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Macroprudential policy and corporate loans: evidence from the syndicated loan market

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ABSTRACT

We examine how macroprudential policy influences the structure of syndicated corporate loan contracts. Using a dataset of 4,853 European syndicated loans matched with detailed macroprudential policy indicators across nineteen EU countries, we study the impact of regulatory stance on loan amount, maturity, collateral and covenant use. Stricter macroprudential policy is associated with larger loans and a higher probability of collateralization, while macroprudential loosening reduces loan size. These adjustments occur along the intensive margin rather than through outright credit rationing and are concentrated among medium-sized loans and long-maturity facilities. We also show that borrower and lender characteristics mediate the response: larger, more leveraged firms and well-capitalized arranging banks are the primary drivers of the increase in loan size and collateral use. Our findings reveal a novel micro-level transmission channel of macroprudential policy and indicate that regulatory tightening reallocates credit toward safer contracts rather than suppressing overall lending.

1. Introduction

Macroprudential policy consists of regulatory tools, such as capital buffers, borrower-based constraints, and liquidity requirements, designed to safeguard the stability of the financial system as a whole (Kahou and Lehar, 2017; Galati & Moessner, 2013, 2018). Since the Global Financial Crisis, the use of these tools has expanded considerably, making them central to efforts to curb credit booms, systemic risk, and excessive leverage (CGFS, 2012; ESRB, 2014; 2021). A growing body of research has documented the effects of macroprudential policy on aggregate credit cycles (Akinci & Olmstead-Rumsey, 2018; Apergis et al., 2022; Calem et al., 2020; Cerutti et al., 2017; Claessens et al., 2013; Gambacorta & Murcia, 2020; Jiménez et al., 2017) bank risk-taking (Altunbas et al., 2018; Davis et al., 2022; Ely et al., 2021; Meuleman & Vander Vennet, 2020; Olszak et al., 2018), and bank efficiency and profitability (Ćehajić & Košak, 2021; Chen et al., 2022; Gaganis et al., 2021).

Despite this extensive literature, little is known about how macroprudential policies shape the terms of individual financial contracts, specifically, bank loans to corporate borrowers. Macroprudential regulations ultimately influence risk-taking, funding costs, and capital allocation, which should affect not only whether banks lend but also how they structure loans. Yet existing studies have largely concentrated on aggregate credit growth, systemic risk, or bank-level outcomes (e.g., Cerutti et al., 2017; Jiménez et al., 2017; Altunbas et al., 2018). What remains largely unexplored is how regulation affects the design of loan contracts. Features such as loan size, maturity, collateral, and covenants are central to how banks manage risk and regulatory costs, but prior work has paid little

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attention to these margins.

Indeed, loan contract terms determine the allocation of risk and control between lender and borrower and are shaped by informational frictions and incentive problems (Berger & Udell, 1995; Besanko & Thakor, 1987; Bester, 1985). For example, shorter maturities reduce exposure to uncertainty; collateral and covenants help mitigate adverse selection and moral hazard. These terms also directly affect bank profitability (e.g., through loan loss provisions and capital charges), and shape the borrower's investment, financial, and operational flexibility.[1] Covenants, in particular, can restrict borrower actions such as asset sales, leverage increases, or dividend payments.

Understanding how macroprudential policy affects loan contract terms is therefore essential to evaluating its transmission to the real economy. This is especially important in the context of the syndicated loan market, the largest segment of private debt globally, totaling $5.9 trillion in deals as of 2024 (LSEG Data & Analytics, 2024). In Europe's bank-centric financial system, where firms rely predominantly on bank credit for external financing (de Haan et al., 2020; Gomes & Phillips, 2012),[2] syndicated loans are a critical funding channel.

We investigate how macroprudential policy shapes the structure of syndicated loans granted to European non-financial corporations. We study four core contractual terms: loan amount, maturity, collateral, and covenants, and examine three theoretical channels through which regulation may operate. The credit-supply channel predicts that tighter prudential rules constrain banks' balance-sheet capacity and tilt credit away from marginal borrowers, potentially reducing facility size. The risk-taking channel suggests that higher regulatory costs for riskier exposures lead lenders to require more collateral or covenants, reallocating credit toward safer borrowers. The efficiency/profitability channel emphasizes that regulation can compress margins and affect funding costs, prompting banks to preserve intermediation capacity by adjusting loan structure, for example, scaling up secured lending where monitoring and capital charges are more favorable.

To study these mechanisms, we construct a unique dataset that merges syndicated loan-level data from Bloomberg with macroprudential policy actions from the ECB's MaPPED database (Budnik & Kleibl, 2018). The dataset covers nearly 2,000 policy actions and 4,857 loans across 19 EU countries between 1999 and 2017. Linking loans to the country of the lead arranging bank allows us to identify how a given regulatory stance translates into contractual outcomes. Although our dataset ends in 2017 due to the scope of MaPPED, the period remains highly informative, encompassing the formative years of European macroprudential frameworks, including the Global Financial Crisis, the sovereign debt crisis, and the first deployment of systemic buffers. More recent developments, such as the activation of countercyclical capital buffers during the COVID-19 period, indicate that the mechanisms we document remain relevant.

Our analysis yields two central findings. First, a tighter macroprudential stance is associated with larger loan amounts and a higher likelihood that loans are secured by collateral. By contrast, we find no systematic effects on maturity or the inclusion of covenants. These results suggest that banks adapt to tighter regulations not by reducing credit but by altering contract structure, consistent with intensive-margin adjustments through the risk-taking and efficiency channels. Second, the effects vary by borrower and lender characteristics: larger, more leveraged firms are more likely to receive the larger secured loans, while well-capitalized banks are better positioned to maintain or expand lending under stricter regulations. These findings highlight that macroprudential policy has distributional consequences within the credit market, shaping who receives credit and under what terms.

Our study makes three contributions. First, we are the first to combine the ECB's MaPPED database with Bloomberg's detailed syndicated loan data, creating a novel panel that links regulatory stance to loan design. Second, we provide micro-level evidence that macroprudential policy operates through contract structure, not only aggregate credit supply. Third, by analyzing heterogeneity across borrowers and lenders, we show how regulatory tightening reallocates credit toward larger, more leveraged firms and well-capitalized banks.

In doing so, we document a novel transmission channel of macroprudential policy: its impact on the structure of individual loan contracts. Our findings challenge the view that tighter regulation unambiguously reduces credit (Akinci & Olmstead-Rumsey, 2018; Cerutti et al., 2017; Calem et al., 2020; De Schryder & Opitz, 2021; Gambacorta & Murcia, 2020). They also complement prior work on the determinants of loan contracts (Qian & Strahan, 2007; Bae & Goyal, 2009; Delis et al., 2017; Paligorova & Santos, 2017) by introducing regulatory stance as a driver of loan design, alongside legal institutions, monetary policy, and borrower quality. Recent evidence on regulatory frictions further underscores this contribution, including Gebauer and Mazelis (2023), who document leakages toward non-bank intermediaries, and Lubello and Rouabah (2024), who highlight securitization and asset substitution as bank-level responses.

In today's environment of heightened macro-financial risk, rising inflation, and post-pandemic regulatory retooling, our results are particularly timely. Episodes of financial stress, such as the 2023 banking-sector turbulence, illustrate the importance of robust macroprudential buffers. Our findings suggest that regulation reshapes not only the volume but also the structure of credit, a key insight for the design and evaluation of future macroprudential frameworks.

The remainder of the paper proceeds as follows. Section 2 reviews related literature and develops hypotheses. Section 3 presents the empirical strategy and dataset. Section 4 reports the results. Section 5 discusses policy implications and concludes.

[1] For instance, the cost of borrowing can affect a company's capital structure, influencing decisions about whether to finance operations or investments through debt or equity.

[2] For instance, in 2024 the domestic credit to private sector by banks (as a % of GDP) equals 74.6% in EU while it is 46.1% in US (source: World Development Indicators).

2. Literature review and hypotheses development

This section develops the conceptual and empirical foundation for our analysis. Section 2.1 outlines the theoretical channels through which macroprudential policy can affect loan contract terms. Section 2.2 synthesizes relevant empirical findings, grouped by transmission channel. Section 2.3 then develops testable hypotheses based on this integrated framework.

2.1. Theoretical framework: How macroprudential policy affects loan contract terms

Macroprudential policies influence bank behavior through several well-established transmission channels. While most prior studies focus on lending volumes or bank risk profiles, we argue that these channels also affect how banks structure financial contracts, i.e., the *intensive margin* of credit.[3] We focus on three interrelated mechanisms (CGFS, 2012; ESRB, 2014; 2021), consistent with theories of bank behavior under regulatory constraints.

2.1.1. Credit-supply (bank-lending) channel

In traditional models of credit intermediation (Bernanke & Gertler, 1995; Holmström & Tirole, 1997; Kashyap & Stein, 2000), macroprudential measures, such as capital surcharges or borrower-based limits, reduce banks' lending capacity by affecting their capital or funding costs. These constraints may lead banks to restrict credit supply overall or reallocate it toward safer or less capital-intensive segments (Aiyar et al., 2014). Empirical evidence confirms this view: Cerutti et al. (2017) show that tightening disproportionately affects credit to riskier borrowers, while Burietz et al. (2023) find increased bank participation in syndicated loans when facing asset-based levies. At the contract level, this may manifest in smaller loan sizes, shorter maturities, or a reallocation toward more transparent borrowers.

2.1.2. Risk-taking channel

Macroprudential tightening may constrain excessive risk-taking not by halting lending but by altering its structure. Banks facing higher regulatory costs may respond by increasing the use of collateral, imposing tighter covenants, or lending to safer firms (Borio & Zhu, 2012; Dell'Ariccia et al., 2014; Jiménez et al., 2017). This behavior is consistent with optimal contract design under asymmetric information (Stiglitz & Weiss, 1981), where lenders mitigate adverse selection and moral hazard through contract terms (e.g., Besanko & Thakor, 1987; Sufi, 2007). Ongena et al. (2025) provide evidence that regulatory frictions shift the distribution of contractual protections in syndicated lending.

2.1.3. Efficiency/profitability channel

Regulatory tightening affects banks' funding structure, balance sheet composition, and operational margins (Diamond & Rajan, 2001; Gambacorta & Shin, 2018). Less efficient, smaller, or under-capitalized banks may shift their lending strategy by focusing on lower-risk, higher-quality loans or by requiring collateral to protect profitability (Meuleman & Vander Vennet, 2020). Ćehajić & Košak (2021) further suggest that macroprudential activation can reduce funding costs in developed countries, which may influence banks' incentives to extend or restructure loan terms. Thus, the response to regulation may be subtle and heterogeneous, with contract terms adapting to preserve intermediation capacity.

These three channels form the conceptual foundation for our empirical design. In all cases, loan contract terms – loan amount, maturity, collateral, and covenants – are used by banks as flexible levers to manage risk, regulatory constraints, and intermediation costs.

2.2. Empirical evidence on macroprudential policy and loan contracting

2.2.1. Macroprudential effects on credit supply and risk

Macroprudential policy has been widely studied for its macro-level effects. A growing literature confirms that such tools affect bank credit, balance sheet risk, and systemic exposures (Lim et al., 2011; Claessens et al., 2013; Cerutti et al., 2017; Jiménez et al., 2017; Gambacorta & Murcia, 2020). However, these effects vary across instruments, countries, and time periods.

Cross-country evidence shows significant heterogeneity. Cerutti et al. (2017) find that countercyclical buffers, leverage limits, and taxes tend to reduce credit growth, while loan-to-value and debt-to-income caps yield more mixed results. Claessens et al. (2013) show that macroprudential tools lower the growth of bank assets, particularly during credit booms. Jiménez et al. (2017) document that Spanish banks use macroprudential flexibility to smooth lending cycles and support firm investment during downturns.

Studies on risk-taking confirm that banks shift their portfolio behavior in response to regulatory constraints. Altunbas et al. (2018) find that tighter macroprudential policy reduces Z-scores and default risk among listed banks, particularly those with weaker balance sheets. Ely et al. (2021) and Gaganis et al. (2021) emphasize that the effectiveness of these policies depends on bank-specific characteristics (e.g., size, governance). Meuleman & Vander Vennet (2020) show that regulatory announcements dampen systemic risk among EU banks but also induce strategic reshuffling.

Another strand of research shows that macroprudential tightening reconfigures credit allocation beyond banks. Using European

[3] See Cuciniello & Iasio (2024) for an extensive margin analysis of credit cycle determinants in Italy.

evidence, Gebauer and Mazelis (2023) document that stricter macroprudential stances generate credit leakages toward non-bank financial intermediaries, attenuating the aggregate effect on total credit. In a complementary modelling framework, Lubello and Rouabah (2024) emphasize securitization and asset substitution as mechanisms through which banks adjust to tighter requirements, shifting exposures off balance sheet.

2.2.2. Macroprudential policy and bank performance

Regulatory tightening may compress bank profitability, especially when tools restrict high-yield activities or increase compliance costs. Davis et al. (2022) find negative effects on return on assets and equity while Chen et al. (2022) observe improved efficiency under tighter regulation. These divergent effects imply that banks face trade-offs between risk control and profitability, trade-offs likely to be managed through loan contract adjustments (e.g., secured lending, tighter covenants).

2.2.3. Loan contract structure and policy environments

Loan contract design has been primarily studied in relation to legal environments and macroeconomic policies. Qian & Strahan (2007) and Bae & Goyal (2009) show that stronger creditor rights and better enforcement environments lead to longer maturities, less reliance on collateral, and larger loans in cross-border syndications. Delis et al. (2017) and Paligorova & Santos (2017) demonstrate that monetary easing triggers riskier loans with fewer protections, illustrating the risk-taking channel of monetary policy.

However, very few studies examine macroprudential policy specifically. He et al. (2021) show that stronger supervision leads to more conservative loan terms, smaller size, more collateral, shorter maturity, but focus on supervisory authority, not formal policy tools. Burietz et al. (2023) analyze a bank levy and find that it increases syndicated lending without major changes to contract terms. Ćehajić & Košak (2022) and Yang & Suh (2023) study access and leverage effects, but not loan structures.

2.3. Hypothesis development

Building on the channels set out in Sections 2.1–2.2, we derive four directional, testable hypotheses that link the macroprudential stance to specific loan-contract terms. Let MPI denote the macroprudential policy index; higher values indicate a tighter stance.

When regulation tightens, banks face higher capital/funding costs and stronger risk constraints. Rather than uniformly contracting lending, they can preserve intermediation capacity by concentrating credit in larger, safer facilities; an intensive-margin response consistent with portfolio reallocation under regulatory pressure (e.g., Kashyap & Stein, 2000; see also evidence of regulation-induced shifts in syndicated lending participation in Burietz et al., 2023).

Hypothesis 1 (H1). Higher values of MPI are associated with larger loan amounts at origination.

Contract theory and monitoring considerations imply that lenders shorten exposure when uncertainty or regulatory costs rise, limiting long-horizon risk (Holmström & Tirole, 1997; Dell'Ariccia et al., 2014). Under tighter macroprudential conditions, we therefore expect maturity to contract.

Hypothesis 2 (H2). Higher values of MPI are associated with shorter contractual maturities.

With tighter prudential constraints, lenders offset risk by strengthening contractual protection. Collateral mitigates adverse selection/moral hazard and reduces expected loss (Stiglitz & Weiss, 1981; Besanko & Thakor, 1987), making it an attractive response to higher regulatory costs (see also Jiménez et al., 2017 for regulation-risk links).

