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DO MACROPRUDENTIAL POLICIES MAKE SMES MORE-OR-LESS DISCOURAGED TO APPLY FOR A BANK LOAN?

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ABSTRACT

This paper investigates the effect of macroprudential policies (MAPs) on discouraged small and medium-sized firms (bank borrowers). Employing confidential firm-level survey data for the Euro area countries and estimating Probit models, we find that several MAPs significantly reduce SMEs discouragement for applying for a bank loan. The marginal effects are, in most cases, highly significant, while the economic magnitude of implementing financial institutions-targeted MAPs is also significant. However, this finding is highly dependent on the degree of a firm's credit quality. Our results are driven by the demand side; a more stable and better-capitalized banking system could make SMEs less discouraged from applying for a bank loan.

***Keywords*:** Discouraged Borrowers; Credit Rationing; Macroprudential Policy; Eurozone SMEs.

***JEL classification**:* D81, E58, G10, G28

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1. Introduction

The global financial crisis triggered a massive policy response from central banks, who introduced several changes in the global regulatory framework. In more detail, the strong complementarity between the financial system and credit markets and the macroeconomy paved the way for transmitting shocks from the financial sector to the real economy, introducing various challenges for policymakers. In response to this, regulators moved from a micro-perspective to a macro-one, aiming to enhance financial stability and limit systemic risk and its diffusion to the real economy (e.g., Tavman, 2015).[1] Therefore, one country after the other started using extensive macroprudential regulations, aiming to reduce the procyclicality of credit and leverage and address systemic risk, either through time series dimension - where borrowers do not internalize the effect of their excess leverage on "normal" periods on their deleveraging on "bad" periods - or structural dimension, stemming from market structure characteristics (see, e.g., Galati and Moessner, 2016).

The effectiveness of macroprudential regulation on curbing the credit cycle and limiting the procyclicality of credit and leverage has received the attention of both theoretical (see, e.g., Clancy and Merola, 2014) and empirical studies (see, e.g., Lim *et al*., 2011; Galati and Moessner, 2016). Implementing MAPs is beneficial for enhancing financial stability and preventing the diffusion of systemic risk (see, e.g., Apergis *et al.,* 2022), especially for upper-middle-income and high-income countries (Rizwan, 2021). Nonetheless, despite the wide adoption of MAPs during the last decade (Morgan *et al.*, 2019), the empirical research on the effects of MAPs on various macroeconomic outcomes is at an early stage, and our knowledge remains limited (see, e.g., Cerutti *et al.*, 2017; Galati and Moessner, 2018).

The objective of the present study is to enhance our understanding of the impact of macroprudential policies on potential bank borrowers' decisions to apply for a bank loan. These policies are designed to enhance financial stability and prevent the diffusion of systemic risk across the real economy. In general, strengthening banking system's stability typically necessitates the implementation of rigorous regulations (Borio, 2003), which may subsequently impede SMEs' access to finance, a detrimental condition for their operational

[1] Lim *et al.* (2011) distinguish four different categories of systemic risk: risk related to strong credit growth and credit-driven asset inflation, risk generated by excessive leverage and the subsequent de-leveraging, risk arising by volatile capital flows and liquidity risk.

viability. This phenomenon has been widely acknowledged in the literature as credit rationing.[2] For instance, Ćehajić and Košak (2022) identify restricted access to finance for SMEs subsequent to the implementation of macroprudential regulations. However, this outcome may be attributed to either the bank-rationing aspect (representing the supply-side channel) or the self-rationing aspect of credit rationing, also known as discouraged bank borrowers due to the fear of rejection (demand-side channel). Therefore, this paper goes beyond previous research by focusing on the impact of the implementation of macroprudential policies (MAPs) on the demand-side channel of credit rationing. This study aims to ascertain whether macro-prudential policies affect the demand for bank loans among small and medium-sized enterprises (SMEs)[3] in Europe. SMEs play a pivotal role in the European economy, representing over 99% of non-financial firms and contributing to over 55% of the sector's value-added and 65% of employment.[4]

The acquisition of external sources for financing holds significant importance for the majority of small business proprietors. External funding is a necessary requirement for small firms to finance their fixed and working capital investments, facilitate the development of new products and services, and meet their day-to-day operational expenses (Caglayan *et al.,* 2022). However, credit-constrained small business owners are discouraged from submitting a funding application for fear of rejection. Although several studies examine the determinants of discouragement (Kon and Storey, 2003; Cole and Sokolyk, 2016; Kallandranis and Drakos, 2021; Anastasiou *et al.,* 2022), and the impact of MAPs on the macroeconomy and bank capital ratios (Cerutti *et al.,* 2017; De Schryder and Opitz, 2021; Mayordomo and Rodríguez-Moreno, 2021; Konstantinou *et al.,* 2022), the association between MAPs and discouraged firms has not been explored so far. To the best of our knowledge, this is the first study investigating this issue.

The results of Probit models using confidential firm-level survey data from the Euro area show a negative relationship between implementing the majority of MAPs and the

[2] The asymmetric information between lenders and borrowers leads to an equilibrium outcome known as credit rationing (Stiglitz and Weiss, 1981). This adverse phenomenon allows for potential borrowers who choose not to apply due to fear of possible rejection, the so-called "discouraged" borrowers (Drakos and Giannakopoulos, 2011). In general, when the level of discouragement increases, inefficiencies in the credit markets are more prone, leading to suboptimal levels of investment.

[3] SMEs are expected to rely more on bank loans and to have less access to external sources of financing, namely financing by non-resident banks. Therefore, it is expected that SMEs are potentially the most affected by credit restrictions. (Farinha and Félix, 2015)

[4] Annual report on European SMEs 2018/2019 by European Commission.

probability of a firm being discouraged from applying for a bank loan. The propagation mechanism of this result comes from the demand side; a more stable and better-capitalized banking system on the back of the implementation of MAPs could improve business confidence and thus lead potential bank borrowers to be less discouraged from applying for a loan. This channel is in line with the findings by Mol-Gómez-Vázquez et al., (2022), which show that, in economies marked by more stabilized banking systems, SMEs are less discouraged from applying for a bank loan; thus, stabilizing the financial system through the implementation of macroprudential regulation does not seem to lower the demand of credit from SMEs. This finding provides significant policy implications for Central Banks since their efforts to strengthen bank stability through the implementation of MAPs are not expected to harm the demand for loans from firms.

Moreover, our results provide evidence that the implementation of some specific MAPs plays a prominent role in reducing the likelihood of a firm being discouraged from applying for a loan only for the firms that exhibit an improvement in their credit quality measured as the capital provided by the owners or shareholders of the enterprise, or the creditworthiness, or the enterprise-specific outlook concerning the sales and profitability. However, this is not the case when the MAPs interact with credit quality deterioration; a worsening in capital, creditworthiness and enterprise-specific outlook increases the likelihood of a firm being discouraged from applying for a loan even if Central Banks implement macroprudential policies in order to safeguard financial stability.

Our approach has various advantages that allow us to contribute to the literature on SME finance and macroprudential policy in several ways. As mentioned earlier, this is the first study to investigate the impact of a comprehensive set of macroprudential policy tools engaged in the European Union on SMEs' fear of applying for a bank loan (discouragement). In particular, we examine not only whether and how macroprudential regulations affect potential discouraged bank borrowers, but also which specific regulations influence the firms' decision to apply for a bank loan. Apparently, this contributes to a deeper understanding of the effects of macroprudential policies on real economic activity. Also, due to the lack of micro evidence in the macroprudential policy literature, this paper contributes to a better understanding of the relationship between macroprudential instruments and firms' decision to apply for a loan with greater granularity. This approach also mitigates potential endogeneity problems that may emerge due to reverse causality issues arising from the decision to

implement macroprudential policies. In particular, macroprudential regulators' decisions are unlikely to be influenced by individual firms' operations and financing conditions, but they are rather affected by the macroeconomic environment and risks pertaining to the financial system as a whole (Cerutti *et al.*, 2017; Claessens *et al.*, 2013; Kang *et al.*, 2021).[5]

The rest of the paper is structured as follows. Section 2 briefly discusses the background theory and the earlier related studies in the literature. Section 3 describes the data and methodology. Section 4 discusses our empirical findings. Finally, Section 5 concludes.

2. Theoretical background

Our work builds on two distinct strands of the literature so far. The first is on credit rationing and borrowers' discouragement. The second is on the effects of macroprudential policies on the financial sector and the economy. In what follows, we discuss them in turn and outline our hypotheses.

2.1 Literature review

Traditional research on SMEs access to finance (Casu *et al.*, 2022; Vlassas *et al.*, 2023; Grandi and Ninou Bozou, 2023) has focused on enterprises that ask for bank funding and, in particular, on the issue of credit rationing (e.g., Stiglitz and Weiss, 1981; Greenwald *et al.*, 1984; Bester, 1985; Chan and Kanatas, 1985; Rajan, 1992; Kiyotaki and Moore, 1997; Bloom *et al.*, 2007; Kallandranis *et al.*, 2023 etc.).[6]

Nevertheless, the sort of rationing caused by imperfect information applies solely to potential borrowers who are loan applicants. To generate unbiased estimates of the borrower-lender relationship, it is necessary to consider not only the firms that apply for a loan but also those that generally need external bank financing but decide not to apply. These are known as discouraged bank borrowers and are, in a sense, those firms who would have applied for bank credit but did not due to fear of possible rejection (Cavalluzzo *et al.*, 2002; Kon and Storey, 2003). Previous empirical research reveals that potential borrowers are frequently discouraged and tries to investigate the potential drivers behind this phenomenon (see, among others, Freel

[5] It is worth noting here that there could be a significant degree of endogeneity among various instruments. For instance, some policies could be adopted as a result of macro-credit developments (e.g. CCB), and some are imposed externally (e.g. Cons and Liq). We leave the examination of this issue for future work. We would like to thank a referee from the Bank of Greece for raising this issue.

[6] The roots of this research go back to Jaffee and Russell (1976) who were the first that examine credit markets through the lens of imperfect information theory, explaining how unobserved disparities in borrower quality might lead to credit restriction.

et al., 2012; Chakravarty and Xiang, 2013; Ferrando *et al.*, 2017, 2022; Popov, 2016; Mac an Bhaird *et al.*, 2016; Rostamkalaei *et al.*, 2020; Qi and Nguyen, 2021; Brown *et al.*, 2022 etc.).

