portfolio rebalancing. *Journal of Financial Intermediation*, 41:100806.

Kalemli-Özcan, Ş., Laeven, L., and Moreno, D. (2022). Debt overhang, rollover risk, and corporate investment: Evidence from the european crisis. *Journal of the European Economic Association*, 20(6):2353–2395.

Kalemli-Özcan, Ş., Sørensen, B. E., Villegas-Sanchez, C., Volosovych, V., and Yeşiltaş, S. (2024). How to construct nationally representative firm-level data from the orbis global database: New facts on smes and aggregate implications for industry concentration. *American Economic Journal: Macroeconomics*, 16(2):353–374.

Khwaja, A. I. and Mian, A. (2008). Tracing the impact of bank liquidity shocks: Evidence from an emerging market. *American Economic Review*, 98(4):1413–1442.

Kim, S. and Mehrotra, A. (2018). Effects of monetary and macroprudential policies—evidence from four inflation targeting economies. *Journal of Money, Credit and Banking*, 50(5):967–992.

Korinek, A. and Simsek, A. (2016). Liquidity trap and excessive leverage. *American Economic Review*, 106(3):699–738.

Kuttner, K. N. and Shim, I. (2016). Can non-interest rate policies stabilize housing markets? evidence from a panel of 57 economies. *Journal of Financial Stability*, 26:31–44.

Kysucky, V. and Norden, L. (2016). The benefits of relationship lending in a cross-country context: A meta-analysis. *Management Science*, 62(1):90–110.

Laeven, L. and Valencia, F. (2013). The real effects of financial sector interventions during crises. *Journal of Money, Credit and Banking*, 45(1):147–177.

Lian, C. and Ma, Y. (2021). Anatomy of corporate borrowing constraints. *Quarterly Journal of Economics*, 136(1):229–291.

Mendicino, C., Nikolov, K., Suarez, J., and Supera, D. (2020). Bank capital in the short and in the long run. *Journal of Monetary Economics*, 115:64–79.

Modigliani, F. and Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review*, 48(3):261–297.

Ongena, S. and Smith, D. C. (2000). What determines the number of bank relationships? cross-country evidence. *Journal of Financial Intermediation*, 9(1):26–56.

Ongena, S. and Smith, D. C. (2001). The duration of bank relationships. *Journal of Financial Economics*, 61(3):449–475.

Ongena, S., Tümer-Alkan, G., and Westernhagen, N. V. (2012). Creditor concentration: An empirical investigation. *European Economic Review*, 56(4):830–847.

Peydró, J.-L., Rodriguez-Tous, F., Tripathy, J., and Uluc, A. (2024). Macroprudential policy, mortgage cycles, and distributional effects: Evidence from the united kingdom. *Review of Financial Studies*, 37(3):727–760.

Poelhekke, S., Vlahu, R., and Volosovych, V. (2021). Corporate Acquisitions and Bank Relationships. Working Paper Series 726, DNB.

Popov, A. (2016). Monetary policy, bank capital, and credit supply: A role for discouraged and informally rejected firms. *International Journal of Central Banking*, 12(1):95–141.

Popov, A. and Rocholl, J. (2018). Do credit shocks affect labor demand? evidence for employment and wages during the financial crisis. *Journal of Financial Intermediation*, 36:16–27.

Popov, A. and Van Horen, N. (2015). Exporting sovereign stress: Evidence from syndicated bank lending during the euro area sovereign debt crisis. *Review of Finance*, 19(5):1825–1866.

Rajan, R. and Zingales, L. (1998). Financial dependence and growth. *American Economic Review*, 88(3):559–86.

Richter, B., Schularick, M., and Shim, I. (2019). The costs of macroprudential policy. *Journal of International Economics*, 118:263–282.

Stiglitz, J. E. and Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71(3):393–410.

Van Ark, B., Hao, J. X., Corrado, C., and Hulten, C. (2009). Measuring intangible capital and its contribution to economic growth in europe. *EIB papers*, 14(1):62–93.

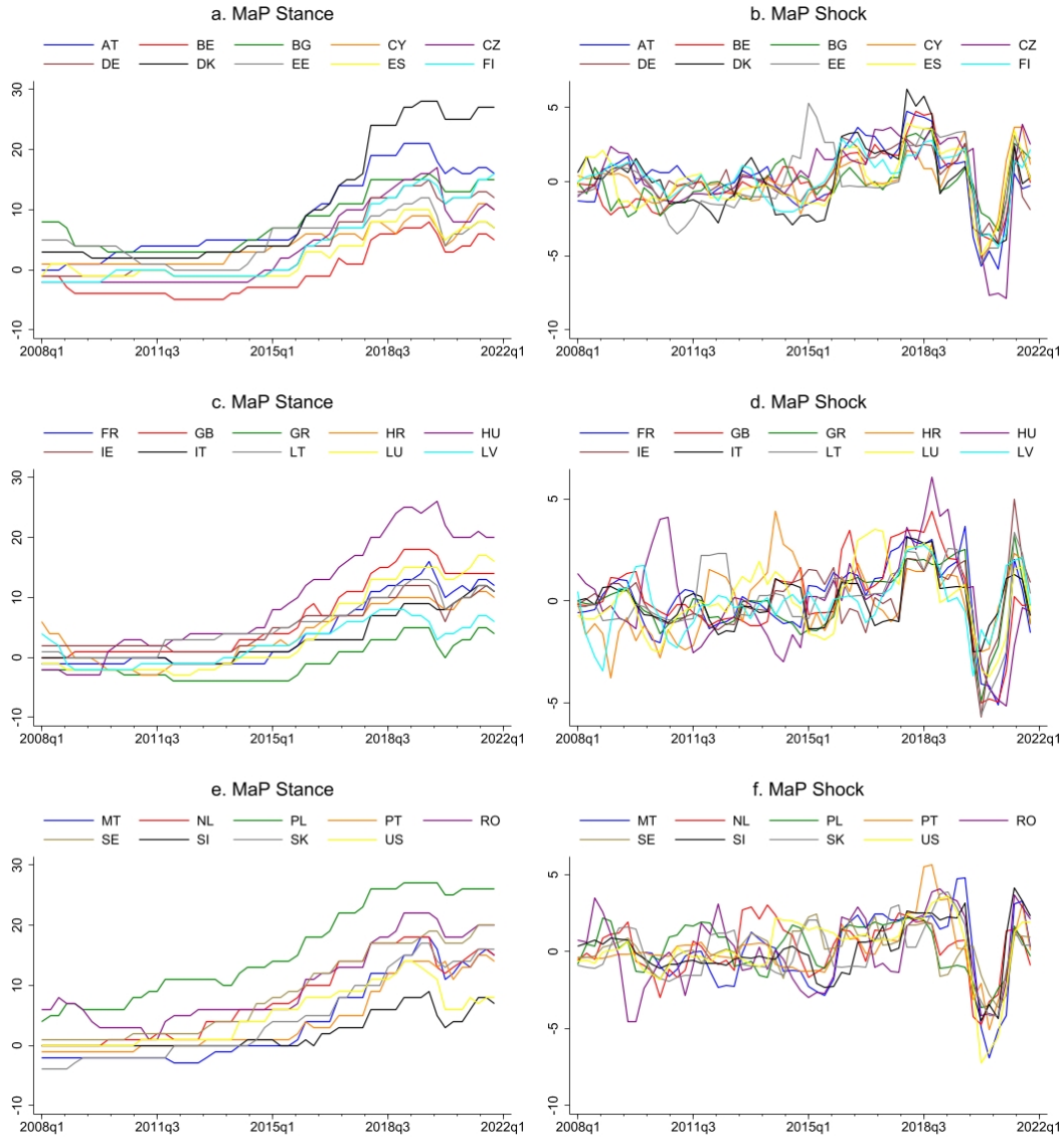
Van Bekkum, S., Gabarro, M., Irani, R. M., and Peydró, J.-L. (2024). The real effects of borrower-based macroprudential policy: Evidence from administrative household-level data. *Journal of Monetary Economics*, page 103574.