Hypothesis 3 (H3). Higher values of MPI increase the probability that a loan is secured by collateral.

When collateral is limited or monitoring is costly, lenders can substitute into covenants that restrict borrower actions and protect repayment (Besanko & Thakor, 1987; Sufi, 2007). Tighter macroprudential conditions should therefore raise covenant incidence, especially where maturities are longer or assets are harder to pledge.

Hypothesis 4 (H4). Higher values of MPI increase the probability that a loan includes financial covenants.

3. Empirical design

This section presents our empirical framework to examine how macroprudential policy shapes the structure of syndicated loan contracts. Section 3.1 introduces the identification strategy and regression models, including detailed explanations of our Macroprudential Policy Index (MPI), control variables, and estimation methods. Section 3.2 outlines data sources, sample construction, and descriptive patterns in the dataset.

3.1. Methodology

3.1.1. Empirical model specification

Our empirical strategy is explicitly designed to test the four hypotheses formulated in Section 2.3. For H1 (loan size) and H2 (maturity) we estimate OLS models with the log of loan amount and log maturity as dependent variables. For H3 (collateral) and H4 (covenants) we use probit models for secured and covenant indicators. In all cases, the key explanatory variable is the lagged Macroprudential Policy Index (MPI), capturing the stance of macroprudential policy in the lead arranger's country.

Formally, our baseline OLS model is:

$$Y_{i,j,t} = \alpha + \beta MPI_{j,t-1} + \Gamma' X_{i,j,t} + \mu_j + \tau_t + \varepsilon_{i,j,t} \quad (1)$$

where $Y_{i,j,t}$ denotes the contract outcome for loan i, arranged by a lead bank in country j in year t; $MPI_{j,t-1}$ is the lagged macroprudential policy index for country j, capturing the net number of tightening actions in $t-1$; $X_{i,j,t}$ is a vector of loan, borrower, lender, and macroeconomic controls; μ_j and τ_t are country and year fixed effects, respectively; $\varepsilon_{i,j,t}$ is the error term.

Lagging the policy index by one year allows time for macroprudential actions to transmit into lending behavior and mitigates concerns about reverse causality. The coefficient β captures the effect of policy stance on the loan outcome.

For binary outcomes, such as whether a loan is secured or contains covenants, we use the following probit model:

$$P(D_{i,j,t} = 1) = \Phi(\alpha + \beta MPI_{j,t-1} + \Gamma' X_{i,j,t} + \mu_j + \tau_t) \quad (2)$$

where $D_{i,j,t}$ is a binary indicator for the outcome of interest, and $\Phi(\bullet)$ is the cumulative distribution function of the standard normal distribution. Equation (2) mirrors the OLS specification but accounts for the binary nature of the dependent variable. The use of probit models is in line with prior literature on binary financial outcomes (Bharath et al., 2007; Jiménez et al., 2017; He et al., 2021), which emphasize that binary decisions under uncertainty, such as collateral or covenant use, are best modeled using a normal latent structure.

This identification strategy compares loan terms across different macroprudential regimes, conditional on fixed effects and controls. Country fixed effects account for unobservable structural differences across jurisdictions, while year fixed effects capture global credit cycle trends and macro shocks. Our design thus isolates the within-country, over-time effect of policy tightening.

3.1.2. Macroprudential policy index construction

To quantify regulatory stance over time and across countries, we construct a Macroprudential Policy Index (MPI) that aggregates policy actions using the ECB's Macroprudential Policies Evaluation Database (MaPPED; Budnik & Kleibl, 2018). This index reflects the intensity and direction of macroprudential regulation in a given country-year and is consistent with established approaches in recent empirical literature (e.g., Akinci & Olmstead-Rumsey, 2018; Altunbas et al., 2018; Ćehajić & Košak, 2022; De Schryder & Opitz, 2021; Bergant et al., 2024).

Each MaPPED policy action is coded + 1 for a tightening measure (e.g., increases in capital buffers or stricter LTV/DTI ratios), −1 for a loosening measure (e.g., easing reserve requirements), and 0 for neutral/other actions. The country-year Macroprudential Policy Index (MPI) is the net sum of these codes. In our sample, MPI ranges from − 7 to + 26 and is skewed toward positive values, consistent with the post-GFC tightening momentum in Europe.

To better disentangle the effects of different policy directions, we also construct two disaggregated indicators: MPI Tightening, which counts the total number of tightening actions in a given country-year, and MPI Loosening, which captures the number of loosening actions. These measures allow us to test whether markets respond asymmetrically to regulatory tightening versus easing. In addition, to explore heterogeneity by policy tool, we construct sub-indices for specific instrument types—such as borrower-based, capital-based, and liquidity tools—which we use in robustness and exploratory analyses.

All indices are lagged by one year relative to loan origination to ensure regulatory changes precede contract design decisions and to mitigate simultaneity bias. This assumption, standard in the macroprudential transmission literature, reflects the time required for banks and borrowers to adapt to new rules. Our construction aggregates across instruments to capture the composite regulatory environment faced by intermediaries, consistent with recent cross-country studies (Akinci & Olmstead-Rumsey, 2018; Altunbas et al., 2018; De Schryder & Opitz, 2021).

3.1.3. Control variables

To isolate the effect of macroprudential policy on loan contract terms, we include a comprehensive set of control variables[4] at the loan, borrower, lender, and country levels. These controls, drawn from the literature on loan contracting (e.g., Bae & Goyal, 2009; Qian & Strahan, 2007; Giannetti & Yafeh, 2012), help account for heterogeneity in credit demand, supply, and institutional environments. Table A1 in the Appendix provides variable definitions and sources.

We control for core loan attributes that shape contract design: indicators for loan purpose (acquisition financing, general corporate purposes, leveraged buyouts, project finance, and debt refinancing); loan type (term loans versus revolving credit lines), which typically differ in facility size and maturity; syndicate size (*Lenders*), measured by the number of participating banks, as larger syndicates may require more monitoring provisions due to coordination frictions; currency denomination, indicating whether the loan is in euros (EUR) versus USD or GBP, which can reflect cross-border risk or investor preference; relationship lending (*Relationship*), an indicator for a prior lending relationship between the lead arranger and the borrower, which tends to reduce information asymmetries and soften terms; and lead arranger reputation (*League*), a dummy equal to one when the lead arranger ranks among the top three banks in Bloomberg's European league tables, reflecting monitoring capacity and pricing power. These features capture variation in loan design arising from borrower–lender dynamics, information frictions, and market positioning.

[4] All continuous borrower and lender variables are winsorized at the 1st and 99th percentiles to limit the influence of outliers. Year and industry fixed effects are included throughout to account for global shocks and sector-specific demand patterns.

On the demand side, we include borrower characteristics to account for credit risk and bargaining power: a credit-rating indicator (*Rating*) equal to one when the borrower is rated by Moody's or S&P (Senior Unsecured or LT Issuer rating); size (*Total assets (B)*), measured as the log of total assets; leverage (*Equity/Assets*) as a proxy for financial risk; liquidity (*Current ratio*) as a measure of short-term solvency; and profitability (*ROA (B)*) as an indicator of operating performance. Larger and more transparent firms generally secure better loan terms; controlling for these attributes ensures that the estimated effect of macroprudential policy is not confounded by shifts in borrower quality.

The supply-side response to macroprudential policy may differ depending on bank balance sheet strength and strategic orientation. We control for bank size (*Total assets (L)*), capitalization (*TCE ratio*), loan share (*Loans/Assets*), efficiency (*Efficiency ratio*), and profitability (*ROA (L)*). These bank-level characteristics help capture how macroprudential tools are transmitted through intermediaries with differing capacities, constraints, and risk appetites (e.g., Altunbas et al., 2018; Meuleman & Vander Vennet, 2020).

To absorb macroeconomic and institutional influences on credit supply and contract enforcement, we include GDP growth (*GDP growth*), capturing the credit cycle, financial development (*Private credit to GDP* (bank credit penetration) and *Stock market capitalization to GDP* (depth of capital markets)), legal environment (*Rule of Law* index and *Legal origin* dummy), banking system characteristics (*Z-score* (Banking sector stability) and *Bank concentration* (share of assets held by top 3 banks)). These macroeconomic and institutional controls help disentangle the effects of regulatory stance from broader country-level credit conditions.

3.2. Data and preliminary results

3.2.1. Data sources and sample construction

We construct a novel panel dataset by merging syndicated loan-level data with regulatory, financial, and macroeconomic information. Our analysis focuses on the 1999–2017 period, which aligns with the availability of comprehensive loan data and corresponds to the post-Euro introduction era and the rise of macroprudential frameworks in Europe.

Macroprudential policy actions are drawn from the ECB's Macroprudential Policies Evaluation Database (MaPPED) (Budnik & Kleibl, 2018), which documents over 1,900 policy changes across 28 EU countries from 1995 to 2017. Each action is categorized by instrument type, country, date, and direction (tightening, loosening, or neutral). The sample is restricted to 1999–2017 to align with loan data availability and capture the evolution of modern macroprudential regimes in Europe. We construct the Macroprudential Policy Index (MPI) from this database as described in Section 3.1.

Syndicated loan data are sourced from Bloomberg's database. We extract all loans issued to non-financial corporate borrowers in EU countries between January 1999 and December 2017. For each loan, we observe detailed contract-level variables including the amount, maturity, currency, loan type (term vs. revolving), loan purpose (e.g., general corporate, M&A, project finance), collateral status, and the presence of covenants. We also capture the structure of each syndicate, with a focus on identifying the lead arranger; typically the bank that coordinates due diligence, negotiates terms, and serves as the key contractual counterparty (Bushman & Wittenberg-Moerman, 2012; Ross, 2010). We retain only loans with an unambiguously identified lead arranger, as lender identity is essential for mapping macroprudential policy stance.

To enrich this dataset, we match firm- and bank-level financial characteristics using Bloomberg. For borrowers (mostly listed firms), we extract size (total assets), leverage, liquidity (current ratio), profitability (return on assets), and credit ratings from Moody's or S&P (where available). For lead banks, we collect size, capitalization (TCE ratio), loan portfolio share (loans/assets), efficiency (cost-to-income ratio), and profitability. These variables are used as controls in the empirical models to account for variation in financial health and strategic posture on both the demand and supply sides of the credit relationship.

At the country level, we add macroeconomic and institutional indicators for each borrower's home country from the World Bank's World Development Indicators and Global Financial Development databases. These include GDP growth (as a proxy for the business cycle), Private credit to GDP and stock market capitalization to GDP (as measures of financial development), Rule of law and legal origin (capturing institutional and enforcement environments), Banking system stability (Z-score) and banking sector concentration (market share of top three banks).

After merging all components, our final sample includes 4,857 syndicated loans, 2,423 unique borrowing firms, and 144 distinct lead banks across 19 EU countries. The sample is well-balanced across borrower industries and loan purposes. The years 1999–2017 cover multiple phases of the European credit cycle, including the pre-crisis boom, the 2008–09 Global Financial Crisis (GFC), the 2010–12 sovereign debt crisis, and the post-crisis period of intensified regulatory reform. This time frame therefore captures both structural and cyclical variation in macroprudential policy use.[5]

Figs. 1 and 2 illustrate sample distribution by year and country. Loan issuance follows well-known macro-financial patterns: volumes peak in the mid-2000 s, drop sharply during the GFC, and recover modestly in the 2010 s. Country-level patterns are concentrated in major economies: France, Germany, and Spain together account for 57 % of loans, and the top five (adding the UK and Italy) comprise ~ 75 %. This concentration reflects underlying differences in market depth and financial infrastructure but does not pose a risk to identification, as the dataset includes both advanced and smaller economies.

[5] While MaPPED data ends in 2017, we argue that the key relationships we estimate remain relevant. The subsequent deployment of countercyclical capital buffers during COVID-19, for example, supports the external validity of our findings for more recent and future applications of macroprudential policy. Furthermore, the structure of loan contracts evolves gradually over time, and our identification strategy leverages intra-country, over-time variation rather than trends alone.

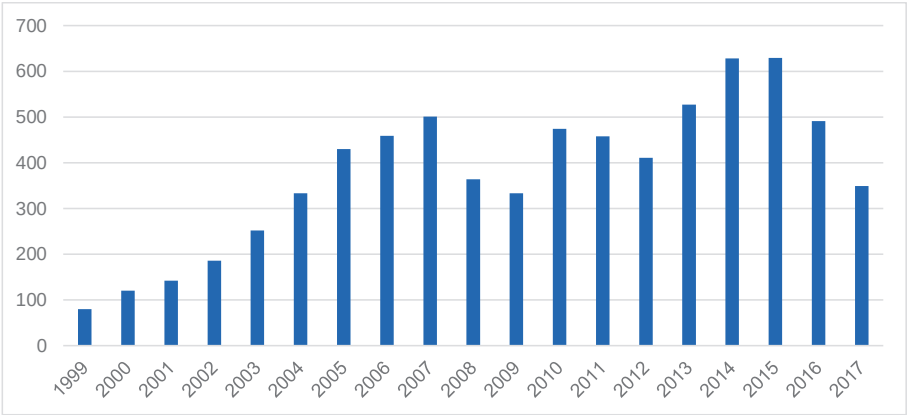

Fig. 1. Loans by year Note: This figure shows the number of syndicated loans in the sample for each origination year. Source: Authors' elaboration based on the data included in the Bloomberg database.

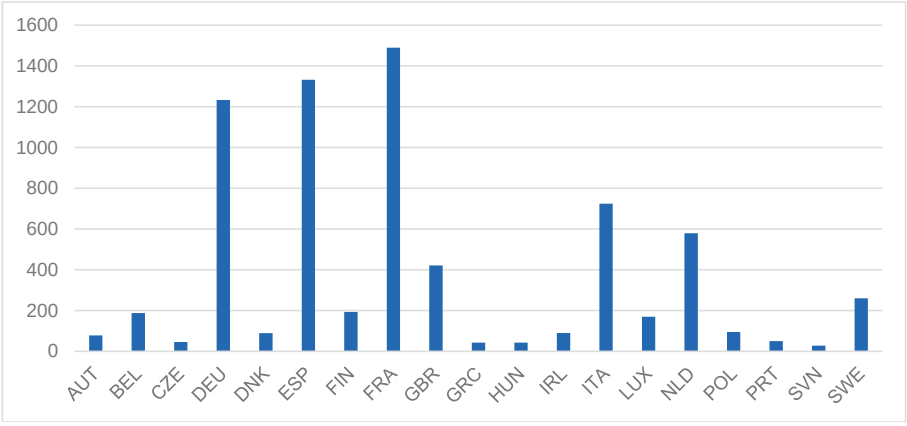

Fig. 2. Loans by country Note: This figure shows the total number of loans by country (borrower). Source: Authors' elaboration based on the data included in the Bloomberg database.

