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The Micro Impact of Macroprudential Policies: Firm-Level Evidence

by Meghana Ayyagari, Thorsten Beck and Maria Soledad Martinez Peria

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I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

Research Department

The Micro Impact of Macroprudential Policies: Firm-Level Evidence¹

Prepared by Meghana Ayyagari², Thorsten Beck³ and Maria Soledad Martinez Peria⁴

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Abstract

Combining balance sheet data on 900,000 firms from 49 countries with information on the adoption of macroprudential policies during 2003-2011, we find that these policies are associated with lower credit growth. These effects are especially significant for micro, small and medium enterprises (MSMEs) and young firms that, according to the literature, are more financially constrained and bank dependent. Among MSMEs and young firms, those with weaker balance sheets exhibit lower credit growth in conjunction with the adoption of macroprudential policies, suggesting that these policies can enhance financial stability. Finally, our results show that macroprudential policies have real effects, as they are associated with lower investment and sales growth.

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1. Introduction

Macroprudential policies have been the focus of increased attention in the post-Global Financial Crisis regulatory reform agenda. These policies increase the resilience of financial institutions and borrowers to aggregate shocks, contain the build-up of systemic vulnerabilities that result from procyclical feedback between asset prices and credit, excessive leverage, or volatile funding, and control structural vulnerabilities in the financial system (IMF, 2013). Given its stated objectives, macroprudential policies would be expected to curb average firm credit growth and, potentially through the effect on credit, affect firm investment and sales growth. An interesting question, however, is whether macroprudential policies have distributional consequences with their impact varying by type of firm. Specifically, are smaller and younger firms that are often credit constrained and typically more dependent on bank finance than larger firms more affected by macroprudential policies? If so, is the impact uniform across these firms or are those that are financially weaker more affected in line with the notion that macroprudential policies should enhance financial stability?⁵

This paper is a first attempt at assessing the effectiveness of macroprudential policies in reducing firm credit and their impact on firms' investment and sales growth. In addition, we explore the distributional consequences of macroprudential policies by examining how they affect different firms. We combine firm-level data on more than 900,000 firms between 2003 and 2011 in 49 countries with detailed data on the use of macroprudential policy instruments in these countries. The micro data allows us to (i) investigate the effect on firms of different sizes and

⁵ A related literature shows that other policies such as monetary policy and capital account restrictions have differing impacts by firm size. See for example Gertler and Gilchrist (1994) who show that small firms are more sensitive than large firms to monetary policy shocks and Forbes (2007) who shows that capital controls in Chile have a larger effect on small firms.

ages, (ii) separately examine borrower-targeted and financial institution-targeted instruments,⁶ (iii) differentiate between growth in short-term and long-term financing, and (iv) examine the behavior of real variables such as firm investment and sales growth.

There are several advantages to using micro data to examine the impact of macroprudential policies. First, using firm-level data and focusing on the differential effects of macroprudential policies across firm groups helps to mitigate endogeneity concerns regarding the adoption of macroprudential policies, as it is harder to argue that credit developments in individual firms or specific firm groups will drive the adoption of aggregate macroprudential policies. Second, by conducting the analysis at the firm-level we can include country-time fixed effects to control for the impact of other macroeconomic developments (e.g., monetary policy) that might also affect firm credit growth.

Our results indicate that macroprudential policies are negatively associated with firm financing growth, but there are heterogeneous effects depending on the type of policies and firms. In estimations combining all types of firms, we find that the index of borrower-targeted macroprudential policies is robustly and negatively associated with growth in long-term firm financing, while policies targeted at financial institutions do not appear to be significantly correlated with firm financing growth. This is consistent with the argument that avoidance or leakage (i.e., a situation where credit activity migrates to institutions that are not covered by the macroprudential instruments) is easier when policies target institutions rather than borrowers.⁷

⁶ The borrower-targeted instruments include loan-to-value ratios and debt-to-income ratios. The financial institution targeted instruments include dynamic loss provisioning, countercyclical capital buffer requirement, leverage ratio, capital surcharges on systemically important financial institutions (SIFIs), limits on interbank exposures, concentration limits, limits on foreign currency loans, reserve requirement ratios, limits of domestic currency loans and levy/tax on financial institutions.

⁷ Evidence of leakage is provided by Aiyar et al. (2014), Cerutti et al. (2015), and Reinhart and Sowerbutts (2015).

