



Macprudential policy, debt and social sustainability: Evidence from Spanish firms

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ABSTRACT

The need for a resilient financial system post-Great Recession led to the incorporation of macroprudential tools to the policy mix. While these policies aim to achieve financial stability, their potential impact on social sustainability deserves examination. This paper pursues two related objectives. First, it analyses the effects of macroprudential policy on firm-level credit growth in Spain. Second, it examines whether these credit effects are associated with changes in employment-based gender inequality within firms. The analysis uses panel regressions with data for more than 900,000 Spanish firms over the period 2010 to 2021, combined with a database on the loosening or tightening use of macroprudential measures in Spain during that period. We find that tightening macroprudential measures reduce firm-level debt growth and are associated with a narrowing of the gender gap in firms' workforces, while loosening measures have the opposite effects. These results suggest that macroprudential policy may have indirect effects on social sustainability through its impact on corporate debt.

1. Introduction

The resilience of the financial system has emerged as a cornerstone of sustainable economic growth, particularly in the wake of the 2008 Global Financial Crisis. This watershed moment prompted a fundamental reassessment of financial regulation, leading to the introduction of new regulatory frameworks that extend beyond traditional macroeconomic policies. At the forefront of these reforms are macroprudential measures, which represent a systematic approach to maintaining financial stability by addressing systemic risks and controlling excessive credit expansion. While these policies have shown promise in promoting long-term economic stability (Hodula & Ngo, 2022), their compatibility with sustainable economic growth remains a subject of intense academic and policy debate.

The theoretical foundations of macroprudential regulation present a complex picture of potential benefits and drawbacks. Carrasco-Gallego (2021) develops a comprehensive framework highlighting how these interventions might inadvertently destabilize markets under certain economic conditions. The author argues that the effectiveness of macroprudential tools depends critically on the nature and origin of economic shocks, suggesting that a one-size-fits-all approach to financial regulation may be suboptimal. This perspective gains additional significance when considered alongside recent research by Chan et al. (2024), which identifies potential conflicts between macroprudential measures and the ongoing transition to a green economy. Their analysis reveals how certain

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regulatory requirements might inadvertently discourage investment in sustainable technologies and infrastructure, thereby potentially impeding crucial structural economic changes.

The practical implementation of macroprudential policies raises equally important concerns about their distributional consequences. A growing body of empirical evidence suggests that efforts to reduce financial vulnerabilities through these policies may have the unintended effect of widening credit access disparities among different social groups. This phenomenon has been documented in several influential studies, including work by [Frost and Van Stralen \(2018\)](#), [Peydró et al. \(2020\)](#), and [Acharya et al. \(2022\)](#), which consistently demonstrate a positive correlation between macroprudential policy implementation and increasing income inequality.

The relationship between macroprudential regulation and social inequality appears particularly pronounced in economies with highly developed financial sectors and significant international exposure. [Konstantinou et al. \(2022\)](#) provide a detailed analysis of this phenomenon, showing how the complexity and interconnectedness of modern financial systems can amplify the distributional effects of regulatory interventions. Their research suggests that the transmission mechanisms through which macroprudential policies affect different socioeconomic groups are more complex than previously understood, with implications for both income and wealth distribution.

A particularly illuminating case study comes from South Korea, where [Park and Kim \(2023\)](#) examine the effects of loan-to-value (LTV) ratio restrictions on household wealth distribution. Their findings reveal that tighter LTV requirements disproportionately affect lower-income households, who typically have fewer alternative financing options and less accumulated wealth to buffer against credit constraints. This research provides concrete evidence of the regressive nature of certain macroprudential tools, raising fundamental questions about the trade-offs between financial stability and social equity.

These distributional concerns have gained increased prominence as policymakers and researchers grapple with the broader implications of financial regulation. The emerging consensus, reflected in recent publications by international organizations ([IMF, 2024](#)) and academic researchers ([Ozili and Ternemba, 2023](#); [Dinh et al., 2024](#)), suggests that financial stability cannot be pursued in isolation from other social and economic objectives. This perspective represents a significant evolution in regulatory thinking, acknowledging that the effectiveness of macroprudential policy must be evaluated not only in terms of its impact on financial stability but also its contribution to inclusive and sustainable economic development.

The challenge, therefore, lies in designing regulatory frameworks that can simultaneously promote financial stability and social sustainability. This requires a more nuanced understanding of how macroprudential tools interact with existing social and economic inequalities, and how their implementation can be calibrated to minimize adverse distributional effects. Some researchers suggest incorporating explicit social welfare considerations into the design of macroprudential policies, while others advocate for complementary measures to offset their regressive impacts.

Unlike studies focused solely on credit access ([Ayyagari et al., 2018](#); [Čehajić & Košak, 2022](#)), we demonstrate broader social sustainability implications of these policies. Our research aligns with emerging literature on the unintended consequences of macroprudential measures ([Malovaná et al., 2023](#); [Richter et al., 2019](#)) and extends it to the realm of gender equality in the workforce.

Our research reveals that macroprudential policies affect gender inequality primarily through their impact on corporate debt. These findings extend previous work on macroprudential policies' effects on credit growth (e.g., [Akinci & Olmstead-Rumsey, 2018](#); [Cerutti et al., 2017](#); [Gambacorta & Murcia, 2020](#)), income inequality (e.g., [Acharya et al., 2022](#); [Frost & Van Stralen, 2018](#); [Peydró et al., 2020](#)), the financial accelerator theory and credit rationing dynamics ([Berger, Saunders, Scalise, & Udell, 1998](#); [Kashyap & Stein, 2000](#)). We show that tighter macroprudential measures—such as stricter lending standards—can disproportionately affect hiring and resource distribution, especially for female-led initiatives, potentially worsening gender disparities. Insights from labour market segmentation and gender bias literature ([Baker & Wurgler, 2007](#); [Demirguc-Kunt et al., 2015](#)) indicate that limited access to finance can further restrict women's opportunities, particularly where credit is crucial for advancement. Additionally, studies on the broader socio-economic impacts of financial regulation ([Kiyotaki & Moore, 1997](#); [Acharya et al., 2009](#)) and market dynamics ([Beck et al., 2000](#)) reinforce the importance of considering both income and gender inequality, strengthening our understanding of the nuanced relationship between financial regulation and gender disparities. This contributes to the growing body of work examining the intersection of financial regulation and social outcomes ([Konstantinou et al., 2022](#); [Park & Kim, 2023](#)). Our findings are particularly relevant in the context of recent studies highlighting the gendered impacts of economic shocks and policy responses ([Landivar et al., 2020](#); [Carli, 2020](#)).

By demonstrating the link between macroprudential policies, corporate debt, and gender inequality, our research highlights the need for policymakers to consider potential unintended consequences on social equity when implementing financial stability measures, echoing calls for more holistic approaches to financial regulation ([Alguindigue, 2020](#); [Hodula & Ngo, 2022](#)).

Spain constitutes a particularly relevant case study within the euro area. As the fourth largest economy in the monetary union, with a bank-based financial system and a business structure dominated by small and micro firms, Spain offers an informative setting for analysing the firm-level transmission of macroprudential policy. The period 2010–2021 covers both the implementation of post-crisis macroprudential reforms and a full economic cycle up to the pandemic, providing sufficient variation in policy actions to identify their effects.

This paper addresses two related empirical questions. First, we examine how macroprudential policy affects firm-level credit growth in Spain, distinguishing between short-term, long-term and total debt growth and allowing for heterogeneous effects across firms of different size and age. Second, we investigate whether these credit effects are associated with changes in employment-based gender inequality within firms, and whether corporate debt constitutes a transmission channel through which macroprudential policy reaches social sustainability outcomes. These two objectives are connected: the debt analysis is not a separate contribution but the first step in identifying the mechanism through which macroprudential policy may affect gender inequality.

The structure of this paper is designed to provide a comprehensive exploration of the topics at hand. Following this introduction, we

delve into the literature review to situate our study within the broad academic discourse. Next, Section 3 outlines the data sources and variables employed in the analysis. In Section 4 we present the empirical methodology elaborating on the specifications used. The results section follows, drawing substantive inferences on the impact of macroprudential policies on social equity and firm behavior in the Spanish context. In Section 6, we perform an additional robustness analysis that allows us to understand the empirical results described in Section 5. Section 7 summarizes our key findings, discusses their main policy implications, and suggests avenues for future research.

2. Related literature

Our study contributes to the growing body of literature examining the impact of macroprudential regulation on financial stability and economic outcomes. The theoretical foundation of macroprudential policies lies in their ability to mitigate systemic risk and enhance financial stability. This is rooted in the financial accelerator theory (Bernanke et al., 1999), which posits that financial market imperfections can amplify economic shocks. Macroprudential measures aim to counteract these amplification mechanisms.

Empirical studies have largely supported this theoretical premise. Akinci and Olmstead-Rumsey (2018), Cerutti et al. (2017), Crowe et al. (2013), and Lim et al. (2011) demonstrate that macroprudential measures reduce the likelihood of financial crises. However, the theoretical trade-off between financial stability and economic growth is highlighted by studies such as Cosimano and Hakura (2011), Duygan-Bump et al. (2015), and Francis and Osborne (2012), who argue that regulatory changes might reduce credit supply, potentially hampering economic activity.