The recent empirical literature has also provided insights into the effects of macroprudential policy on several economic variables, with a large strand of this literature devoted to the study of the effects of MAPs on credit. This literature is divided into two broad categories. The first category consists of panel data regressions at the country level, where macroprudential policies are found to be effective in reducing the procyclicality of credit and leverage (Lim *et al.*, 2011), mitigating the effects of a bust, and lessening its adverse effects on the real economy (Bakker *et al.*, 2012; Dell'Ariccia *et al.*, 2012) and safeguarding financial stability (Apergis *et al.*, 2022).[7]

Nonetheless, some studies find mixed results. For example, Cerutti *et al.* (2017) find that the implementation of borrower-targeted MAPs is associated with lower household credit growth in advanced and emerging economies. In contrast, financial-institutions-targeted instruments significantly affect credit only in emerging countries; however, this impact on credit growth is negatively related to the degree of financial development and economic openness. Furthermore, they find that the introduction of MAPs does not affect credit to non-financial corporations (NFCs). De Schryder and Opitz (2021) document that a tightening macroprudential policy shock results in lower household credit-to-GDP and bank credit-to-GDP, while the reaction of total credit and credit to NFCs is insignificant. Furthermore, they find a substitution effect from household credit to NFCs credit after a tightening of MAPs.

The second strand in the empirical literature uses micro-level data, focusing on some specific MAPs. For instance, Jiménez *et al.* (2012) and Lopez *et al.* (2014) find that countercyclical buffers can amplify credit cycles in Spain and Colombia, respectively. Furthermore, Dassatti *et al.* (2019) provide evidence that reserve requirements lower credit supply in Uruguay, respectively, increasing the banking system's resilience against credit and liquidity crises. Gomez *et al.* (2020) provide evidence that dynamic provisioning and reserve requirements have a negative effect on credit expansion in Colombia, whereas Aiyar *et al.* (2013) find that increasing capital requirements have adverse effects on U.K. bank lending.

[7] In a similar vein, Carreras et al. (2018) and Richter et al. (2019) find that household credit decreases after a tightening in MAPs, while Akinci and Olmstead-Rumsey (2018) find that a change in an overall MAP index lowers bank credit growth.

Finally, Behncke (2023) supported that the countercyclical capital buffer and a cap on the loan-to-value ratios in Switzerland led to a reduction in high LTV mortgages.

Although the related literature has identified, in general, a negative effect of MAPs on total credit growth (see, e.g., Mirzaei *et al*., 2021), empirical evidence from various studies points out a weak effect of MAPs on corporate credit, while household credit reacts stronger to changes in MAPs, mainly affecting the demand and supply of mortgages (see, e.g., Cerutti *et al*., 2017; Galati and Moessner, 2018). According to Cerutti *et al*. (2017), MAPs are primarily targeted at financial institutions, influencing the capital base of banks and their liquidity, and at households via their access to credit, resulting in a milder effect of MAPs on corporate credit. Digging deeper, De Schryder and Opitz (2021) suggest that the decrease in household credit followed by the implementation of a macroprudential measure results in an unaffected or even increased corporate credit, uncovering a substitution effect between these two credit categories.[8]

2.2 Macroprudential policy

The outbreak of the Global Financial Crisis in 2008 paved the way for the extensive use of macroprudential policy by Central Banks as a measure to mitigate systemic risk and prevent its diffusion to the real economy as well as to safeguard financial stability. In general, the macroprudential toolkit consists of a broad range of policy instruments, usually categorized to two main groups: the borrower-targeted measures, aiming at borrowers' leverage, and the financial-institutions-targeted instruments, aiming at the financial position of financial institutions either on their assets and/or their liabilities (see, for a discussion, Cerutti et al., 2017). In this paper, we concentrate our analysis only to the financial-institutions targeted measures, as the borrower-targeted measures are orientated mainly to the credit conditions of households.

Specifically, the macroprudential instruments used in our analysis are the following[9]: CCB is the countercyclical capital buffer, which is a capital reserve requirement applied to banks, over and above their standard capital requirements. *Cons* comprises requirements for banks to maintain a capital conservation buffer while *Capital* incorporates several capital

[8] The subdued response of corporate credit to the implementation of MAPs is also related to the fact that, in advanced economies, firms have greater access to alternative sources of financing (e.g., non-banking sector and/or foreign credit), which are not subject to macroprudential regulation (see, e.g., Cerutti et al., 2017; Cizel et al., 2019; and De Schryder and Opitz, 2021).

[9] See also the Table A.1 in the appendix which summarizes the MAPs used in our analysis and their definitions.

requirements for banks, including, among others, systemic risk buffers, risk weights and minimum capital requirements. *Capital_Corp* is a subcategory of capital requirements tailored to corporations. All the above, act as a safety net against future economic contraction or possible outbreaks of financial crises; for example, in periods of economic downturns, these requirements could be reduced so as to allow banks to use their capital to mitigate potential losses. Furthermore, we use the loan loss provision requirements (*LLP*), which are financial reserves held by banks as a buffer against future loan defaults during economic downturns. Loan restrictions (*LoanR*) include loan limits and prohibitions, depending on the loan characteristics and bank characteristics (e.g., the type of the interest rate, the maturity, etc.). Limits on foreign currency loans (*LFC*) belong to the broader category of loan restrictions but are tailored to loans issued on foreign currency. We use also taxes (*TAX*) applied to specific transactions, assets or liabilities (e.g., capital gain taxes) and liquidity measures (*Liq*) which aim to reduce liquidity and systemic risks, including, among others, minimum requirements for liquidity coverage ratios, liquidity assets ratios etc. Moreover, we use reserve requirements (*R.R.*) which are rules that mandate banks to hold a percentage of their deposits as reserves. A lower reserve requirement during a financial crisis acts as a liquidity injection and could help banks to mitigate liquidity losses. Finally, we utilize measures taken to mitigate risks from the systemically important financial institutions (*SIFI*), comprising of capital and liquidity surcharges.

2.3 Hypotheses development

The literature discussed in the previous sections has been devoted to studying the effects of macroprudential policies on credit supply, whereas, to the best of our knowledge, little attention has been paid to the demand for credit. An additional study closer in spirit to ours is the work of Ćehajić and Košak (2022). The main focus of their study has been on the impact of macroprudential policies on SMEs' access to bank finance, using also data from the SAFE database, without distinguishing between the supply and the demand channel. According to their findings, the implementation of tightening macroprudential policies is associated with a lower probability of SMEs obtaining bank financing. However, the above studies have not examined the impact of macroprudential policies on the demand-side channel of credit rationing, i.e., discouraged bank borrowers, per se, as a particular self-rationing phenomenon.

Thus, our focus is on how the implementation of MAPs affects the demand for SMEs loans. The role of MAPs in safeguarding financial stability, compressing systemic risks and preventing their diffusion into the real economy could trigger shifts in private agents' decisions (Beau et al., 2012), including their demand for credit. According to Jeanne and Korinek (2014), macroprudential policy has been chiefly developed to supervise banks aiming to affect non-financial borrowers' behavior indirectly. Also, they emphasize that significant externalities can also exist on the demand side, for instance, when borrowers endogenously build up leverage, being aware that borrowing restrictions will become tighter in the future. To do so, we focus on discouraged (potential) bank borrowers, employing confidential firm-level data from the Survey of Access to Finance of Enterprises (SAFE) for a large sample of SMEs across all Eurozone countries. Most studies that employ bank-level data (e.g., Claessens et al., 2013) or credit-registry data (e.g., Jiménez et al., 2017) focus on single countries, and therefore their results may not be generalizable to other jurisdictions. The use of a dataset from the Eurozone allows us to increase the cross-country validity of our findings.

Using data from the Eurozone comes with one more advantage in a cross-country setting. This is because the literature suggests that there can be interactions between macroprudential policies and monetary policy (Angelini et al., 2012; Fabiani et al., 2022; Revelo and Levieuge, 2022). However, the Eurozone countries we examine in the present study have a common currency and a common monetary policy under the responsibility of the European Central Bank.

Moreover, the establishment of trust in banks is contingent upon the level of trust that a firm has in society (Fungáčová et al., 2019; Nicolas et al., 2023); this, in turn, significantly influences whether or not a company will apply for a loan (Tang et al., 2017; Naegels et al., 2021). Therefore, the implementation of stricter MAPs could potentially lessen borrower deterrence (discouragement) by fostering a greater degree of confidence in financial institutions.

Having all the above as a springboard, we develop the following two testable hypotheses that are then examined in this paper:

H1. *The adoption of macroprudential policies leads to reduced discouraged SMEs borrowers applying for a bank loan.*

H2. *The tightening vs loosening episodes of macroprudential policies exert asymmetric impact on discouraged SME borrowers.*

Financial institutions have less information regarding the creditworthiness of informationally opaque enterprises and are thus more inclined to make errors during the screening process. Furthermore, literature (e.g., Berger and Udell, 1998; Han *et al.,* 2009) reveals that larger enterprises are less risky and more trustworthy regarding their information. In contrast, smaller and medium-sized businesses tend to be more informationally opaque, which might raise the screening and monitoring expenses of external lenders. These charges, in turn, may reduce the profitability of lending to SMEs, thus discouraging smaller business borrowers.

Due to the greater agency costs (Holmstrom and Tirole, 1997) associated with financing their investment projects, riskier enterprises with worsened credit history suffer the most from capital tightening (credit crunch or collateral squeezing). On the other hand, less risky borrowers with good credit quality (history) have higher incentives to make well-informed investment decisions and take activities to assure positive financial results, lowering the need for creditors to examine and monitor their projects extensively (Calabrese *et al.,* 2021).