We also find differential effects of macroprudential policies based on firm size and age. Financing growth for MSMEs (firms with fewer than 250 employees) and young firms (those three or less years of age) is more negatively correlated with macroprudential policies than for larger and older firms. This could be driven by the fact that MSMEs and young firms are typically opaque and dependent on bank relationship lending (Petersen and Rajan, 1994; Berger and Udell, 1995; Beck, Demirguc-Kunt and Maksimovic, 2008), whereas in the presence of macroprudential policies that limit bank credit, larger firms can substitute this type of financing with non-bank finance.

These results are robust to controlling for industry demand shocks through industry-time fixed effects, accounting for differences in firm performance, and allowing for a heterogeneous impact of other macroeconomic policies (such as monetary policy) across firm size and age. We also confirm the results for borrower targeted measures, specifically loan-to-value ratio caps, using recent data on the intensity of macroprudential tools (Cerutti et al., 2017), where we show that the long-term financing growth of MSMEs is negatively associated with cumulative changes in the intensity of loan-to-value ratio caps.⁸

Given the above results, an interesting question is whether among MSMEs and young firms, those which could pose more severe financial stability concerns, due to poor creditworthiness, are most impacted by macroprudential policies. To address this question, we measure firms' creditworthiness using the leverage ratio, interest coverage ratio, and an indicator of profitability (return on assets or ROA) and include interactions of these variables with the

⁸ The finding that borrower-targeted policy measures affect primarily the smallest firms might be related to the fact that the owners of such firms might collateralise financing with their personal real estate. This is consistent with the literature on entrepreneurial financing, which has shown the use of personal assets for firm financing (Adelino, et al., 2015).

macroprudential measures. We find that among MSMEs and young firms, the negative association between credit growth and macroprudential policies is stronger for the least credit worthy and riskiest firms, in line with the stability-enhancing goal of such policies.

Finally, we also document important real effects of macroprudential policies on MSMEs and young firms. MSMEs in countries with borrower targeted macroprudential instruments have lower investment and sales growth; young firms in economies with borrower and/or financial institution targeted macroprudential instruments have lower investment and sales growth. Thus, we show that macroprudential policies seem to have an effect not only on financial stability, but also the real economy.

Our paper relates to several strands of literature. First, it relates to the literature that has documented the importance of financing constraints for firm growth and shown that younger and smaller firms are generally more financially constrained and tend to be more dependent on bank financing and relationship lending than older and larger firms. Using either Tobin's Q model or the Euler equation of investment, an extensive literature has documented the existence of financing constraints, by showing a higher investment-cash flow sensitivity for these firms (for example, Abel, 1980; Fazzari et al., 2000). While most of this earlier literature has used information on larger, listed firms, a more recent literature using firm-level surveys has shown that smaller firms are more likely to report financing obstacles and are more constrained in their growth by such obstacles (Beck et al. 2005, 2006).⁹ At the same time several studies, starting with Petersen and Rajan (1994) and Berger and Udell (1995), document that smaller and younger firms are more dependent on bank relationship lending. Our analysis expands this literature by showing that

⁹ Farre-Mensa and Ljungqvist (2016) provide an overview of the measures of financial constraints used in the corporate finance literature. Other studies that use size as part of an index to proxy for financial constraints include Rajan and Zingales (1995), Almeida, Campello, and Weisbach (2004), and Whited and Wu (2006), among others.

MSMEs and young firms, known to be more financially constrained and dependent on bank financing than large firms, are more impacted by macroprudential regulations.

Second, our findings also relate to the macro literature on the differential sensitivity of small firms to policy shocks of various kinds. In a seminal paper, Gertler and Gilchrist (1994) present evidence that small firms are more sensitive to monetary policy shocks¹⁰. Chodorow-Reich (2014) examines the impact of credit supply disruptions associated with the Global Financial Crisis and finds bigger effects among small firms. Forbes (2007) shows that taxes on short-term capital flows in Chile increased financing constraints for small, but not for large firms. Lilienfeld-Toal, Mookherjee and Visaria (2012) show that a judicial reform in India had important distributional consequences, resulting in lower (higher) bank financing for small (large) firms. Our paper contributes to this literature by being the first to focus on the distributional effects of macroprudential policies across firms.