The theoretical channel through which macroprudential policies affect firm behavior is primarily through their impact on credit availability and cost. This builds on theories of financial intermediation and credit rationing (Stiglitz & Weiss, 1981). Recent empirical work has explored these dynamics. Calem et al. (2020) and Gambacorta and Murcia (2020) show that macroprudential policies significantly influence bank lending and credit growth. Poghosyan (2020) finds asymmetric effects of tightening versus loosening policies on credit growth in the EU. Our study extends this literature by examining how these credit dynamics translate into firm-level outcomes in Spain, particularly focusing on debt structure and growth.

The impact of macroprudential policies on smaller and younger firms is of particular interest, given their greater reliance on bank financing. Čehajić and Košak (2022) demonstrate that these policies particularly affect SMEs' access to bank finance, highlighting the importance of firm size in this context. Ayyagari et al. (2018) show that younger and smaller firms are significantly affected by macroprudential regulations, emphasizing the need to understand the trade-off between financial regulation and economic development.

Our research contributes to this literature by utilizing firm-level data from Spain, allowing for a more granular analysis of policy impacts. We build on the methodological approaches used in previous studies, such as panel regression analysis (e.g., Frost & Van Stralen, 2018) and VAR approaches (Cerutti et al., 2017; Cizel et al., 2019), while focusing specifically on the Spanish context.

A key innovation of our study is its exploration of the link between macroprudential policies and social sustainability outcomes, particularly gender inequality in the workforce. This connects to broader theories of financial inclusion and economic inequality. Recent studies have begun to explore these relationships. Frost and Van Stralen (2018) find a positive association between certain macroprudential tools and income inequality. Peydró et al. (2020) and Acharya et al. (2022) show that macroprudential borrowing limits disproportionately affect low-income borrowers. Park and Kim (2023) demonstrate that LTV ceilings in South Korea have widened household wealth inequality.

By combining analysis of financial variables with gender equality outcomes, we provide insights into the broader societal implications of financial regulations. This approach allows us to contribute to the emerging field of research on the interaction between macroprudential policies and sustainability issues, as highlighted by Alguindigue (2020) and Richter et al. (2019).

Our main hypothesis is that macroprudential policy directly affects firm's external financing as it monitors the amount of private credit to the economy. Another hypothesis is that, through its impact on firm's debt, macroprudential strategies might affect firm's hiring decisions and gender inequality in the workforce, especially in companies that depend more on external financing.

3. Theoretical framework and hypotheses

3.1. From macroprudential policy to firm credit growth

The theoretical foundation for the first link rests on the credit channel of monetary and financial policy transmission. Stiglitz and Weiss (1981) show that credit markets with imperfect information are subject to rationing: lenders cannot perfectly distinguish borrower quality and therefore adjust credit supply in response to regulatory constraints rather than price alone. Macroprudential policy operates precisely through this channel: by tightening lending standards, increasing capital requirements, or limiting loan-to-value ratios, regulators reduce the volume of credit available to borrowers. Conversely, loosening macroprudential tools eases these constraints and expands credit supply.

At the firm level, this transmission operates through banks' willingness and capacity to lend. Bernanke's (1999) financial accelerator framework establishes that financial market imperfections amplify the effects of policy changes on real economic activity: when credit conditions tighten, firms with limited internal funds face binding financing constraints, which reduces their capacity to invest and operate. This mechanism is particularly relevant for firms that depend heavily on external bank financing, such as small and young firms (Berger & Udell, 1995; Petersen & Rajan, 1994).

Empirical evidence confirms this first link. Cerutti et al. (2017) and Akinci and Olmstead-Rumsey (2018) show that

macroprudential policies effectively reduce credit growth. [Gambacorta and Murcia \(2020\)](#) find similar results using credit registry data in Latin America. [Čehajić and Košak \(2022\)](#) and [Ayyagari et al. \(2018\)](#) document that these effects are stronger for smaller and younger firms. This leads to our first two hypotheses:

H1. Tightening macroprudential policies reduce firm-level debt growth, while loosening policies increase it.

H2. The effect of macroprudential policy on firm debt growth is stronger among micro and young firms, given their greater dependence on external bank financing.

3.2. From firm credit conditions to employment decisions

The second link connects changes in firms' access to credit with their employment decisions. When firms face binding credit constraints, they must adjust their operations to available resources. Labour is one of the main adjustable costs available to firms, particularly in economies where labour market regulation allows for hiring and dismissal flexibility. [Duygan-Bump et al. \(2015\)](#) provide evidence that financing constraints during the Great Recession led to significant employment reductions, establishing an empirical connection between credit conditions and labour market outcomes. [Bakhtiari et al. \(2020\)](#) further document that financially constrained small and medium firms have more difficulty expanding their workforce.

The Spanish context is particularly relevant here. The period 2010–2021 includes the aftermath of the Global Financial Crisis, during which Spanish firms faced severe credit restrictions, and a subsequent recovery phase. The combination of a bank-dependent business sector and a labour market with significant flexibility in hiring and dismissal of permanent contract workers makes Spain a setting where the employment effects of credit conditions are likely to be observable.

3.3. From employment decisions to employment-based gender inequality

The third link is the most novel contribution of this paper and, we acknowledge, the least established in the prior literature. We propose that changes in firm credit conditions may be associated with changes in the gender composition of the workforce, and we treat this as an empirical hypothesis rather than an established theoretical result.

The reasoning is the following. If firms adjust their workforce in response to changes in credit availability, and if men and women are not distributed uniformly across the types of contracts, roles, or sectors that are most affected by those adjustments, then credit-driven employment changes may produce measurable changes in the gender composition of the workforce. Our measure of gender inequality captures the variation in the difference between the number of men and women with permanent contracts in each firm. A reduction in this gap when credit tightens could reflect either relatively more dismissals of male workers, relatively more hiring of female workers, or both. The data available do not allow us to distinguish between these mechanisms, and we do not claim to identify which one operates. What we can test empirically is whether the association between credit conditions and employment-based gender inequality exists and is systematic.

This is not to say that there is no theoretical basis for expecting such an association. Labour market segmentation literature documents persistent differences in the distribution of men and women across firm types, contract types, and sectors ([Demirguc-Kunt et al., 2015](#)). If credit constraints affect certain types of firms or contracts more than others, and if those types are systematically gendered, an aggregate association between credit conditions and gender composition would be expected even without a direct causal mechanism at the individual level. However, we present this reasoning as motivation for the empirical analysis rather than as an established theoretical result, and we acknowledge that identifying the precise mechanism requires data that go beyond what is available in our dataset.

This leads to our remaining hypotheses:

H3. Changes in firm debt growth are associated with changes in employment-based gender inequality within firms.

H4. Macroprudential policy affects employment-based gender inequality indirectly through its impact on firm credit growth, consistently with a debt channel.

4. Data

Data for our research has been collected from The Data Laboratory of the Bank of Spain, known as BELab, which provides economic and financial information of non-financial corporations through microdata from the Central Balance Sheet Data Office. Its main features include mass access to the Central Balance Sheet Data Office's databases, obtaining over 100 variables per company per year with a homogeneous formulation, a historical series available since 1995, and approximately 900,000 companies per year (for the latest years of the series), of which around 600,000 companies per year meet the quality standards of the Central Balance Sheet Data Office.

We focus our analysis on Spanish non-financial firms for several reasons. First, Spain is the fourth largest economy in the euro area and one of the most significant bank-based financial systems in the European Union, making it a relevant case for studying the transmission of macroprudential policy at the firm level. Second, the Spanish business structure is dominated by small and micro firms that are highly dependent on bank financing, which makes firm-level credit conditions particularly sensitive to macroprudential actions. Third, the period 2010–2021 encompasses the full cycle of macroprudential policy implementation in Spain following the Global Financial Crisis, including both tightening and loosening episodes, which provides the variation in policy actions necessary for

identification. Fourth, the BELab database of the Banco de España offers exceptionally granular firm-level data, covering approximately 900,000 non-financial corporations per year, which allows for a more precise analysis of heterogeneous policy effects across firms of different size and age than is possible with aggregate or sectoral data. We do not claim that Spain is statistically representative of the entire European Union; rather, we present it as an informative and policy-relevant case within the euro area, particularly for economies with bank-dependent business sectors.

The dataset contained in MCB (Central Balance Sheet Data Office) presents several important characteristics. Firstly, it offers identification codes, including CIF and internal codes, facilitating entity referencing and tracking. Its time horizon spans from 1995 onwards, with an annual update frequency. Data is delivered to BELab twice a year, in June and November, following a specific update procedure. The geographical coverage focuses on Spanish non-financial corporations, obtained from mandatory deposits of annual accounts in the Mercantile Registers, in accordance with the Agreement between the Bank of Spain and CORPME. The provided information includes analytical variables constructed by the Central Balance Sheet Data Office, regardless of whether they meet the quality standards of the CB, along with indicators that allow for filtering as needed. The data is presented in .csv files, distinguishing between zero values and missing values, and all available variables are provided, leaving the decision to utilize them in analyses to the researcher.