Van den Heuvel, S. J. (2008). The welfare cost of bank capital requirements. *Journal of Monetary Economics*, 55(2):298–320.

Violon, A., Durant, D., Toader, O., et al. (2020). The impact of the designation of global systemically important banks on their business model. *International Journal of Central Banking*, 16(5):95–142.

7. Figures and Tables

Figure 1: The first stage: MaP Stances and MaP Shocks



Note: This left-hand figures plot the quarterly MaP stances and the right-hand figures plot the MaP shocks for 29 sample countries across time 2008-2022. In each regression, we identify the MaP shocks by regressing MaP stances on a set of controls, and use the residuals as the identified shocks. The set of controls include lagged value of MaP stances, GDP growth, and credit growth country by country in each regression. We use four lags for all variables.

Table 1: Variables description

Variable	Definition	Sources
Panel A: Firm characteristics		
Investment	Total investment scaled by total assets	EIBIS
Tangible investment	Tangible investment scaled by total assets	EIBIS
Intangible investment	Intangible investment scaled by total assets	EIBIS
Firm total asset	Natural logarithm of total asset	EIBIS
Export/import dummy	Export is 1 if the firm reports export/import	EIBIS
Age	Age_1 is a dummy variable equals 1 if the firm is less than 2 years old. Age_2 is a dummy variable equals 1 if the firm is between 2 and 5 years old. Age_3 is a dummy variable equals 1 if the firm is between 5 and 10 years old. Age_4 is a dummy variable equals 1 if the firm is 10-20 years old. Age_5 is a dummy variable equals 1 if the firm is over 20 years old.	EIBIS
Staff headcount	Headcount_1 is a dummy variable equals 1 if the number of employees is between 1 and 9. Headcount_2 is a dummy variable equals 1 if the number is between 10 and 49. Headcount_3 is a dummy variable equals 1 if the number is between 50 and 249. Headcount_4 is a dummy variable equals 1 if the number is over 250.	EIBIS
Turnover	Turnover_1 is a dummy variable equals 1 if the firm's annual turnover is less than €2 mln. Turnover_2 is a dummy variable equals 1 if the turnover is between €2 mln. and €10 mln. Turnover_3 is a dummy variable equals 1 if the turnover is between €10 mln. and €50 mln. Turnover_4 is a dummy variable equals 1 if the turnover is over €50 mln.	EIBIS
External finance dependence (EFD)	1-Cash flow / Total investment	EIBIS
SA index	$-0.737 \times \text{size} + 0.043 \times \text{size}^2 - 0.04 \times \text{age}$	EIBIS

Continued on next page

Table 1 – continued from previous page

Variable	Definition	Sources
Liquidity ratio	(Current assets - Stocks) / Current liabilities	EIBIS
Leverage ratio	Total debt / Total asset	EIBIS
Interest coverage	EBITDA / Interest expense	EIBIS
Profitability	EBITDA / Total asset	EIBIS
Fixed assets	Fixed asset / Total asset	EIBIS
Internal finance	Proportion of internal finance in total finance	EIBIS
Intra finance	Proportion of finance from a parent firm in total finance	EIBIS
External finance	Proportion of external finance in total finance	EIBIS
Constrained	Constrained is a dummy variable equals 1 if the firm failed in the loan application or was discouraged	EIBIS
Size	Size is a dummy variable equal to 1 if the firm was dissatisfied with the size of loan it obtained	EIBIS
Price	Price is a dummy variable equal to 1 if the firm was dissatisfied with the price of loan	EIBIS
Maturity	Maturity is a dummy variable equal to 1 if the firm was dissatisfied with the maturity of loan	EIBIS
Collateral	Collateral is a dummy variable equal to 1 if the firm was dissatisfied with the collateral requirement of the loan	EIBIS
Panel B: Macro variables		
MaP_{stance}	Index of net macroprudential policy	IMF iMaPP
MaP_{shock}	Purged index of macroprudential policy	Authors' calculation
$\text{MaP}_{shock}^{supply}$	Purged index of supply-based macroprudential policy	Authors' calculation
$\text{MaP}_{shock}^{demand}$	Purged index of demand-based macroprudential policy	Authors' calculation
GDP growth	Real GDP growth	ECB
CPI growth	Change of consumer prices	ECB