Finally, our paper builds on and contributes to a small but rapidly expanding literature on the effects of macroprudential policies across countries¹¹. Cerutti et al (2015) document the use of various macroprudential policies in 119 countries over the period of 2000–13 and find that macroprudential policies are associated with lower aggregate (country-level) growth in credit. Claessens et al (2013) use balance sheet data of individual banks in 48 countries over 2000–10 to show that borrower-based measures (such as loan-to-value (LTV) and debt-service-to-income

¹⁰ Other studies showing that changes in monetary policy have differential effects on borrowers' ability to borrow (balance sheet effect) include Gertler and Hubbard (1989), Bernanke, Gertler, and Gilchrist (1996), Kashyap, Lamont, and Stein (1994), Oliner and Rudebusch (1996). See also the survey in Kashyap and Stein (1994).

¹¹ Empirical studies have also focused on specific regions. Zhang and Zoli (2014) study Asian banks to show that macroprudential policies restricted the supply of credit from Asian banks. Bruno et al. (2017) study Asia-Pacific economies and Tovar et al. (2012) focus on Latin America. Both papers show that macroprudential instruments play a complementary role to monetary policy. Vandenbussche et al. (2015) study the impact of macroprudential policies on housing prices in central, eastern and southeastern Europe. Country-specific studies include Igan and Kang (2011) and Bruno and Shin (2013) on Korea; Vargas et al (2010) on Colombia; Glocker and Towbin (2012) on Brazil; and Saurina (2009) and Jimenez et al (2013) on Spain. See literature reviews by Galati and Moessner (2011) and Claessens (2014).

(DSTI) caps) along with credit growth and foreign currency lending limits are effective in reducing the growth in banks' leverage, asset, and non-core to core liabilities. Akinci and Olmstead-Rumsey (2018) record the tightening and easing of macroprudential policies every quarter from 2000 onwards in 57 countries and show that these policies are used in tandem with bank reserve requirements, capital flow management measures, and monetary policy. Lim et al (2011) study a smaller subset of 49 countries and find that macroprudential policies are associated with reductions in the procyclicality of credit and leverage. Our paper is the first to consider the effect of macroprudential policies on firms' financing growth and real activity across countries, using micro-level evidence to shed light on the distributional effects of such policies across firms.

There are two important data qualifications to consider. First, because we combine data across a large number of countries and an array of different macroprudential tools, we cannot speak to the effectiveness of specific tools. Second, notwithstanding the advantages of using micro-data, there may still be some residual endogeneity concerns, as changes in aggregate debt growth might lead to the adoption of macroprudential tools and the implementation of these policies might result in changes both in the demand for and supply of credit. Focusing on within-firm variation and considering the differential effects across firm groups allows us to address the endogeneity to a certain degree. Hence, we are cautious in drawing causal inferences from our results.

The remainder of the paper is structured as follows. Section 2 discusses the data and the empirical methodology. Section 3 presents the results on the association between macroprudential policies and firm financing and growth. Section 4 concludes.

2. Data and methodology

To investigate the association between macroprudential policies and firm financing and real performance, we combine firm-level balance sheet data with country level information on

macroprudential policies. We complement these data with other macroeconomic data. Appendix Table A lists the countries in our sample with the respective number of firms included in the analysis.

We use data from Orbis, a commercial database distributed by Bureau van Dijk containing basic firm-level information including data on external financing for over 900,000 companies across 49 countries over the period of 2003 to 2011. Compared with other databases, the unique advantage of using Orbis is that it includes data on large and small, listed and unlisted firms. We “clean” the data in a number of ways. First, we restrict our analysis to non-financial firms and drop all duplicate observations or double reports for the same firm. Second, we only include in our sample countries that have at least 25 firms over the entire period. Third, we drop all firms that were acquirers in an acquisition deal, post-acquisition, or that merged with others following the merger since such transactions can result in sharp changes in firms’ balance sheets. Fourth, we drop observations with zero values for total assets and employees and we remove outliers such as negative values for total assets and employees and listed MSMEs.

As shown in Appendix A, we have a wide variation in the number of firms across countries, ranging from 224,786 firms in France and over 110,000 firms in Italy and Spain, respectively, to fewer than 100 firms in Brazil, Chile, Kazakhstan, Mexico, Netherlands, and Philippines, respectively.¹² To address the unbalanced nature of our data, we weight all our estimations with the inverse of the number of firms in each country.

We construct the following financing variables: *Short-term financing* which is the growth in short-term debt (with residual maturity of less than one year), *Long-term financing* which is growth in long-term debt (with residual maturity of one year or more) and *Overall Financing*

¹² Some of these countries end up with fewer than 25 firms in our regressions, as not all firms have observations for all the dependent variables.