In addition, according to Cavalluzzo *et al.* (2002), over half of the small firms that needed bank credit in the 1993 National Survey of Small Business Finances did not apply for a loan due to their fear that the loan application would be denied owing to a bad credit history. In the same vein, Drakos and Giannakopoulos (2018), using data from the SAFE database, found that bank credit rationing is higher for firms whose credit history has deteriorated, signifying a higher probability of potential bank borrowers being discouraged. Therefore, a third hypothesis can be formulated as follows:

H3. *The effect of macroprudential policies on discouraged SME borrowers is highly dependent on the degree of the firm's credit quality.*

3 Data, variables and methodology

We employ confidential firm-level data from the Survey of Access to Finance of Enterprises (SAFE) for a large sample of SMEs across all Eurozone countries and 19 waves

corresponding to the 2009H2-2018H2 period.[10,11] SAFE provides information about businesses in the European Union and is carried out on behalf of the European Commission's Directorate General for Enterprise and Industry and the European Central Bank (ECB). The sample is divided into four main categories: business size, economic activity, and nation, and the sample's number of enterprises in each stratum was modified to improve its accuracy by activity and size class. The original database contained more than 90,000 firm–semester observations.[12] Firms in the financial services, non-profit, and public administration sectors were omitted, as well as large and listed firms (Mac an Bhaird *et al.*, 2016; Anastasiou *et al.*, 2022). Further observations were dropped due to missing data in one or more of the variables, yielding a final dataset of more than 58,000 firm-level observations.

SAFE questionnaire question Q20 asks whether a firm needs external financing to realize its growth ambitions, and if the answer is yes, it then asks what type of external financing the firm would prefer most. Given that firms need bank credit (as a type of external financing) and following Kon and Storey (2003), Kallandranis and Drakos (2021) and Anastasiou *et al.*, (2022), we define discouraged borrowers as those firms that are in need of credit but choose not to apply because of fear of possible rejection. We capture firms' hesitation to demand a loan by retrieving data from the firms' responses to the following question in SAFE (question Q7A), "*Did not apply because of possible rejection*".

Thus, our dependent variable (D_i) is of a dichotomous nature, classifying the *i-th* firm as discouraged or not, as follows:

$$D_i = \begin{cases} 1 \; if \; firm \; needs \; credit \; but \; did \; not \; apply \; because \; of \; fear \; of \; rejection \\ 0 \; otherwise \end{cases} \quad (1)$$

Table 1 below provides some key descriptive statistics while distinguishing between those SMEs in our sample that needed a bank loan but were discouraged, vs. those that needed a loan and applied to a bank. The differences between the two groups are highlighted

[10] The importance of small and medium enterprises (SMEs) for the European economy is highlighted by the introductory paragraph of the EC official link (source: https://ec.europa.eu/growth/smes_en) that refers to SMEs according to which: "*Small and medium-sized enterprises (SMEs) are the backbone of Europe's economy. They represent 99% of all businesses in the EU. They employ around 100 million people, account for more than half of Europe's GDP and play a key role in adding value in every sector of the economy […]They are essential to Europe's competitiveness and prosperity, industrial ecosystems, economic and technological sovereignty, and resilience to external shocks".*

[11] The use of the relatively narrow and homogeneous sample of Eurozone economies allows us to diminish any distortions emerging from cross-country differences (e.g., financial depth and openness) as well as variations in the use of MAPs between emerging and advanced economies.

[12] Companies chosen to participate in SAFE were chosen at random from the Dun & Bradstreet database.

based on three main firm characteristics (i.e., size, age, and profitability). We observe that on average, 10.8% (89.2%) of the European sample consists of discouraged (non-discouraged) firms.

*****Insert Table 1 here*****

Figure 1 depicts the distribution of enterprises among the euro area countries of our sample, while Figure 2 illustrates SAFE survey waves (semesters). In particular, Figure 1 shows that there are large cross-country disparities in non-application rates attributed to the fear of loan rejection. Interestingly, enterprises in Greece seemed to have the highest non-application rates (27%), followed by Ireland (23%), Cyprus (19%), the Netherlands (18%), and Portugal (11%). Malta (4.5%), Luxembourg (5%), and Austria (7%), on the other hand, have the lowest discouragement rates. Figure 2 shows that the average discouragement ratio climbed dramatically during the Eurozone's sovereign debt crisis before beginning to decrease again.

*****Insert Figures 1 and 2 here*****

The key independent variable, MAP, is a discrete variable that includes dummy-type data on macroprudential policy events. The variable attains the value 1 if the country implements a tightening episode in the specific semi-annual period, -1 if the country implements a loosening episode, and 0 if there is no change. Figure 3 provides an overview of the number of recorded episodes (-1, 0, 1) per macroprudential policy instrument during the period of our study (2010-2018). It is worth noting that, for most MAPs used in our regressions, the number of tightening episodes in the sample is larger than that of loosening episodes, apart from reserve requirements (*R.R.*). Data on MAPs come from the iMaPP database by Alam *et al.* (2019), whereas Table A1 in the Appendix provides further information on the MAPs used in our study.[13]

*****Insert Figure 3 here*****

Turning to the control variables, previous research suggests that borrower discouragement is associated with various firm-level and macroeconomic-specific characteristics. To this end, following, among others, Kon and Storey (2003), Freel *et al.* (2012), MacBhaird *et al.* (2016) and Anastasiou *et al.* (2022), we include several firm- and

[13] The dataset used provides information about the implementation date of the MAPs and not on their announcement data.

macro-specific characteristics affecting discouragement.[14] By doing so, we reduce the possible unobserved heterogeneity in the discouragement mechanism. For example, younger and smaller SMEs are much more likely to be discouraged (Han *et al.*, 2009; Freel *et al.*, 2012; Chakravarty and Xiang, 2013; Mac an Bhaird *et al.*, 2016; Rostamkalaei, 2017). Similarly, the smallest, most informationally opaque SMEs may have higher levels of borrower discouragement, in line with a priori theoretical arguments (Han *et al.*, 2009; Anastasiou *et al.*, 2022). Moreover, the economic environment in which firms operate also influences their decision to apply for a bank loan. To account for macroeconomic conditions, we control for the real GDP growth rate, the HICP headline inflation rate and the 10-year government bond yield (Chakravarty and Xiang, 2013; Mac an Bhaird *et al.*, 2016; Moro *et al.*, 2020; Anastasiou *et al.*, 2022).

*****Insert Table A2 here*****

To model the impact of MAPs on discouragement we employ a Probit model with robust standard errors, that takes the following form:

$$\begin{aligned} &\text{Prob}\left(D_{i,j,t} = 1 | N = 1\right) \\ &= \lambda_0 + \lambda_1 \cdot MAP_{j,t-1} + \sum_{k=1}^{N} \theta_k \cdot Controls_{i,j,t} + CountryDummies + \varepsilon_{i,j,t} \end{aligned} \tag{2}$$

Where i, j, t denote firm, country and time (semester/wave). Thus, consistent with the definition of discouragement described above, we model the probability of a firm being discouraged (Di), given that this firm needs a bank loan ($N = 1$). $MAP_{j,t}$ includes implementation events of MAPs in country *j* and period *t*. The introduction of MAPs may not have an immediate impact on discouragement, as their effects could potentially take some time to materialize. To this end, we estimate equation 2 with MAPs entering the model with one-period lag (six months ago). Furthermore, in order to examine how within-country variation in MAPs implementation affects discouragement, we incorporate country dummies in equation 2.

[14] These are listed in Table A2 in the Appendix.

4 Empirical findings

4.1 Baseline results and discussion

Table 2 reports the marginal effects of the Probit models. Our results suggest a strong negative relationship between the implementation of various financial institutions-targeted MAPs and the likelihood of a firm being discouraged from applying for a loan.[15] In other words, the implementation of some specific MAPs raises demand for corporate loans as the firm owners become more encouraged to apply for a loan. The marginal effects are, in most cases, highly significant, while the economic magnitude of implementing financial institutions-targeted MAPs is also significant. For instance, we find that a change by 1 unit (i.e., implementation of a tightening episode) in the case of LLP decreases the probability of a firm being discouraged by 1.2 percentage points.

In more detail, we get negative and statistically significant coefficients for several MAPs, including the: capital conservation limits (*Cons*), loan loss provision requirements (*LLP*), reserve requirements (*R.R.*), limits on foreign currency loans (*LFC*) and measures taken to mitigate risks of systemically important financial institutions (*SIFI*). The main channel for this result comes from the bank stabilizing property of macroprudential regulation; implementing MAPs promotes the financial system's stability as they mitigate the risk of a financial crisis domestically and addresses the negative consequences of the diffusion of financial crises to the macroeconomy. Thus, a healthier banking system through lowering the probability of a domestic banking crisis (Choi *et al.*, 2021), lower firms' fear to not apply for a bank loan because of the possible rejection.

The stabilizing property of the implementation of MAPs on the financial system has been widely recognized by the related literature, with positive effects on various aspects of the macroeconomy (see, e.g., Galati and Moessner, 2018; Martinez-Miera and Repullo, 2019 and Ma, 2020), while, MAPs, are also found to play a significant role in promoting bank stability and reducing bank risk (Gaganis *et al.*, 2020). In particular, as also supported by Meuleman and Vander Vennet (2022) a tightening in macroprudential policy promotes financial stability by restraining credit flows and strengthening bank resilience, while Chen *et al.*, (2022)

[15] At this stage, we rule out the study of the effects of borrower-based MAPs since they are mainly targeted at households. Following Cerutti *et al.* (2017), these measures could only have negative effects to corporate credit in cases where entrepreneurs resort to personal loans in order to generate the required sources to finance their business activity. We leave this for future work.

suggest that a tightening in macroprudential regulations stimulates the efficiency of banks. Moreover, Olszak *et al.*, (2018) find that several MAPs (e.g., concentration limits, taxes and dynamic provisions) reduce the procyclicality of loan-loss provisions of banks. Thus, a more stable and better capitalized banking system on the back of implementing MAPs could improve business confidence and thus lead potential bank borrowers to be less discouraged from applying for a loan. More precisely, businesses anticipate that Central Banks take actions against possible future financial risks that could erode the stability of the financial system, preventing their diffusion to the real economy, and thus, businesses' expectations are significantly improved in front of a more stabilized financial and real sector. This finding is in line with the study by Mol-Gómez-Vázquez *et al*., (2022) which show that a more stable banking system make SMEs less discouraged to apply for a bank loan; thus, stabilizing the financial system through the adoption of macroprudential regulation does not seem to lower the demand of credit from SMEs. An interesting finding which allows us to link the improved business confidence in the business sector on the probability of a firm applying for a bank loan is found in the study of Anastasiou *et al*. (2022), who highlighted that potential bank borrowers attempt to predict how banks would evaluate their loan applications based on their profile as loan applicants and the overall expected economic conditions.