Continued on next page

Table 1 – continued from previous page

Variable	Definition	Sources
Financial institution development	Index of financial institution development	IMF FD
Financial market development	Index of financial market development	IMF FD
Export growth	Annual change of total export	World Bank WDI
Import growth	Annual change of total import	World Bank WDI
Credit growth	Annual change of total credit	World Bank WDI
FDI net inflows (% of GDP)	FDI net inflows as percentage of GDP	World Bank WDI
FDI net outflows (% of GDP)	FDI net outflows as percentage of GDP	World Bank WDI
Government effectiveness	Index of Government effectiveness	World Bank WGI
Political stability	Index of Political stability	World Bank WGI
Rule of law	Index of the agents' confidence in the rules of society	World Bank WGI
Regulatory quality	Index of Regulatory quality	World Bank WGI
Panel C: Bank characteristics		
Bank total asset	Natural logarithm of total asset	Bankscope
Bank ROA	Return on asset	Bankscope
Bank ROE	Return on equity	Bankscope
Bank Tier 1 ratio	Tier 1 ratio	Bankscope
Bank capital ratio	Ratio of bank equity to total asset	Bankscope
Bank liquidity ratio	Ratio of bank liquid asset to deposits and short-term funding	Bankscope
Bank loan to asset	Ratio of bank loan to total asset	Bankscope
Bank loan to deposit	Ratio of bank loan to deposit	Bankscope

Table 2: Descriptive statistics

Variable	N	Mean	SD	Min	Med	Max
Panel A: Firm characteristics						
Investment (scaled by total asset)	32976	0.095	0.239	0.001	0.051	0.405
Tangible investment (scaled by total asset)	32976	0.062	0.084	0	0.026	0.359
Intangible investment (scaled by total asset)	32976	0.016	0.054	0	0.006	0.166
Firm total asset (log)	33378	15.365	2.184	10.733	15.337	20.683
Export/import dummy	32976	0.522	0.500	0	1	1
Age_1	32976	0.002	0.046	0	0	1
Age_2	32976	0.024	0.153	0	0	1
Age_3	32976	0.085	0.279	0	0	1
Age_4	32976	0.231	0.421	0	0	1
Age_5	32976	0.657	0.475	0	1	1
Headcount_1	32976	0.151	0.358	0	0	1
Headcount_2	32976	0.314	0.464	0	0	1
Headcount_3	32976	0.351	0.477	0	0	1
Headcount_4	32976	0.184	0.387	0	0	1
Turnover_1	32976	0.293	0.455	0	0	1
Turnover_2	32976	0.295	0.456	0	0	1
Turnover_3	32976	0.257	0.437	0	0	1
Turnover_4	32976	0.155	0.362	0	0	1
External finance dependence (EFD)	32976	0.531	0.749	-0.172	0.039	1.686
SA index	32949	-2.077	1.297	-4.767	-2.273	2.106
Liquidity ratio (%)	31569	1.905	2.748	0.09	1.16	8.31
Leverage ratio (%)	32044	0.269	0.728	0	0.194	0.663

Continued on next page

Table 2 – continued from previous page

Variable	N	Mean	SD	Min	Med	Max
Interest coverage (%)	19809	0.482	1.235	-0.46	0.079	6.855
Profitability (scaled by total asset)	24202	0.125	0.176	-0.232	0.103	0.615
Fixed asset (scaled by total asset)	32532	0.361	0.257	0	0.327	0.905
Internal finance (%)	27772	69.107	36.605	0	99	100
Intra finance (%)	27772	2.079	12.381	0	0	100
External finance (%)	27772	28.814	35.541	0	0	100
Constrained	32976	0.073	0.260	0	0	1
Size	14266	0.364	0.481	0	0	1
Price	14266	0.268	0.442	0	0	1
Maturity	14266	0.221	0.415	0	0	1
Collateral	14266	0.183	0.387	0	0	1
Panel B: Macroeconomic variables						
MaP_{stance}	32976	1.998	2.344	-8	2	8
MaP_{shock}	32976	0.985	1.897	-7.271	1.194	4.494
$\text{MaP}_{shock}^{supply}$	32976	0.933	1.760	-4.664	1.146	4.172
$\text{MaP}_{shock}^{demand}$	32976	0.241	0.867	-2.305	0.005	4.052
GDP growth (%)	32976	1.922	5.551	-21.95	2.6	21.72
CPI growth (%)	32976	1.048	1.248	-2.1	1	4.233
FDI net inflows (% of GDP)	32976	0.048	1.8	-0.401	0.027	0.813
FDI net outflows (% of GDP)	32976	0.032	1.95	-0.568	0.0125	0.650
Government effectiveness	32976	1.055	0.560	-0.177	1.066	2.014
Political stability	32976	0.665	0.329	-0.140	0.729	1.426
Rule of law	32976	1.072	0.627	-0.140	1.051	2.053
Regulatory quality	32976	1.133	0.502	0.135	1.075	2.040

Continued on next page

Table 2 – continued from previous page

Variable	N	Mean	SD	Min	Med	Max
Credit growth (%)	32976	2.752	6.819	-14.47	3.19	18.6
Export growth (%)	32976	4.726	5.352	-10.65	4.650	16.339
Import growth (%)	32976	5.263	5.480	-9.229	5.012	32.354
Financial institution development	32976	0.653	0.129	0.358	0.671	0.879
Financial market development	32976	0.467	0.276	0.022	0.529	0.949
Panel C: Bank characteristics						
Total asset (log)	13238	2.167	0.475	1.275	2.163	3.610
ROA (%)	13238	0.662	0.721	-0.543	0.590	1.959
ROE (%)	13238	6.934	5.959	-6.974	6.934	16.786
Tier 1 ratio (%)	13238	17.556	5.559	9.8	16.4	27.89
Capital ratio (%)	13238	9.561	3.823	4.389	8.695	25.708
Liquidity ratio (%)	13238	40.952	26.044	5.617	35.376	85.376
Loan/asset (%)	13238	57.29	13.698	32.298	58.986	76.599
Loan/deposit (%)	13238	79.71	22.47	45.641	78.445	118.446
Net loan/asset (%)	13238	18.137	20.811	0.565	7.335	55.564

Note: This table presents the descriptive statistics for the variables used in the analysis. Panel A includes firm characteristics, Panel B includes macroeconomic variables, and Panel C includes bank characteristics. See Table 1 for the variable definitions.