The principles governing output control within BELab emphasizing the anonymization of data to ensure compliance with confidentiality regulations. Results extracted from BELab's secure environment must undergo complete anonymization to prevent the direct or indirect identification of individual agents, considering potential methods for third-party re-identification. Researchers accessing BELab are responsible for ensuring that their results adhere to strict anonymization criteria, including the exclusion of identifiers and microdata from extracted results. Additionally, a minimum of three observations is required for any extracted results, whether aggregated or presented in graphs and tables. Regression models must have a minimum of ten observations and degrees of freedom. Furthermore, a dominance rule is imposed to prevent indirect identification of entities based on the weight of observations. Confidentiality measures extend to multiple tables, particularly when calculating results for subsets of populations, to prevent differentiation-based identification.

We use the Integrated Macprudential Policy (iMaPP) Database of the IMF, originally constructed by [Alam et al. \(2019\)](#), to obtain information on macroprudential policy strategies during the period analyzed. The IMF's iMaPP Database is an Excel file with country panel data that encapsulates a comprehensive repository of macroprudential policies providing insights for policymakers, researchers, and practitioners alike. It operates as a dynamic repository, continually updated to reflect the evolving landscape of macroprudential policies. Through regular data updates and revisions, it captures new policy initiatives, modifications to existing measures, and the repeal or expiry of outdated regulations. This real-time dimension imbues the database with relevance and timeliness.

The IMF's iMaPP Database combines information from five existing databases, as well as the IMF's new Annual Macprudential Policy Survey, and various additional sources, such as authorities' official announcements and IMF country documents including the World Bank's World Development Indicators, the IMF's International Financial Statistics, and the Bank for International Settlements' (BIS) International Banking Statistics. This allows to cover a rich set of macroprudential policies implemented around the world, concretely, in 134 different countries. These policies span a diverse spectrum, ranging from traditional tools like capital buffers and loan-to-value ratios to more innovative measures such as countercyclical capital requirements and systemic risk buffers. For each country, the database provides monthly data of 17 macroprudential instruments, describing each policy action registered. The iMaPP Database also uses dummy-type indicators to distinguish between tightening and loosening actions undertaken by each of the countries included and for each of the instruments considered. The indicator takes value 0 when the instrument was not used.

Specifically, to perform our analysis, we focus on tightening and loosening macroprudential actions undertaken in Spain during the period 2010-2021, adding the number of actions carried out in each year and thus using annual data. We do not distinguish between the different instruments, instead we construct two different variables for tightening and loosening decisions that include all the macroprudential tools used in Spain.

5. Empirical approach and specifications

The empirical analysis is organised in four sequential blocks, each designed to test one of the hypotheses set out in the conceptual framework. [Table X](#) provides a summary of the specifications estimated in each block. The first block (equations (1)–(3)) examines the effect of macroprudential policy on firm debt growth, distinguishing between short-term, long-term and total debt, and tests for heterogeneous effects across firms of different age (equation (2)) and size (equation (3)). This block tests [H1](#) and [H2](#). The second block (equations (4)–(6)) examines the direct association between macroprudential policy and employment-based gender inequality, again allowing for heterogeneity by firm age (equation (5)) and size (equation (6)). This block tests [H3](#). The third block (equations (7) and (8)) restricts the sample to micro and young firms and introduces interactions between macroprudential policy and creditworthiness indicators, examining whether firms' financial health conditions the effects found in the first two blocks. The fourth block (equations (9)–(11)) examines the debt channel directly, by replacing the macroprudential regressors with firm debt growth as the explanatory variable for the gender gap, and tests [H4](#). Results from the first block motivate the second; results from the second motivate the fourth; and the third block provides evidence on heterogeneity within the most financially vulnerable firms.

Table X

Summary of empirical specifications

Block	Equations	Dependent variable	Objective	Hypotheses
1	(1)–(3)	Debt (ST, LT, total)	Effect of macroprudential policy on credit; heterogeneity by age and size	H1, H2
2	(4)–(6)	Gender gap	Association between macroprudential policy and gender inequality; heterogeneity by age and size	H3
3	(7)–(8)	Debt and gender gap (restricted sample)	Role of financial health in young firms and microenterprises	H1–H3
4	(9)–(11)	Gender gap	Debt channel: does firm debt growth mediate the relationship between macroprudential policy and gender inequality?	H4

To analyze the relationship between macroprudential policies, firm debt growth and gender inequality we construct different variables and estimate a series of specifications.

The dependent variables of the regressions are firm debt and gender inequality. Concretely, firm debt represents annual growth of firms' financing by credit institutions and has been classified by *short-term firm debt*, *long-term firm debt* and *total firm debt* (which is the growth of the sum of short term external financing and long term external financing). (Bank of Spain, 2024).

The second dependent variable considered for this analysis is gender inequality, measured as the variation in the difference between long-term contract male employees and long-term contract female employees in each firm. This variable will allow assessing whether gender inequality has increased or decreased in companies, based on the difference between the number of men and women hired in the workforce. The data was collected from the database of Bank of Spain (2024).

This measure captures employment-based gender inequality within firms and should be distinguished from the gender pay gap, which refers to differences in remuneration between male and female workers. The gender pay gap is a widely documented and arguably more direct dimension of gender inequality in the labour market. However, the BELab database does not provide firm-level wage data disaggregated by gender, which prevents us from constructing a wage-based measure of gender inequality. We therefore limit our analysis to the employment-based indicator described above and acknowledge this as a limitation of the study. The gender pay gap, and the potential relationship between macroprudential policy and wage inequality, constitute an important avenue for future research that would require access to matched employer-employee wage data at the firm level.

Macroprudential policies are used as independent variables in the estimated specifications. These policies are introduced into the regression through a variable that takes a discrete numerical value each year corresponding to the number of policy actions taken in Spain during that year. In turn, we have differentiated two types of macroprudential actions, and therefore macroprudential variables, based on whether they were implemented for restrictive *-MaP_T*- or expansive purposes, *-MaP_L*. (Alam et al., 2019).

We control for the log variation of total firm's assets *-asset growth*- and the log variation of firm's operating turnover *-sales growth*-to account, respectively, for changes in the dependent variables that are due to firm growth and to demand shocks that imply sales increases. (Bank of Spain, 2024).

With regard to the macro aspect, first we control for *GDP growth*-which is the log change of Spanish GDP- that allows to observe the effect of economic growth on both external debt and gender inequality. Secondly we define the *real rate* as the marginal deposit facility minus the inflation rate, and controlling for its variation computed as the annual difference of the policy rate. This is to examine how changes in monetary policy affect the dependent variables. Last, we control for the effects of the covid-19 crisis on both external financing and gender inequality in the firms. With that purpose we include a dummy, *Cov19*, that takes value 1 for year 2020 and 0 otherwise.

We also categorize the companies by size and age, taking into consideration that small and young firms are more dependent on bank lending (Berger & Udell, 1995; Petersen & Rajan, 1994). Micro firms are those with 10 or less employers and young firms are

Table 1

Summary statistics The number of observations, N, corresponds to the number of firms times the number of years of data available for each firm.

	N	Mean	SD	Min	p1	Median	p99	Max
LT Debt Growth	1668724	-0.09	0.7	-2.52	-1.91	-0.13	2.41	3.14
ST Debt Growth	1432611	0.02	0.96	-4.19	-2.86	0.01	3.03	4.18
Total Debt Growth	2155513	-0.01	0.78	-3.3	-2.18	-0.08	2.78	3.98
Gender Gap	1221369	0.01	0.7	-15.33	-2.01	0	1.79	18.51
Asset Growth	2153170	0.04	0.24	-0.92	-0.6	0.01	0.89	1.24
Sales Growth	2085660	0.02	0.39	-1.87	-1.25	0.02	1.24	1.88
Cov19	2854562	0.1	0.3	0	0	0	1	1
MaP_T	2854561	1.58	1.34	0	0	2	4	4
MaP_L	2854561	0.95	2.08	0	0	0	7	7
GDP Growth	2202187	0	0.05	-0.12	-0.12	0.02	0.1	0.15
Real Rate	1673695	-0.08	0.09	-0.82	-0.38	-0.09	0.03	0.11
Young	2854562	0.13	0.34	0	0	0	1	1
Micro	2854562	0.77	0.42	0	0	1	1	1
Leverage	2853580	0.49	0.53	-2.9	-0.9	0.44	2.41	4.5
ROA	2853580	0.05	0.37	-2.87	-1.26	0.04	1.33	2.98
icoverage	2616996	0.17	0.69	-3.06	-1.13	0.04	3.53	7.74

those that are three years or younger since incorporation. We allow the firm size and age to vary each period, resulting in a different number of micro and young firms in each of the years considered.

We use three additional variables to examine the relation between the financial health of the firm and the dependent variables. This creditworthiness is measured by the *interest coverage* ratio, calculated as the relation between the EBIT and the interests expenses, the Return on assets, *ROA*, and the *leverage* ratio, which is captured by the total firm's debt as a share to total assets. (Bank of Spain, 2024).

To obtain a coherent sample, we exclude companies for which any of the debt variables has a negative value and those for which the total level of debt is equal to zero. Additionally, we drop those companies for which there is no information about the number of hired workers and also those companies for which this data is zero. Moreover, to eliminate the impact of outliers, we remove from the sample the top and bottom 1% of the firm level variables considered in the analysis: the debt growth variables, sales growth, asset growth, and creditworthiness variables.