3.2.2. Preliminary descriptive statistics

Table 1 presents summary statistics for the core variables used in our empirical analysis[6]. Panel A focuses on macroprudential policy indicators. The aggregate Macroprudential Policy Index (MPI), which reflects the net number of tightening actions, ranges from –7 to + 26 across country-year observations. The mean value of + 1.1 and a standard deviation of 3.5 indicate a modest upward bias in macroprudential stance during our sample period, consistent with the post-crisis tightening trend across European countries. Though most country-years display relatively few actions (typically 0–2), the distribution is skewed: some years saw intense regulatory activity, with up to 7 tightening or 5 loosening measures. While not shown in the main table, separate indicators for MPI Tightening and MPI Loosening confirm this asymmetric distribution. This variation in policy stance is a core driver of identification in our empirical design. Figs. 3 and 4 provide visual summaries of temporal and cross-country variation in MPI. The average policy stance is predominantly restrictive over time, with a notable spike in 1999, where some countries implemented up to six tightening measures. By country, Greece exhibits the highest average MPI, driven by repeated interventions in the post-2010 period. These patterns suggest both cross-sectional and temporal variation in policy stance, which we exploit in our fixed-effects framework.

Panel B of Table 1 summarizes loan contract characteristics and control variables. The average loan amount is approximately $1.4 billion, though the median is closer to $500 million, reflecting a skew toward larger deals. The average maturity is 6.5 years, with a standard deviation of 3.1 years, suggesting most loans range between 3 and 10 years in duration. Roughly 40 % of loans are secured by collateral, highlighting the prevalence of asset-backed lending in the syndicated market. In contrast, only 4.5 % of loans include explicit covenants, consistent with the rise of covenant-lite structures in the 2000 s, particularly for high-quality borrowers or during risk-on market conditions. These institutional trends are important to interpret any observed impact of regulation on contractual features. Other deal-level features display meaningful variation. The average syndicate size is 9 lenders, but ranges widely from small

[6] Table A2 provides the correlation matrix.

Table 1
Descriptive statistics.

Panel A: descriptive statistics for macroprudential variables					
Variable	**Mean**		**SD**	**Min.**	**Max.**
MPI (t-1)	1.02		1.81	−7.00	26.00
MPI Tightening (t-1)	1.05		1.76	0.00	26.00
MPI Loosening (t-1)	−0.04		0.29	−7.00	0.00
***Panel B:* descriptive statistics for all loan, syndicate, country, borrower, and (lead) lender variables**					
Variable	**Mean**	**SD**	**P25**	**Median**	**P75**
Amount	1400.37	2378.33	92.23	245.86	650.00
Maturity	6.56	3.97	5.00	6.00	7.13
Secured	0.40	0.49	0.00	0.00	1.00
Covenants	0.04	0.20	0.00	0.00	0.00
Loan & Syndicate					
Lenders	9.00	8.20	4.00	7.00	11.00
League	0.15	0.36	0.00	0.00	0.00
Relationship	0.12	0.32	0.00	0.00	0.00
EUR	0.85	0.35	1.00	1.00	1.00
GBP	0.04	0.20	0.00	0.00	0.00
USD	0.07	0.25	0.00	0.00	0.00
Term	0.63	0.48	0.00	1.00	1.00
Revolving	0.34	0.47	0.00	0.00	1.00
Acquisition	0.15	0.35	0.00	0.00	0.00
General corporate	0.17	0.38	0.00	0.00	0.00
LBO	0.16	0.36	0.00	0.00	0.00
Project finance	0.08	0.27	0.00	0.00	0.00
Debt refinancing	0.34	0.47	0.00	0.00	1.00
Country (borrower)					
GDP growth	1.61	2.09	0.60	1.74	2.96
Private credit	102.47	31.94	80.37	94.32	118.55
Stock market	70.34	29.73	47.12	72.40	88.80
Rule of law	1.37	0.47	1.06	1.47	1.75
French legal origin	0.65	0.48	0.00	1.00	1.00
Bank Z score	14.69	5.88	10.80	14.93	18.93
Bank concentration	67.55	14.33	60.55	68.60	76.55
Borrower					
Rating	0.09	0.29	0.00	0.00	0.00
Total assets	6.73	2.87	4.89	7.31	8.78
Equity / Assets	0.41	0.24	0.25	0.37	0.57
Current ratio	0.01	0.01	0.01	0.01	0.02
RoA	1.52	6.31	0.01	0.04	0.12
Lender					
Total assets	13.22	1.45	12.98	13.55	14.02
Loans to assets	0.43	0.15	0.30	0.44	0.57
TCE ratio	0.04	0.02	0.02	0.04	0.05
Efficiency ratio	0.66	0.12	0.57	0.64	0.74
RoA	0.00	0.00	0.00	0.00	0.01

Notes: Variables definitions and sources of the data are available in Table A1 in the Appendix.

bilateral deals to large, multi-bank facilities. Term loans represent about 63 % of the sample, while the remainder are revolving credit facilities or other structures. The most common loan purposes are general corporate financing, debt refinancing (about one-third of all loans), acquisitions, and project finance. Approximately 85 % of loans are denominated in euros, underscoring the unified currency landscape within much of the sample. The remainder are in USD or GBP, often in cross-border deals or when U.S. banks serve as lead arrangers. About 15 % of loans involve a top-tier lead arranger (based on Bloomberg's league tables), and 12 % of deals reflect relationship lending, where the lead arranger had a prior relationship with the borrower. These factors potentially shape loan terms by affecting information asymmetries and bargaining dynamics.

Collectively, these patterns underscore the richness and heterogeneity of our dataset setting the stage for causal estimation of regulatory effects. Crucially, there is no strong ex ante correlation between MPI and basic loan characteristics, which supports the plausibility of our empirical strategy. Nonetheless, some episodes such as waves of tightening in the early 2000 s or post-2010 coincide with shifts in lending volumes or terms, motivating a formal analysis of these relationships.

4. Results

This section presents the core empirical findings of our study. Section 4.1 examines the baseline effects of macroprudential policy on loan contract terms. Section 4.2 investigates heterogeneity across loan characteristics, while Section 4.3 focuses on borrower and lender characteristics. Section 4.4 presents robustness checks, including tests by credit cycle, cross-border status, instrument type, and loan pricing.

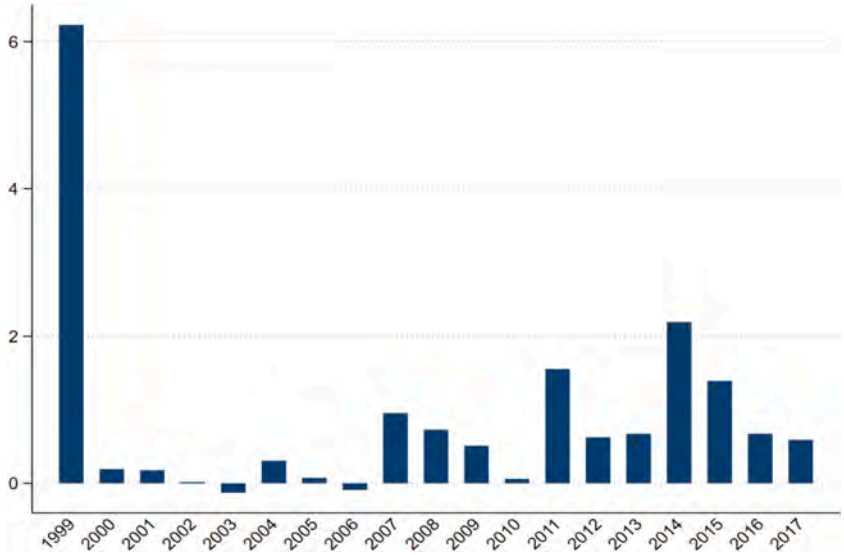

Fig. 3. Macroprudential policy index by year Note: This figure shows the average macroprudential index by year. Source: Authors' elaboration based on the data included in the MaPPED database.

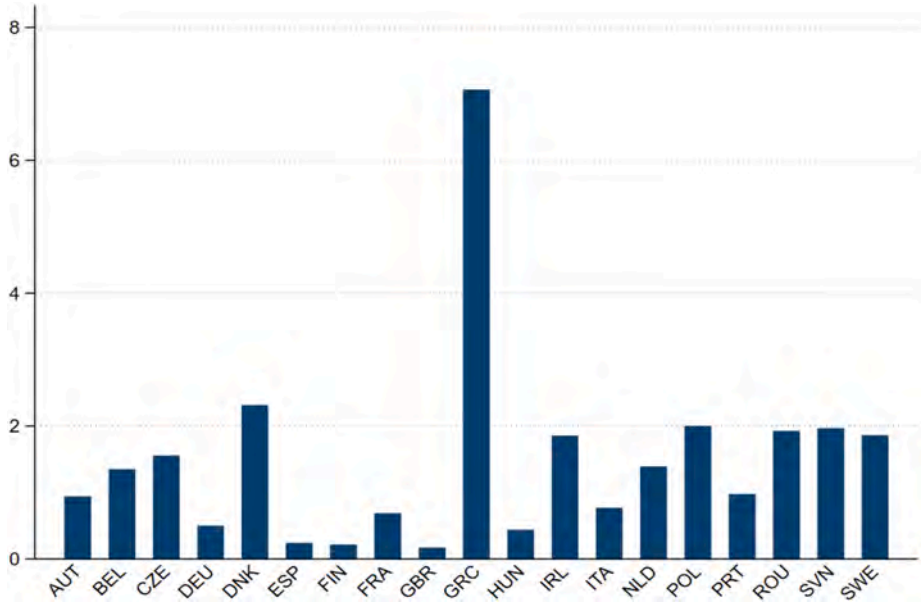

Fig. 4. Macroprudential policy index by country Note: This figure shows the average macroprudential index by country (lead lender). Source: Authors' elaboration based on the data included in the MaPPED database.

4.1. Baseline regression results

Table 2 presents the baseline effects of macroprudential policy measured via the aggregate Macroprudential Policy Index (MPI) on four key syndicated loan contract features: loan amount, maturity, collateral (secured), and covenants. For conciseness, we focus discussion on the estimated coefficients for MPI and its tightening/loosening components, controlling for the full set of covariates and fixed effects described in Section 3.

The baseline results reveal a clear pattern: a more restrictive macroprudential stance increases both loan size and the likelihood of collateralization. In regressions using the overall MPI, the coefficient on MPI is statistically significant and positive for the Secured indicator, and positive, though weaker, for Loan Amount. The implied economic significance is sizeable: a one-standard-deviation increase in MPI (1.81) raises the probability of collateralization by about 12.6 % relative to the sample mean, which corresponds to an increase of roughly 5 percentage points, given that 40 % of loans in our sample are secured on average.

Table 2
The effects of macroprudential policy on corporate loan terms.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants
MPI (t-1)	0.0336	−0.0050	**0.0666*****	0.0435								
	(0.0205)	(0.0080)	**(0.0226)**	(0.0464)								
MPI Tightening (t-1)					**0.0497****	−0.0069	**0.0751*****	0.0591				
					(0.0220)	(0.0085)	**(0.0237)**	(0.0493)				
MPI Loosening (t-1)									−0.1498	0.0217	−0.0403	−0.0274
									(0.0999)	(0.0315)	(0.1088)	(0.1564)
Amount		−0.0106	0.0165	0.3254***		−0.0092	0.0147	0.3257***		−0.0093	0.0181	0.3244***
		(0.0084)	(0.0249)	(0.0438)		(0.0084)	(0.0247)	(0.0438)		(0.0083)	(0.0245)	(0.0439)
Maturity	−0.0459		0.4197***	0.0254	−0.0397		0.4235***	0.0265	−0.0402		0.4220***	0.0227
	(0.0359)		(0.0432)	(0.0493)	(0.0361)		(0.0434)	(0.0495)	(0.0358)		(0.0431)	(0.0492)
Secured	0.0674	0.2055***		0.8323***	0.0616	0.2071***		0.8321***	0.0679	0.2063***		0.8335***
	(0.0574)	(0.0188)		(0.1097)	(0.0573)	(0.0189)		(0.1097)	(0.0571)	(0.0188)		(0.1096)
Covenants	0.7551***	0.0084	0.8786***		0.7611***	0.0081	0.8787***		0.7607***	0.0083	0.8800***	
	(0.1209)	(0.0256)	(0.1175)		(0.1202)	(0.0256)	(0.1174)		(0.1209)	(0.0256)	(0.1167)	
Intercept	8.7930***	0.8387**	−6.2745***	−9.2615***	7.4252***	0.7845***	−1.9667***	−9.2489***	7.4426***	0.7832***	−1.9058***	−9.1265***
	(1.8501)	(0.3635)	(0.7150)	(0.8046)	(0.6913)	(0.2428)	(0.6392)	(0.8022)	(0.6944)	(0.2427)	(0.6342)	(0.7815)
#Loans	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857
R2	0.41	0.22			0.41	0.22			0.41	0.22		
pseudo-R2			0.25	0.21			0.25	0.21			0.25	0.21

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. The main explanatory variables are macroprudential policy indices (MPI). All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the loan facility level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

Decomposing MPI into its Tightening and Loosening components reveals asymmetry: tightening actions significantly raise both loan amount and collateralization, while loosening actions reduce loan size. For loan size, a one-standard-deviation increase in MPI Tightening (1.76) expands facility amounts by 4.1 % of the sample mean. With an average loan size of USD 1.4 billion, this translates into an increase of approximately USD 57 million per facility. For collateralization, tightening actions increase the secured-loan probability by 13.4 % relative to its mean, equivalent to about 5.4 percentage points, again for a one-standard-deviation change in MPI Tightening. These magnitudes demonstrate that the adjustments are economically meaningful in addition to being statistically significant.

While the positive association between tighter regulation and larger loans may appear counter-intuitive, given that macroprudential tightening is typically expected to restrain credit, our evidence suggests compensatory behavior by banks. Confronted with higher capital requirements or lending limits, banks appear to pivot toward larger, collateralized loans in order to preserve profitability. This behavior aligns with both the risk mitigation channel and the profit-compensation motive discussed earlier.

The positive MPI effect on collateral requirements further supports the view that banks respond to tighter regulations by strengthening loan security. This shift toward larger, secured loans indicates a strategic reallocation toward lower-risk borrowers. The pattern resembles the "flight-to-quality" mechanism identified by Jiménez et al. (2017), whereby heightened regulatory pressure discourages lending to marginal borrowers, prompting banks to concentrate on better-capitalized clients who can offer substantial collateral.

Theoretically, these findings support both the risk-taking channel where tighter regulation prompts banks to demand more collateral and an adaptive form of the efficiency channel, whereby banks maintain overall lending volumes by adjusting loan terms. The absence of a contraction in loan size suggests that banks preserve credit activity by reallocating it toward safer exposures, rather than scaling it back.

In summary, macroprudential tightening is associated with increases in both loan amounts (H1) and collateralization (H3), while no systematic effects are found on maturities (H2) or covenants (H4). This result runs counter to the standard bank-lending channel prediction but aligns with recent theoretical and empirical work emphasizing shifts along the intensive margin of lending. In the following subsections, we examine the robustness of this finding and explore heterogeneous effects across borrower, lender, and institutional characteristics.

4.2. The role of heterogeneity in loan contract characteristics and design

We next examine whether the baseline effects of macroprudential policy vary systematically across different types of loan contracts. Table 3 presents results from subsample regressions based on key loan features, including loan size (small vs. large), maturity (short vs. long term), loan type (term loan vs. revolving credit), relationship lending (yes vs. no), and currency denomination (euro vs. non-euro).