Table 3: Effects of MaP stance and MaP shock on corporate investment

	Dependent variable: Corporate investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{stance}	-0.0098*		-0.0146**		-0.0164***	
	(0.0054)		(0.0059)		(0.0058)	
MaP_{shock}		-0.0135		-0.0226**		-0.0236***
		(0.0095)		(0.0091)		(0.0087)
Firm controls	No	No	No	No	Yes	Yes
Macro controls	No	No	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32976	32976	32976	32976	32976

Note: This table shows the impact of MaP stances (column 1,3,5) and shocks (column 2,4,6) on the total amount of investment. Our dependent variable is the corporate investment as a ratio to its total assets. We show results with and without firm controls (not reported) such as staff headcount, turnover, age, total assets, financial conditions, and export dummy (whether the firm is an exporter), with and without observable macroeconomic variables (not reported), including financial institution development, financial market development, inflation rate, GDP growth, foreign direct investment growth, export growth, import growth, population growth, credit growth, and measures of institutional quality (political stability, regulatory quality, rule of law, corruption). The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 4: Effects of supply- and demand-based MaP shocks

	Dependent variable: Corporate investment		
	(1)	(2)	(3)
MaP^{supply}_{shock}	-0.0246***		-0.0246***
	(0.0086)		(0.0083)
MaP^{demand}_{shock}		-0.0025	0.0004
		(0.0170)	(0.0159)
Firm controls	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes
Observation	32976	32976	32976

Note: This table shows the impact of supply- and demand-based MaP shocks on the investment. Total investment is the corporate investment as a ratio to its total assets. supply-based MaP includes countercyclical capital buffer, capital conservation buffer, capital requirement, leverage requirement, loan loss provision requirement, limits on credit growth, liquidity requirement, limits on loan-to-deposit ratio, reserve requirements for macroprudential purposes, surcharges for systemically important financial institutions. demand-based MaP includes limits on loan to value ratio and debt service to income ratio. We use the same method in our baseline to purge the supply- and demand-based MaP shocks. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 5: Effects of MaP shocks on banks' credit activities

	Dependent variable: Bank credit					
	Total loan/ total asset		Total loan/ total deposit		Net loan/ total asset	
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	-0.0058*		-0.0083		-0.0129*	
	(0.0032)		(0.0052)		(0.0065)	
$\text{MaP}^{supply}_{shock}$		-0.0037		-0.0059		-0.0087*
		(0.0023)		(0.0043)		(0.0051)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country number	28	28	28	28	28	28
Bank number	608	608	608	608	608	608
Observation	3924	3924	3924	3924	3924	3924

Note: This table shows the effect of MaP shocks (Column 1,3,5) and supply-based MaP shocks (Column 2,4,6) on European banks. We identify 608 banks from the EIBIS database. They are defined as the main bank affiliated with the firms in the survey. Our dependent variables are different measures of bank loan information from the balance sheet. Columns 1 and 2 shows the effect of MaP_{shocks} and MaP^{supply}_{shocks} on total loans and advances to customers scaled by total assets. Columns 3 and 4 show the effect of MaP_{shocks} and MaP^{supply}_{shocks} on total loans scaled by deposit, which is a critical measure of liquidity and funding risk. Columns 5 and 6 shows the effect of MaP_{shocks} and MaP^{supply}_{shocks} on net loans scaled by total assets. This ratio is similar to loans to total assets but uses net loans (gross loans minus provisions for loan losses) instead of gross loans. It provides a clearer picture of the actual, risk-adjusted value of loans as an asset class on the bank's balance sheet. This ratio is more conservative and takes into account the quality of the loan portfolio. For time-varying bank characteristics, we control for bank total asset, return of asset, and liquidity ratio. For time-varying bank characteristics, we control for inflation rate, financial development, current ratio, country-level credit growth, gdp growth, government consumption, regulatory quality, corruption, z-score (distance to default of total banking system), and financial openness. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 6: Effects of MaP shocks on banks' performance and financial health

	ROA		ROE		Tier 1	
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	0.0031		0.0044		0.1383**	
	(0.0126)		(0.0432)		(0.0684)	
MaP^{supply}_{shock}		-0.0008		-0.0064		0.1480**
		(0.0106)		(0.0543)		(0.0698)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country number	28	28	28	28	28	28
Bank number	608	608	608	608	513	513
Observation	3924	3924	3924	3924	3167	3167

Note: This table shows the effect of MaP shocks (Column 1,3,5) and supply-based MaP shocks (Column 2,4,6) on European banks. We identify 608 banks from the EIBIS database. They are defined as the main bank affiliated with the firms in the survey. Our dependent variables are different measures of bank loan information from the balance sheet. Columns 1 and 2 show the effect of MaPs and supply-based MaPs on ROA. Columns 3 and 4 show the effect on ROE. Columns 5 and 6 show the effect on Tier 1 ratio. We focus on core capital, which is the variable most often used in empirical work as a proxy for the bank's net worth and financial strength (Jiménez et al., 2012, 2014; Carlson et al., 2013; Popov, 2016). For time-varying bank characteristics, we control for inflation rate, financial development, current ratio, country-level credit growth, GDP growth, government consumption, regulatory quality, corruption, z-score (distance to default of total banking system), and financial openness. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 7: Effects of MaP shocks on investment controlling for firm-bank relationship

	Dependent variable: Corporate investment					
	Without bank-firm link		Bank-firm link		Controlling Bank-Year FE for Supply	
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	-0.0280**		-0.0413**		0.0269	
	(0.0137)		(0.0185)		(0.0838)	
MaP_{shock}^{supply}		-0.0330**		-0.0441**		0.0960
		(0.0141)		(0.0191)		(0.0988)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Year FE	No	No	No	No	Yes	Yes
Country-Sector-Firm-Bank FE	No	No	Yes	Yes	Yes	Yes
Observation	12563	12563	8135	8135	7531	7531

Note: This table shows the effect of MaP shocks (Column 1,3,5) and supply-based MaP shocks (Column 2,4,6) on corporate investment. Banks in our regression are defined as the main bank affiliated with the firms in the survey. Our dependent variable is the corporate investment as a ratio to its total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 8: Effects of MaP shocks on investment: the role of bank heterogeneities