Table 1 shows the summary statistics for the regression variables. There is a high variation in the use of external financing in Spanish firms in our sample, ranging from −419% to 418% for short-term financing growth and from −252% to 314% for long-term debt growth. The median firm in our sample exhibits a growth of 1% in short-term debt and a decline of 13% in long-term debt.

The Pearson correlation matrix can be found in Table 2.

5.1. Macprudential policies and firm's external financing

To analyze how macroprudential policies affect firm's debt growth we start from the following regression framework:

$$\text{Firm Debt Growth}_{it} = \beta_0 + \beta_1 \text{MaP_T}_{t-1} + \beta_2 \text{MaP_L}_{t-1} + \beta_3 \text{Asset Growth}_{it} + \beta_4 \text{Sales Growth}_{it} + \beta_5 \text{GDP growth}_{t-1} + \beta_6 \text{Real rate}_t + \beta_7 \text{Cov19}_t + \gamma_i + \varepsilon_{it} \quad (1)$$

where i indexes companies and t indexes years. The dependent variable of this specification, *Firm Debt Growth*, represents the either short term financing, long term financing or total financing. The macroprudential indicators are denoted by *MaP_T* and *MaP_L* for the tightening policy actions and the loosening policy, respectively, and are lagged to avoid reverse causality. *Asset Growth* refers to the log change of total assets and *Sales Growth* is the log change of firm's sales. The macroeconomic effects on firm's debt are represented by the lagged *GDP Growth* and the *Real Rate*; *Cov19* is the pandemic crisis dummy variable to control for its effects on firm's debt during year 2020; and are company-specific fixed effects to control for each firm's time-invariant specific characteristics that could affect its external financing.

The macroprudential and macroeconomic regressors enter the specification with a one-year lag for four reasons. First, the firm-

Table 2
Correlation matrix.

	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth	Gender Gap	Asset Growth	Sales Growth	Cov19	MaP_T
LT_Debt Growth	1.000							
ST_Debt Growth	0.003**	1.000						
Total_Debt Growth	0.770***	0.630***	1.000					
Gender Gap	0.022***	0.024***	0.025***	1.000				
Asset Growth	0.290***	0.186***	0.309***	0.066***	1.000			
Sales Growth	−0.002**	0.053***	0.026***	0.088***	0.296***	1.000		
Cov19	0.188***	−0.030***	0.118***	0.005***	0.057***	−0.138***	1.000	
MaP_T	0.032***	0.017***	0.029***	0.018***	0.055***	0.036***	0.136***	1.000
MaP_L	−0.032***	0.021***	−0.023***	0.009***	0.022***	0.110***	−0.080***	0.347***
GDP Growth	0.054***	0.003**	0.050***	0.014***	0.028***	−0.065***	0.132***	−0.043***
Real Rate	0.035***	0.007***	0.011***	0.019***	0.018***	−0.004***	0.247***	0.215***
Young	0.017***	0.051***	0.052***	0.021***	0.124***	0.147***	−0.001	0.061***
Micro	−0.060***	−0.019***	−0.039***	−0.041***	−0.045***	−0.053***	0.007***	−0.013***
Leverage	0.118***	0.062***	0.109***	−0.003***	−0.000	−0.007***	0.004***	−0.015***
ROA	−0.034***	−0.020***	−0.037***	0.028***	0.161***	0.166***	−0.022***	0.021***
icoverage	−0.052***	−0.027***	−0.048***	0.022***	0.116***	0.116***	0.014***	0.054***
	MaP_L	GDP Growth	Real Rate	young	Micro	leverage1	ROA1	icoverage1
MaP_L	1.000							
GDP Growth	−0.792***	1.000						
Real Rate	0.225***	0.066***	1.000					
Young	0.102***	−0.010***	0.032***	1.000				
Micro	0.018***	−0.008***	−0.019***	0.112***	1.000			
Leverage	0.006***	−0.012***	0.001	0.095***	0.033***	1.000		
ROA	0.015***	0.003***	0.015***	0.044***	−0.041***	−0.305***	1.000	
icoverage	0.024***	0.008***	0.030***	−0.005***	−0.072***	−0.137***	0.230***	1.000

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

level balance sheet data are annual, which means that the relevant policy environment for a firm's financing decisions in year t is the one observed in year $t-1$, when the firm was planning and executing those decisions. Second, the transmission of macroprudential actions to firm-level credit conditions is not instantaneous: changes in lending standards or capital requirements take time to translate into observable adjustments in firms' debt growth. Third, the use of lagged regressors mitigates simultaneity concerns, since current macroprudential policy could itself respond to current credit and macroeconomic conditions. Fourth, a one-year lag is consistent with the annual frequency of the accounting data, since firms' balance sheets reflect the cumulative effect of financing decisions taken throughout the year and are closed at year-end. GDP growth is also lagged for the same reasons: current output growth and current firm debt growth are jointly determined by common shocks, and using lagged GDP reduces this simultaneity problem.

We also observe how the effects of macroprudential policy on firm's debt vary across firms of different age as we believe that financing can also be affected by this factor. This is to evaluate whether debt of firms with three years or less since incorporation is differently affected by macroprudential policies than the average firm. The literature has already explored the relation between the firm's age and its external debt (Cole & Sokolyk, 2018; Epure & Guasch, 2020). There are some authors that even find that firm's financing can be constrained by the firm's age (Jungherr & Schott, 2021 or Ayyagari et al., 2018). With that aim we add interactions of macroprudential policy with firm's age to equation (1), and we get:

$$\begin{aligned} \text{Firm Debt Growth}_{it} = & \beta_0 + \beta_1 \text{MaP}_{t-1} + \beta_2 \text{MaP}_{L_{t-1}} + \beta_3 \text{MaP}_{T_{t-1}} * \text{Young Firms} + \beta_4 \text{MaP}_{L_{t-1}} * \text{Young Firms} + \beta_5 \text{Asset Growth}_{it} \\ & + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}, \end{aligned} \quad (2)$$

being *Young firms* a dummy variable that takes value one if the firm is three years or younger and zero otherwise.

Based on Ayyagari et al. (2018) we also examine whether the macroprudential policy effects vary across group of firms of different size. After a literature review, Bakhtiari et al. (2020) conclude that small and medium enterprises (SMEs) face higher financial constraint and thus have more difficulties to expand and grow. Therefore, we incorporate interactions of macroprudential measures with firm's size to equation (1), to get:

$$\begin{aligned} \text{Firm Debt Growth}_{it} = & \beta_0 + \beta_1 \text{MaP}_{t-1} + \beta_2 \text{MaP}_{L_{t-1}} + \beta_3 \text{MaP}_{T_{t-1}} * \text{Micro Firms} + \beta_4 \text{MaP}_{L_{t-1}} * \text{Micro Firms} + \beta_5 \text{Asset Growth}_{it} \\ & + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (3)$$

being *Micro firms* a dummy variable of value one if the firm has ten or less employees and zero otherwise.

5.2. Macroprudential policy and gender inequality

Next, in order to evaluate the impact of macroprudential policy on the social sustainability of the company and the economy, in a second step of the analysis we look for the relation between macroprudential policy and gender inequality. We find this relation interesting as an indicator of the impact that macroprudential instruments have on social sustainability. Moreover, some authors have recently explored the increase in gender inequality resulting from the pandemic consequences (Landivar et al., 2020; Carli, 2020; Mooi-Reci & Risman, 2021). We measure gender inequality using a variable we call *Gender gap*, which is the log change of the difference between the number of men and the number of women in the workforce of the Spanish companies in our sample.

The corresponding regression is the following:

$$\begin{aligned} \text{Gender gap}_{it} = & \beta_0 + \beta_1 \text{MaP}_{t-1} + \beta_2 \text{MaP}_{L_{t-1}} + \beta_3 \text{Asset Growth}_{it} + \beta_4 \text{Sales Growth}_{it} + \beta_5 \text{GDP Growth}_{t-1} + \beta_6 \text{Real Rate}_t \\ & + \beta_7 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (4)$$

We also want to evaluate the different effects of macroprudential policy on the *Gender gap* based on the age and size groups that we defined above. Therefore, we estimate the following two additional regressions, to group the companies in relation to their age,

$$\begin{aligned} \text{Gender gap}_{it} = & \beta_0 + \beta_1 \text{MaP}_{t-1} + \beta_2 \text{MaP}_{L_{t-1}} + \beta_3 \text{MaP}_{T_{t-1}} * \text{Young Firms} + \beta_4 \text{MaP}_{L_{t-1}} * \text{Young Firms} + \beta_5 \text{Asset Growth}_{it} \\ & + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (5)$$

and to their size,

$$\begin{aligned} \text{Gender gap}_{it} = & \beta_0 + \beta_1 \text{MaP}_{t-1} + \beta_2 \text{MaP}_{L_{t-1}} + \beta_3 \text{MaP}_{T_{t-1}} * \text{Micro Firms} + \beta_4 \text{MaP}_{L_{t-1}} * \text{Micro Firms} + \beta_5 \text{Asset Growth}_{it} \\ & + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (6)$$

5.3. Creditworthiness and macroprudential policies

Below, we have sought to carry out a final analysis focused solely on companies that are vulnerable due to their characteristics of age and size mentioned above. We want to observe whether the financial health of young and micro companies can also be key in determining the effects of macroprudential policy.