Several notable patterns of heterogeneity emerge. First, the effect of macroprudential policy is most pronounced among smaller loans. Splitting the sample at the median loan size, we find that the MPI significantly increases both loan amount and the probability of collateralization in the below-median group. The economic magnitudes are substantial: a one-standard-deviation increase in MPI Tightening raises facility size by 10.2 % of the sample mean and increases the probability of collateralization by 26.9 % relative to the mean. Given that 40 % of loans are secured on average, this corresponds to roughly an 11-percentage-point increase in the likelihood of collateralization. In contrast, the effect largely dissipates for larger loans. For very large facilities, macroprudential tightening is even associated with a modest decrease in loan size. This suggests that banks do not uniformly expand all loans in response to tighter policy but selectively increase mid-sized exposures. One interpretation is that small and mid-sized firms offer more room for secured, profitable lending under regulatory pressure, while the largest deals may already be at scale or carry risks that deter expansion.

Second, we explore heterogeneity by loan maturity. While the baseline regressions showed no strong average effect on maturity, disaggregated results reveal that macroprudential tightening increases collateral requirements primarily for long-term loans. A one-standard-deviation increase in MPI Tightening raises the probability of collateralization for long-maturity loans by 16.7 % of the mean, equivalent to about a 7-percentage-point increase given the baseline secured share. In contrast, for short-term loans, we observe that tighter policy increases loan amount and, to a lesser extent, the incidence of covenants. These patterns suggest that banks manage risk differently depending on loan maturity. For long-term exposures where uncertainty is greater banks respond to tighter regulation by demanding collateral. For short-term loans where monitoring and rollovers are more feasible banks expand size under tightening but may also impose covenants or collateral as precautionary safeguards.

Interestingly, covenants, which are relatively rare overall, tend to appear more frequently in short-term, unsecured loans during loosening periods. This may reflect the use of covenants as a risk-control tool when collateral is absent, and the regulatory environment becomes more permissive. These findings are consistent with a framework of contract adjustment through multiple levers (loan amount, collateral, and covenants) depending on the specific risk-return trade-offs presented by the loan structure.

Other loan characteristics, such as loan type (term loan vs. revolver), relationship status (new vs. repeat borrower), or currency denomination (euro vs. non-euro), show no substantial differential effects. The positive relationship between MPI and both loan amount and collateralization holds across these dimensions. The prevalence of euro-denominated loans in our sample, along with the inclusion of year fixed effects, likely mitigates currency-related variation.

In summary, the heterogeneity analysis reinforces our core findings: macroprudential tightening leads banks to issue larger, more collateralized loans. However, the form of contract adjustment varies by loan design. Collateral plays a central role in long-term loans (supporting H3), covenants see marginal use in short-term, unsecured loans, and loan size increases are concentrated in mid-sized deals (supporting H1). These patterns suggest that banks use differentiated tools to balance regulatory compliance with continued lending, adjusting contract features in context-specific ways.

Table 3
The role of loan contract characteristics and design.

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
						Loan size: Larger loan						
MPI (t-1)	**−0.0481****	−0.0038	0.0230	0.0455								
	(0.0230)	(0.0096)	(0.0325)	(0.0582)								
MPI Tightening (t-1)					−0.0402	−0.0090	0.0274	0.0428				
					(0.0248)	(0.0100)	(0.0341)	(0.0629)				
MPI Loosening (t-1)									−0.1876	0.0855	−0.0588	0.1737
									(0.1147)	(0.0613)	(0.1938)	(0.2573)
#Loans	2283	2283	2283	2283	2283	2283	2283	2283	2283	2283	2283	2283
R2	0.31	0.27			0.31	0.27			0.31	0.27		
pseudo-R2			0.30	0.30			0.30	0.30			0.30	0.30
						Loan size: Smaller loan						
MPI (t-1)	**0.0837*****	−0.0122	**0.1059*****	0.0538								
	(0.0170)	(0.0120)	**(0.0311)**	(0.0799)								
MPI Tightening (t-1)					**0.0903*****	−0.0107	**0.1210*****	0.1052				
					(0.0186)	(0.0130)	**(0.0331)**	(0.0830)				
MPI Loosening (t-1)									0.0411	−0.0270	−0.0668	−0.0739
									(0.0418)	(0.0276)	(0.1117)	(0.1357)
#Loans	2574	2574	2574	2574	2574	2574	2574	2574	2574	2574	2574	2574
R2	0.24	0.21			0.24	0.21			0.23	0.21		
pseudo-R2			0.25	0.37			0.25	0.37			0.24	0.37
						Maturity: Longer maturity						
MPI (t-1)	0.0403	0.0023	**0.0904*****	−0.0065								
	(0.0297)	(0.0069)	**(0.0329)**	(0.0775)								
MPI Tightening (t-1)					0.0450	0.0012	**0.0954*****	0.0417				
					(0.0319)	(0.0076)	**(0.0344)**	(0.0791)				
MPI Loosening (t-1)									−0.0091	0.0012	0.0793	−0.1960
									(0.1039)	(0.0175)	(0.1588)	(0.1601)
#Loans	2192	2192	2192	2192	2192	2192	2192	2192	2192	2192	2192	2192
R2	0.45	0.43			0.46	0.43			0.45	0.43		
pseudo-R2			0.23	0.34			0.23	0.34			0.23	0.34
						Maturity: Shorter maturity						
MPI (t-1)	0.0288	0.0041	**0.0627****	**0.1018****								
	(0.0241)	(0.0096)	**(0.0282)**	**(0.0516)**								
MPI Tightening (t-1)					**0.0576****	0.0048	**0.0768****	0.0813				
					(0.0261)	(0.0100)	**(0.0299)**	(0.0572)				
MPI Loosening (t-1)									**−0.3418***	−0.0059	**−0.2301***	**0.6357****
									(0.1917)	(0.0465)	**(0.1266)**	**(0.2806)**
#Loans	2665	2665	2665	2665	2665	2665	2665	2665	2665	2665	2665	2665
R2	0.43	0.12			0.42	0.12			0.42	0.12		
pseudo-R2			0.17	0.44			0.17	0.44			0.17	0.44
						Loan type: Term loan only						
MPI (t-1)	**0.0448***	0.0010	**0.0836*****	0.0451								
	(0.0243)	(0.0097)	**(0.0265)**	(0.0582)								
MPI Tightening (t-1)					**0.0639****	−0.0005	**0.0946*****	0.0835				
					(0.0259)	(0.0102)	**(0.0279)**	(0.0597)				
MPI Loosening (t-1)									−0.1389	0.0258	−0.0246	−0.1255
									(0.1085)	(0.0400)	(0.1210)	(0.1471)
#Loans	3154	3154	3154	3154	3154	3154	3154	3154	3154	3154	3154	3154

(*continued on next page*)

Table 3 (*continued*)

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
R2	0.42	0.20			0.42	0.20			0.42	0.20		
pseudo-R2			0.23	0.34			0.23	0.34			0.22	0.34
Loan type: Revolving loan only												
MPI (t-1)	0.0253	−0.0134	**0.0515***	0.0111								
	(0.0214)	(0.0096)	**(0.0270)**	(0.0455)								
MPI Tightening (t-1)					**0.0402***	−0.0156	**0.0559****	−0.0071				
					(0.0231)	(0.0103)	**(0.0285)**	(0.0512)				
MPI Loosening (t-1)									−0.1982	0.0122	−0.0432	0.2908
									(0.1284)	(0.0278)	(0.1304)	(0.2134)
#Loans	2858	2858	2858	2858	2858	2858	2858	2858	2858	2858	2858	2858
R2	0.42	0.16			0.43	0.16			0.43	0.16		
pseudo-R2			0.26	0.35			0.26	0.35			0.26	0.35
Loan type: Excluding relationship loans												
MPI (t-1)	0.0258	−0.0034	**0.0768*****	0.0273								
	(0.0213)	(0.0083)	**(0.0236)**	(0.0513)								
MPI Tightening (t-1)					**0.0430***	−0.0049	**0.0855*****	0.0429				
					(0.0230)	(0.0089)	**(0.0249)**	(0.0559)				
MPI Loosening (t-1)									−0.1539	0.0173	−0.0183	−0.0436
									(0.1027)	(0.0316)	(0.1108)	(0.1492)
#Loans	3883	3883	3883	3883	3883	3883	3883	3883	3883	3883	3883	3883
R2	0.40	0.22			0.40	0.22			0.40	0.22		
pseudo-R2			0.25	0.33			0.25	0.33			0.25	0.33
Currency: Loans in EUR only												
MPI (t-1)	**0.0635*****	0.0050	**0.0823*****	0.0528								
	(0.0218)	(0.0087)	**(0.0251)**	(0.0519)								
MPI Tightening (t-1)					**0.0774*****	0.0040	**0.0939*****	0.0784				
					(0.0229)	(0.0092)	**(0.0264)**	(0.0552)				
MPI Loosening (t-1)									−0.1242	0.0235	−0.0566	−0.0425
									(0.1016)	(0.0327)	(0.1059)	(0.1381)
#Loans	3857	3857	3857	3857	3857	3857	3857	3857	3857	3857	3857	3857
R2	0.39	0.22			0.39	0.21			0.39	0.21		
pseudo-R2			0.24	0.33			0.24	0.33			0.24	0.33

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms by considering various sub-samples according to specific loan characteristics. The classification of loans according to their amount (larger vs smaller loan) and their maturity (longer vs shorter maturity) is done using their sample medians (cf. table 1). The main explanatory variables are the macroprudential policy indices (MPI). Significant coefficients are marked in bold. All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. Standard errors are clustered at the loan facility level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

Table 4
The effect of borrower characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants
MPI (t-1)	**0.0515****	−0.0117	0.0133	−0.0288								
	(0.0229)	(0.0096)	(0.0267)	(0.0597)								
MPI Tightening (t-1)					**0.0620*****	−0.0161	0.0140	0.0171				
					(0.0240)	(0.0103)	(0.0272)	(0.0537)				
MPI Loosening (t-1)									**−0.2434***	0.0352	0.0098	**−0.3674***
									(0.1263)	(0.0417)	(0.1681)	**(0.1930)**
Amount		−0.0174*	0.0061	0.3382***		−0.0161*	0.0060	0.3391***		−0.0166*	0.0070	0.3377***
		(0.0094)	(0.0302)	(0.0438)		(0.0094)	(0.0302)	(0.0437)		(0.0095)	(0.0299)	(0.0443)
Maturity	−0.0710*		0.4355***	0.0542	−0.0649*		0.4355***	0.0614	−0.0671*		0.4348***	0.0613
	(0.0387)		(0.0546)	(0.0737)	(0.0382)		(0.0545)	(0.0740)	(0.0386)		(0.0546)	(0.0756)
Secured	0.0136	0.1984***		0.9973***	0.0110	0.1993***		0.9976***	0.0126	0.1989***		0.9947***
	(0.0587)	(0.0209)		(0.1434)	(0.0585)	(0.0209)		(0.1438)	(0.0579)	(0.0210)		(0.1429)
Covenants	0.5842***	−0.0020	0.9754***		0.5832***	−0.0007	0.9744***		0.5601***	0.0036	0.9740***	
	(0.0844)	(0.0408)	(0.1383)		(0.0842)	(0.0409)	(0.1385)		(0.0858)	(0.0414)	(0.1374)	
Rating	0.9514***	−0.0374	−0.0719	−0.1468	0.9541***	−0.0353	−0.0715	−0.1512	0.9535***	−0.0344	−0.0732	−0.1265
	(0.0828)	(0.0363)	(0.1194)	(0.2048)	(0.0821)	(0.0363)	(0.1192)	(0.2044)	(0.0833)	(0.0366)	(0.1192)	(0.2041)
Equity / Assets	−0.0019	0.0433	0.0160	−0.1015	−0.0045	0.0390	0.0165	−0.0978	0.0098	0.0363	0.0178	−0.0619
	(0.1153)	(0.0425)	(0.1192)	(0.2106)	(0.1154)	(0.0426)	(0.1193)	(0.2120)	(0.1152)	(0.0429)	(0.1194)	(0.2090)
RoA	0.0218***	−0.0016	0.0051	0.0008	0.0221***	−0.0016	0.0052	0.0013	0.0216***	−0.0014	0.0049	0.0014
	(0.0055)	(0.0011)	(0.0035)	(0.0055)	(0.0055)	(0.0011)	(0.0035)	(0.0056)	(0.0056)	(0.0012)	(0.0035)	(0.0054)
Current ratio	−1.0454	0.7175	−2.8811	−3.1718	−0.8440	0.9469	−2.8748	−3.2714	−0.9563	0.9882	−2.9195	−3.3573
	(2.6667)	(1.1019)	(4.8900)	(6.0254)	(2.6214)	(1.1128)	(4.8905)	(5.9840)	(2.7951)	(1.0670)	(4.9094)	(5.7190)
Total assets	0.0453***	−0.0019	−0.0070	−0.0067	0.0460***	−0.0015	−0.0070	−0.0053	0.0450***	−0.0011	−0.0073	−0.0047
	(0.0096)	(0.0037)	(0.0114)	(0.0175)	(0.0096)	(0.0037)	(0.0114)	(0.0177)	(0.0098)	(0.0037)	(0.0114)	(0.0175)
Intercept	4.5858***	0.4034**	−5.7036***	−8.7565***	4.8722***	0.5298**	−6.1429***	−8.6425***	4.9550***	0.5031**	−6.1357***	−8.8309***
	(0.8152)	(0.1856)	(0.4152)	(0.7301)	(0.6145)	(0.2401)	(0.5519)	(0.7246)	(0.6098)	(0.2317)	(0.5622)	(0.7603)
#Loans	2313	2313	2313	2313	2313	2313	2313	2313	2313	2313	2313	2313
#Firms	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503	1503
R2	0.49	0.24			0.49	0.24			0.49	0.24		
pseudo-R2			0.26	0.26			0.26	0.26			0.26	0.26

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. The results for the regressions include borrower variables. The main explanatory variables are macroprudential policy indices (MPI). All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the borrower level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

Table 5
The role of borrower characteristics: analysis in subsamples.