	Dependent variable: Corporate investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	-0.0413**	-0.0327	-0.0358*	-0.0341*	-0.0330*	-0.0344*
	(0.0185)	(0.0208)	(0.0209)	(0.0184)	(0.0191)	(0.0184)
Bank total asset			0.0826			
			(0.2207)			
MaP_{shock}× Bank total asset			0.1020**			
			(0.0447)			
Bank ROA				-0.1336		
				(0.1199)		
MaP_{shock}× Bank ROA				0.0306**		
				(0.0120)		
Bank ROE					0.0141	
					(0.0095)	
MaP_{shock}× Bank ROE					0.0022**	
					(0.0010)	
Tier 1 Ratio						-0.0092
						(0.0128)
MaP_{shock}× Tier 1 Ratio						0.0054**
						(0.0023)
Bank controls	No	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	8135	6414	6414	6414	6414	6414

Note: This table shows the impact of MaP shocks varying with bank level financial indicators. Our dependent variable is the corporate investment as a ratio to its total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 9: Effects of MaP shocks on firms' financing choices

	Dependent variable: Share of financing choices					
	Internal finance		Intra finance		External finance	
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	0.3196*		-0.0495		-0.2701*	
	(0.1869)		(0.0668)		(0.1592)	
MaP^{supply}_{shock}		0.4449*		-0.0541		-0.3907*
		(0.2424)		(0.0793)		(0.2354)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	27745	27745	27745	27745	27745	27745

Note: This table shows the impact of MaP shocks (Column 1,3,5) and supply-based MaP shocks (Column 2,4,6) on firm financing choices. Our dependent variable is the proportion of different finance choices. In question 27, firms are asked the proportion of the investment was financed by three sources of finance: internal (internal fund, retained earning), intra-firm (loan from parent company), and external (such as bank credit). The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 10: Effects of MaP shocks on loan application outcome and firms' satisfaction level on four key items within loan contracts

	Constrained		Dissatisfied w. Size		Dissatisfied w. Price		Dissatisfied w. Maturity		Dissatisfied w. Collateral	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
MaP_{shock}	0.0011**		0.0069*		0.0017		0.0009		0.0015	
	(0.0005)		(0.0038)		(0.0053)		(0.0046)		(0.0045)	
MaP_{shock}^{supply}		0.0014***		0.0079**		0.0011		0.0007		0.0010
		(0.0005)		(0.0040)		(0.0056)		(0.0066)		(0.0052)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32976	14266	14266	14266	14266	14266	14266	14266	14266

Note: This table shows the impact of MaP shocks (column 1,3,5,7,9) and supply-based MaP shocks (column 2,4,6,8,10) on the outcome of the loan application and satisfaction of firms finance. For columns 1 and 2, we investigate all of the firms' loan application outcome while for columns 3-10, we restrict the sample to only the firms obtained external finance and investigate those firms' satisfaction on the four key items in the contract. For columns 1 and 2, our dependent variable is a dummy variable equals one if in the past one year the firm sought external finance but did not receive it (rejected), or did not seek external finance because they thought borrowing costs would be too high (price rationed), or did not apply for external finance because of possible rejection (discouraged), or received less than its expected amount (quantity rationed). For columns 3-10, our dependent variables are dummy variables equal one if a firm reports that it is very dissatisfied or fairly dissatisfied with the four items within a loan contract. We use question 30:" Thinking about the external finance you were offered, how satisfied or dissatisfied were you with it in terms of A.the amount you were offered B.cost of external finance C.Maturity D.collateral requirement." The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 11: Firm heterogeneity with respect to size measured by turnover

	Dependent variable: Total investment							
	Micro Firms		Small Firms		Medium Firms		Large firms	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MaP_{shock}	-0.0023		-0.0525***		-0.0319**		-0.0009	
	(0.0162)		(0.0170)		(0.0159)		(0.0195)	
MaP^{supply}_{shock}		-0.0125		-0.0568***		-0.0195*		-0.0029
		(0.0188)		(0.0192)		(0.0117)		(0.0211)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9012	9012	8807	8807	7832	7832	4804	4804

Note: This table shows the subsample results for the impact of MaP shocks (Column 1,3,5,7) and supply-based MaP shocks (Column 2,4,6,8) on corporate investment. Our dependent variable is the corporate investment as a ratio to its total assets. We divide the sample firms in four categories based on the turnover: micro (0-2M), small (2-10M), medium (10-50M), large (50M+). The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 12: Effects of MaP shocks on investment: the role of firm characteristics

	Dependent variable: Total investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MaP_{shock}	-0.0173*	-0.0252***	-0.0262***	-0.0235**	-0.0072	-0.0130	-0.0240***
	(0.0087)	(0.0088)	(0.0086)	(0.0099)	(0.0089)	(0.0085)	(0.0096)
EFD	-0.0294***						
	(0.0099)						
MaP_{shock} × EFD	-0.0096**						
	(0.0042)						
SA index		0.0101					
		(0.0548)					
MaPs × SA index		0.0110*					
		(0.0056)					
Liquidity ratio			-0.0011				
			(0.0028)				
MaP_{shock} × Liquidity ratio			0.0018**				
			(0.0007)				
Leverage ratio				-0.6440***			
				(0.1212)			
MaP_{shock} × Leverage ratio				-0.0142			
				(0.0309)			
Interest Coverage					0.0030***		
					(0.0011)		
MaP_{shock} × Interest Coverage					0.0035***		
					(0.0013)		
Profitability						0.2971**	
						(0.1099)	
MaP_{shock} × Profitability						0.0148	
						(0.0269)	
Fixed assets							0.3422***
							(0.0389)
MaP_{shock} × Fixed assets							0.0092**
							(0.0039)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32949	31569	32044	19809	24202	32532

Note: This table shows the impact of MaP shocks varying with firm level financial indicators. Our dependent variable is the corporate investment as a ratio to its total assets. We include other indicators such as leverage, liquidity, and interest coverage ratio to measure financial positions. Columns 1-5 indicate the financial condition channel. In columns 6 and 7, we test whether the asset-based or earning-based borrowing constraint is the channel through which MaPs can affect corporate investment. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 13: Effects of MaP shocks on investment types

	Dependent variable: Different types of investment					
	Total investment		Tangible investment		Intangible investment	
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	-0.0236***		-0.0856***		-0.0074	
	(0.0087)		(0.0243)		(0.0164)	
MaP^{supply}_{shock}		-0.0246***		-0.0764***		-0.0102
		(0.0086)		(0.0265)		(0.0237)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32976	32976	32976	32976	32976