On the contrary, we find that the corporate sector targeted capital requirements for banks (*Capital Corp*) increase the likelihood of a firm being discouraged from applying for a bank loan. Probably, the opposite sign of the marginal effect of *Capital Corp* is attributable to the fact that this measure is targeted to corporations only; thus, the imposition of this MAP has a direct negative effect on credit supply towards corporations, raising the likelihood of a firm being discouraged.

*****Insert Table 2 here*****

4.2 Further analysis and robustness checks

In this section we provide a set of robustness checks in order to ensure the validity of the baseline results.

4.2.1 Heckman correction

When the sub-population is non-randomly drawn from the overall population, standard regression analysis leads to the well-known sample selection bias. To this end, we employ a

Probit model with Heckman's (1979) correction that accounts for a possible selection bias arising due to the fact that we observe only firms with a need for credit. This selection model consists of two equations. The first equation is the so-called selection model, where the dichotomous decision as to whether a firm needs or not a bank loan, is estimated as in a Probit model. The second equation is the so-called outcome model, where the dichotomous decision is whether or not a firm -that needs a bank loan- is discouraged. It should be mentioned though, that the sample is pseudo-panel because, in the SAFE questionnaire, we do not have the same cross-section between the waves. Therefore, given that the original work of Heckman (1979) was based on panel datasets, one may argue that such an attempt would not be appropriate in our setting. However, following past work in the field, we proceed with such an estimation as a robustness test (see Drakos and Giannakopoulos, 2018).

The general setup we employ consists of the selection equation that models the probability of a firm needing a loan and it can mathematically be formulated as follows:

$$\begin{aligned}\text{Prob}(N_{i,j,t} = 1) \\ &= \lambda_0 + \lambda_1 \cdot competition_{j,t-1} + \sum_{k=1}^{N} \theta_k \cdot Controls_{i,j,t} \\ &+ CountryDummies + \varepsilon_{i,j,t}\end{aligned} \tag{3}$$

Then, we model the so-called **outcome equations** as follows:

$$\begin{aligned}\text{Prob}(D_{i,j,t} = 1 | N = 1) \\ &= \lambda_0 + \lambda_1 \cdot MAP_{j,t-1} + \sum_{k=1}^{N} \theta_k \cdot Controls_{i,j,t} + CountryDummies \\ &+ \xi \cdot (\rho \cdot \sigma_\varepsilon) + u_{i,j,t}\end{aligned} \tag{4}$$

We assume that $(\varepsilon_{i,j,t}, u_{i,j,t})$ follows a bivariate normal distribution with:

$$\begin{pmatrix}\varepsilon_{i,j,t} \\ u_{i,j,t}\end{pmatrix} \sim N\left[\begin{pmatrix}0 \\ 0\end{pmatrix}, \begin{pmatrix}\sigma_\varepsilon^2 & \rho\sigma_\varepsilon \\ \rho\sigma_\varepsilon & \sigma_u^2\end{pmatrix}\right] \tag{5}$$

where (ρ) is the correlation between $(\varepsilon_{i,j,t}, u_{i,j,t})$ while ξ is the inverse Mill's ratio denoting the non-selection hazard.

As in Ćehajić and Košak (2022), Bremus and Neugebauer (2018), and Ferrando *et al.* (2017), we consider competition as a selection variable. The SAFE database includes a

variable, which attains the value 1 if competition is the firm's most immediate problem (priority), and the value of 0 otherwise. The underlying idea is that businesses that experience intense competition, followed by decreased sales and profitability, may need more credit and be discouraged from applying for a bank loan. We anticipate that the SMEs' discouragement will not influence the bank's decision to issue the loan, so satisfying the exclusion restriction requirements by affecting only the demand for credit and not its supply.

Table 3 contains the marginal effects of the Heckman Probit models with sample selection. The main results hold.

*****Insert Table 3 here*****

4.2.2 Incorporating supply side factors

So far, we have included in the Probit models only demand side factors, since the burgeoning literature on discouraged bank borrowers focuses predominantly on firm-level attributes that could influence loan demand (firm size, age etc.). However, supply-side effects may also affect firms' decision to apply for a bank loan. For example, firms that interpret correctly the potential debt overhang of their economy may experience a greater fear of loan application refusal, and thus borrower discouragement will be higher (Mac an Bhaird *et al.*, 2016). Apart from that, banks may need to deleverage to satisfy capital ratios (Holton *et al.*, 2014) and hence reduce credit supply by tightening their credit standards. This, in turn, will enhance the discouragement of potential bank borrowers.

To this end, we re-estimate each model using data about the actual bank credit (lending) standards (C.S.) across the different countries in our sample. C.S. are an integral part of banking activity and a critical aspect of the overall economic activity, particularly through the path of firms' function, as the latter are directly dependent on bank lending (Anastasiou *et al.*, 2021). Data for bank credit standards were obtained from the responses of senior bank loan officers from the Bank Lending Survey, also comprised by the ECB. Among other things, the survey collects information on changes in credit standards that the banks apply when approving loans to enterprises and households. The results in Table 4 show that when we also

control for the supply side of the economy, this does not influence our main findings, which therefore are robust.

*****Insert Table 4 here*****

4.2.3 Tightening vs loosening effects of MAPs

First, we check whether there are any asymmetric effects on discouraged borrowers stemming from the loosening and tightening effects of MAPs. Therefore, we re-estimate our Probit model while splitting between tightening and loosening episodes in the case of MAPs. In more detail, we now include two separate dummy variables, "one-by-one" in different specifications. The first is *MAPT*, which attains the value 1 for a tightening episode and 0 otherwise. The second is *MAPL*, that is equal to 1 for loosening episodes and equal to 0 otherwise.

$$\text{Prob}\left(D_{i,j,t} = 1 | N = 1\right) = \lambda_0 + \lambda_1 \cdot MAPT_{j,t-1} + \sum_{k=1}^{N} \theta_k \cdot Controls + CountryDummies + \varepsilon_{i,j,t} \quad (6)$$

$$\text{Prob}\left(D_{i,j,t} = 1 | N = 1\right) = \lambda_0 + \lambda_1 \cdot MAPL_{j,t-1} + \sum_{k=1}^{N} \theta_k \cdot Controls + CountryDummies + \varepsilon_{i,j,t} \quad (7)$$

Table 5 reports the regression results when we distinguish between tightening and loosening episodes. We present only the results we get for tightening and loosening episodes for each MAP (i.e., for *Cons*, *LLP*, *Liq* and *SIFI*). Our findings for the impact of tightening episodes are qualitatively the same and close to the results of the baseline estimation. For instance, the marginal effects of tightening episodes for Cons, LLP and SIFI are very close to the coefficients obtained in the baseline regression. In contrast, the marginal effects of loosening episodes are either insignificant (*Cons* and *LLP*) or significant but different in magnitude from the baseline results (*SIFI*). The picture is quite different for the last MAP examined, i.e., *Liq*. In this case, we get a significant and negative marginal effect for loosening episodes only; however, in our baseline results, the marginal effect of this MAP is insignificant, which is probably driven by the fact that the number of tightening episodes for this MAP exceeds the number of loosening ones in our sample. Thus, to sum up, our results

provide evidence of an asymmetric effect of tightening and loosening episodes of the specific MAPs on discouraged borrowers, with tightening episodes to be the main driver of our baseline estimation findings.

*****Insert Table 5 here*****

4.2.4 The effect of MAPs according to firms' credit quality

In this section, we exploit firms' heterogeneity in order to analyze which type of firms are affected most by the implementation of MAPs and whether the effect of MAPs varies according to the credit quality of the firms.

Bank credit rating scoring methods are based on historical and behavioral data concerning a company's capacity to repay a loan. In these models, leverage, performance, and credit history are essential inputs for measuring the credit risk of businesses. Specifically, firms that improve their profitability and reduce their leverage are more likely to repay their debt. However, this is also true for companies with excellent past performance that build up their capital reserves within their operations and so minimize their likelihood of default (Cowling, 2010).

In addition, credit history is a component of "soft information" that banks employ for risk assessment, and an improvement in bank-firm relationship increases the likelihood of firms repaying their debt obligations. Therefore, following Calabrese *et al.* (2020), in order to quantify firms' credit quality, we collect data on profitability, capital, and credit history, and we utilize questions from the SAFE database that inquire whether firms' economic outlook with respect to their sales and profitability (question Q11_c), own capital (question Q11_d), and credit history (question Q11_e) has improved, remained the same, or deteriorated over the past six months. To this end, we use the interaction between each credit quality proxy and each MAP, with the coefficients of the interaction terms capturing the increasing effect of MAPs on less risky firms.

Tables 6, 7, and 8 report the marginal effects after testing our third hypothesis (H3). Depending on the table, we notice various coefficients. It seems that the decreasing effect of the implementation of MAPs on discouraged borrowers observed in our baseline estimations is evident for enterprises that report an improvement in capital and credit history. For instance, the marginal effects of the interaction of capital improvement with the capital

conservation limits (*Cons*), loan loss provision requirements (*LLP*), measures taken to mitigate systemic liquidity and funding risks (*Liq*) and measures taken to mitigate risks of systemically important financial institutions (*SIFI*) are negative and highly significant. This result is also evident for the marginal effects of the interaction of credit history improvement with the capital conservation limits (*Cons*), loan loss provision requirements (*LLP*), measures taken to mitigate systemic liquidity and funding risks (*Liq*), measures taken to mitigate risks of systemically important financial institutions (*SIFI*) and limits on foreign currency loans (*LFC*). The same holds for enterprises with an improved outlook with respect to their sales and profitability, albeit to a lesser extent (only for the capital conservation limits (*Cons*) and measures taken to mitigate risks of systemically important financial institutions (*SIFI*).

On the contrary, our results indicate a positive relationship between the interaction of various macroprudential instruments and credit quality deterioration. More specifically, we get positive and statistically significant marginal effects of the interaction between: capital deterioration and *CCB, Cons*, *LLP*, *Tax, Liq* and *SIFI*; credit history deterioration and *Cons, Tax, Liq* and *SIFI*; enterprise-specific outlook deterioration and *CCB, Cons* and *Liq*.[16]

Thus, our results provide evidence that the implementation of some specific MAPs plays a prominent role in reducing the likelihood of a firm being discouraged from applying for a loan; however, this result holds only for the firms who exhibit an improvement in their credit quality measured as the capital provided by the owners or shareholders of the enterprise, or the creditworthiness, or the enterprise-specific outlook with respect to the sales and profitability. However, this is not the case when the MAPs interact with credit quality deterioration; a worsening in the capital, creditworthiness, and enterprise-specific outlook increases the likelihood of a firm being discouraged from applying for a loan even if Central Banks implement macroprudential policies in order to safeguard financial stability.