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
					Firm size : Larger firms							
MPI (t-1)	0.0451	−0.0030	−0.0262	0.0957								
	(0.0302)	(0.0137)	(0.0355)	(0.0684)								
MPI Tightening (t-1)					**0.0568***	−0.0141	−0.0247	0.0797				
					(0.0313)	(0.0143)	(0.0361)	(0.0751)				
MPI Loosening (t-1)									**−0.7633*****	0.1264	−0.1185	**0.6184****
									(0.2315)	(0.0971)	(0.2828)	**(0.2927)**
#Firms	691	691	691	691	691	691	691	691	691	691	691	691
R2	0.50	0.27			0.50	0.26			0.50	0.26		
pseudo-R2			0.29	0.46			0.29	0.46			0.29	0.46
					Firm size : Smaller firms							
MPI (t-1)	0.0401	−0.0160	0.0213	−0.0920								
	(0.0279)	(0.0122)	(0.0331)	(0.0774)								
MPI Tightening (t-1)					0.0465	−0.0151	0.0292	−0.0085				
					(0.0296)	(0.0134)	(0.0340)	(0.0709)				
MPI Loosening (t-1)									−0.0547	0.0060	−0.0930	**−0.5912*****
									(0.1295)	(0.0356)	(0.1859)	**(0.1935)**
#Firms	753	753	753	753	753	753	753	753	753	753	753	753
R2	0.52	0.22			0.52	0.22			0.52	0.22		
pseudo-R2			0.26	0.39			0.26	0.39			0.26	0.40
					Firm leverage : Higher leverage							
MPI (t-1)	**0.0665****	−0.0031	−0.0066	−0.1220								
	(0.0286)	(0.0098)	(0.0319)	(0.0840)								
MPI Tightening (t-1)					**0.0724****	−0.0016	−0.0127	−0.1169				
					(0.0298)	(0.0102)	(0.0329)	(0.0940)				
MPI Loosening (t-1)									−0.2916	−0.0030	0.2156	−0.3363
									(0.1895)	(0.0733)	(0.1878)	(0.2293)
#Firms	763	763	763	763	763	763	763	763	763	763	763	763
R2	0.49	0.28			0.49	0.28			0.49	0.28		
pseudo-R2			0.28	0.49			0.28	0.49			0.28	0.49
					Firm leverage : Lower leverage							
MPI (t-1)	0.0320	**−0.0237***	0.0467	0.0259								
	(0.0313)	**(0.0144)**	(0.0336)	(0.0695)								
MPI Tightening (t-1)					0.0411	**−0.0350****	**0.0600***	0.0863				
					(0.0336)	**(0.0156)**	**(0.0343)**	(0.0645)				
MPI Loosening (t-1)									−0.2117	0.0437	−0.1280	**−0.3684***
									(0.1378)	(0.0517)	(0.1905)	**(0.2175)**
#Firms	740	740	740	740	740	740	740	740	740	740	740	740
R2	0.51	0.22			0.51	0.22			0.51	0.21		
pseudo-R2			0.29	0.37			0.30	0.37			0.30	0.37
					Firm profitability : Higher profitability							
MPI (t-1)	**0.0602***	−0.0212	0.0033	−0.0325								
	(0.0317)	(0.0170)	(0.0352)	(0.0755)								
MPI Tightening (t-1)					**0.0702****	−0.0228	0.0127	−0.0245				
					(0.0323)	(0.0184)	(0.0351)	(0.0751)				
MPI Loosening (t-1)									**−0.6694****	−0.0732	−0.3974	−0.2219
									(0.3103)	(0.0620)	(0.3743)	(0.4138)
#Firms	642	642	642	642	642	642	642	642	642	642	642	642

(*continued on next page*)

Table 5 (*continued*)

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
R2	0.46	0.24			0.47	0.23			0.47	0.23		
pseudo-R2			0.29	0.39			0.29	0.39			0.29	0.39
					Firm profitability : Lower profitability							
MPI (t-1)	**0.0467***	−0.0115	0.0339	−0.0425								
	(0.0268)	(0.0109)	(0.0331)	(0.0971)								
MPI Tightening (t-1)					**0.0623****	−0.0168	0.0332	0.0571				
					(0.0283)	(0.0113)	(0.0354)	(0.0926)				
MPI Loosening (t-1)									**−0.2270***	0.0200	0.0739	**−0.4081***
									(0.1158)	(0.0575)	(0.1785)	**(0.2421)**
#Firms	833	833	833	833	833	833	833	833	833	833	833	833
R2	0.53	0.26			0.53	0.25			0.53	0.25		
pseudo-R2			0.26	0.48			0.26	0.48			0.26	0.48

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. The regressions include results for sub-samples split according to medians of borrower variables (cf. table 1): total assets, equity / assets, RoA. The main explanatory variables are macroprudential policy indices (MPI). All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the borrower level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

Table 6
The effect of lender characteristics.

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
MPI (t-1)	0.0536	−0.0104	**0.0793*** **	−0.0424								
	(0.0340)	(0.0064)	**(0.0296)**	(0.0493)								
MPI Tightening (t-1)					**0.0682***	**−0.0134***	**0.0787****	−0.0764				
					(0.0368)	**(0.0077)**	**(0.0308)**	(0.0586)				
MPI Loosening (t-1)									**−0.3378***	−0.0092	0.0946	0.1553
									(0.1902)	(0.0254)	(0.2180)	(0.1684)
Amount		−0.0097	0.0520	0.2532***		−0.0101*	0.0533	0.2547***		−0.0108*	0.0591	0.2561***
		(0.0060)	(0.0381)	(0.0487)		(0.0060)	(0.0375)	(0.0492)		(0.0060)	(0.0362)	(0.0484)
Maturity	−0.0428		0.4577***	0.0629	−0.0442		0.4654***	0.0595	−0.0472*		0.4627***	0.0679
	(0.0260)		(0.0491)	(0.0537)	(0.0267)		(0.0495)	(0.0529)	(0.0267)		(0.0498)	(0.0531)
Secured	0.1592*	0.2189***		0.8633***	0.1642*	0.2235***		0.8655***	0.1739*	0.2219***		0.8625***
	(0.0956)	(0.0236)		(0.1544)	(0.0927)	(0.0232)		(0.1537)	(0.0915)	(0.0234)		(0.1578)
Covenants	0.5057***	0.0254	0.9235***		0.5108***	0.0222	0.9228***		0.5008***	0.0249	0.9073***	
	(0.1517)	(0.0272)	(0.1414)		(0.1534)	(0.0283)	(0.1401)		(0.1511)	(0.0283)	(0.1419)	
Bank total asset	0.1738**	−0.0261	0.0478	0.0451	0.1572**	−0.0264	0.0413	0.0447	0.1571**	−0.0258	0.0345	0.0397
	(0.0771)	(0.0202)	(0.0600)	(0.0873)	(0.0679)	(0.0204)	(0.0601)	(0.0865)	(0.0694)	(0.0207)	(0.0598)	(0.0864)
TCE ratio	4.4957	−2.3088*	−1.9347	2.2850	3.5839	−2.3228*	−2.5315	2.3714	3.0743	−2.2153*	−3.5228	1.8204
	(5.6330)	(1.1959)	(3.8684)	(6.6462)	(5.4985)	(1.1766)	(3.9093)	(6.5477)	(5.8092)	(1.1771)	(3.8950)	(6.3322)
Efficiency ratio	0.6997	−0.0759	0.6049	0.3862	0.7335	−0.0806	0.5834	0.3674	0.6213	−0.0708	0.5332	0.4800
	(0.4782)	(0.1012)	(0.5160)	(0.7386)	(0.4756)	(0.1042)	(0.5114)	(0.7333)	(0.4724)	(0.1048)	(0.5020)	(0.7140)
Loans to assets	−0.0949	0.0761	0.6042*	−1.3965***	−0.0088	0.0505	0.6047*	−1.3781***	−0.0683	0.0491	0.6281*	−1.3615***
	(0.4124)	(0.0817)	(0.3449)	(0.5186)	(0.3786)	(0.0859)	(0.3408)	(0.5197)	(0.3788)	(0.0877)	(0.3689)	(0.5192)
RoA	2.5702	−4.3831	31.2052**	46.6383*	−0.9277	−3.4441	30.5935**	47.5067*	1.3640	−4.2033	35.8449***	48.9534*
	(16.1368)	(5.5888)	(12.9631)	(26.0880)	(15.8902)	(5.5407)	(13.0051)	(25.5172)	(16.1650)	(5.4676)	(13.2350)	(26.0195)
Intercept	1.6793	0.9630***	−7.9646***	−8.0975***	2.6343*	1.1047***	−4.1108***	−8.3608***	2.8625**	1.0616***	−3.7730***	−8.4216***
	(2.0128)	(0.3121)	(1.0981)	(1.5973)	(1.3833)	(0.2790)	(1.2038)	(1.4599)	(1.3586)	(0.2705)	(1.2016)	(1.4445)
#Loans	3650	3650	3650	3650	3650	3650	3650	3650	3650	3650	3650	3650
#Banks	144	144	144	144	144	144	144	144	144	144	144	144
R2	0.45	0.23			0.45	0.22			0.45	0.22		
pseudo-R2			0.28	0.21			0.28	0.21			0.28	0.21

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. The results include the regressions including (lead) lender variables. The main explanatory variables are macroprudential policy indices (MPI). All regressions include industry and year dummies, main loan, loan & syndicate, country, and (lead) lender variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the (lead) lender level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

Table 7
The role of lender characteristics: analysis in subsamples.

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
						Lender size : Larger lenders						
MPI (t-1)	0.0491	**−0.0168****	0.0466	−0.0687								
	(0.0378)	**(0.0067)**	(0.0547)	(0.0864)								
MPI Tightening (t-1)					0.0575	**−0.0143***	0.0516	−0.1196				
					(0.0416)	**(0.0072)**	(0.0508)	(0.1046)				
MPI Loosening (t-1)									**−0.6510****	−0.0106	−0.0202	0.2128
									(0.2940)	(0.0579)	(0.4832)	(0.2360)
#Banks	33	33	33	33	33	33	33	33	33	33	33	33
R2	0.50	0.23			0.49	0.23			0.49	0.23		
pseudo-R2			0.29	0.40			0.29	0.40			0.29	0.40
						Lender size : Smaller lenders						
MPI (t-1)	0.0253	−0.0039	**0.0896*****	0.0180								
	(0.0376)	(0.0105)	**(0.0303)**	(0.0617)								
MPI Tightening (t-1)					0.0527	−0.0055	**0.0929*****	0.0273				
					(0.0443)	(0.0121)	**(0.0329)**	(0.0710)				
MPI Loosening (t-1)									−0.0559	−0.0156	0.1226	−0.0214
									(0.1134)	(0.0261)	(0.1447)	(0.1460)
#Banks	90	90	90	90	90	90	90	90	90	90	90	90
R2	0.48	0.24			0.48	0.24			0.48	0.24		
pseudo-R2			0.31	0.33			0.32	0.33			0.31	0.33
						Capital adequacy : Higher TCE						
MPI (t-1)	**0.0585***	**−0.0179***	**0.1484*****	**−0.1732*****								
	(0.0333)	**(0.0091)**	**(0.0336)**	**(0.0656)**								
MPI Tightening (t-1)					0.0491	**−0.0265****	**0.1577*****	**−0.1865****				
					(0.0418)	**(0.0110)**	**(0.0350)**	**(0.0796)**				
MPI Loosening (t-1)									−0.1136	0.0125	0.1639	−0.1912
									(0.1482)	(0.0398)	(0.1354)	(0.1163)
#Banks	86	86	86	86	86	86	86	86	86	86	86	86
R2	0.51	0.28			0.49	0.27			0.49	0.27		
pseudo-R2			0.32	0.46			0.33	0.46			0.32	0.45
						Capital adequacy : Lower TCE						
MPI (t-1)	−0.0666	0.0052	**−0.1135****	0.0168								
	(0.0511)	(0.0123)	**(0.0495)**	(0.0712)								
MPI Tightening (t-1)					0.0084	0.0041	**−0.1276*****	−0.0154				
					(0.0684)	(0.0135)	**(0.0422)**	(0.0797)				
MPI Loosening (t-1)									**−0.9103*****	−0.0500	−0.1581	0.4180
									(0.2590)	(0.0546)	(0.4121)	(0.3371)
#Banks	50	50	50	50	50	50	50	50	50	50	50	50
R2	0.46	0.21			0.45	0.21			0.46	0.21		
pseudo-R2			0.29	0.30			0.29	0.30			0.29	0.30
						Lender efficiency: Higher efficiency						
MPI (t-1)	−0.0048	0.0027	0.0075	0.0646								
	(0.0446)	(0.0129)	(0.0410)	(0.0678)								
MPI Tightening (t-1)					0.0146	0.0049	−0.0111	0.0718				
					(0.0483)	(0.0123)	(0.0387)	(0.0667)				
MPI Loosening (t-1)									**−0.6080*****	−0.0591	0.1220	0.1447
									(0.2283)	(0.0507)	(0.3077)	(0.2557)
#Banks	66	66	66	66	66	66	66	66	66	66	66	66

(*continued on next page*)

Table 7 (*continued*)

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
R2	0.45	0.24			0.45	0.23			0.46	0.23		
pseudo-R2			0.28	0.45			0.28	0.45			0.28	0.44
					Lender efficiency: Lower efficiency							
MPI (t-1)	**0.0782***	**−0.0225****	**0.1111*****	**−0.0991***								
	(0.0467)	**(0.0091)**	**(0.0345)**	**(0.0585)**								
MPI Tightening (t-1)					**0.0904***	**−0.0246****	**0.1212*****	**−0.1384***				
					(0.0518)	**(0.0102)**	**(0.0357)**	**(0.0716)**				
MPI Loosening (t-1)									−0.0656	−0.0074	0.0396	0.0603
									(0.1055)	(0.0196)	(0.1574)	(0.1233)
#Banks	77	77	77	77	77	77	77	77	77	77	77	77
R2	0.50	0.24			0.51	0.25			0.50	0.24		
pseudo-R2			0.33	0.31			0.33	0.31			0.33	0.31
					Lender credit portfolio size : Larger loan portfolio							
MPI (t-1)	0.0627	−0.0023	**0.0901*****	−0.0867								
	(0.0382)	(0.0083)	**(0.0309)**	(0.0723)								
MPI Tightening (t-1)					**0.0942****	−0.0040	**0.1001*****	−0.1218				
					(0.0418)	(0.0096)	**(0.0299)**	(0.0946)				
MPI Loosening (t-1)									−0.2176	0.0191	0.0674	−0.0154
									(0.2093)	(0.0347)	(0.1695)	(0.1467)
#Banks	78	78	78	78	78	78	78	78	78	78	78	78
R2	0.47	0.24			0.47	0.24			0.47	0.24		
pseudo-R2			0.30	0.37			0.30	0.37			0.30	0.37
					Lender credit portfolio size : Smaller loan portfolio							
MPI (t-1)	0.0423	−0.0182	0.0318	−0.0220								
	(0.0492)	(0.0139)	(0.0598)	(0.0906)								
MPI Tightening (t-1)					0.0537	−0.0249	0.0164	−0.0523				
					(0.0519)	(0.0173)	(0.0570)	(0.0843)				
MPI Loosening (t-1)									**−0.6320***	−0.0763	0.0896	0.6875
									(0.3196)	(0.0517)	(0.2882)	(0.6141)
#Banks	39	39	39	39	39	39	39	39	39	39	39	39
R2	0.49	0.24			0.49	0.23			0.49	0.23		
pseudo-R2			0.31	0.38			0.30	0.38			0.30	0.38
					Lender profitability : Higher profitability							
MPI (t-1)	0.0551	**−0.0297****	**0.1273*****	**−0.1250****								
	(0.0493)	**(0.0115)**	**(0.0314)**	**(0.0597)**								
MPI Tightening (t-1)					0.0433	**−0.0350****	**0.1296*****	**−0.1500****				
					(0.0551)	**(0.0134)**	**(0.0360)**	**(0.0743)**				
MPI Loosening (t-1)									−0.1534	**−0.0557****	0.1122	−0.0916
									(0.1376)	**(0.0226)**	(0.1876)	(0.0996)
#Banks	75	75	75	75	76	76	76	75	76	76	76	75
R2	0.49	0.23			0.48	0.23			0.48	0.23		
pseudo-R2			0.37	0.30			0.37	0.30			0.37	0.30
					Lender profitability : Lower profitability							
MPI (t-1)	0.0471	0.0106	0.0221	0.0414								
	(0.0373)	(0.0098)	(0.0401)	(0.0671)								
MPI Tightening (t-1)					**0.0879****	0.0123	0.0257	0.0161				
					(0.0399)	(0.0106)	(0.0405)	(0.0724)				
MPI Loosening (t-1)									**−0.7349*****	0.0536	−0.0435	0.5766
									(0.1410)	(0.0991)	(0.3766)	(0.4525)

(*continued on next page*)

Table 7 (*continued*)

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
#Banks	69	69	69	68	69	69	69	68	69	69	69	68
R2	0.49	0.24			0.48	0.24			0.48	0.24		
pseudo-R2			0.25	0.45			0.25	0.45			0.25	0.45

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. The results cover sub-samples split according to medians of lender variables (cf. table 1): *Lender size: total assets; Lender capital adequacy: TCE ratio; Lender efficiency: efficiency ratio; Lender credit portfolio size: loans / asset; Lender profitability: RoA*. The main explanatory variables are macroprudential policy indices (MPI). All regressions include industry and year dummies, main loan, loan & syndicate, country, and (lead) lender variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the (lead) lender level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

4.3. The role of borrower and lender characteristics

We now explore whether the effects of macroprudential policy differ depending on who the borrower is, and which bank provides the loan. This analysis aims to identify which types of firms benefit (or are constrained) under tighter regulation and which banks are more active in driving observed changes in loan terms. To investigate this, we extend our baseline models by incorporating borrower and lender characteristics and conducting split-sample analyses.