Note: This table shows the impact of MaP shocks and supply-based MaP shocks on the total amount of investment (column 1,2), tangible investment (column 3,4), and intangible investment (column 5,6). Total investment is the corporate investment as a ratio to its total assets. Tangible investment is the sum of the value of investment in land, business buildings and infrastructure, and machinery and equipment, scaled by the total assets. Intangible investment is the sum of the value of investment in R&D, software, data, and networks, training of employees, and organization and business process improvements, scaled by the total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 14: Firm heterogeneity with respect to size measured by turnover

	Dependent variable: Different types of corporate investment							
	Tangible investment				Intangible investment			
	Micro	Small	Medium	Large	Micro	Small	Medium	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MaP_{shock}	-0.1044	-0.0988**	-0.0711**	-0.0136	-0.0425	-0.0508	0.0309	0.0310
	(0.0869)	(0.0398)	(0.0342)	(0.0329)	(0.0531)	(0.0319)	(0.0266)	(0.0604)
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9012	8807	7832	4804	9012	8807	7832	4804

Note: This table shows the subsample results for the impact of MaP shocks on two different types of investment, tangible investment (column 1, 2, 3, and 4) and intangible investment (column 5, 6, 7, and 8). We divide the sample firms in four categories based on the turnover: micro (0-2M), small (2-10M), medium (10-50M), large (50M+). Tangible investment is the is the sum of the value of investment in land, business buildings and infrastructure, and machinery and equipment, scaled by the total assets. Intangible investment is the sum of the value of investment in R&D, software, data, and networks, training of employees, and organization and business process improvements, scaled by the total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 15: Effects of MaP stances and shocks on investment: the role of COVID-19

	Dependent variable: Total investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{stance}	-0.0137**		-0.0199***		-0.0212***	
	(0.0062)		(0.0064)		(0.0065)	
MaP_{stance}× COVID-19	0.0082		0.0122		0.0128	
	(0.0114)		(0.0130)		(0.0129)	
MaP_{shock}		-0.0160		-0.0277**		-0.0287**
		(0.0117)		(0.0113)		(0.0109)
MaP_{shock}× COVID-19		0.0056		0.0125		0.0133
		(0.0207)		(0.0219)		(0.0209)
$\beta_1 + \beta_2$	-0.0055	-0.0077	-0.0084	-0.0104	-0.0152	-0.0154
	(0.0095)	(0.0110)	(0.0106)	(0.0166)	(0.0182)	(0.0164)
Firm controls	No	No	No	No	Yes	Yes
Macro controls	No	No	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32976	32976	32976	32976	32976

Note: This table shows the impact of MaP stance (column 1,3,5) and shocks (column 2,4,6) on the total amount of investment. Our dependent variable is the corporate investment as a ratio to its total assets. We create a dummy variable for the year 2020, 2021, and 2022. We show results with and without firm controls (not reported) such as staff headcount, turnover, age, total assets, financial conditions, and export dummy (whether the firm is an exporter), with and without observable macroeconomic variables (not reported), including financial institution development, financial market development, inflation rate, GDP growth, foreign direct investment growth, export growth, import growth, population growth, credit growth, and some measures of institutional quality (political stability, regulatory quality, rule of law, corruption). The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 16: Effects of MaP stances and shocks on investment

	Dependent variable: Total investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{stance}	-0.0098*		-0.0146**		-0.0164***	
	(0.0060)		(0.0062)		(0.0061)	
MaP_{shock}		-0.0135*		-0.0226***		-0.0236***
		(0.0081)		(0.0084)		(0.0083)
Firm controls	No	No	No	No	Yes	Yes
Macro controls	No	No	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32976	32976	32976	32976	32976

Note: This table shows the impact of MaP stance (column 1,3,5) and shocks (column 2,4,6) on the total amount of investment. Our dependent variable is the corporate investment as a ratio to its total assets. We show results with and without firm controls (not reported) such as staff headcount, turnover, age, total assets, financial conditions, and export dummy (whether the firm is an exporter), with and without observable macroeconomic variables (not reported), including financial institution development, financial market development, inflation rate, GDP growth, foreign direct investment growth, export growth, import growth, population growth, credit growth, and some measures of institutional quality (political stability, regulatory quality, rule of law, corruption). The standard errors clustered at firm level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

A. Appendix

Table A1: 17 Macroprudential tools (Excerpt from IMF iMaPP database)

Instrument	Description
CCB	A requirement for banks to maintain a countercyclical capital buffer. Implementations at 0% are not considered as a tightening in dummy-type indicators.
Conservation	Requirements for banks to maintain a capital conservation buffer, including the one established under Basel III.
Capital	Capital requirements for banks, which include risk weights, systemic risk buffers, and minimum capital requirements.
LVR	A limit on leverage of banks, calculated by dividing a measure of capital by the bank's non-risk-weighted exposures.
LLP	Loan loss provision requirements for macroprudential purposes, which include dynamic provisioning and sectoral provisions (e.g. housing loans).
LCG	Limits on growth or the volume of aggregate credit, the household-sector credit, or the corporate-sector credit, and penalties for high credit growth.
LoanR	Loan restrictions, which may be conditioned on loan characteristics (e.g., the maturity, the size, the LTV ratio and the type of interest rate of loans), lender characteristics, and other factors.
LFC	Limits on foreign currency (FC) lending, and rules or recommendations on FC loans.
LTV	Limits to the loan-to-value ratios, applied to residential and commercial mortgages but also applicable to other secured loans, such as for automobiles.
DSTI	Limits to the debt-service-to-income ratio and the loan-to-income ratio, which restrict the size of debt service payments or the size of a loan relative to income.
Tax	Taxes and levies applied to specified transactions, assets, or liabilities, which include stamp duties, and capital gain taxes.
Liquidity	Measures taken to mitigate systemic liquidity and funding risks, including minimum requirements for liquidity coverage ratios, liquid asset ratios, net stable funding ratios, core funding ratios and external debt restrictions that do not distinguish currencies.
LTD	Limits to the loan-to-deposit (LTD) ratio and penalties for high LTD ratios.
LFX	Limits on net or gross open foreign exchange (FX) positions, limits on FX exposures and FX funding, and currency mismatch regulations.
RR	Reserve requirements for macroprudential purposes.
SIFI	Measures taken to mitigate risks from global and domestic systemically important financial institutions (SIFIs), which includes capital and liquidity surcharges.
Other	Macroprudential measures not captured in the above categories—e.g., stress testing, restrictions on profit distribution, and structural measures.