*****Insert Tables 6, 7, and 8 here*****

5 Conclusions

The related literature has extensively studied the effects of macroprudential policies on credit supply, whereas, to the best of our knowledge, no attention has been paid to the demand

[16] We get negative and significant marginal effects only for the interaction between credit quality deterioration and reserve requirement (*RR*).

for credit. Thus, our aim is to examine how the implementation of MAPs affects the demand for corporate loans using confidential firm-level data from the ECB's SAFE survey in an attempt to shed light on the effect of macroprudential policies on the probability of SMEs being discouraged from applying for a bank loan. Thus, our study combines two distinct strands of the literature, the first focusing on borrowers' discouragement and the second on the effects of macroprudential policies on credit; however, we focus mainly on the demand for credit by SMEs.

Our results suggest that implementing MAPs, except for those that directly target corporate credit, decreases the probability of a firm being discouraged from applying for a bank loan. In other words, implementing specific MAPs raises demand for corporate loans as the firm owners become more encouraged to apply for a loan. The marginal effects are highly significant, while the economic magnitude of implementing financial institutions-targeted MAPs is also significant. This effect can be attributed to enhancing financial stability in the economy, improving business confidence, and decreasing firm discouragement. By conducting a set of various sensitivity analyses, we confirm the robustness of our results. Future research may investigate the dynamic effects of MAPs on discouraged borrowers to identify possible lags in the transmission mechanism of these shocks. Moreover, it would be interesting to examine whether the announcement of the implementation of MAPs on discouragement affects borrowers' discouragement rather than their activation or, equivalently, if the announcement – activation period changes our results.

References

Aiyar, S., Calomiris, C,W., and Wieladek, T., (2014). Does Macro-Prudential Regulation Leak? Evidence from a U.K. Policy Experiment, *Journal of Money, Credit and Banking*, 46(s1), 181-214, 02.

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, M. A., Eiseman, J., Gelos, M. R., Kang, M. H., Narita, M. M., Nier E., and Wang, N. (2019). *Digging deeper-Evidence on the effects of macroprudential policies from a new database*. International Monetary Fund.

Anastasiou, D., Bragoudakis, Z., and Giannoulakis, S. (2021). Perceived vs actual financial crisis and bank credit standards: Is there any indication of self-fulfilling prophecy?. *Research in International Business and Finance*, 58, 101486.

Anastasiou, D., Kallandranis, C., and Drakos, K. (2022). Borrower discouragement prevalence for Eurozone SMEs: Investigating the impact of economic sentiment. *Journal of Economic Behavior and Organization*, 194, 161-171.

Angelini, P., Nicoletti-Altimari, S., and Visco, I. (2012). Macroprudential, Microprudential and Monetary Policies: Conflicts, Complementarities and Trade-Offs, Occasional papers series, Banca D'Italia, 140, 1-34.

Apergis, N., Aysan, A. F., and Bakkar, Y. (2022). Borrower-and lender-based macroprudential policies: What works best against bank systemic risk?. *Journal of International Financial Markets, Institutions and Money*, 80, 101648.

Bakker, M. B. B., Dell'Ariccia, M. G., Laeven, M. L., Vandenbussche, J., Igan, M. D., and Tong, M. H. (2012). Policies for macrofinancial stability: How to deal with credit booms. International Monetary Fund.

Beau, D., Clerc, L., and Mojon, B. (2012). Macro-prudential policy and the conduct of monetary policy.

Bester, H. (1985). Screening vs. rationing in credit markets with imperfect information. *The American Economic Review*, 75(4), 850-855.

Bloom, N., Bond, S., and Van Reenen, J. (2007). Uncertainty and investment dynamics. *Review of Economic Studies*, 74, 391– 415.

Borio, C. (2003). Towards a macroprudential framework for financial supervision and regulation?. *CESifo Economic Studies*, *49*(2), 181-215.

Bremus, F., Neugebauer, K., 2018. Reduced cross-border lending and financing costs of SMEs. *Journal of International Money and Finance*, 80, 35–58.

Brown, R., Liñares-Zegarra, J. M., and Wilson, J. O. (2022). Innovation and borrower discouragement in SMEs. *Small Business Economics*, 1-29.

Behncke, S. (2023). Effects of macroprudential policies on bank lending and credit risks. *Journal of Financial Services Research*, 63(2), 175–199.

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 and Finance*, 22, 613-673.

Caglayan, M., Talavera, O., and Xiong, L. (2022). Female small business owners in China: Discouraged, not discriminated. *Journal of International Financial Markets, Institutions and Money*, 80, 101649.

Calabrese, R., Girardone, C., and Sclip, A. (2021). Financial fragmentation and SMEs' access to finance. *Small Business Economics*, 57(4), 2041-2065.

Carreras, O., Davis, E.P., and Piggott, R. (2018). Assessing macroprudential tools in OECD countries within a cointegration framework. *Journal of Financial Stability*, 37, 112–130.

Cavalluzzo, K. S., Cavalluzzo, L. C., and Wolken, J. D. (2002). Competition, small business financing, and discrimination: Evidence from a new survey. *The Journal of Business*, 75(4), 641-679.

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, 203–224.

Chakravarty, S., and Xiang, M. (2013). The international evidence on discouraged small businesses. *Journal of Empirical Finance*, 20, 63-82.

Chan, Y. S., and Kanatas, G. (1985). Asymmetric valuations and the role of collateral in loan agreements. *Journal of Money, Credit and Banking*, 17(1), 84-95.

Chen, M., Kang, Q., Wu, J., and Jeon, B. N. (2022). Do macroprudential policies affect bank efficiency? Evidence from emerging economies. *Journal of International Financial Markets, Institutions and Money*, 77, 101529.

Choi, S. M., Kodres, L. E., and Lu, J. (2021). Friend or Foe? Cross-Border Links, Contagious Banking Crises, and Joint Use of Macroprudential Policies. *Journal of Financial Services Research*, 60, 55-79.

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

Clancy, D., and Merola, R. (2014). The effect of macroprudential policy on endogenous credit cycles. Central Bank and Financial Services Authority of Ireland.

Cole, R., and Sokolyk, T. (2016). Who needs credit and who gets credit? Evidence from the surveys of small business finances. *Journal of Financial Stability*, 24, 40-60.

Cowling, M., (2010). The role of loan guarantee schemes in alleviating credit rationing. *Journal of Financial Stability*, 6(1), 36–44.

Dassatti, C., Peydró, J., and Rodriguez-Tous, F. (2019). Macroprudential and Monetary policy: Loan level Evidence from Reserve Requirements. Department of Economics and Business, Universitat Pompeu Fabra Economics Working Papers 1650.

De Schryder, S., and Opitz, F. (2021). Macroprudential policy and its impact on the credit cycle. *Journal of Financial Stability*, 53, 100818.

Dell'Ariccia, G., Igan, D., Laeven, L., Tong, H., Bakker, B., and Vandenbussche, J. (2012). Policies for Macrofinancial Stability: How to Deal with Credit Booms, IMF Staff Discussion Note 12/06.

Drakos, K., and Giannakopoulos, N. (2011). On the determinants of credit rationing: Firm-level evidence from transition countries. *Journal of International Money and Finance*, 30(8), 1773-1790.

Drakos, K., and Giannakopoulos, N. (2018). Self and bank credit rationing: a trivariate probit with double selection. *Research in International Business and Finance*, 44, 124-134.

Fabiani, A., Piñeros, M. L., Peydró, J. L., and Soto, P. E. (2022). Capital controls, domestic macroprudential policy and the bank lending channel of monetary policy. *Journal of International Economics*, 103677.

Farinha, L., and Félix, S. (2015). Credit rationing for Portuguese SMEs. *Finance Research Letters*, *14*, 167-177.

Ferrando A. and Mulier, K. (2022). The real effects of credit constraints: Evidence from discouraged borrowers, *Journal of Corporate Finance*, 73, 102171.

Franklin, J., Rostom, M., and Thwaites, G. (2020). The banks that said no: the impact of credit supply on productivity and wages. *Journal of Financial Services Research*, 57, 149-179.

Freel, M., Carter, S., Tagg, S., and Mason, C. (2012). The latent demand for bank debt: characterizing "discouraged borrowers". *Small Business Economics*, 38(4), 399-418.

Fungáčová, Z., Hasan, I., and Weill, L., (2019). Trust in Banks. *Journal of Economic Behavior and Organization*, 157, 452–476.

Gaganis, C., Lozano-Vivas, A., Papadimitri, P., and Pasiouras, F. (2020). Macroprudential policies, corporate governance and bank risk: Cross-country evidence. *Journal of Economic Behavior and Organization*, 169, 126-142.

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

Grandi, P., and Ninou Bozou, C. (2023). Bank Market Power and Access to Credit: Bank-Firm Level Evidence From the Euro Area. *Journal of Financial Services Research*, 63(1), 63-90.

Greenwald, B. C., Stiglitz, J. E., and Weiss, A. (1984). Informational imperfections in the capital market and macro-economic fluctuations (No. w1335). National Bureau of Economic Research.

Han, L., Fraser, S., and Storey, D. J. (2009). Are good or bad borrowers discouraged from applying for loans? Evidence from U.S. small business credit markets. *Journal of Banking and Finance*, 33(2), 415–424.

Heckman, J. J., (1979). Statistical models for discrete panel data. Department of Economics and Graduate School of Business, University of Chicago.

Holmstrom, B., and Tirole, J., (1997). Financial intermediation, loanable funds, and the real sector. *The Quarterly Journal of Economics*, 112(3), 663–691

Holton S, Lawless M and McCann F (2014) Firm credit in the Euro area: A tale of three crises. *Applied Economics*, 46(2), 190- 211.

Jaffee, D.M. and Russell, T. (1976). Imperfect information, uncertainty and credit rationing, *Quarterly Journal of Economics*, 90, 651-666.

Jeanne, O. and Korinek, A. (2014). Macroprudential policies: implementation and interactions. *Banque de France Financial Stability Review*, 18, 163–72.