4.3.1. Borrower-side analysis

In Table 4, we augment the baseline regressions by adding borrower-specific financial controls (size, leverage, profitability, and credit rating) and re-estimate the impact of MPI. Including these controls significantly reduces the sample size, as financial information is not available for all firms (e.g., private firms). Nevertheless, within this restricted sample, we continue to observe a significant and positive effect of MPI, particularly MPI Tightening, on loan amount. The implied magnitudes are non-trivial: a one-standard-deviation increase in MPI raises facility size by 3.4 % of the sample mean, while MPI Tightening accounts for a 4.1 % increase. With an average loan size of USD 1.4 billion, these effects correspond to increases of about USD 48–57 million per facility, consistent with H1. Loosening, by contrast, is associated with a decrease in loan size. A one-standard-deviation increase in Loosening lowers loan amounts by 16 % of the sample mean, equivalent to roughly USD 224 million. This confirms the asymmetry observed earlier: tightening actions expand loan size, whereas loosening actions reduce it, and reinforces the direction prediction of H1. These results also suggest that macroprudential policy continues to shape loan amounts even after accounting for borrower credit quality. The effect of MPI on the likelihood of collateralization becomes statistically insignificant once borrower controls are included, although the coefficient remains positive. This attenuation suggests that part of the baseline effect on collateral may reflect changes in borrower composition, specifically, a shift toward firms more likely to post collateral when policy tightens. The borrower-level controls themselves behave as expected: larger, more profitable, and credit-rated firms tend to secure larger loans. These findings provide confidence in the specification and underscore the role of firm fundamentals in credit outcomes.

Table 5 deepens the borrower analysis by splitting the sample along key firm attributes: size, leverage, and profitability. We find that the positive relationship between MPI and loan amount is concentrated among larger and more leveraged firms. Specifically, the effect of a one-standard-deviation increase in MPI Tightening raises loan amounts by about 3.8 % of the mean loan size for large firms and 2.6 % for highly leveraged firms. In levels, this corresponds to loan increases of roughly USD 53 million and USD 36 million, respectively, relative to the sample average loan amount of USD 1.4 billion. For smaller or less-leveraged firms, the effect is muted or statistically insignificant. Profitability does not yield clear differential effects, suggesting that the leverage dimension, rather than income, is more central to the observed credit reallocation. One interpretation is that large, highly leveraged firms often rely heavily on syndicated lending and may be better equipped to meet collateral requirements. These firms may be prioritized by banks under regulatory pressure due to their size, transparency, or existing relationships. Conversely, smaller or low-leverage firms may face fewer constraints and might not be the focus of credit reallocation under tighter policy. The net result is a form of portfolio rebalancing, in which banks shift lending toward fewer, larger, and more leveraged borrowers, those who can support larger secured loans. This finding is consistent with a risk-shifting or flight-to-quality response to macroprudential tightening.

4.3.2. Lender-side analysis

Turning to the supply side, Table 6 includes lender-specific variables (bank size, capitalization (TCE ratio), efficiency, lending intensity (loans/assets), and profitability (ROA)) to examine whether the responsiveness to MPI varies by lender profile. Adding these variables modestly reduces the sample size but allows for richer analysis. The inclusion of lender characteristics restores the statistical significance of MPI's effect on collateral, particularly under tightening. The estimated economic magnitude is considerable: a one-standard-deviation increase in MPI raises the probability that a loan is secured by 16.2 % relative to the mean, equivalent to about 6.5 percentage points given that 40 % of loans are secured on average. For MPI Tightening, the effect is virtually identical, with an economic significance of 16.1 %, again around 6.5 percentage points. These findings provide strong support for H3 once lender heterogeneity is considered. The impact on loan amounts also remains robust. A one-standard-deviation increase in MPI Tightening raises loan size by 4.4 % of the mean, corresponding to an expansion of approximately USD 62 million relative to the average loan size of USD 1.4 billion. Conversely, MPI Loosening reduces loan amounts substantially: the economic significance of –0.217 implies a 21.7 % decrease relative to the mean, or about USD 304 million per facility. These asymmetric effects reinforce H1 by showing that tightening expands facility size while loosening contracts it. The effect on maturity is weaker but still directionally consistent with H2. A one-standard-deviation increase in MPI Tightening shortens maturities by about 2.1 % of the mean, or roughly 0.14 years given an average maturity of 6.6 years. While economically modest, this supports the idea that regulatory pressure can induce lenders to limit longer exposures. Lender characteristics themselves play a notable role. Larger and better-capitalized banks are more likely to provide larger loans, while some traits, such as inefficiency, are associated with greater collateral use, potentially as compensation for operational risk. These results highlight that bank-specific constraints and business models influence the pass-through of macroprudential regulation to loan contract design.

Table 7 presents a split-sample analysis based on lender attributes. We divide loans according to whether the lead arranger ranks above or below the sample median in size, capital adequacy, efficiency, lending intensity, and profitability. The most salient result is that well-capitalized and loan-intensive banks are those driving the increase in loan size and collateralization under tighter policy. These institutions may have greater regulatory flexibility, internal risk buffers, or strategic incentives to maintain loan volumes despite policy constraints. For arrangers with above-median capitalization (TCE ratio), a one-standard-deviation increase in MPI Tightening raises the probability that a loan is secured by 32.1 % of the mean, which translates into about a 13-percentage-point increase given the

Table 8
Robustness checks: samples and variables.

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
Modified sample: Excluding top lead lenders (BNP, DB, UC, SG)												
MPI (t-1)	**0.0623*****	0.0002	**0.0628****	0.0723								
	(0.0221)	(0.0092)	**(0.0249)**	(0.0477)								
MPI Tightening (t-1)					**0.0699*****	−0.0030	**0.0814*****	**0.0997****				
					(0.0235)	(0.0099)	**(0.0266)**	**(0.0485)**				
MPI Loosening (t-1)									0.0071	0.0542	**−0.1737***	−0.0558
									(0.0892)	(0.0346)	**(0.0963)**	(0.1577)
#Loans	2901	2901	2901	2901	2901	2901	2901	2901	2901	2901	2901	2901
R2	0.42	0.25			0.43	0.24			0.42	0.24		
pseudo-R2			0.23	0.33			0.24	0.33			0.23	0.32
Modified sample: Excluding loans originated in 1999												
MPI (t-1)	**0.0346***	−0.0049	**0.0666*****	0.0435								
	(0.0205)	(0.0080)	**(0.0226)**	(0.0464)								
MPI Tightening (t-1)					**0.0470****	−0.0067	**0.0759*****	0.0591				
					(0.0216)	(0.0084)	**(0.0238)**	(0.0493)				
MPI Loosening (t-1)									−0.1461	0.0211	−0.0431	−0.0274
									(0.0997)	(0.0313)	(0.1088)	(0.1564)
#Loans	4414	4414	4414	4414	4414	4414	4414	4414	4414	4414	4414	4414
R2	0.41	0.22			0.41	0.22			0.41	0.22		
pseudo-R2			0.25	0.21			0.25	0.21			0.24	0.21
Modified sample: Excluding (lead) lenders from Greece												
MPI (t-1)	**0.0357***	−0.0059	**0.0677*****	0.0637								
	(0.0208)	(0.0081)	**(0.0230)**	(0.0468)								
MPI Tightening (t-1)					**0.0521****	−0.0072	**0.0773*****	0.0667				
					(0.0219)	(0.0085)	**(0.0238)**	(0.0501)				
MPI Loosening (t-1)									**−0.3074****	0.0218	−0.1304	0.1366
									(0.1298)	(0.0394)	(0.1566)	(0.2278)
#Loans	4404	4404	4404	4404	4404	4404	4404	4404	4404	4404	4404	4404
R2	0.42	0.22			0.42	0.22			0.42	0.22		
pseudo-R2			0.25	0.21			0.25	0.22			0.24	0.22
Modified sample: Excluding loans originated in 1999 & (lead) lenders from Greece												
MPI (t-1)	**0.0367***	−0.0059	**0.0677*****	0.0637								
	(0.0208)	(0.0081)	**(0.0230)**	(0.0468)								
MPI Tightening (t-1)					**0.0494****	−0.0071	**0.0780*****	0.0667				
					(0.0215)	(0.0085)	**(0.0239)**	(0.0501)				
MPI Loosening (t-1)									**−0.3033****	0.0219	−0.1344	0.1366
									(0.1291)	(0.0394)	(0.1569)	(0.2278)
#Loans	4400	4400	4400	4400	4400	4400	4400	4400	4400	4400	4400	4400
R2	0.42	0.22			0.42	0.22			0.42	0.22		
pseudo-R2			0.24	0.21			0.25	0.21			0.24	0.21
Modified sample: Loans originated in the Pre-GFC period												
MPI (t-1)	−0.0365	−0.0080	−0.0458	0.0630								
	(0.0362)	(0.0119)	(0.0377)	(0.0510)								
MPI Tightening (t-1)					−0.0176	−0.0085	−0.0524	**0.0890***				
					(0.0420)	(0.0145)	(0.0428)	**(0.0539)**				
MPI Loosening (t-1)									−0.1024	−0.0121	−0.0464	−0.0490
									(0.1010)	(0.0257)	(0.1107)	(0.1451)
#Loans	2095	2095	2095	2095	2095	2095	2095	2095	2095	2095	2095	2095

(*continued on next page*)

Table 8 (*continued*)

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants	(5) Amount	(6) Maturity	(7) Secured	(8) Covenants	(9) Amount	(10) Maturity	(11) Secured	(12) Covenants
R2	0.41	0.20			0.41	0.20			0.41	0.20		
pseudo-R2			0.31	0.21			0.31	0.21			0.31	0.21
Modified sample: Loans originated in the Post-GFC period												
MPI (t-1)	**0.0542****	−0.0050	**0.0996*****	**−0.2118***								
	(0.0236)	(0.0115)	**(0.0302)**	**(0.1278)**								
MPI Tightening (t-1)					**0.0649*****	−0.0079	**0.1015*****	**−0.2699***				
					(0.0241)	(0.0116)	**(0.0314)**	**(0.1493)**				
MPI Loosening (t-1)									**−0.4517****	0.1506	0.1859	0.4018
									(0.2279)	(0.1159)	(0.1911)	(0.6285)
#Loans	2325	2325	2325	2325	2325	2325	2325	2325	2325	2325	2325	2325
R2	0.48	0.27			0.48	0.27			0.48	0.27		
pseudo-R2			0.23	0.73			0.23	0.73			0.23	0.73
Change in the set of control variables: Excluding main loan variables from the regression												
MPI (t-1)	**0.0358***	−0.0007	**0.0712*****	0.0296								
	(0.0213)	(0.0080)	**(0.0220)**	(0.0439)								
MPI Tightening (t-1)					**0.0519****	−0.0021	**0.0798*****	0.0438				
					(0.0227)	(0.0085)	**(0.0231)**	(0.0483)				
MPI Loosening (t-1)									−0.1546	0.0198	−0.0463	−0.0490
									(0.0999)	(0.0315)	(0.1025)	(0.1209)
#Loans	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857
R2	0.40	0.20			0.40	0.20			0.40	0.20		
pseudo-R2			0.21	0.24			0.21	0.24			0.21	0.24
Change in the set of control variables: Using MPI (Y) instead of MPI (t-1)												
MPI (Y)	**0.0556****	−0.0055	0.0394	0.0301								
	(0.0258)	(0.0092)	(0.0283)	(0.0567)								
MPI Tightening (Y)					**0.0711*****	−0.0090	**0.0581***	0.0618				
					(0.0262)	(0.0099)	**(0.0301)**	(0.0588)				
MPI Loosening (Y)									−0.0931	0.0353	**−0.1963***	−0.1208
									(0.1444)	(0.0383)	**(0.1175)**	(0.1682)
#Loans	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857	4857
R2	0.41	0.22			0.42	0.22			0.41	0.22		
pseudo-R2			0.25	0.21			0.25	0.21			0.25	0.21

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms by considering various sub-samples. Top (lead) lenders are lenders who represent more than 5% of the sample (BNP PARIBAS (FRA): 12.24%, DEUTSCHE BANK (GER): 7.84%, UNICREDIT (ITA): 6.74%, SOCIETE GENERALE (FRA): 6.17%). The pre and post GFC periods are based on the date of 15 September 2008..The main explanatory variables are the macroprudential policy indices (MPI). Significant coefficients are marked in bold. All regressions include industry and year dummies, main loan, loan & syndicate, and country variables, except for "Excluding main loan variables from RHS" where Amount, Maturity, Secured, and Covenants are not included on the RHS. MPI (Y) is the current year variable with respect to the loan year. Standard errors are clustered at the loan facility level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

baseline secured share of 40 %. This is a large and economically meaningful effect, underscoring that well-capitalized institutions are able to preserve lending capacity under regulation by shifting toward collateralized exposures. Similarly, among loan-intensive arrangers (above-median loans/assets), tightening generates substantial adjustments. Facility size rises by 6.3 % of the mean, which corresponds to an increase of roughly USD 88 million relative to the average facility size of USD 1.4 billion. At the same time, the probability of collateralization increases by 20.2 % of the mean, equivalent to an 8-percentage-point increase. These magnitudes highlight that arrangers with a strong lending orientation strategically expand secured lending under regulatory pressure. In contrast, smaller or thinly capitalized banks show weaker responses to MPI. These institutions may curtail lending more uniformly, unable or unwilling to engage in selective risk-shifting. We also observe that less efficient banks display stronger responses in some specifications, perhaps compensating for higher operational risk with safer, collateralized lending under tightening.

The borrower and lender heterogeneity analyses reinforce and nuance our baseline findings. On the borrower side, larger and more leveraged firms are the main beneficiaries of credit expansion under tighter regulation, consistent with a flight-to-quality narrative. On the lender side, large, well-capitalized banks appear to drive the observed increase in loan size and collateralization, suggesting that policy effects may be disproportionately mediated by top-tier institutions. These findings carry implications for macroprudential transmission. First, tightening may inadvertently reinforce the market position of large borrowers and systemically important banks. Second, the credit composition shifts induced by macroprudential tools may not reflect uniform tightening but rather strategic reallocation across borrower and lender types. This selective adaptation could amplify concentration risks or alter competition in corporate credit markets. Overall, the results show robust support for H1 and H3 highlighting that macroprudential policy reshapes not just how much banks lend but to whom and on what terms. We explore these dynamics further in the robustness and institutional heterogeneity analyses that follow.