First, we assess how external financing of firms that are financially weak, due to their small size or young age, is affected by

macroprudential actions. In this way, we estimate the following specification, both for the sample of young enterprises and for the sample of micro enterprises, where macroprudential policy interacts with creditworthiness characteristics:

$$\begin{aligned} \text{Firm Debt Growth}_{it} = & \beta_0 + \beta_1 \text{MaP_T}_{t-1} + \beta_2 \text{MaP_L}_{t-1} + \beta_3 \text{MaP_T}_{t-1} * \text{Creditworthiness} + \beta_4 \text{MaP_L}_{t-1} * \text{Creditworthiness} \\ & + \beta_5 \text{Creditworthiness} + \beta_6 \text{Asset Growth}_{it} + \beta_7 \text{Sales Growth}_{it} + \beta_8 \text{GDP Growth}_{t-1} + \beta_9 \text{Real Rate}_t + \beta_{10} \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (7)$$

being *Creditworthiness* the financial characteristic measured by the leverage ratio, the ROA or the interest coverage ratio.

Second, we examine the effects of macroprudential policy on the Gender Gap of firms with weaker financial health, due to their small size and young age. The specification used for both -the sample of young enterprises and the sample of micro enterprises-is the following:

$$\begin{aligned} \text{Gender gap}_{it} = & \beta_0 + \beta_1 \text{MaP_T}_{t-1} + \beta_2 \text{MaP_L}_{t-1} + \beta_3 \text{MaP_T}_{t-1} * \text{Creditworthiness} + \beta_4 \text{MaP_L}_{t-1} * \text{Creditworthiness} \\ & + \beta_5 \text{Asset Growth}_{it} + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (8)$$

6. Empirical results

Table 3 shows the results of the starting regression in which the relationship between macroprudential policies and firms' debt growth is explored. In column 1 the estimates for long-term financing growth can be found, in column 2 for short-term financing growth and in column 3 for total financing growth, that aggregates short- and long-term debt growths. All coefficients on this regression's variables enter significantly, except for the loosening macroprudential policy in the long-term debt regression. For all three types of debt, a negative and significant coefficient is obtained for the tightening macroprudential measures, while the coefficient is positive and significant when the policy is loosening in the short-term and total debt growth cases. This reflects the fact that when authorities tighten the financial conditions firms reduce their external financing and when authorities ease financial restrictions firms' debt increases. There is a positive coefficient for asset growth and a negative coefficient for sales growth, meaning that as companies grow, they need additional external financing but that companies tend to reduce their debt level as their turnover increases. The signs of the coefficient for the Covid-19 imply that, during year 2020, the pandemic led companies to take on long-term debt while reducing their short-term debt, to ensure longer financing maturities in times of uncertainty (D'Amato, 2020). Finally, the macroeconomic variables' coefficients reveal that firms increase their debt during strong economic periods in which GDP raises or when the monetary authority decides to lower the policy rate.

We extend the analysis to test whether the relationship between firms' debt and macroprudential policy varies for companies that may be more vulnerable due to their age or size. Thus, we perform two different regressions, contained in Tables 4 and 5, including interactions of macroprudential policies with firm age and firm size characteristics, respectively.

In Table 4 the interactions of the tightening macroprudential tools with the young firms dummy enters always positive and significantly. Then, based on the magnitude of the coefficients, we can infer that the tightening policy effect on younger firms' long-term and total debt is negative but lower than on the rest of the sample. Also, unlike the case of older companies, this kind of macroprudential strategy increases young firms' short-term debt. The interaction of MaP_L with the age dummy enters negative and at 10% significance level only for the short-term financing growth, implying a reduction of the positive effects of the loosening policy on this

Table 3
Macroprudential policy and firm's short term, long term and total debt.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0188*** (0.000616)	−0.0206*** (0.000888)	−0.0217*** (0.000580)
MaP_L	0.000880 (0.000872)	0.0227*** (0.00134)	0.0173*** (0.000849)
Asset Growth	0.998*** (0.00504)	0.797*** (0.00649)	1.085*** (0.00459)
Sales Growth	−0.142*** (0.00219)	−0.111*** (0.00381)	−0.166*** (0.00223)
Cov19	0.369*** (0.00286)	−0.208*** (0.00364)	0.212*** (0.00252)
GDP Growth	0.304*** (0.0354)	1.097*** (0.0540)	1.114*** (0.0345)
Real Rate	−0.313*** (0.0102)	−0.132*** (0.0157)	−0.424*** (0.0103)
Constant	−0.145*** (0.00141)	0.0107*** (0.00221)	−0.0991*** (0.00141)
Observations	1,272,077	1,109,832	1,621,631
R-squared	0.117	0.035	0.104
Number of id	340,777	302,836	407,992

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 4

Macprudential policy and firm's short term, long term and total debt. Interacting with firm age.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0189*** (0.000617)	−0.0210*** (0.000888)	−0.0219*** (0.000581)
MaP_L	0.00103 (0.000873)	0.0233*** (0.00134)	0.0176*** (0.000850)
Map_T*Young	0.00923*** (0.00239)	0.0328*** (0.00354)	0.0116*** (0.00217)
Map_L*Young	0.00558 (0.00402)	−0.0127* (0.00657)	−0.00126 (0.00397)
Asset Growth	0.998*** (0.00504)	0.796*** (0.00649)	1.085*** (0.00459)
Sales Growth	−0.142*** (0.00219)	−0.111*** (0.00381)	−0.166*** (0.00223)
Cov19	0.371*** (0.00287)	−0.205*** (0.00367)	0.214*** (0.00254)
GDP Growth	0.303*** (0.0354)	1.091*** (0.0540)	1.112*** (0.0345)
Real Rate	−0.313*** (0.0102)	−0.132*** (0.0157)	−0.424*** (0.0103)
Constant	−0.146*** (0.00142)	0.00858*** (0.00223)	−0.1000*** (0.00143)
Observations	1,272,077	1,109,832	1,621,631
R-squared	0.117	0.035	0.104
Number of id	340,777	302,836	407,992

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 5

Macprudential policy and firm's short term, long term and total debt. Interacting with firm size.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0159*** (−0.0304)	−0.0167*** (−0.0241)	−0.0192*** (−0.0340)
MaP_L	−0.00577*** (−0.0159)	0.0256*** (0.0518)	0.0167*** (0.0412)
Map_T*Micro	−0.00420*** (−0.00816)	−0.00640*** (−0.00945)	−0.00373*** (−0.00674)
Map_L*Micro	0.00992*** (0.0236)	−0.00449*** (−0.00767)	0.000953 (0.00205)
Asset Growth	0.998*** (0.303)	0.797*** (0.192)	1.085*** (0.324)
Sales Growth	−0.142*** (−0.0722)	−0.111*** (−0.0416)	−0.166*** (−0.0785)
Cov19	0.370*** (0.168)	−0.209*** (−0.0727)	0.212*** (0.0902)
GDP Growth	0.308*** (0.0191)	1.099*** (0.0511)	1.116*** (0.0632)
Real Rate	−0.315*** (−0.0404)	−0.133*** (−0.0129)	−0.425*** (−0.0522)
Constant	−0.146***	0.0114***	−0.0990***
Observations	1,272,077	1,109,832	1,621,631
R-squared	0.117	0.035	0.104
Number of id	340,777	302,836	407,992

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

financial variable for young enterprises. Therefore, the macroprudential impact on young firms' financial variables is more moderate than on older companies' debt.

In Table 5 all three regressions, the interactions of MaP_T with the Micro dummy enter negatively and significantly, because the tightening macroprudential measures further restrict the growth of debt when it comes to micro businesses. The interaction coefficient of MaP_L with the firms' size dummy is positive for long-term debt and negative for short-term debt, meaning that loosening macroprudential policy has fewer positive effects on micro firms' short-term debt but increases by more the microenterprises' long-term

debt than that of bigger firms. Hence, in general, macroprudential policies lead to a greater decline in debt growth when companies are vulnerable due to their small size.

Table 6 reports the results obtained for the gender gap regressions that allow to assess the relationship between the different macroprudential strategies and gender inequality. We obtain evidence in favour of the existence of a significant impact of macroprudential policies on the gender gap. More concretely, the coefficients of column 1 show that when authorities tighten the macroprudential tool the gender gap decreases while it increases as they ease the tool. A possible interpretation for this result is that due to restrictive macroprudential policies Spanish companies face greater difficulty in obtaining external financing. With less debt, firms tend to lay off more men or hire more women than when economic policies do not restrict their access to credit, thus reducing the gender gap. This channel of transmission of the macroprudential effects to gender inequality will be explored in Section 6. The underlying reasons for this business decision could lead to further research. Potential causes could involve the effect of the wage gap on hiring and layoffs, as well as the influence of private credit and macroprudential policy on wage inequality or differences in labor productivity between men and women.