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.

Kallandranis, C., and Drakos, K. (2021). Self-Rationing in European Businesses: Evidence from Survey Analysis. *Finance Research Letters*, 41, 101807.

Kang, Q., Wu, J., Chen, M., and Jeon, B. N. (2021). Do macroprudential policies affect the bank financing of firms in China? Evidence from a quantile regression approach. *Journal of International Money and Finance*, 115, 102391.

Kiyotaki, N., and J. Moore, (1997). Credit Cycles, *Journal of Political Economy*, 105(2), 211-248.

Kon, Y. and Storey, D. (2003). A theory of discouraged borrowers. *Small Business Economics*, 21, 37-49.

Konstantinou, P., Rizos, A., and Stratopoulou, A. (2022). Macroprudential policies and income inequality in former transition economies. *Economic Change and Restructuring*, 55, 1005-1062.

Lim, C. H., Costa, A., Columba, F., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T. and Wu, X. (2011). Macroprudential policy: what instruments and how to use them? Lessons from country experiences. IMF Working Paper No. 11/238

Lopez, M., Tenjo, F., Zárate, H., (2014). Credit cycles, credit risk and countercyclical loan provisions. *Ensayos sobre Política Económica* 32 (74), 9–17

Ma, C. (2020). Financial stability, growth and macroprudential policy, *Journal of International Economics,* 122, 103259.

Mac an Bhaird, C., Vidal, J. S., and Lucey, B. (2016). Discouraged borrowers: evidence for Eurozone SMEs. *Journal of International Financial Markets, Institutions and Money*, 44, 46-55.

Mälkönen, V., and Vesala, T. (2013). The adverse selection problem in imperfectly competitive financial markets. *Oxford Economic Papers*, *65*(4), 789-806.

Martinez-Miera, D., and Repullo, R. (2019). Monetary Policy, Macroprudential Policy, and Financial Stability, available at SSRN: https://ssrn.com/abstract=3427096

Mayordomo, S., and Rodríguez-Moreno, M. (2021). How do European banks cope with macroprudential capital requirements. *Finance Research Letters*, 38, 101459.

Meuleman, E., and Vander Vennet, R. (2022). Macroprudential policy, monetary policy and Eurozone bank risk, *International Journal of Central Banking*, 18(4), 259–323.

Mirzaei, A., Pasiouras, F., and Samet, A. (2021). State ownership, macroprudential policies, and bank lending. *Journal of International Money and Finance*, 117, 102456.

Mol-Gómez-Vázquez, A., Hernández-Cánovas, G., & Koëter-Kant, J. (2022). Banking stability and borrower discouragement: a multilevel analysis for SMEs in the EU-28. *Small Business Economics*, 1-15.

Morgan, P.J., Regis, P.J. and Salike, N., (2019). LTV policy as a macroprudential tool and its effects on residential mortgage loans. *Journal of Financial Intermediation,* 37, 89–103.

Moro, A., Maresch, D., Fink, M., Ferrando, A., and Piga, C. (2020). Spillover effects of government initiatives fostering entrepreneurship on the access to bank credit for entrepreneurial firms in Europe. *Journal of Corporate Finance*, 62, 101603.

Naegels, V., Mori, N., and D'Espallier, B., (2022). The Process of Female Borrower Discouragement. *Emerging Markets Review*, 50, 100837.

Nicolas, C., Tarazi, A., and Danisman, G. O. (2023). Disentangling the effect of Trust on Bank Lending. *Journal of Economic Behavior and Organization*, 210, 360-378.

Olszak, M., Roszkowska, S., and Kowalska, I. (2018). Macroprudential policy instruments and procyclicality of loan-loss provisions–cross-country evidence. *Journal of International Financial Markets, Institutions and Money*, 54, 228-257.

Osei-Tutu, F., and Weill, L. (2023). Individualism reduces borrower discouragement. *Journal of Economic Behavior and Organization*, 211, 370-385.

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

Qi, S., and Nguyen, D. D. (2021). Government connections and credit access around the world: Evidence from discouraged borrowers. *Journal of International Business Studies*, 52(2), 321–333.

Rajan, R. (1992), Insiders and outsiders: the choice between informed and arm's length debt, *Journal of Finance*, 47, 1367-1400.

Revelo, J. D. G., and Levieuge, G. (2022). When could macroprudential and monetary policies be in conflict?. *Journal of Banking and Finance*, 139, 106484.

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

Rizwan, M. S. (2021). Macroprudential regulations and systemic risk: Does the one-size-fits-all approach work?. *Journal of International Financial Markets, Institutions and Money*, 74, 101409.

Rostamkalaei, A. (2017). Discouraged borrowers aftermath of financial crisis: A UK study. *Journal of Small Business and Enterprise Development*, 24(2), 394–410.

Rostamkalaei, A., Nitani, M. and Riding, A. (2020). Borrower discouragement: the role of informal turndowns. *Small Business Economics*, 54, 173–188.

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

Tang, Y., Deng, C., and Moro, A., (2017). Firm-Bank Trusting Relationships and Discouraged Borrowers. *Review of Managerial Science* 11, 519–541.

Tavman, Y. (2015). A comparative analysis of macroprudential policies. *Oxford Economic Papers*, *67*(2), 334-355.

Vlassas, I., Kallandranis, C., and Anastasiou, D. (2023). Innovative Activity and Access to Finance of SMEs: Views and Agenda. *Theoretical Economics Letters*, 13(1), 59-83.

Tables

Table 1: Descriptive statistics for discouraged -vs- non-discouraged firms				
	Firms that need a bank loan			
	Non-discouraged firms		Discouraged firms	
Main firm-specific characteristics	89.2% of the total sample		10.8% of the total sample	
	Mean	**S.D.**	**Mean**	**S.D.**
age1	0.102	0.302	0.059	0.237
age2	0.130	0.336	0.079	0.270
age3	0.149	0.356	0.092	0.290
age4	0.100	0.300	0.060	0.238
size1	0.162	0.369	0.097	0.295
size2	0.103	0.305	0.060	0.239
size3	0.063	0.243	0.036	0.188
profit1	0.078	0.268	0.041	0.199
profit2	0.090	0.286	0.050	0.218
profit3	0.136	0.343	0.090	0.286

Table 2: Probit estimation results (Marginal Effects): Baseline Results											
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CCB	0.004 (0.008)										
Cons		-0.008** (0.003)									
Capital			0.017 (0.011)								
Capital Corp				0.045* (0.024)							
LLP					-0.012*** (0.005)						
LoanR						0.002 (0.007)					
LFC							-0.054*** (0.016)				
Tax								0.012 (0.011)			
Liq									-0.001 (0.003)		
R.R.										-0.016*** (0.006)	
SIFI											-0.014*** (0.004)
Controls	Included										
Constant	-1.593*** (0.539)	-1.598*** (0.540)	-1.587*** (0.539)	-1.587*** (0.539)	-1.594*** (0.539)	-1.595*** (0.541)	-1.586*** (0.539)	-1.589*** (0.539)	-1.592*** (0.539)	-1.606*** (0.540)	-1.597*** (0.539)
Log Pseudolikelihood	-18159.73	-18156.87	-18158.47	-18157.59	-18156.59	-18159.84	-18156.95	-18159.27	-18159.85	-18155.81	-18153.87
Country Dummies	Included										
Observations	58,098										

Notes: (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors (c) all the explanatory variables are expressed in one period lag.

Table 3: Probit estimation results (Marginal Effects): Probit model with Heckman (1979) correction											
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CCB	0.047 (0.051)										
Cons		-0.044** (0.018)									
Capital			0.103* (0.059)								
Capital Corp				0.187 (0.119)							
LLP					-0.076*** (0.028)						
LoanR						0.017 (0.044)					
LFC							-0.427** (0.197)				
Tax								0.097 (0.070)			
Liq									0.003 (0.018)		
R.R.										-0.091*** (0.030)	
SIFI											-0.084*** (0.025)
Controls	Included										
Constant	-1.691*** (0.536)	-1.701*** (0.535)	-1.692*** (0.534)	-1.698*** (0.532)	-1.692*** (0.536)	-1.701*** (0.535)	-1.694*** (0.533)	-1.676*** (0.539)	-1.697*** (0.531)	-1.692*** (0.538)	-1.691*** (0.536)
Log Pseudolikelihood	-79511.48	-79523.56	-79524.88	-79520.66	-79522.63	-79525.37	-79523.16	-79505.74	-79519.25	-79522.57	-79520.47
Country Dummies	Included										
Observations	58,101										

Notes: (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors (c) all the explanatory variables are expressed in one period lag.

Table 4: Probit estimation results (Marginal Effects): Incorporating supply side factors											
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CCB	0.0001 (0.009)										
Cons		-0.008*** (0.003)									
Capital			0.017 (0.011)								
Capital Corp				0.044* (0.024)							
LLP					-0.012** (0.005)						
LoanR						0.006 (0.008)					
LFC							-0.054*** (0.016)				
Tax								0.033 (0.021)			
Liq									-0.001 (0.003)		
R.R.										-0.016*** (0.006)	
SIFI											-0.016*** (0.004)
Controls	Included										
Constant	-1.433** (0.553)	0.018 (0 .021)	-1.433** (0.553)	-1.433** (0.553)	-1.441*** (0.555)	-1.440*** (0.550)	-1.429** (0.553)	-1.432** (0.553)	-1.436*** (0.553)	-1.456*** (0.553)	-1.453*** (0.553)
Log Pseudolikelihood	-17133.28	-17129.80	-17132.03	-17131.03	-17132.99	-17133.98	-17130.48	-17131.77	-17133.19	-17129.66	-17125.80
Country Dummies	Included										
Observations	54,539										

Notes: We enrich our model specification using bank credit (lending) standards as an additional independent variable that captures supply-side factors. (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors (c) all the explanatory variables are expressed in one period lag.