4.4. Robustness checks and extensions

We conduct a wide range of robustness checks to ensure that the baseline results are not driven by specific banks, countries, or model assumptions, and to explore extensions that deepen the interpretation of our findings. Table 8 summarizes these tests, with further detail in the Appendix.

4.4.1. Top lenders

To test whether our results are driven by large, influential banks, we re-estimate the main regressions excluding the top 5 % of lead arrangers by size and then isolate these top banks in a separate analysis. The results hold qualitatively in both subsamples. Interestingly, the effect of MPI is somewhat more pronounced when top lenders are excluded, consistent with the idea that larger banks more actively engage in risk reallocation (as observed in Section 4.3). These results confirm that no single bank or small group of institutions drives the observed effects, strengthening the external validity of our findings.

4.4.2. Outliers in MPI

We examine whether our results are sensitive to extreme MPI values, specifically, the high number of tightening actions in 1999 and in Greece (see Figs. 3 and 4). Excluding the year 1999 or omitting all loans originating from Greek banks does not materially alter our main results. The coefficients remain stable in magnitude and significance, indicating that the findings are not being driven by a single year or country.

4.4.3. Omitting control groups

To rule out overfitting or multicollinearity concerns, we re-run our baseline regressions excluding different sets of control variables (e.g., macroeconomic indicators, borrower industry fixed effects). The MPI coefficients remain significant and even increase in magnitude, suggesting that including these controls was conservative and did not artificially inflate our results.

4.4.4. Influence of the Global financial crisis (GFC)

Given the timing of macroprudential reforms, we split the sample into pre-GFC (1999–2006) and post-GFC (2010–2017) periods. The results show that the positive effects of MPI on loan amount and collateralization are concentrated in the post-GFC period. In the pre-GFC years, when macroprudential frameworks were less developed and less frequently used, MPI had no statistically significant impact on loan terms. This supports the notion that post-crisis reforms made macroprudential policy a more active and effective tool, and that our MPI measure captures meaningful variation primarily after 2008.

4.4.5. Endogeneity of policy timing

To test whether the timing of policy changes could bias our results, we replace the lagged MPI variable with a contemporaneous version (i.e., MPI at time t). The effects become weaker and lose significance, consistent with the assumption that macroprudential policy takes time (several months to a year) to influence lending behavior. We also re-specify the policy variable using dummies for “any tightening” and “any loosening” (instead of counts). The results are similar: tightening is associated with larger, more secured loans, while loosening is associated with smaller ones. These tests lend further support to our causal interpretation and confirm the appropriateness of our lag structure.

4.4.6. Domestic vs cross-border loans

We assess whether the effect of MPI differs between domestic and cross-border loans. About 71 % of our sample are domestic loans

Table 9
Robustness checks: domestic vs non-domestic loans.

Panel A: domestic loans sub-sample												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants
MPI (t-1)	**0.0621****	−0.0050	**0.0976*****	0.0409								
	(0.0250)	(0.0105)	**(0.0286)**	(0.0575)								
MPI Tightening (t-1)					**0.0728*****	−0.0064	**0.1114*****	0.0762				
					(0.0262)	(0.0111)	**(0.0299)**	(0.0584)				
MPI Loosening (t-1)									−0.0739	0.0010	−0.0877	−0.1024
									(0.1116)	(0.0360)	(0.1123)	(0.1558)
#Loans	3448	3448	3448	3448	3448	3448	3448	3448	3448	3448	3448	3448
R2	0.44	0.22			0.44	0.22			0.44	0.22		
pseudo-R2			0.23	0.21			0.24	0.21			0.23	0.21
Panel B: non-domestic loans sub-sample												
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants	Amount	Maturity	Secured	Covenants
MPI (t-1)	**−0.0798****	−0.0125	−0.0178	0.0416								
	(0.0343)	(0.0135)	(0.0419)	(0.0636)								
MPI Tightening (t-1)					−0.0553	−0.0173	−0.0285	0.0080				
					(0.0380)	(0.0143)	(0.0446)	(0.0720)				
MPI Loosening (t-1)									−0.2877	0.0611	0.0856	**0.8913***
									(0.2230)	(0.0648)	(0.2256)	**(0.5067)**
#Loans	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409	1409
R2	0.44	0.24			0.43	0.24			0.43	0.24		
pseudo-R2			0.32	0.32			0.32	0.33			0.32	0.33

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. Panel A presents the results for the domestic loans sub-sample (i.e. where the (lead) lender and the borrower are from the same country). Panel B presents the results for the non-domestic loans sub-sample (i.e. where the (lead) lender and the borrower are from a different country). All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. The main explanatory variables are macroprudential policy indices (MPI). Significant coefficients are marked in bold. Standard errors are clustered at the loan facility level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

(where the lead arranger and borrower are based in the same country); the remaining 29 % are cross-border. In Table 9, we show that our baseline findings (positive effects of MPI on loan amount and collateralization) hold for domestic loans. However, for cross-border loans, we observe a significant negative effect of MPI on loan amount and no effect on collateral. This suggests that banks are less able or willing to engage in risk-reallocation strategies when lending abroad. The likely reasons include limited collateral enforceability, greater information asymmetry, and differing regulatory environments. These results are consistent with the bank-lending channel in cross-border settings (Ongena et al., 2013, 2021) and highlight the limits of regulatory transmission in an international context.

4.4.7. Macroprudential instrument types

To examine which categories of macroprudential instruments drive our results, we group policy tools into four broad categories following Akinci & Olmstead-Rumsey (2018) and Altunbas et al. (2018). The first category comprises capital-related tools, such as capital buffers and provisioning requirements. The second covers borrower-targeted tools, including loan-to-value and debt-to-income ratios. A third category consists of liquidity-related tools, such as reserve or funding requirements. Finally, a residual group captures other measures, for instance credit growth limits or exposure caps. For each category, we construct indices that distinguish between tightening and loosening actions. Figs. A1 and A2 in the Appendix illustrate the use of these instruments across countries and years, confirming that borrower-targeted measures largely drove the 1999 surge in actions and the repeated policy spikes observed in Greece.

Table 10 presents regression results using the disaggregated indices. We find that capital-based and borrower-targeted instruments drive the increase in loan amount and collateralization, while liquidity and other measures have no significant effects. This finding reinforces the idea that policy tools affecting banks' capital buffers or borrowers' credit conditions are more likely to translate into changes in loan contract design. In contrast, liquidity regulations may influence balance sheet composition or funding, but not necessarily loan terms. These findings support a risk-mitigation and credit-shifting interpretation of macroprudential transmission. Tighter capital and borrower requirements appear to incentivize banks to issue larger and better-secured loans, maintaining profitability while reducing risk exposure. The results also provide granular policy insights: capital and borrower tools are the most effective levers for influencing corporate lending behavior..

4.4.8. Loan spread

Finally, we assess whether macroprudential policy affects loan pricing. Due to limited data availability, this analysis covers only 1,921 loans – a 57 % reduction in sample size. Table 11 presents the results. We find that MPI has a small and statistically insignificant effect on loan spreads. In some specifications, tighter policy is even associated with slightly lower spreads, possibly reflecting the safer profile of collateralized loans. This suggests that loan contract adjustments occurred primarily through non-price margins (loan size and collateral) rather than interest rate changes. Competitive dynamics or borrower bargaining power may have constrained banks' ability to pass on regulatory costs through higher spreads. Instead, banks appear to have managed risk by adjusting contract structure and borrower selection. This further validates our focus on non-price dimensions of loan design.

Across all robustness checks, the positive effects of macroprudential tightening on loan size and collateralization remain significant and economically meaningful. The results are not driven by specific banks, countries, or outlier years; they are strongest in the post-crisis era, concentrated in domestic lending, and primarily shaped by capital- and borrower-based tools. Together, these findings strengthen confidence in our baseline results and provide granular policy insights: macroprudential tightening reshapes corporate lending mainly through contract structure, with distributional effects across loan types, borrower profiles, and lending institutions.

Table 10
The effects of MPI components on corporate loan terms.

	(1) Amount	(2) Maturity	(3) Secured	(4) Covenants
MP: Capital (t-1)	0.0133	−0.0041	**0.0781****	0.0796
	(0.0276)	(0.0117)	**(0.0322)**	(0.0637)
MP: Borrower (t-1)	**0.0847***	**−0.0348***	**0.1871*****	0.0187
	(0.0465)	**(0.0189)**	**(0.0665)**	(0.1514)
MP: Liquidity (t-1)	0.0379	−0.0043	−0.0529	0.0293
	(0.0764)	(0.0211)	(0.0743)	(0.1169)
MP: Other (t-1)	0.0534	0.0085	0.0092	−0.0467
	(0.0457)	(0.0148)	(0.0438)	(0.1030)
#Loans	4857	4857	4857	4857
R2	0.41	0.22		
pseudo-R2			0.25	0.21

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS (Amount and Maturity) and Probit (Secured and Covenants) regressions examining the relationship between macroprudential policy and bank loan terms. The main explanatory variables are the components of macroprudential policy (MP): capital, borrower, liquidity, and other related instruments. All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the loan facility level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

Table 11
Macroprudential policy and loan spread.

	(1)	(2)	(3)
MPI (t-1)	−0.0019		
	(0.0149)		
MPI Tightening (t-1)		−0.0058	
		(0.0162)	
MPI Loosening (t-1)			0.1032
			(0.0938)
#Loans	1921	1921	1921
R2	0.50	0.50	0.50

Notes: This table presents estimated coefficients and standard errors (in parentheses) from OLS regressions examining the relationship between macroprudential policy and loan spread (in bps). The sample average (median) spread equals 235.75 bps (225 bps). The standard deviation equals 156.44. The dependent variable equals the log(Spread). The main explanatory variables are macroprudential policy indices (MPI). All regressions include industry and year dummies, main loan, loan & syndicate, and country variables that are not reported to save space. Significant coefficients are marked in bold. Standard errors are clustered at the loan facility level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively. Definitions and data sources of all variables are provided in Table A1.

5. Discussion and conclusions

This study investigates how macroprudential policy affects the structure of corporate loan contracts. Using a novel panel that combines detailed macroprudential action data with syndicated loan contracts for 1999–2017 in Europe, we examine four core terms: loan amount, maturity, collateral, and covenants, and uncover several important patterns.

Our baseline results show that macroprudential tightening is associated with larger and more frequently collateralized loans. Rather than reducing credit uniformly, banks facing tighter regulatory constraints adjust along the intensive margin: they reallocate lending toward borrowers perceived as safer, typically larger and collateral-rich firms, and strengthen contractual protections. This compensatory adjustment contrasts with the extensive-margin contraction predicted by the traditional bank-lending channel. In other words, banks lend differently under regulation, not necessarily less.

These findings extend the macroprudential transmission literature in several ways. Prior work has concentrated on aggregate credit growth, systemic risk, or bank-level outcomes; our analysis provides evidence at the contract level, revealing how regulatory policies reshape the microstructure of credit relationships. By documenting intensive-margin adjustments, we complement existing studies and support emerging theories of strategic bank optimization under regulatory constraints. The results also highlight a risk-shifting channel, whereby banks preserve profitability and lending activity by reallocating credit to safer exposures rather than cutting supply outright. The evidence underscores the importance of distinguishing between the extensive and intensive margins of lending. Macroprudential tools may reduce the number of loans extended while increasing the size and security of those that are issued. This nuance carries theoretical implications, suggesting that models of regulatory transmission must account not only for total lending volumes but also for how loan structures evolve under prudential pressure.

From a policy perspective, the findings have several implications. For regulators, the evidence suggests that broad-based macroprudential tools reallocate credit toward larger, collateralized borrowers, strengthening systemic resilience but potentially disadvantaged smaller or unrated firms. Policymakers may therefore need to complement such measures with targeted tools, such as SME credit support, to avoid disproportionate tightening for vulnerable segments. For banks, the results highlight the importance of capitalization and efficiency: well-capitalized institutions adapt by expanding secured lending, while weaker banks retrench. This dynamic could reinforce concentration among large arrangers and systemically important borrowers, shifting risks from individual exposures to market segmentation and concentration. For borrowers, the distributional effects are heterogeneous. Large, leveraged firms often retain or even expand access to credit under tighter regimes, while smaller firms face higher barriers and stricter collateral demands.

The results also shed light on the cost–benefit trade-offs of macroprudential policy. On the benefit side, tighter collateralization and a shift toward lower-risk borrowers enhance financial stability. On the cost side, smaller firms may be marginalized from bank credit. Importantly, however, we find no evidence of a generalized credit crunch. Instead, regulation reshapes credit allocation without collapsing it, suggesting that carefully calibrated tools can meet stability objectives while preserving overall lending.

Robustness checks reinforce these conclusions. The results hold across specifications, subsamples, and time periods; they are concentrated in domestic lending and are driven primarily by capital- and borrower-based tools. Liquidity measures appear less relevant for loan contract terms. Interestingly, we find no significant effect on loan spreads, implying that banks adjust to regulatory pressure primarily through non-price margins such as size and collateral, rather than interest rates.

To our knowledge, this is the first study to link the ECB's MaPPED database of macroprudential actions with detailed syndicated loan contracts. By providing a contract-level perspective, we open a new avenue for understanding how regulation transmits to credit relationships. Our focus on the intensive margin and on heterogeneity across borrowers and lenders highlights distributional consequences that have been overlooked in the literature.

Looking ahead, these results offer a cautionary note for policymakers. While macroprudential tools are effective in shaping lending practices, their distributional impact warrants close monitoring. Future research should examine whether these patterns persist in the

post-2017 period, including during the COVID-19 episode and subsequent tightening cycles, and whether contract-level adjustments ultimately improve borrower performance and long-term financial stability.

CRediT authorship contribution statement

Christophe J. Godlewski: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Małgorzata Olszak:** Conceptualization, Data curation, Formal analysis, Writing – review & editing, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

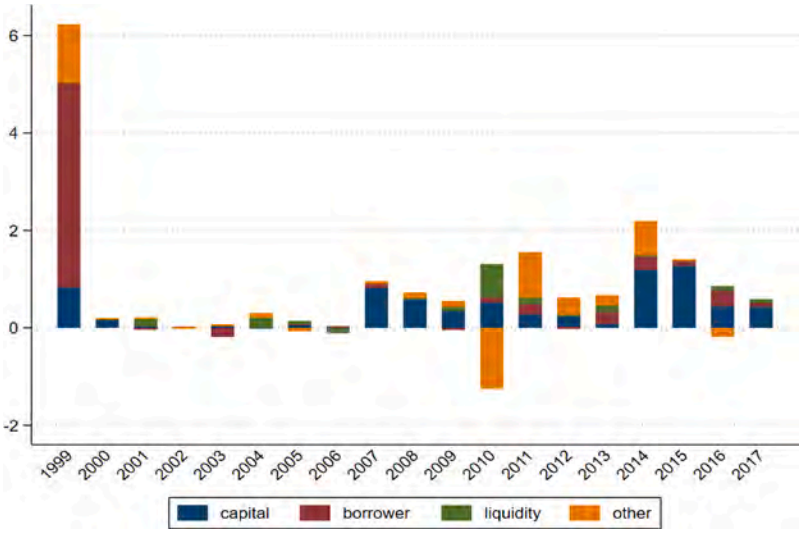

Fig. A1. Macroprudential index decomposition by year

Notes: This figure shows the average macroprudential index components by year.
Source: Authors' elaboration based on the data included in the MaPPED database.