The positive coefficients of the asset growth and the sales growth mean a rise of the gender gap as either firms or their operating turnover grow. The coefficient of the Covid-19 dummy enters negatively so the gender gap could have been reduced during the pandemic. The macroeconomic variables' coefficients imply that increases in GDP contribute to gender inequality in the firms' workforce. The second column includes the interaction between the macroprudential tools and the young firms dummy, and the third column the interaction between the macroprudential tools and the micro firms dummy. In both cases, the interaction of the dummies with tightening macroprudential measures enters significantly. The coefficient is positive for the young firms dummy and negative for the microenterprises dummy. This means that the effects of this policy on the gender gap are lower for younger firms and stronger for microenterprises. The interactions between the loosening macroprudential policy and the age and size dummies are irrelevant for the firms' gender gap.

Next, in Tables 7–12 we evaluate whether the financial health of firms affects the impact of macroprudential actions on their debt growth. With that aim we include the interaction of the macroprudential variables with different creditworthiness characteristics, concretely the leverage ratio, the ROA ratio and the interest coverage ratio. We focus the analysis only on young and micro firms, based on the assumption that they are usually financially weaker. Although this assumption reduces our sample it also allows us to obtain more robust results.

Be aware that increases in the ROA and interest coverage ratio and decreases in the leverage ratio are indicators of improved financial health. In Tables 7 and 10 the leverage ratio coefficient enters positively while in Tables 8, 9, 11, and 12, the ROA and interest coverage ratio coefficients enter negatively. For that reason, a common result in both samples is the inverse relation between financial strength and financing growth. The intuition is that weaker firms are more dependent on external financing as they accumulate lower

Table 6
Macroprudential policy and Gender Gap. Interacting with firm age and size.

VARIABLES	Gender Gap		
MaP_T	−0.00659*** (0.000700)	−0.00670*** (0.000701)	−0.000600 (0.00102)
MaP_L	0.00541*** (0.00108)	0.00558*** (0.00109)	0.00496*** (0.00123)
Map_T*Young		0.00888*** (0.00303)	
Map_L*Young		−0.00525 (0.00560)	
Map_T*Micro	0.0665*** (0.00476)	0.0663*** (0.00476)	0.0664*** (0.00476)
Map_L*Micro	0.117*** (0.00293)	0.117*** (0.00293)	0.116*** (0.00293)
Asset Growth	−0.0116*** (0.00274)	−0.0108*** (0.00276)	−0.0118*** (0.00274)
Sales Growth	0.506*** (0.0445)	0.504*** (0.0445)	0.512*** (0.0445)
Cov19	0.0165 (0.0127)	0.0167 (0.0127)	0.0139 (0.0127)
GDP Growth			−0.00975*** (0.00118)
Real Rate			0.000857 (0.000904)
Constant	0.0138*** (0.00180)	0.0134*** (0.00181)	0.0144*** (0.00180)
Observations	947,879	947,879	947,879
R-squared	0.005	0.005	0.005
Number of id	257,746	257,746	257,746

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 7

Young firms sample. Macroprudential policy and firm's short term, long term and total debt. Interacting with the leverage ratio.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0231** (0.0113)	−0.0472** (0.0189)	−0.0288*** (0.0112)
MaP_L	0.00484 (0.0157)	−0.0149 (0.0268)	−0.00614 (0.0158)
MaP_T*Leverage	0.0110 (0.0112)	0.0112 (0.0181)	0.0169 (0.0109)
MaP_L*Leverage	−0.0232*** (0.00787)	0.000241 (0.0139)	−0.0167** (0.00807)
leverage	0.255*** (0.0295)	0.276*** (0.0491)	0.329*** (0.0297)
Asset Growth	0.827*** (0.0301)	0.680*** (0.0425)	0.868*** (0.0281)
Sales Growth	−0.184*** (0.0212)	−0.140*** (0.0365)	−0.198*** (0.0217)
Cov19	0.255*** (0.0314)	−0.391*** (0.0467)	0.0721*** (0.0279)
GDP Growth	0.249 (0.682)	0.965 (1.190)	0.482 (0.679)
Real Rate	−0.131 (0.0951)	−0.132 (0.192)	0.0470 (0.0987)
Constant	−0.294*** (0.0276)	0.00144 (0.0456)	−0.192*** (0.0268)
Observations	48,693	43,184	64,545
R-squared	0.157	0.052	0.146
Number of id	38,692	34,513	51,076

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 8

Young firms sample. Macroprudential policy and firm's short term, long term and total debt. Interacting with the ROA ratio.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0178** (0.00812)	−0.0381*** (0.0140)	−0.0201*** (0.00781)
MaP_L	−0.0114 (0.0148)	−0.0134 (0.0254)	−0.0154 (0.0147)
MaP_T*ROA	−0.0232 (0.0155)	−0.0274 (0.0245)	−0.0180 (0.0155)
MaP_L*ROA	0.0340** (0.0164)	−0.0218 (0.0213)	0.00441 (0.0158)
ROA	−0.234*** (0.0367)	−0.180*** (0.0571)	−0.267*** (0.0360)
Asset Growth	0.858*** (0.0308)	0.703*** (0.0427)	0.900*** (0.0287)
Sales Growth	−0.155*** (0.0211)	−0.107*** (0.0367)	−0.160*** (0.0216)
Cov19	0.253*** (0.0315)	−0.388*** (0.0468)	0.0733*** (0.0281)
GDP Growth	0.373 (0.684)	0.910 (1.196)	0.572 (0.684)
Real Rate	−0.159* (0.0957)	−0.110 (0.193)	0.0273 (0.0993)
Constant	−0.105*** (0.0178)	0.191*** (0.0316)	0.0378** (0.0177)
Observations	48,693	43,184	64,545
R-squared	0.155	0.050	0.140
Number of id	38,692	34,513	51,076

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 9

Young firms sample. Macroprudential policy and firm's short term, long term and total debt. Interacting with the Interest coverage ratio.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0231*** (0.00867)	−0.0445*** (0.0147)	−0.0215*** (0.00810)
MaP_L	−0.0158 (0.0154)	−0.00700 (0.0260)	−0.0192 (0.0148)
MaP_T*icoverage	0.0329* (0.0189)	0.00182 (0.0250)	0.00137 (0.0161)
MaP_L*icoverage	0.0365*** (0.00997)	0.0129 (0.00928)	0.0202** (0.00809)
icoverage	−0.216*** (0.0571)	−0.122* (0.0625)	−0.165*** (0.0445)
Asset Growth	0.852*** (0.0317)	0.734*** (0.0454)	0.919*** (0.0301)
Sales Growth	−0.189*** (0.0221)	−0.170*** (0.0382)	−0.220*** (0.0216)
Cov19	0.259*** (0.0323)	−0.402*** (0.0487)	0.0709** (0.0284)
GDP Growth	0.375 (0.708)	1.410 (1.225)	0.730 (0.690)
Real Rate	−0.149 (0.0986)	−0.129 (0.200)	0.0603 (0.101)
Constant	−0.0932*** (0.0189)	0.197*** (0.0327)	0.0451** (0.0182)
Observations	46,880	39,871	59,816
R-squared	0.148	0.049	0.145
Number of id	37,309	31,876	47,392

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 10

Micro firms sample. Macroprudential policy and firm's short term, long term and total debt. Interacting with the leverage ratio.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0222*** (0.00104)	−0.0191*** (0.00157)	−0.0219*** (0.00102)
MaP_L	0.00849*** (0.00112)	0.0206*** (0.00187)	0.0243*** (0.00112)
MaP_T*Leverage	0.0133*** (0.00135)	0.00121 (0.00214)	0.00755*** (0.00133)
MaP_L*Leverage	−0.0117*** (0.000871)	−0.000579 (0.00151)	−0.0123*** (0.000861)
leverage	0.225*** (0.00385)	0.216*** (0.00590)	0.278*** (0.00381)
Asset Growth	0.950*** (0.00584)	0.707*** (0.00777)	1.027*** (0.00530)
Sales Growth	−0.118*** (0.00233)	−0.101*** (0.00432)	−0.143*** (0.00241)
Cov19	0.322*** (0.00335)	−0.197*** (0.00462)	0.210*** (0.00302)
GDP Growth	0.363*** (0.0412)	1.055*** (0.0684)	1.177*** (0.0410)
Real Rate	−0.336*** (0.0119)	−0.139*** (0.0197)	−0.447*** (0.0121)
Constant	−0.285*** (0.00271)	−0.105*** (0.00411)	−0.254*** (0.00263)
Observations	913,335	754,470	1,186,483
R-squared	0.124	0.034	0.114
Number of id	275,119	236,404	334,931

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 11

Micro firms sample. Macroprudential policy and firm's short term, long term and total debt. Interacting with the ROA ratio.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0177*** (0.000750)	−0.0198*** (0.00116)	−0.0206*** (0.000719)
MaP_L	0.00178* (0.00104)	0.0204*** (0.00171)	0.0176*** (0.00103)
MaP_T*ROA	−0.0235*** (0.00296)	−0.0169*** (0.00408)	−0.0231*** (0.00272)
MaP_L*ROA	−0.00617*** (0.00208)	−0.0127*** (0.00319)	−0.00627*** (0.00200)
ROA	−0.157*** (0.00621)	−0.161*** (0.00872)	−0.190*** (0.00574)
Asset Growth	0.977*** (0.00595)	0.737*** (0.00785)	1.063*** (0.00542)
Sales Growth	−0.106*** (0.00235)	−0.0862*** (0.00435)	−0.127*** (0.00243)
Cov19	0.314*** (0.00338)	−0.201*** (0.00463)	0.204*** (0.00305)
GDP Growth	0.320*** (0.0415)	1.026*** (0.0685)	1.129*** (0.0412)
Real Rate	−0.352*** (0.0119)	−0.146*** (0.0197)	−0.458*** (0.0122)
Constant	−0.156*** (0.00167)	0.0102*** (0.00281)	−0.106*** (0.00169)
Observations	913,335	754,470	1,186,483
R-squared	0.116	0.032	0.105
Number of id	275,119	236,404	334,931

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

Table 12

Micro firms sample. Macroprudential policy and firm's short term, long term and total debt. Interacting with the Interest coverage ratio.