Table A2: Effects of MaP shocks on tangible investment: the role of bank heterogeneities

	Dependent variable: Tangible investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	-0.1613***	-0.1119	-0.1240	-0.1232	-0.1226	-0.1219
	(0.0549)	(0.0798)	(0.0820)	(0.0783)	(0.0781)	(0.0789)
Bank total asset			0.6432			
			(0.5034)			
MaP_{shock} × Bank total asset			0.1256**			
			(0.0531)			
Bank ROA				0.0405		
				(0.0404)		
MaP_{shock} × Bank ROA				0.0825**		
				(0.3188)		
Bank ROE					0.0789***	
					(0.0237)	
MaP_{shock} × Bank ROE					0.0038	
					(0.0030)	
Tier 1 Ratio						-0.0015
						(0.0082)
MaP_{shock} × Tier 1 Ratio						0.0588*
						(0.0360)
Bank controls	No	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	8135	6414	6414	6414	6414	6414

Note: This table shows the impact of MaP shocks on tangible investment varying with bank level financial indicators. Our dependent variable is the corporate tangible investment as a ratio to its total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A3: Effects of supply-based MaP shocks on tangible investment: the role of bank heterogeneities

	Dependent variable: Tangible investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP^{supply}_{shock}	-0.1339***	-0.1280	-0.1281*	-0.1319*	-0.1329*	-0.1219*
	(0.0597)	(0.0798)	(0.0729)	(0.0696)	(0.0681)	(0.0706)
Bank total asset			0.1927			
			(0.1496)			
MaP^{supply}_{shock} × Bank total asset			0.2843*			
			(0.2516)			
Bank ROA				0.0638		
				(0.0488)		
MaP^{supply}_{shock} × Bank ROA				0.0842**		
				(0.3250)		
Bank ROE					0.0847**	
					(0.0339)	
MaP^{supply}_{shock} × Bank ROE					0.0060	
					(0.0041)	
Tier 1 Ratio						-0.0038
						(0.0098)
MaP^{supply}_{shock} × Tier 1 Ratio						0.0580*
						(0.0328)
Bank controls	No	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	8135	6414	6414	6414	6414	6414

Note: This table shows the impact of supply-based MaP shocks on tangible investment varying with bank level financial indicators. Our dependent variable is the corporate tangible investment as a ratio to its total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A4: Effects of MaP shocks on tangible investment: the role of firm heterogeneities

	Dependent variable: Tangible investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MaP$_{shock}$	-0.0679**	-0.0894***	-0.0912***	-0.0874***	-0.0520	-0.0599**	-0.0821***
	(0.0282)	(0.0259)	(0.0250)	(0.0241)	(0.0320)	(0.0232)	(0.0234)
EFD	-0.0527**						
	(0.0193)						
MaP$_{shock}$× EFD	-0.0194**						
	(0.0081)						
SA index		0.0150					
		(0.0129)					
MaP$_{shock}$× SA index		0.0402*					
		(0.0230)					
Liquidity ratio			-0.0015				
			(0.0011)				
MaP$_{shock}$× Liquidity ratio			0.0066*				
			(0.0037)				
Leverage ratio				-0.1203***			
				(0.0370)			
MaP$_{shock}$× Leverage ratio				-0.0072			
				(0.0089)			
Interest Coverage					0.0072***		
					(0.0026)		
MaP$_{shock}$× Interest Coverage					0.0061**		
					(0.0023)		
Profitability						0.0063	
						(0.0109)	
MaP$_{shock}$× Profitability						0.0012	
						(0.0025)	
Fixed assets							0.5707***
							(0.0856)
MaP$_{shock}$× Fixed assets							0.0155*
							(0.0086)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32949	31569	32044	19809	24202	32532

Note: This table shows the impact of MaP shocks on corporate tangible investments varying with firm level financial indicators. Our dependent variable is the corporate tangible investment as a ratio to its total assets. We include other indicators such as leverage, liquidity, and interest coverage ratio to measure financial positions. Columns 1-5 indicate the financial condition channel. In columns 6 and 7, we test whether the asset-based or earning-based borrowing constraint is the channel through which MaPs can affect corporate investment. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A5: Effects of supply-based MaP shocks on tangible investment: the role of firm heterogeneities

	Dependent variable: Tangible investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MaP^{supply}_{shock}	-0.0605*	-0.0844***	-0.0828***	-0.0772**	-0.0596*	-0.0767**	-0.0732***
	(0.0331)	(0.0304)	(0.0282)	(0.0284)	(0.0343)	(0.0282)	(0.0258)
EFD	-0.0448***						
	(0.0142)						
MaP^{supply}_{shock} × EFD	-0.0203**						
	(0.0078)						
SA index		0.0145					
		(0.0108)					
MaP^{supply}_{shock} × SA index		0.0401*					
		(0.0229)					
Liquidity ratio			-0.0038				
			(0.0073)				
MaP^{supply}_{shock} × Liquidity ratio			0.0065*				
			(0.0037)				
Leverage ratio				-0.1203***			
				(0.0371)			
MaP^{supply}_{shock} × Leverage ratio				-0.0070			
				(0.0095)			
Interest Coverage					0.0081***		
					(0.0021)		
MaP^{supply}_{shock} × Interest Coverage					0.0058***		
					(0.0015)		
Profitability						0.0083	
						(0.0159)	
MaP^{supply}_{shock} × Profitability						0.0012	
						(0.0015)	
Fixed assets							0.5677***
							(0.0852)
MaP^{supply}_{shock} × Fixed assets							0.0183**
							(0.0087)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32949	31569	32044	19809	24202	32532

Note: This table shows the impact of supply-based MaP shocks on corporate tangible investments varying with firm level financial indicators. Our dependent variable is the corporate tangible investment as a ratio to its total assets. We include other indicators such as leverage, liquidity, and interest coverage ratio to measure financial p ositions. Columns 1-5 indicate the financial condition ch annel. In columns 6 and 7, we test whether the asset-based or earning-based borrowing constraint is the channel through which MaPs can affect corporate investment. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A6: Effects of MaP shocks on intangible investment: the role of bank heterogeneities