Growth which is the growth in total financing (defined as the sum of short- and long-term debt), where growth is the annual growth rate, defined as the log-difference of the variable.¹³ To reduce the impact of outliers, we drop the top and bottom 5% of each of the financing variables. We also drop observations for which we do not have all three variables available to make results comparable across the three dependent variables. We then create a consistent sample across all three variables.

To examine the real implications of macroprudential policies, we look at *Investment Growth*, which is the growth in fixed assets, and *Sales Growth*, which is the growth in operating turnover. As before, growth rates are computed as log-differences and we remove top and bottom 5% outliers.

We control for the log of total assets to account for changes in external financing due to firm growth. We define MSME firms as those with fewer than 250 employees, micro firms as those with one to nine employees, SME firms as firms with 10 to 249 employees.¹⁴ We categorize each firm into a firm size class according to the median employees across all observations available during the sample period. Thus, the firm size classifications are fixed avoiding the reclassification bias (e.g. see Moscarini and Postel-Vinay, 2012) where firms are classified into larger size bins as the economy grows. We define young firms as firms that are three years or younger (since incorporation).

To measure the creditworthiness of firms, we use three measures: *Leverage ratio* which is the ratio of total debt to total assets, *Interest Coverage* which is a dummy that takes the value 1 for

¹³ We also run estimations using the growth rate measure proposed by Haltiwanger et al. (2013) which uses the average of the start and end periods as the denominator for the growth rate to reduce the incidence of outliers. The results do not change depending on how growth rates are measured.

¹⁴ The employee ranges we consider coincide with the European Commission and OECD criteria. See http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en.

financially distressed firms (interest coverage ratios less than 1) and 0 otherwise, and *Profitability* as measured by the return on assets.

The summary statistics in Table 1 shows high variation in external financing growth among firms in our sample, ranging from –190% to 200% for short-term financing and –140% to 150% for long-term financing growth. The median firm experienced a positive short-term financing growth, but a decline in long-term financing growth. Overall financing growth was negative, on average, in our sample of firms for the period we consider.

We combine the firm-level data with country panel data on the use of different macroprudential tools from the Global Macroprudential Policy Instruments (GMPI), as described in Cerutti et al. (2015). The GMPI survey is very detailed and covers 12 different instruments. The database distinguishes between (i) tools targeted at borrowers' leverage and financial positions (BOR) and (ii) tools targeted at financial institutions (FIN).¹⁵ The former includes LTV and DSTI ratios, while the latter includes the following 10 instruments: dynamic loan-loss provisioning; countercyclical capital buffers; bank leverage ratio; capital surcharge for systemically important financial institutions; limits on interbank exposures; concentration limits; limits on foreign currency loans; limits on domestic currency loans; reserve requirement ratios; and taxes or levies on financial institutions. Each instrument is coded as 1 or 0 for each country-year depending on whether it was in use or not. Thus, the BOR index could range from 0 (no borrower-targeted instrument in place) to 2 (both borrower-targeted instruments in place) and the FIN index could range from 0 (no financial institution-targeted instrument in place) to 10 (all 10 financial institution-targeted instruments in place). Our third index (MPI) is the sum of BOR and FIN. Instruments are each coded for the period they were actually in place, i.e., from the date that they

¹⁵ As the use of different macroprudential tools varies quite significantly across countries, we prefer to use aggregate indicators.

were introduced until the day that they were discontinued. While the survey captures the breadth of macroprudential policy across an array of tools and for a large cross-section of countries, it does not capture the intensity of the tools or the extent to which they were binding.¹⁶ The descriptive statistics in Table 1 show a high variation in the use of macroprudential tools across countries and over the sample period, ranging from zero to two instruments targeted at borrowers (out of two possible tools) and zero to six tools targeted at financial institutions (out of a possible maximum of 10 possible tools).

We control for several country-level time-varying factors to ensure that we do not confound the effect of macroprudential tools with other policies or macro factors.¹⁷ We control for the log change of GDP, thus effectively controlling for economic growth, and the real monetary policy rate, defined as the discount rate minus the inflation rate. Finally, we control for the effect of the Global Financial Crisis by including a dummy for the years 2008 and 2009.

To assess the relationship between changes in macroprudential policies and growth in firms' loans, long-term debt, and overall external financing, we run the following regression:

$$Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} + \beta_2 Firm\ Size_{ijt} + \beta_3 Macro_{jt-1} + \beta_4 GFC_t + \eta_i + \varepsilon_{ijt} \quad (1)$$

where i denotes the firm, j the country and t the year. The dependent variable is one of the following three measures of financing growth: *Short-term financing*, *Long-term financing*, and *Overall Financing Growth*. *Macropru* is an indicator of macroprudential policies; *Firm Size* is proxied by the log of total assets; *Macro* is a vector of macroeconomic variables including the real monetary

¹⁶ As a robustness check we also conduct estimations with a measure of the intensity of macroprudential policies available for a subset of countries. See Table 5.