VARIABLES	LT_Debt Growth	ST_Debt Growth	Total_Debt Growth
MaP_T	−0.0174*** (0.000785)	−0.0205*** (0.00122)	−0.0208*** (0.000743)
MaP_L	0.000549 (0.00108)	0.0220*** (0.00179)	0.0168*** (0.00106)
MaP_T*icoverage	−0.000447 (0.00175)	0.000559 (0.00223)	−0.00205 (0.00162)
MaP_L*icoverage	0.00547*** (0.000931)	−0.00189 (0.00137)	0.00370*** (0.000908)
icoverage	−0.105*** (0.00443)	−0.0863*** (0.00565)	−0.103*** (0.00413)
Asset Growth	1.003*** (0.00616)	0.759*** (0.00825)	1.107*** (0.00561)
Sales Growth	−0.120*** (0.00245)	−0.103*** (0.00456)	−0.147*** (0.00249)
Cov19	0.330*** (0.00349)	−0.201*** (0.00480)	0.222*** (0.00312)
GDP Growth	0.318*** (0.0431)	1.114*** (0.0714)	1.165*** (0.0423)
Real Rate	−0.344*** (0.0122)	−0.161*** (0.0204)	−0.483*** (0.0124)
Constant	−0.153*** (0.00174)	0.0120*** (0.00292)	−0.105*** (0.00174)
Observations	871,124	698,840	1,097,982
R-squared	0.119	0.033	0.116
Number of id	265,956	221,783	315,563

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

levels of network.

Regarding how creditworthiness affects the relation between macroprudential policies and external financing growth, we look at the results obtained for both samples separately. Tables 7–9 show the results of the young firms' sample regressions where we control for financial strength by including macroprudential policy interacting with creditworthiness variables. In all three tables the interaction coefficients are irrelevant for short-term debt. Table 7 shows that, for young firms, the higher the leverage ratio the lower the financing growth when macroprudential policy is loosening. Table 8 provides a positive coefficient of the MaP_L and ROA interaction, implying that young firms with high ROA ratios experience increases in the long-term debt growth when loosening macroprudential measures are carried out. In both tables, 7 and 8, coefficients of the interaction between MaP_T and the creditworthiness variables are irrelevant for the debt growth rates. In Table 9, the positive coefficient of the MaP_L and interest coverage interaction also means that the long-term debt growth of young firms goes up with higher interest coverage ratios. In this case, the coefficient of the tightening macroprudential policy and the interest coverage ratio enters with a 10% significance level and positive for the long-term debt regression. Thus, these macroprudential strategies increase the long-term debt growth rate of young firms with higher interest coverage ratios. To sum up, for the sample of young companies, greater financial health, measured through any of the three indicators considered, amplifies the positive impact that loosening macroprudential strategies have on long-term debt growth.

In Tables 10–12 we evaluate the relationship between the financial health of the firm and the macroprudential effect on debt growth for the microenterprises sample. In Table 10 we can observe that the coefficients of the interaction between macroprudential policy and leverage only enter significantly in the long-term debt regression. The signs of the coefficients mean that as leverage ratios of microenterprises increase, the effect of macroprudential policy on long-term debt growth weakens. In this way, if macroprudential policy is contractionary, higher leverage ratios cause smaller falls in debt growth and if the macroprudential policy is easing, higher leverage ratios generate smaller increases in the debt growth rate. Table 11 provides the results for the regressions where the ROA ratio interacts with macroprudential policies. In this case, the interaction terms are significant and negative for all kinds of debt. This implies that higher micro firms' ROA ratios amplify the negative impact of tightening macroprudential policy on debt growth but reduce the positive effect of loosening macroprudential policy on the latter. The coefficients of the interaction between the interest coverage ratio and macroprudential measures are contained in Table 12. Significance in the interaction coefficient is found only for the impact of loosening macroprudential policy on long-term debt resulting in a stronger positive relation between both variables as interest coverage ratios go up. Thereupon, we can confirm that the relation between macroprudential policies and microenterprises' debt growth is affected by the financial strength of these firms although the effects on this relation vary depending on the creditworthiness indicator considered.

Finally, we assess how financial health affects the impact that macroprudential measures have on the gender gap of young and micro firms. The results are presented in Tables 13 and 14, respectively. Both tables show that the interaction between macroprudential policies and the creditworthiness variables are irrelevant for gender inequality in young and micro firms' workforce, implying that the vulnerable firms' financial health does not change the impact of macroprudential policies on their gender gap.

7. Analysis of the transmission channel of macroprudential policy

Based on the basic results described above, we broad our analysis in order to identify the channel that is responsible for the impact that macroprudential measures have on gender inequality in the Spanish firms of the sample.

Our study explores the theoretical and empirical link between macroprudential policies and gender inequality through the debt channel. Theoretically, macroprudential policies aim to stabilize financial systems by controlling credit growth and reducing systemic risk (Akinci & Olmstead-Rumsey, 2018; Cerutti et al., 2017). However, these policies can inadvertently impact social outcomes, such as gender inequality, by altering firms' financing conditions. This aligns with theories suggesting that financial regulations can have broader socio-economic implications (Stiglitz & Weiss, 1981).

Empirical evidence supports the notion that macroprudential measures influence credit supply dynamics (Calem et al., 2020; Gambacorta & Murcia, 2020) and may disproportionately affect smaller or younger firms (Čehajić & Košak, 2022; Ayyagari et al., 2018). Our study builds on this by examining how changes in credit availability due to macroprudential policies affect hiring practices and gender composition within firms.

By leveraging firm-level data from Spain, we assess whether tightening or loosening macroprudential measures influence the gender gap through their impact on corporate debt. This approach allows us to identify a specific transmission channel—corporate debt—through which these policies may affect workforce gender equality.

7.1. Complementary specifications

With that aim, and given that macroprudential policy is related to the firm's debt, we evaluate the relation of the firm's debt with the Gender Gap through the regression:

$$\begin{aligned} \text{Gender gap}_{it} = & \beta_0 + \beta_1 \text{ST_Debt Growth}_{it} + \beta_2 \text{LT_Debt Growth}_{it} + \beta_3 \text{Asset Growth}_{it} + \beta_4 \text{Sales Growth}_{it} + \beta_5 \text{GDP Growth}_{t-1} \\ & + \beta_6 \text{Real Rate}_t + \beta_7 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \end{aligned} \quad (9)$$

ST_Dept Growth and LT_Dept Growth are the short term and long term firm's debt annual growth, respectively. We replicate the analysis for the Gender Gap-Firm's debt relationship based on the size and age groups abovementioned so we also estimate:

Table 13

Young firms sample. Macroprudential policy and Gender Gap. Interacting with creditworthiness indicators.

VARIABLES	Gender Gap		
MaP_T	−0.0219 (0.0142)	−0.0253** (0.0116)	−0.0261** (0.0123)
MaP_L	−0.00731 (0.0263)	−0.00128 (0.0250)	−0.0109 (0.0260)
MaP_T*Leverage	−0.00620 (0.0141)		
MaP_L*Leverage	0.00995 (0.0129)		
Asset Growth	0.0137 (0.0349)	0.0123 (0.0349)	0.00684 (0.0368)
Sales Growth	0.186*** (0.0320)	0.187*** (0.0326)	0.195*** (0.0335)
Cov19	−0.0727* (0.0427)	−0.0739* (0.0430)	−0.0849* (0.0451)
GDP Growth	0.860 (1.191)	0.863 (1.192)	0.652 (1.238)
Real Rate	−0.224 (0.174)	−0.225 (0.174)	−0.251 (0.180)
MaP_T*ROA		−0.00350 (0.0132)	
MaP_L*ROA		0.00351 (0.0183)	
MaP_T*icoverage			−0.00822 (0.0112)
MaP_L*icoverage			0.0159* (0.00837)
Constant	0.0850*** (0.0303)	0.0848*** (0.0303)	0.0954*** (0.0313)
Observations	32,132	32,132	30,137
R-squared	0.009	0.009	0.010
Number of id	25,902	25,902	24,310

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

$$\text{Gender gap}_{it} = \beta_0 + \beta_1 \text{ST_Debt Growth}_{it} + \beta_2 \text{LT_Debt Growth}_{it} + \beta_3 \text{ST_Debt Growth}_{it} * \text{Young Firms} + \beta_4 \text{LT_Debt Growth}_{it} * \text{Young Firms} + \beta_5 \text{Asset Growth}_{it} + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \quad (10)$$

to distinguish the effects across the age groups, and

$$\text{Gender gap}_{it} = \beta_0 + \beta_1 \text{ST_Debt Growth}_{it} + \beta_2 \text{LT_Debt Growth}_{it} + \beta_3 \text{ST_Debt Growth}_{it} * \text{Micro Firms} + \beta_4 \text{LT_Debt Growth}_{it} * \text{Micro Firms} + \beta_5 \text{Asset Growth}_{it} + \beta_6 \text{Sales Growth}_{it} + \beta_7 \text{GDP Growth}_{t-1} + \beta_8 \text{Real Rate}_t + \beta_9 \text{Cov19}_t + \gamma_i + \varepsilon_{it}. \quad (11)$$

to account for the different effects across the company's size groups.