Table 5: Probit estimation results (Marginal Effects): Tightening vs loosening episodes								
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cons_T	-0.009*** (0.003)							
Cons_L		-0.004 (0.011)						
LLP_T			-0.014*** (0.004)					
LLP_L				-0.001 (0.013)				
Liq_T					-0.002 (0.003)			
Liq_L						-0.046*** (0.012)		
SIFI_T							-0.015*** (0.004)	
SIFI_L								-0.044* (0.022)
Controls	Included							
Constant	-1.978*** (0.517)	-1.971*** (0.517)	-1.976*** (0.517)	-1.971*** (0.517)	-1.975*** (0.517)	-1.945*** (0.518)	-1.966*** (0.517)	-1.944*** (0.517)
Log Pseudolikelihood	-19447.18	-19450.58	-19446.55	-19450.63	-19450.41	-19446.58	-19443.87	-19449.42
Country Dummies	Included							
Observations	60940	60940	60940	60940	60940	60940	60940	60940

Notes: (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors. T denotes tightening episodes, while, L denotes loosening episodes.

Table 6: Marginal effects of MAPs on discouraged borrowers when interacted with the capital provided by the owners or shareholders of the enterprise

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CCB*Capital improvement	-0.017									
	(0.014)									
CCB*Capital unchanged	-0.010									
	(0.009)									
CCB*Capital deterioration	0.086***									
	(0.026)									
Cons*Capital improvement		-0.019***								
		(0.006)								
Cons*Capital unchanged		-0.020***								
		(0.004)								
Cons*Capital deterioration		0.039***								
		(0.006)								
Capital*Capital improvement			0.015							
			(0.018)							
Capital*Capital unchanged			0.029*							
			(0.015)							
Capital*Capital deterioration			-0.006							
			(0.024)							
CapitalCorp*Capital improvement				0.019						
				(0.039)						
CapitalCorp*Capital unchanged				0.094**						
				(0.038)						
CapitalCorp*Capital deterioration				-0.035						
				(0.032)						
LLP*Capital improvement					-0.019*					
					(0.011)					
LLP*Capital unchanged					-0.018***					
					(0.006)					
LLP*Capital deterioration					0.031**					
					(0.012)					
LoanR*Capital improvement						0.010				
						(0.016)				
LoanR*Capital unchanged						-0.009				
						(0.009)				
LoanR*Capital deterioration						0.023				
						(0.017)				

Tax*Capital improvement							-0.016 (0.021)			
Tax*Capital unchanged							-0.007 (0.013)			
Tax*Capital deterioration							0.091*** (0.030)			
Liq*Capital improvement								-0.025*** (0.006)		
Liq*Capital unchanged								-0.012*** (0.004)		
Liq*Capital deterioration								0.052*** (0.006)		
RR*Capital improvement									-0.006 (0.012)	
RR*Capital unchanged									0.001 (0.007)	
RR*Capital deterioration									-0.0465** (0.009)	
SIFI*Capital improvement										-0.021*** (0.007)
SIFI*Capital unchanged										-0.025*** (0.005)
SIFI*Capital deterioration										0.031*** (0.009)
Macro Controls	Included									
Firm Controls	Included									
Constant	-1.581*** (0.539)	-1.586*** (0.539)	1.586*** (0.539)	-1.588*** (0.539)	-1.5932*** (0.539)	-1.611*** (0.546)	-1,592*** (0.539)	-1.578*** (0.537)	-1.619*** (0.541)	-1.593*** (0.539)
Log Pseudolikelihood	-18150.32	-18120.22	-18157.42	-18154.42	-18150.31	-18157.94	-18151.83	-18100.94	-18146.18	-18138.73
Country Dummies	Included									
Observations	58098	58098	58098	58098	58098	58098	58098	58098	58098	58098

Notes: (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors. LFC is not depicted since we get results only for the interaction term with unchanged capital

Table 7: Marginal effects of MAPs on discouraged borrowers when interacted with the credit worthiness, i.e., the track record of repaying past debts										
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CCB*Credit improvement	-0.002									
	(0.014)									
CCB*Credit unchanged	0.004									
	(0.011)									
CCB*Credit deterioration	0.0357									
	(0.023)									
Cons*Credit improvement		-0.029***								
		(0.006)								
Cons*Credit unchanged		-0.009***								
		(0.004)								
Cons*Credit deterioration		0.034***								
		(0.007)								
Capital*Cred improvement			0.021							
			(0.019)							
Capital*Credit unchanged			0.021							
			(0.014)							
Capital*Cred deterioration			0.0137							
			(0.031)							
CapCorp*Cred improvement				0.067						
				(0.047)						
CapCorp*Credit unchanged				0.046						
				(0.031)						
CapCorp*Credit deterioration				0.006						
				(0.064)						
LLP*Credit improvement					-0.032***					
					(0.009)					
LLP*Credit unchanged					-0.009*					
					(0.006)					
LLP*Credit deterioration					0.018					
					(0.014)					
LFC*Credit improvement						-0.066***				
						(0.023)				
LFC*Credit unchanged						-0.051**				
						(0.022)				
LFC*Credit deterioration						-0.007				
						(0.079)				
Tax*Credit							0.236			

improvement							(0.031)			
Tax*Credit unchanged							-0.006 (0.012)			
Tax*Credit deterioration							0.065** (0.031)			
Liq*Credit improvement								-0.026*** (0.006)		
Liq*Credit unchanged								-0.006* (0.004)		
Liq*Credit deterioration								0.054*** (0.006)		
RR*Credit improvement									0.009 (0.013)	
RR*Credit unchanged									-0.006 (0.007)	
RR*Credit deterioration									-0.043*** (0.009)	
SIFI*Credit improvement										-0.031*** (0.008)
SIFI*Credit unchanged										-0.018*** (0.005)
SIFI*Credit deterioration										0.035*** (0.009)
Macro Controls	Included									
Firm Controls	Included									
Constant	-1.590*** (0.539)	-1.599*** (0.539)	-1.587*** (0.539)	-1.589*** (0.540)	-1.595*** (0.539)	-1.587*** (0.539)	-1.588*** (0.539)	-1.590*** (0.538)	-1.596*** 90.539)	-1.597*** (0.539)
Log Pseudolikelihood	-18158.51	-18132.85	-18158.04	-18157.73	-18151.94	-18156.84	-18155.97	-18106.23	-18149.32	-18139.36
Country Dummies	Included									
Observations	58098	58098	58098	58098	58098	58098	58098	58098	58098	58098
Notes: (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors.										

Table 8: Marginal effects of MAPs on discouraged borrowers when interacted with the enterprise-specific outlook with respect to the sales and profitability or business plan

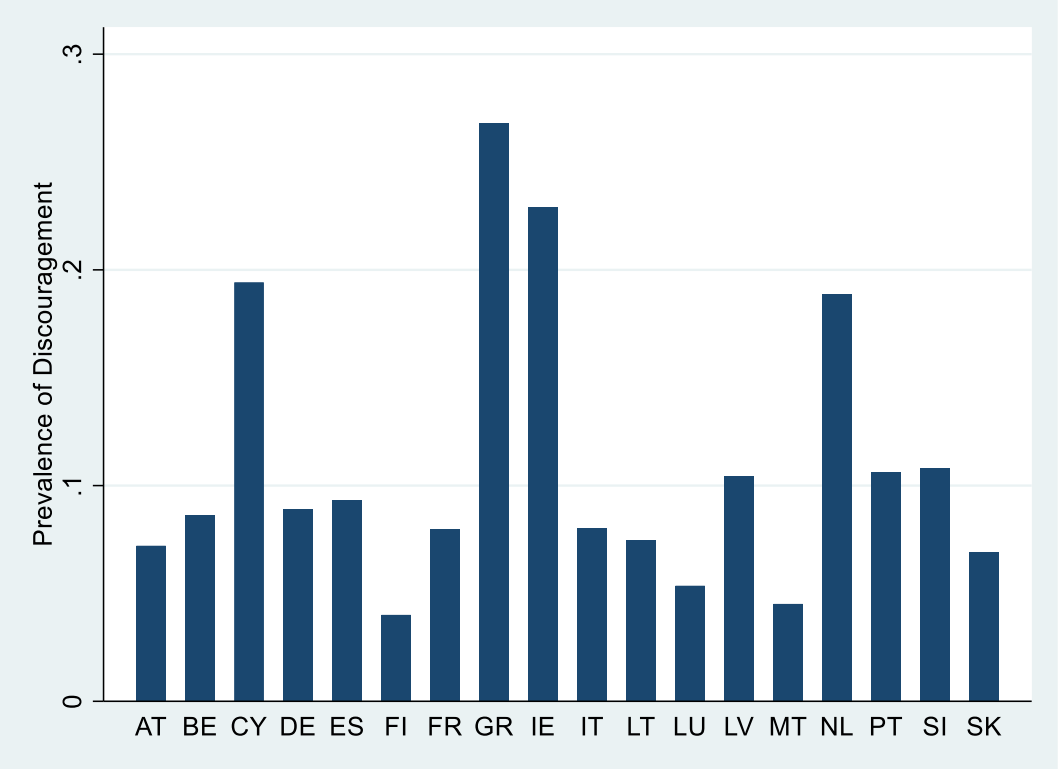
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CCB*Output improvement	-0.001									
	(0.013)									
CCB*Output unchanged	-0.007									
	(0.011)									
CCB*Output deterioration	0.030**									
	(0.017)									
Cons*Output improvement		-0.011*								
		(0.005)								
Cons*Output unchanged		-0.019***								
		(0.005)								
Cons*Output deterioration		0.015***								
		(0.006)								
Capital*Output improvement			0.035*							
			(0.018)							
Capital*Output unchanged			0.016							
			(0.015)							
Capital*Output deterioration			-0.006							
			(0.022)							
CapitalCorp*Output improvement				0.0569						
				(0.037)						
CapitalCorp*Output unchanged				0.0569						
				(0.041)						
CapitalCorp*Output deterioration				0.006						
				(0.046)						
LLP*Output improvement					-0.009					
					(0.0080					
LLP*Output unchanged					-0.026***					
					(0.007)					
LLP*Output deterioration					0.004					
					(0.010)					
LoanR*Output improvement						0.005				
						(0.014)				
LoanR*Output unchanged						-0.008				
						(0.011)				
LoanR*Output deterioration						0.016				
						(0.013)				