¹⁷ Appendix B provides detailed definitions and sources of each of the variables used in the analysis.

policy rate and the log change of GDP. *GFC* is the Global Financial Crisis dummy variable for 2008 and 2009 to control for the generally lower growth during this period; η_i are firm fixed effects.

We lag the macroprudential and macroeconomic variables to reduce any bias that might come from reverse causation and allow for the time lag it takes for policy to affect firms' financing growth. We include firm-fixed effects to control for time-invariant firm characteristics such as their sector and business model that could affect financing growth. We weight observations by the inverse of the number of firms per country and year so that each country has the same weight in our estimations. Finally, we cluster standard errors at the country-level, thus allowing error terms to be correlated across firms within a country.

While regression (1) allows us to mitigate concerns about reverse causation and unobserved firm-level factors driving financing growth by using firm-level data and including firm fixed effects, the worry that our estimates could be biased due to time-varying omitted variables remains. In a second step, we therefore focus on within country-year variation in financing growth across different firm groups that the literature has identified as facing different degrees of financing constraints. Specifically, we distinguish between firms of different sizes and of different ages, as an extensive literature has shown that financing constraints are inversely related to the size and age of enterprises (e.g., Hadlock and Pierce, 2010). We run the following regression including country-year fixed effects:

$$Financing\ growth_{ijt} = \beta_1 Macropu_{jt-1} * Firm\ Characteristic_i + \beta_2 Firm\ Size_{jt} + \mu_{jt} + \eta_i + \varepsilon_{ijt} \quad (2)$$

Adding country-year fixed effects (μ_{jt}) allows us to control for any time-varying country factor that might affect financing growth for any average firm in the country. Moreover, we

consider whether firms of different sizes and ages respond differently to the implementation of macroprudential tools than the average firm by including interactions of macroprudential policies with firm size and age. Given that macroprudential tools are implemented for aggregate and systemic stability considerations, rather than targeting specific firm groups, this also allows us to partly control for the confounding influence of credit growth and policy measures. Specifically, we focus on firms with one to nine employees (micro), 10 to 249 employees (SME), as well as firms that are three years or younger (since incorporation). As these firms are typically more bank-dependent and have less diversified external financing sources, we expect the effect of macroprudential policies to be stronger among them.

To examine whether macroprudential policies have real consequences we estimate the following equation:

$$Firm\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Characteristic_i + \beta_2 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt} \quad (3)$$

where firm growth is measured by *Investment growth* and *Sales growth* and the other variables are as defined above. As in regression (2), explaining the differential effects of macroprudential policies across different firm groups allows us to mitigate endogeneity concerns.

3. Macroprudential policies and firm financing and growth

In Table 2 we explore the relationship between macroprudential policies and firms' financing growth. We regress firms' short-term, long-term and overall financing growth on different macroprudential policies, controlling for firm size and a number of country-level variables. We include firm-fixed effects, thus controlling for other time-invariant firm-level

characteristics. Hence, we exploit within-firm financing growth and its relationship with macroprudential policies.

While all nine coefficients on the macroprudential policies enter negatively, only the coefficient on BOR in the long-term financing growth regression enters significantly. The coefficient size suggests that applying one additional borrower-related macroprudential policy is associated with a 4.8 percentage points lower long-term financing growth. We find that firms reduce their financing growth as they grow larger, while GDP growth is positively and significantly associated with firm financing growth. Financing growth was significantly lower during the Global Financial Crisis, while there is no significant relationship between the real interest rate and firms' financing growth over our period of analysis.

3.1. Firm heterogeneity

In Table 3, we include interactions of macroprudential policies with firm size (Panels A and B) and age (Panel C) to examine their differential effect on firms of different sizes and ages. This along with the introduction of country-time fixed effects allows us to improve our identification further. While macroprudential tools might be adjusted in reaction to country-level developments, it is less likely that they are adjusted in response to developments within specific firm groups.