7.2. Additional results

In Table 15 we explore the relationship between the gender gap in the firms' workforce and short-term and long-term firms' financing growth. We find that the coefficients for the growth of both types of debt enter significantly and positively (column 1) what implies that as enterprises increase their external financing, the gender inequality in their workforce also grows. As explained in Table 3, tightening macroprudential policy reduces debt growth and loosening macroprudential policy increases the latter. From Table 6 we know that tightening macroprudential measures also bring down the gender gap while loosening macroprudential decisions raise this gap. Now, Table 15 shows that there is a positive relation between the debt growth rate and the gender gap, providing evidence for the existence of a debt channel through which macroprudential policy might be affecting the firms' workforce inequality.

Columns 2 and 3 in Table 15 repeat the regression presented in Column 1 but including interactions between debt growth and the young and microenterprises dummies, respectively. We can confirm that in the case of young firms the channel by which macroprudential policy affects the gender gap becomes stronger through long-term debt (see the significant and positive coefficient of the interaction between LT_Dept Growth and the young dummy in Column 2). However, the coefficient of the interaction between ST_Dept Growth and Micro enters significantly and negative (see Column 3) implying that the debt channel becomes weaker in the case of microenterprises. Therefore, we can state that macroprudential policy will find it more difficult to reduce the gender gap of vulnerable firms based on their size.

Table 14

Micro firms sample. Macroprudential policy and Gender Gap. Interacting with creditworthiness indicators.

VARIABLES	Gender Gap		
MaP_T	−0.00475*** (0.00103)	−0.00531*** (0.000878)	−0.00534*** (0.000929)
MaP_L	0.00666*** (0.00139)	0.00561*** (0.00130)	0.00615*** (0.00137)
MaP_T*Leverage	−0.00169 (0.00133)		
MaP_L*Leverage	−0.00217* (0.00121)		
Asset Growth	0.0406*** (0.00549)	0.0412*** (0.00551)	0.0452*** (0.00583)
Sales Growth	0.0933*** (0.00316)	0.0938*** (0.00318)	0.0941*** (0.00335)
Cov19	−0.00527 (0.00338)	−0.00554 (0.00338)	−0.00469 (0.00354)
GDP Growth	0.451*** (0.0531)	0.452*** (0.0531)	0.469*** (0.0557)
Real Rate	0.0514*** (0.0152)	0.0525*** (0.0152)	0.0421*** (0.0160)
MaP_T*ROA		−0.00303 (0.00204)	
MaP_L*ROA		0.000937 (0.00225)	
MaP_T*icoverage			−0.000396 (0.000939)
MaP_L*icoverage			−0.000217 (0.000892)
Constant	−0.00324 (0.00217)	−0.00325 (0.00217)	−0.00448** (0.00226)
Observations	640,626	640,626	596,942
R-squared	0.003	0.003	0.003
Number of id	200,964	200,964	190,008

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

8. Policy implications and conclusions

This paper has examined two related questions. First, we have analyzed how macroprudential policy affects firm-level credit growth in Spain. Second, we have investigated whether these credit effects are associated with changes in employment-based gender inequality within firms, consistently with a debt channel of transmission. The analysis uses panel data for more than 900,000 Spanish non-financial firms over the period 2010–2021 and draws on the iMaPP database for macroprudential policy actions.

We find that when macroprudential policy is tightening companies use less external debt to carry out their business, while they increase their credit when authorities loose macroprudential tools. This implies that macroprudential decisions are being successful in their main objective: they are tightened when there is excessive private leverage, and they are eased to encourage private credit.

Another relevant conclusion is that tightening macroprudential policies restrict the debt of microenterprises more than that of larger companies. Thus, smaller businesses become even more vulnerable when it comes to accessing private credit. Though, we do not find evidence of this financial disadvantage for younger firms.

Regarding the gender gap of the Spanish firms' workforce, we conclude that it rises when macroprudential policies become flexible and it shrinks with tightening macroprudential policies. Once more, we observe that tightening macroprudential decisions are associated with a stronger reduction of the gender gap in microenterprises, while firm age does not significantly condition the macroprudential effects on gender inequality.

Finally, the analysis of the relationship between firm debt growth and the gender gap provides evidence consistent with a debt channel through which macroprudential policy may indirectly affect employment-based gender inequality. These findings have policy implications. When macroprudential tools are eased during crises to support the financial system, the associated increase in firm credit growth is linked to a widening of the gender gap in firms' workforces. Conversely, when macroprudential tools are tightened to contain excessive credit growth, the associated reduction in firm debt is linked to a narrowing of the gender gap, with stronger effects among microenterprises. Policymakers designing macroprudential frameworks should be aware that these instruments may have unintended indirect effects on social sustainability outcomes, operating through their impact on corporate debt. We do not claim that these effects are direct or that the mechanism is fully identified; rather, our results are consistent with the existence of such a channel and motivate further research into the precise mechanisms at work.

Our findings contribute to several strands of the literature. The results on the effects of macroprudential tightening and loosening on firm debt growth are consistent with [Cerutti et al. \(2017\)](#) and [Akinci and Olmstead-Rumsey \(2018\)](#), who document that

Table 15

Short term and long term debt and Gender Gap. Interacting with firm age and size.

VARIABLES	Gender Gap		
ST_Debt Growth	0.00716*** (0.00155)	0.00708*** (0.00157)	0.0128*** (0.00241)
LT_Debt Growth	0.00514*** (0.00184)	0.00467** (0.00186)	0.00640*** (0.00247)
ST_Debt Growth*Young		0.00359 (0.00968)	
LT_Debt Growth*Young		0.0222* (0.0128)	
Asset Growth	0.0819*** (0.00800)	0.0814*** (0.00800)	0.0815*** (0.00801)
Sales Growth	0.127*** (0.00455)	0.127*** (0.00455)	0.126*** (0.00455)
Cov19	−0.0247*** (0.00387)	−0.0245*** (0.00387)	−0.0245*** (0.00387)
GDP Growth	0.322*** (0.0258)	0.321*** (0.0258)	0.322*** (0.0258)
Real Rate	0.00739 (0.0168)	0.00737 (0.0168)	0.00716 (0.0168)
ST_Debt Growth*Micro			−0.00975*** (0.00307)
LT_Debt Growth*Micro			−0.00271 (0.00343)
Constant	0.0124*** (0.00150)	0.0124*** (0.00151)	0.0122*** (0.00151)
Observations	485,456	485,456	485,456
R-squared	0.005	0.005	0.005
Number of id	149,534	149,534	149,534

Robust standard errors in parentheses.

***p < 0.01, **p < 0.05, *p < 0.1.

macroprudential policies effectively reduce credit growth, and extend their findings to the firm level with heterogeneous effects by size. The stronger effects on microenterprises are consistent with Berger and Udell (1998) and Čehajić and Košak (2022), who show that smaller firms face greater financial constraints. The finding that the gender gap narrows with tightening policies and widens with loosening is consistent with the cyclical pattern documented by Albanesi and Şahin (2018), who find that the gender employment gap tends to widen during recessions. Our approach of using firm-level data to examine policy effects on employment outcomes is methodologically comparable to Jiménez et al. (2017), who studied credit supply effects of dynamic provisioning in Spain using a similar data infrastructure.

Several avenues for future research follow from this study. First, the analysis could be extended to other countries to assess whether the associations documented here hold in different institutional and financial contexts. Second, the availability of firm-level wage data disaggregated by gender would allow future work to examine the gender pay gap as an additional dimension of gender inequality, which our dataset does not permit. Third, alternative empirical approaches, including instrumental variable strategies or quasi-experimental designs exploiting specific macroprudential policy changes, could help identify the mechanisms more precisely. Finally, the broader question of whether other types of economic policy produce similar unintended indirect effects on social sustainability outcomes remains open and merits further investigation.

CRedit authorship contribution statement

Juan Infante Infante: Conceptualization, Supervision, Validation, Writing – original draft, Writing – review & editing, Investigation, Project administration. **Tomás Curto González:** Data curation, Formal analysis, Methodology, Software, Resources, Visualization.

Declaration of competing interests

The corresponding author, on behalf of all co-authors, declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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