Tax*Output improvement							0.042 (0.026)			
Tax*Output unchanged							-0.002 (0.016)			
Tax*Output deterioration							0.012 (0.018)			
Liq*Output improvement								-0.007 (0.005)		
Liq*Output unchanged								-0.014*** (0.005)		
Liq*Output deterioration								0.027*** (0.005)		
RR*Output improvement									-0.009 (0.014)	
RR*Output unchanged									-0.002 (0.009)	
RR*Output deterioration									-0.032*** (0.008)	
SIFI*Output improvement										-0.015** (0.007)
SIFI*Output unchanged										-0.025*** (0.006)
SIFI*Output deterioration										0.007 (0.008)
Macro Controls	Included									
Firm Controls	Included									
Constant	-1.587*** (0.539)	-1.596*** (0.539)	-1.587*** (0.539)	-1.588*** (0.539)	-1.593*** (0.539)	-1.588*** (0.542)	-1.588*** (0.539)	-1.594*** (0.538)	-1.595*** (0.539)	-1.596*** (0.539)
Log Pseudolikelihood	-18157.87	-18144.58	-18157.15	-18157.02	-18153.09	-18158.71	-18157.89	-18137.97	-18151.47	-18148.87
Country Dummies	Included									
Observations	58098	58098	58098	58098	58098	58098	58098	58098	58098	58098

Notes: (a) *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively, (b) numbers in brackets denote cluster robust standard errors. LFC is not depicted since we get results only for the interaction term with unchanged capital

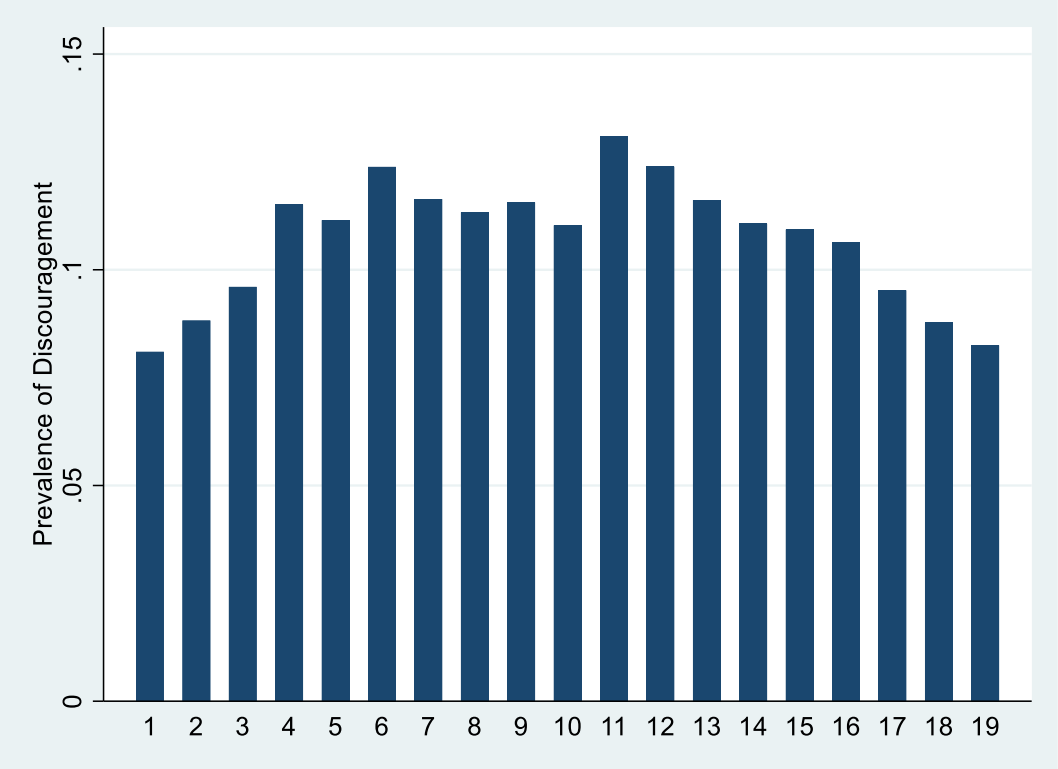
Figures

Figure 1: Distribution of discouraged bank borrowers by country over the period 2009H2-2018H2



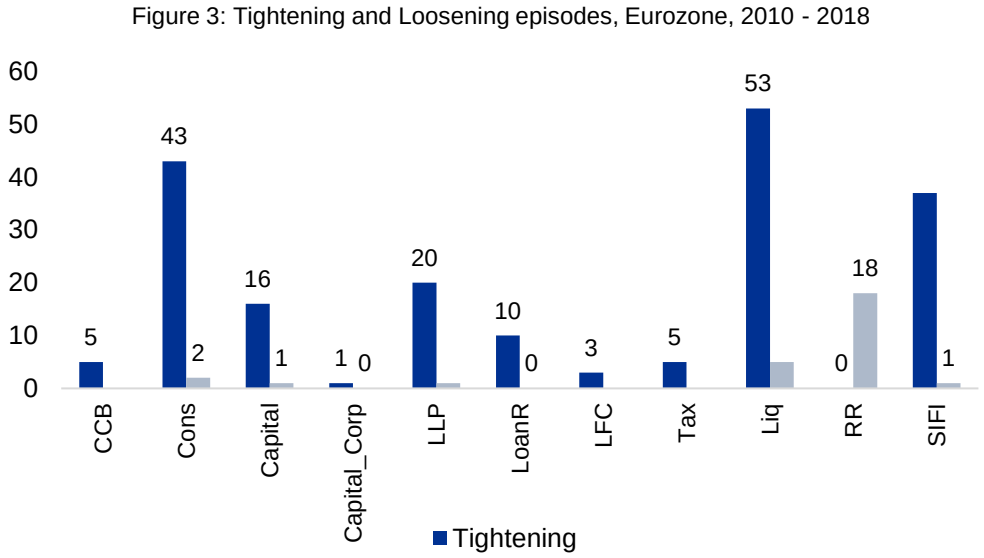
Notes: This figure depicts the distribution of discouraged bank borrowers by country across all the SAFE survey waves during the period 2009H2-2018H2. The horizontal axis denotes country codes as following: AT: Austria, BE: Belgium, C.Y.: Cyprus, DE: Germany, ES: Spain, FI: Finland, FR: France, GR: Greece, I.E.: Ireland, IT: Italy, L.T.: Lithuania, L.U.: Luxemburg, LV: Latvia, MT: Malta, NL: Netherlands, P.T.: Portugal, SI: Slovenia, SK: Slovakia.

Figure 2: Distribution of discouraged bank borrowers by wave (across all countries)



Notes: This figure depicts the distribution of discouraged bank borrowers by wave (across all countries). The horizontal axis denotes survey waves (six-month periods) during the period 2009H2 to 2018H2

Figure 3: Number of tightening and loosening episodes of MAPs



Notes: This figure depicts the number of tightening and loosening episodes of MAPs in Eurozone countries, 2010-2018

Appendix

Table A.1 List of macroprudential policy measures used in our regressions	
MAP 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.
Cons	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. Countercyclical capital buffers and capital conservation buffers are captured in their sheets respectively and thus not included here.
Capital_Corp	Subcategory of capital requirements for banks, targeted especially to corporations.
LLP	Loan loss provision requirements for macroprudential purposes, which include dynamic provisioning and sectoral provisions (e.g., housing loans).
LoanR	Loan restrictions, that are more tailored than those captured in "LCG". They include loan limits and prohibitions, which may be conditioned on loan characteristics (e.g., the maturity, the size, the LTV ratio, and the type of interest rate of loans), bank characteristics (e.g., mortgage banks), and other factors. Restrictions on foreign currency lending are captured in "LFC".
LFC	Limits on foreign currency (F.C.) lending, and rules or recommendations on F.C. loans.
TAX	Taxes and levies applied to specified transactions, assets, or liabilities, which include stamp duties, and capital gain taxes.
Liquidity (Liq)	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.
R.R.	Reserve requirements (domestic or foreign currency) for macroprudential purposes. Please note that this category may currently include those for monetary policy as distinguishing those for macroprudential or monetary policy purposes is often not clear-cut.
SIFI	Measures taken to mitigate risks from global and domestic systemically important financial institutions (SIFIs), which includes capital and liquidity surcharges.

Table A2: Definition of factors affecting discouraged borrowers		
Factor	**Depending on**	**Proxy Definition**
Firm Specific-Controls		
ownership1	**Ownership type**	1, if one owner only; 0, otherwise
ownership2		1, if family; 0, otherwise
ownership3		1, if business associates; 0, otherwise
ownership4		1, if public shareholders; 0, otherwise
ownership5		1, if venture capital enterprises or business angels; 0, otherwise
ownership6		1, if other ownership type; 0, otherwise
legal1	**Legal form**	1, if a subsidiary of another enterprise; 0, otherwise
legal2		1, if a branch of another enterprise; 0, otherwise
legal3		1, if an autonomous profit-oriented enterprise; 0, otherwise
legal4		1, if a non-profit enterprise; 0, otherwise
age1	**Age**	1, if age≥10 years or more; 0, otherwise
age2		1, if age ≥5 & <10; 0, otherwise
age3		1, if age ≥2 & <5; 0, otherwise
age4		1, if age <2; 0, otherwise
size1	**Size**	1, if # of employees ≥1 & ≤9; 0, otherwise
size2		1, if # of employees ≥10 & ≤49; 0, otherwise
size3		1, if # of employees ≥50 & ≤249; 0, otherwise
turnover1	**Financial**	1, if turnover increased over the past six months; 0, otherwise
turnover2		1, if turnover remained unchanged over the past six months; 0, otherwise
turnover3		1, if turnover decreased over the past six months; 0, otherwise
interest_expense1		1, if interest expenses increased over the past six months; 0, otherwise
interest_expense2		1, if interest expenses remained unchanged over the past six months; 0, otherwise
interest_expense3		1, if interest expenses decreased over the past six months; 0, otherwise
interest_expense4		1, if not applicable over the past six months; 0, otherwise
profit1		1, if firm profit increased over the past six months; 0, otherwise
profit2		1, if firm profit remained unchanged over the past six months; 0, otherwise
profit3		1, if firm profit decreased over the past six months; 0, otherwise
sector1	**Sector type**	1, if construction; 0, otherwise

sector2		1, if industry; 0, otherwise
sector3		1, if wholesale or retail trade; 0, otherwise
sector4		1, if transport; 0, otherwise
Macroeconomic-Controls		
gdp		Real GDP growth (annual percentage change)
inflation		HICP inflation (annual percentage change)
yield		10-year government bond yield (%)

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