The results in Panel A show that MSMEs' short-term, long-term, and overall financing growth are negatively associated with the additional implementation of borrower-related macroprudential tools. While most of the nine interaction terms enter negatively, only the regressions coefficients for BOR enter significantly. The implementation of one additional borrower-related tool is associated with 8.6 percentage points lower short-term, 3.8 percentage points lower long-term, and 5.1 percentage points lower overall financing growth for MSMEs

compared to large firms in the country. In Panel B, we distinguish further between microenterprises and SMEs, with the effects for large firms again captured by the country-year fixed effects. All six interactions of BOR with the micro- and the SME dummies enter negatively and significantly at least at the 10 percent significance level, with economic effects being somewhat higher for microenterprises than for SMEs. We also find that macroprudential tools targeted at financial institutions are associated with relatively lower financing growth for microenterprises, but not for SMEs.¹⁸ There is also a negative relationship between the overall index of macroprudential tools and the relative financing growth of both microenterprises and SMEs, though the relationship is only significant for microenterprises, but not for SMEs.

The results in Panel C show that the relationship between macroprudential tools and financing growth is relatively stronger and more negative for younger firms, especially for macroprudential tools targeted at borrowers and for long-term financing growth. Specifically, while all the interaction terms between macroprudential tools and the young firm dummy enter negatively, they only enter significantly for the BOR measure across all measures of financing growth and in the other two regressions of long-term financing growth. The relative economic effects are not as strong for young firms as they are for MSMEs; both short- and long-term financing growth is 2.3 percentage points lower for younger than for older firms after one additional borrower-targeted tool is adopted, while overall financing growth is 1.4 percentage points lower. Long-term financing growth also decreases by 4 percentage points for younger firms relative to older firms after one additional macroprudential tool targeted at financial institutions is adopted and by 2.5 percentage points for any additional macroprudential tool. While the negative

¹⁸ To the contrary, the interaction between FIN and the SME dummy enters positively and significantly in the short-term financing regression, suggesting that compared to large firms, SMEs increase their financing after additional macroprudential tools targeted at financial institutions are being implemented.

coefficient estimates in Table 3 only tell us about the relative financing growth of specific firm groups, the combination of results in Tables 2 and 3 give us confidence in having identified a negative association of macroprudential policies (especially the ones targeted at borrowers) with financing growth of MSMEs and young firms.

We undertake a number of robustness tests of our results in Table 3. First, to address further endogeneity concerns we repeat the specifications in Table 3, but this time control for the differential impact of other macro shocks on different firms by interacting the size and age dummies with the macro variables. Table 4 shows that the results from Table 3 hold when we allow for these additional interactions.

Next, in Appendix C, we repeat our specifications in Table 3 but controlling for industry-year fixed effects in addition to firm and country-year fixed effects to better control for different industries experiencing different business cycle effects. Once again, all our findings from Table 3 hold when we allow for different industries facing different cyclicity. In Appendix D, we report estimations controlling for three measures of firm financial strength or creditworthiness: leverage, interest coverage ratio, and return on assets. Again, the results are robust to including these additional firm characteristics.

Thus far, we have assessed the relationship between the implementation of macroprudential policies and financing of firms. We now turn our attention to indicators of the intensity of macroprudential measures, using data from Cerutti et al. (2017). Specifically, we focus on the loan-to-value cap for residential borrowers, since most of our significant results come from the implementation of borrower macroprudential measures. While we would have liked to have information on the intensity of the other macroprudential measures, none of the existing databases provide that level of granularity for our sample of countries.

The underlying intensity measure is reported at the quarterly frequency and records regulatory changes in the loan-to-value ratio limits to real estate transactions. The index can take on values of 1 and -1 depending on whether the macroprudential tool was tightened or loosened in each quarter. A value of 0 indicates no policy change. We time-aggregate this indicator to the yearly frequency by taking the cumulative changes in the loan-to-value ratio cap starting from quarter one and keeping the cumulative index at the fourth quarter of every year.

The results in Table 5 show that both the level and the change in loan-to-value ratio are associated with a relatively lower long-term financing growth of MSMEs, while neither short-term financing growth nor overall financing growth seem to be impacted (Panel A). On average, implementing one additional quarter to the cumulative intensity level with a tightened loan-to-value cap is associated with a 10.1 percentage point lower long-term financing growth for MSMEs relative to large firms. Implementing one additional quarter to the year-to-year change of the cumulative intensity with a tightened loan-to-value cap within a given year is associated with a 6.2 percentage point lower long-term financing growth for MSMEs relative to large firms. These findings hold both for microenterprises and SMEs (Panel B). Adding one additional quarter to the cumulative intensity level with a tightened loan-to-value cap is associated with a decrease in long-term financing growth by 9.5 and 10.2 percentage points for microenterprises and SMEs, respectively, relative to large firms. Implementing one additional quarter to the year-to-year change with a tightened loan-to-value cap is associated with a 5.2 and 6.4 percentage points lower long-term financing growth for microenterprises and SMEs, respectively, relative to large firms. On the other hand, we do not find any significantly different effect of the level or change of macroprudential tools for the financing growth of young vs. older firms (Panel C), but we also have fewer countries in this table for which we have intensity data. Together, these results provide

some evidence that not only the implementation but also tightening of borrower-targeted macroprudential measures is negatively associated with firms' financing growth.