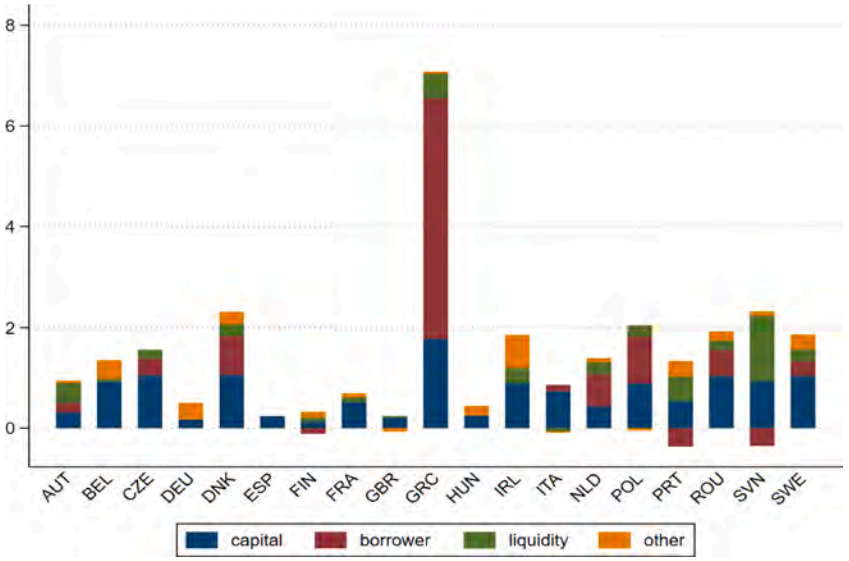

Fig. A2. Macroprudential index decomposition by country

Notes: This figure shows the average macroprudential index components by country (lead lender).
Source: Authors' elaboration based on the data included in the MaPPED database.

Table A1
Definition and sources of all variables.

Variable name	Definition	Source
Macroprudential policy variables		
MPI (t-1)	Macroprudential Policy Index equal to the sum of all macroprudential policy changes	ECB, MaPPED
MPI Tightening (t-1)	Macroprudential Policy Index equal to the sum of all macroprudential policy tightenings	ECB, MaPPED
MPI Loosening (t-1)	Macroprudential Policy Index equal to the sum of all macroprudential policy loosenings	ECB, MaPPED
Main bank loan contracting variables		
Amount	Size of the loan in millions of USD	Bloomberg
Maturity	Maturity of the loan in years	Bloomberg
Secured	=1 if the loan is secured by collateral	Bloomberg
Covenants	=1 if the loan includes financial covenants	Bloomberg
Loan & Syndicate control variables		
Lenders	Number of lenders in the syndicate	Bloomberg
League	=1 if the lead lender is listed among the top 3 of the Bloomberg European League Table	Bloomberg
Relationship	=1 if the borrower and the lead lender of the syndicate had lending relationship in the past 3 years	Bloomberg
EUR	=1 if the loan currency is EUR	Bloomberg
GBP	=1 if the loan currency is GBP	Bloomberg
USD	=1 if the loan currency is USD	Bloomberg
Term	=1 if the loan type is term loan	Bloomberg
Revolving	=1 if the loan type is revolving	Bloomberg
Acquisition	=1 if the loan purpose is acquisition	Bloomberg
General corporate	=1 if the loan purpose is general corporate	Bloomberg
LBO	=1 if the loan purpose is leverage buy out	Bloomberg
Project finance	=1 if the loan purpose is project finance	Bloomberg
Debt refinancing	=1 if the loan purpose is debt refinancing	Bloomberg
Country (borrower) control variables		
GDP growth	GDP growth (% annual)	World Bank
Private credit	Private credit by deposit money banks and other financial institutions to GDP	World Bank
Stock market	Total value of all listed shares in a stock market as a percentage of GDP	WGI
Rule of law	This indicator refers to "the extent to which agents have confidence in and abide by the rules of society." (ranging from −2.5 to 2.5)	WGI
French legal origin	=1 if country legal origin is French law	World Bank
Bank Z score	Z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns	World Bank
Bank concentration	Assets of three largest commercial banks as a share of total commercial banking assets.	World Bank
Borrower control variables		

(*continued on next page*)

Table A1 (*continued*)

Variable name	Definition	Source
Rating	= 1 if a borrowing firm has a rating (Moody's or S&P, Senior Unsecured Debt or LT Issuer Credit)	Bloomberg
Total assets (B)	Total assets of the borrowing firm (in millions USD, in log)	Bloomberg
Equity / Assets	Total common equity to total assets of the borrowing firm	Bloomberg
Current ratio	Current assets to current liabilities of the borrowing firm	Bloomberg
RoA (B)	Return on assets of the borrowing firm	Bloomberg
Lead lender control variables		
Total assets (L)	Total assets of the lead lender (in millions USD, in log)	Bloomberg
Loans to assets	Total loans to total assets of the lead lender	Bloomberg
TCE ratio	Total Common Equity to total assets of the lead lender	Bloomberg
Efficiency ratio	Non-interest expenses to total revenues of the lead lender	Bloomberg
RoA (L)	Return on assets of the lead lender	Bloomberg

Notes: This table provides the definitions of all variables. Macroprudential policy variables come from MaPPED. Country variables come from World Bank. All other variables come from Bloomberg. All MP are computed by year and by country. (t-1) refers to a 1-year lag of the MP variables with respect to the year of loan origination.

Table A2
Correlation matrix.

		1.	2.	3.	4.	5.	6.	7.
1.	MPI (t-1)	1.00						
2.	MPI Tightening (t-1)	0.99	1.00					
		(0.00)						
3.	MPI Loosening (t-1)	0.24	0.08	1.00				
		(0.00)	(0.00)					
4.	Amount	0.01	0.00	0.00	1.00			
		(0.32)	(0.64)	(0.72)				
5.	Maturity	−0.04	−0.04	0.00	−0.02	1.00		
		(0.00)	(0.00)	(0.81)	(0.00)			
6.	Secured	0.05	0.06	−0.00	−0.02	0.26	1.00	
		(0.00)	(0.00)	(0.57)	(0.01)	(0.00)		
7.	Covenants	−0.05	−0.05	−0.03	0.01	−0.00	0.09	1.00
		(0.00)	(0.00)	(0.00)	(0.07)	(0.87)	(0.00)	

Notes: This table provides the correlation matrix for main variables of interest. Definitions and data sources of all variables are provided in Table A1.

Data availability

The authors do not have permission to share data.

References

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., Olmstead-Rumsey, J., 2018. How effective are macroprudential policies? An empirical investigation. J. Financ. Intermed. 33, 33–57.

Altunbas, Y., Binici, M., Gambacorta, L., 2018. Macroprudential policy and bank risk. J. Int. Money Financ. 81, 203–220.

Apergis, N., Aysan, A.F., 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.

Bae, K.H., Goyal, V.K., 2009. Creditor rights, enforcement, and bank loans. J. Financ. 64 (2), 823–860.

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

Berger, A.N., Udell, G.F., 1995. Relationship Lending and Lines of Credit in small firm Finance. J. Bus. 68 (3), 351–381.

Bernanke, B.S., Gertler, M., 1995. Inside the Black Box: the Credit Channel of Monetary Policy Transmission. J. Econ. Perspect. 9 (4), 27–48.

Besanko, D., & Thakor, A. V. (1987). Collateral and Rationing : Sorting Equilibria in Monopolistic and Competitive Credit Markets. *International Economic Review, Vol . 28 , No . 3 (Oct ., 1987), pp . 671-689* .

Bester, H. (*1985*). Screening vs . Rationing in Credit Markets with Imperfect Information. *The American Economic Review,* Vol . 75 , No . 4 (Sep ., 1985), pp . 850-855.

Bharath, S., Dahiya, S., Saunders, A., Srinivasan, A., 2007. So what do I get? the bank's view of lending relationships. J. Financ. Econ. 85 (2), 368–419.

Borio, C., Zhu, H., 2012. Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism? J. Financ. Stab. 8 (4), 236–251.

Budnik, K.B., Kleibl, J., 2018. Macroprudential Regulation in the European Union in 1995-2014: introducing a New Data Set on Policy Actions of a Macroprudential Nature. SSRN Electron. J. 2123.

Burietz, A., Ongena, S., & Picault, M. (2023). Taxing banks leverage and syndicated lending: A cross-country comparison. *International Review of Law and Economics*, *73*(October 2022), 106103.

Bushman, R.M., Wittenberg-Moerman, R., 2012. The Role of Bank Reputation in "Certifying" Future Performance Implications of borrowers' Accounting Numbers. J. Account. Res. 50 (4), 883–930.
Calem, P., Correa, R., Lee, S.J., 2020. Prudential policies and their impact on credit in the United States. J. Financ. Intermed. 42, 100826.
Ćehajić, A., Košak, M., 2021. Macroprudential measures and developments in bank funding costs. Int. Rev. Financ. Anal. 78.
Ćehajić, A., Košak, M., 2022. Bank lending and small and medium-sized enterprises' access to finance – Effects of macroprudential policies. J. Int. Money Financ. 124.
Cerutti, E., Claessens, S., Laeven, L., 2017. The use and effectiveness of macroprudential policies: New evidence. J. Financ. Stab. 28, 203–224.
CGFS, Committee on the Global Financial System. (2012). Operationalising the selection and application of macroprudential instruments. *CGFS Papers* (Issue 48).
Chen, M., Kang, Q., Wu, J., Jeon, B.N., 2022. Do macroprudential policies affect bank efficiency? evidence from emerging economies. J. Int. Financ. Mark. Inst. Money 77 (February).
Claessens, S., Ghosh, S.R., Mihet, R., 2013. Macro-prudential policies to mitigate financial system vulnerabilities. J. Int. Money Financ. 39 (January), 153–185.
Cuciniello, V., Iasio, N.D., 2024. Determinants of the Credit Cycle: a Flow Analysis of the Extensive Margin. J. Money Credit Bank. 2445.
Davis, E.P., Karim, D., Noel, D., 2022. The effects of macroprudential policy on banks' profitability. Int. Rev. Financ. Anal. 80.
de Haan, J., Schoenmaker, D., Wierts, P., 2020. *Financial Markets and institutions: a European Perspective*, 4th ed. Cambridge University Press, Cambridge.
De Schryder, S., Opitz, F., 2021. Macroprudential policy and its impact on the credit cycle. J. Financ. Stab. 53, 100818.
Delis, M.D., Hasan, I., Mylonidis, N., 2017. The Risk-taking Channel of Monetary Policy in the U.S.: evidence from Corporate Loan Data. J. Money Credit Bank. 49 (1), 187–213.
Diamond, D.W., Rajan, R.G., 2001. Liquidity risk, liquidity Creation, and Financial Fragility: a Theory of Banking. J. Polit. Econ. 109 (2), 287–327.
Kahou, M.E., Lehar, A., 2017. Macroprudential policy: A review. J. Financ. Stab. 29, 92–105.
Ely, R.A., Tabak, B.M., Teixeira, A.M., 2021. The transmission mechanisms of macroprudential policies on bank risk. Econ. Model. 94.
ESRB, European Systemic Risk Board, 2014. The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector. European Systemic Risk Board 1–241.
ESRB, European Systemic Risk Board. (2021). *A Review of Macroprudential Policy in the EU in 2020*, *July*.
Gaganis, C., Galariotis, E., Pasiouras, F., Staikouras, C., 2021. Macroprudential regulations and bank profit efficiency: international evidence. J. Regul. Econ. 59 (2), 136–160.
Galati, G., Moessner, R., 2013. Macroprudential policy - a literature review. J. Econ. Surv. 27 (5), 846–878.
Galati, G., Moessner, R., 2018. What do we know about the Effects of Macroprudential Policy? Economica 85 (340), 735–770.
Gambacorta, L., Shin, H.S., 2018. Why Bank Capital matters for Monetary Policy. J. Financ. Intermed. 35, 17–29.
Gambacorta, L., Murcia, A., 2020. The impact of macroprudential policies in Latin America : an empirical analysis using credit registry data. J. Financ. Intermed. 42.
Gebauer, S., Mazelis, F., 2023. Macroprudential regulation and leakage to the shadow banking sector. Eur. Econ. Rev. 154, 104404.
Giannetti, M., Yafeh, Y., 2012. Contracting Parties Matter? evidence from Syndicated Bank loans. Manag. Sci. 58 (2), 365–383.
Gomes, A., Phillips, G., 2012. Why do public firms issue private and public securities? J. Financ. Intermed. 21 (4), 619–658.
He, Z., Qiao, G., Zhang, L., Zhang, W., 2021. Regulator supervisory power and bank loan contracting. J. Bank. Financ. 126, 106062.
Holmström, B., Tirole, J., 1997. Financial Intermediation, Loanable Funds, and the Real Sector. Q. J. Econ. 112 (3), 663–691.
Jiménez, G., Ongena, S., Peydró, J.L., Saurina, J., 2017. Macroprudential policy, countercyclical bank capital buffers, and credit supply: evidence from the spanish dynamic provisioning experiments. J. Polit. Econ. 125 (6), 2126–2177.
Kashyap, A.K., Stein, J.C., 2000. What do a million observations on banks say about the transmission of monetary policy? Am. Econ. Rev. 90 (3), 407–428.
Lim, C., Columba, F., Costa, A., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T., & Wu, X. (2011). Macroprudential policy: What instruments and how to use them? *IMF Working Paper* 11/238.
Lubello, F., Rouabah, A., 2024. Securitization, shadow banking system and macroprudential regulation: a DSGE approach. Econ. Model. 131, 106603.
LSEG Data & Analytics. (2024). GLOBAL SYNDICATED LOANS.
Meuleman, E., Vander Vennet, R., 2020. Macroprudential policy and bank systemic risk. J. Financ. Stab. 47, 100724.
Olszak, M., Roszkowska, S., Kowalska, I., 2018. Macroprudential policy instruments and procyclicality of loan-loss provisions – Cross-country evidence. J. Int. Financ. Mark. Inst. Money 54.
Ongena, S., Popov, A., Udell, G.F., 2013. "When the cat's away the mice will play": does regulation at home affect bank risk-taking abroad? J. Financ. Econ. 108 (3), 727–750.
Ongena, S., Saffar, W., Sun, Y., Wei, L., 2025. Movables as collateral and corporate credit: Loan-level evidence from legal reforms across Europe. J. Bank. Financ. 170, 107331.
Ongena, S., Schindele, I., Vonnák, D., 2021. In lands of foreign currency credit, bank lending channels run through? J. Int. Econ. 129, 103435.
Paligorova, T., Santos, J.A.C., 2017. Monetary policy and bank risk-taking: evidence from the corporate loan market. J. Financ. Intermed. 30, 35–49.
Qian, J., Strahan, P.E., 2007. How laws and institutions shape financial contracts: the case of bank loans. J. Financ. 62 (6), 2803–2834.
Ross, D.G., 2010. The "Dominant Bank effect:" how high lender reputation affects the information content and terms of bank loans. Rev. Financ. Stud. 23 (7), 2730–2756.
Stiglitz, J.E., Weiss, A., 1981. Credit Rationing in Markets with Imperfect Information. Am. Econ. Rev. 71 (3), 393–410.
Sufi, A., 2007. Information Asymmetry and Financing Decisions: evidence from Syndicated loans. J. Financ. 62 (2), 629–668.
Yang, J.Y., Suh, H., 2023. Heterogeneous effects of macroprudential policies on firm leverage and value. Int. Rev. Financ. Anal. 86, 102554.