	Dependent variable: Intangible investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}	-0.0169	-0.0301	-0.0263	-0.0282	-0.0296	-0.0304
	(0.0598)	(0.0692)	(0.0629)	(0.0674)	(0.0691)	(0.0624)
Bank total asset			-0.6870			
			(0.7867)			
MaP_{shock} × Bank total asset			0.0343			
			(0.0861)			
Bank ROA				0.2704		
				(0.2859)		
MaP_{shock} × Bank ROA				-0.0298		
				(0.0877)		
Bank ROE					0.0292	
					(0.0239)	
MaP_{shock} × Bank ROE					-0.0032	
					(0.0028)	
Tier 1 Ratio						0.0398
						(0.0332)
MaP_{shock} × Tier 1 Ratio						-0.0013
						(0.0010)
Bank controls	No	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	8135	6414	6414	6414	6414	6414

Note: This table shows the impact of MaP shocks on intangible investment varying with bank level financial indicators. Our dependent variable is the corporate intangible investment as a ratio to its total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A7: Effects of supply-based MaP shocks on intangible investment: the role of bank heterogeneities

	Dependent variable: Intangible investment					
	(1)	(2)	(3)	(4)	(5)	(6)
MaP_{shock}^{supply}	-0.091	-0.0390	-0.0390	-0.0322	-0.0324	-0.0386
	(0.0505)	(0.0612)	(0.0598)	(0.0602)	(0.0611)	(0.0592)
Bank total asset			-0.6569			
			(0.8034)			
MaP_{shock}^{supply} × Bank total asset			0.0347			
			(0.0867)			
Bank ROA				0.2599		
				(0.2785)		
MaP_{shock}^{supply} × Bank ROA				-0.0304		
				(0.0881)		
Bank ROE					0.0357	
					(0.0243)	
MaP_{shock}^{supply} × Bank ROE					-0.0041	
					(0.0037)	
Tier 1 Ratio						0.0424
						(0.0326)
MaP_{shock}^{supply} × Tier 1 Ratio						-0.0021
						(0.0020)
Bank controls	No	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm-Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observation	8135	6414	6414	6414	6414	6414

Note: This table shows the impact of supply-based MaP shocks on intangible investment varying with bank level financial indicators. Our dependent variable is the corporate intangible investment as a ratio to its total assets. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A8: Effects of MaP shocks on intangible investment: the role of firm heterogeneities

	Dependent variable: Intangible investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MaP_{shock}	-0.0087	-0.0111	-0.0069	-0.0050	-0.0298	-0.0123	-0.0300
	(0.0168)	(0.0183)	(0.0165)	(0.0154)	(0.0243)	(0.0165)	(0.0206)
EFD	-0.1729**						
	(0.0751)						
MaP_{shock}× EFD	0.0035						
	(0.0153)						
SA index		0.1555					
		(0.1209)					
MaP_{shock}× SA index		0.0056					
		(0.0132)					
Liquidity ratio			0.0034				
			(0.0073)				
MaP_{shock}× Liquidity ratio			0.0052				
			(0.0037)				
Leverage ratio				0.3815			
				(0.2580)			
MaP_{shock}× Leverage ratio				-0.0693			
				(0.0530)			
Interest Coverage					-0.0004		
					(0.0018)		
MaP_{shock}× Interest Coverage					-0.0009		
					(0.0017)		
Profitability						0.0346	
						(0.0421)	
MaP_{shock}× Profitability						-0.0068	
						(0.0075)	
Fixed assets							0.0008
							(0.0008)
MaP_{shock}× Fixed assets							-0.0003
							(0.0002)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32949	31569	32044	19809	24202	32532

Note: This table shows the impact of MaP shocks on corporate intangible investments varying with firm level financial indicators. Our dependent variable is the corporate intangible investment as a ratio to its total assets. We include other indicators such as leverage, liquidity, and interest coverage ratio to measure financial positions. Column 1-5 indicate the financial condition channel. In columns 6 and 7, we test whether the asset-based or earning-based borrowing constraint is the channel through which MaPs can affect corporate investment. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table A9: Effects of supply-based MaP shocks on intangible investment: the role of firm heterogeneities

	Dependent variable: Intangible investment						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MaP^{supply}_{shock}	0.0105	-0.0059	-0.0156	-0.0155	-0.0015	-0.0082	-0.0491
	(0.0182)	(0.0196)	(0.0179)	(0.0175)	(0.0266)	(0.0180)	(0.0216)
EFD	-0.1747**						
	(0.0747)						
MaP^{supply}_{shock} × EFD	-0.0063						
	(0.0152)						
SA index		0.1548					
		(0.1212)					
MaP^{supply}_{shock} × SA index		0.0088					
		(0.0131)					
Liquidity ratio			0.0144				
			(0.0105)				
MaP^{supply}_{shock} × Liquidity ratio			0.0062				
			(0.0040)				
Leverage ratio				0.3829			
				(0.2591)			
MaP^{supply}_{shock} × Leverage ratio				-0.0806			
				(0.0642)			
Interest Coverage					-0.0002		
					(0.0016)		
MaP^{supply}_{shock} × Interest Coverage					-0.0005		
					(0.0012)		
Profitability						0.0355	
						(0.0420)	
MaP^{supply}_{shock} × Profitability						-0.0036	
						(0.0076)	
Fixed assets							0.0008
							(0.0009)
MaP^{supply}_{shock} × Fixed assets							-0.0003
							(0.0002)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-Sector-Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	32976	32949	31569	32044	19809	24202	32532

Note: This table shows the impact of supply-based MaP shocks on corporate intangible investments varying with firm level financial indicators. Our dependent variable is the corporate intangible investment as a ratio to its total assets. We include other indicators such as leverage, liquidity, and interest coverage ratio to measure financial positions. Column 1-5 indicate the financial condition channel. In columns 6 and 7, we test whether the asset-based or earning-based borrowing constraint is the channel through which MaPs can affect corporate investment. The standard errors clustered at country level are reported in the parentheses. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

How do macroprudential policies affect corporate investment? Insights from EIBIS data

February 2025

European Investment Bank

pdf: ISBN 978-92-861-5900-8

2025-0015