3.2. Differential impact by financial strength

The findings above show that MSMEs and young firms are differentially more sensitive to macroprudential policies than larger and older firms presumably because they are more financially constrained and are more bank dependent. While this may not be the intended impact of these regulations, it begs the question whether the policies actually work to suppress credit to the riskiest firms at whom these policies are targeted. In other words, we would like to assess whether macroprudential policies hurt financial inclusion by limiting access to typically credit constrained firms across the board or whether they enhance financial stability and efficiency by restricting credit to poorly performing and risky firms. To try to get at this, we look within the sub-samples of micro, small, and young firms and interact the macroprudential variables with the financial strength or creditworthiness of the firm. As before, we use three measures of financial strength – *Leverage* in Table 6, *Interest Coverage* in Table 7, and *Profitability* in Table 8. At the outset, Appendix D shows that controlling for the different measures of creditworthiness does not alter the findings in Table 3.

In Table 6, we assess whether the impact of macroprudential policies on firms' financing growth varies with their leverage by interacting the macroprudential policy measures with this variable. Panel A shows that highly levered micro firms are more sensitive to macroprudential policies. Macroprudential policies targeted at both borrowers and financial institutions are associated with lower short-term financing and overall financing growth for highly levered micro borrowers relative to less levered micro borrowers. A micro firm with 1 percentage point higher

leverage has, on average, 0.127, 0.191, or 0.160 percentage points lower short-term financing growth following the implementation of one additional instrument in BOR, FIN, or their combination (MPI), respectively. To put these estimates in context, consider a change in leverage from the 25th percentile to the 75th percentile of the leverage distribution, a 31.0 percentage point increase in leverage. Such an increase would be associated with an additional 3.9, 5.9, or 5.0 percentage points decrease in short-term financing growth after implementation of one additional macroprudential policy in BOR, FIN, or MPI, respectively. We find no effect of leverage on long-term financing for micro borrowers. In the SME sub-sample in panel B, we see that while borrower targeted policies are associated with lower short-term financing for SMEs with high leverage, financial institution targeted policies are associated with lower long-term financing for SMEs with high leverage. Both instruments, BOR and FIN and their combination (MPI) are associated with lower overall financing growth for SMEs that have high leverage. In panel C we do not find a differential effect of macroprudential policies by leverage in the sample of young firms.

The results in Table 7 show that the impact of macroprudential policies varies with the profitability of firms. Here, we repeat the specifications in Table 6, but now we interact the macroprudential policies with the profitability ratio (i.e., return on assets). Panel A shows that borrower targeted macroprudential policies are associated with higher short-term, long-term and overall financing growth for more profitable micro firms and financial institution targeted policies are associated with higher short-term financing growth for more profitable micro firms. A micro firm with 1 percentage point higher return on assets (ROA) has, on average, 0.24, 0.11, or 0.13 percentage points higher short-term financing growth following the implementation of one additional instrument in BOR, FIN, or their combination (MPI), respectively. To put these estimates in context, consider an 8.0 percentage point increase in ROA from the 25th percentile to

the 75th percentile. Such an increase would lead to an additional 1.9, 0.9, or 1.0 percentage points increase in short-term financing growth after implementation of one additional macroprudential tool in BOR, FIN, or MPI, respectively. In panel B, we do not see a differential impact by profits in the sample of SMEs. In panel C, we see that both BOR and FIN are associated with higher short-term financing growth for more profitable young firms.

Finally, the results in Table 8 show cross-firm variation in the reaction to macroprudential policies across different levels of interest coverage. Here, we repeat these specifications using *Interest Coverage* in place of the profitability indicator. Interest coverage ratios less than 1 suggest that a firm is not generating enough revenues to meet its interest expenses and may be in financial distress. Panel A shows that both borrower and financial institution targeted macroprudential policies reduce short-term financing growth for micro firms with low interest coverage and borrower targeted policies also reduce long-term financing and overall financing growth for micro firms that are financially distressed. A micro firm in financial distress with interest coverage less than 1 has, on average, 0.025, 0.030, or 0.027 percentage points lower short-term financing growth relative to firms not in financial distress following the implementation of one additional instrument in BOR, FIN, or their combination (MPI), respectively. While we find no differential effect by interest coverage in the sample of SMEs in panel B, panel C shows that borrower targeted policies are associated with a drop in long-term financing and overall financing growth for young firms with interest coverage ratios less than 1. We also see that financial institution targeted policies, FIN, are negatively associated, albeit weakly, with overall financing growth for young firms with interest coverage ratios less than 1.

Overall, the results in Tables 6 - 8 suggest that among the MSME and young firms, it is the weakest firms with high leverage, low profitability, and low interest coverage ratios that

experience a drop in credit growth as macroprudential policies are implemented. While we might interpret the effect of macroprudential tools on financially weak MSMEs and younger firms as unintended consequences, these effects are consistent with the stability objective of these policy tools.

3.3. Real effect of macroprudential policies

Thus far we have shown that there is at least a negative association between macroprudential policies and firm financing growth. The question remains whether this has any real impact, in the sense that firms have to adjust their investment and growth plans. Such effects can only be expected if firms do not have sufficient internal resources to compensate for the lower growth in external financing. It is important to note that even in the case of firms where we did not find a significant reduction in financing growth after the implementation of macroprudential policies, there still might be a real effect if macroprudential policies result in higher financing costs or more stringent collateral requirements. We turn to the real effects of macroprudential policies in the next tables.

In Table 9, we repeat the specification in Table 2 replacing financing growth with firm growth. Here we regress firms' investment and sales growth on different macroprudential policies, controlling for firm size and a number of country-level variables. We control for firm-fixed effects, thus taking into account other time-invariant firm-level characteristics. We thus exploit within-firm growth and its relationship with macroprudential policies.

We find that only the coefficient on BOR enters significantly in the investment and sales growth regression. The coefficient size suggests that applying one additional borrower-related

macroprudential tool is associated with a 5.3 percentage point lower investment growth and 4.4 percentage point lower sales growth.

The results in Table 10 show that the implementation of macroprudential tools is associated with relatively slower investment growth for smaller and younger firms. As in Table 3, we include firm- and country-year fixed effects along with interactions of macroprudential measures with indicator dummies for smaller and younger firms, so that we gauge the differential effect of macroprudential policies on the relative investment growth of MSMEs (Panel A), microenterprises and SMEs (Panel B) and young firms (Panel C).

In Panel A, we find a statistically and economically significant negative relationship between the implementation of borrower-targeted measures and the relative investment and sales growth of MSMEs. The interaction terms between MSMEs and macroprudential tools targeted at financial institutions and the overall macroprudential index enter negatively but not significantly. The results in Panel B show that both microenterprises and SMEs experience relatively lower investment growth and sales growth after implementation of borrower-targeted macroprudential policies, while there is no significant effect in the case of financial institution-targeted policies. Panel C shows that the interaction between the young dummy and all three macroprudential indicators enters negatively and significantly, suggesting that both borrower- and financial institution-targeted macroprudential policies are associated with relatively lower investment growth and sales growth of younger firms. Overall, the economic significance of these effects is in line with the effects that we identified in Table 3 for the relationship between macroeconomic policies and long-term financing growth.

Together, the results in Tables 9 and 10 indicate that the negative effect of macroprudential policies has implications for the real economy, confirming the importance of financing constraints and bank dependency for smaller and younger firms.

4. Conclusion

This paper examines the micro-evidence on the impact of macroprudential policies. In particular, we assess the effect of macroprudential policies on firms' financing growth across a broad cross-section of firms and countries, differentiating between firms of different sizes and ages, and considering different types of macroprudential policies. We find evidence that the smallest firms (those with fewer than 10 employees) and youngest firms (less than or equal to three years since incorporation) are more likely to be affected by macroprudential policies. We also find that borrower-targeted policies are more effective than policies targeted at financial institutions.

Among the MSME and young firms, we find that it is the weakest firms with high leverage, low profitability, and low interest coverage ratios that experience a drop in credit growth as macroprudential policies are implemented. These effects are consistent with the stability objective of these policy tools.

Finally, we find that the implementation of macroprudential policies had real effects on economic activity. MSMEs experience relatively lower investment growth and sales growth after implementation of borrower-targeted macroprudential policies and young firms have lower investment and sales growth after implementation of both borrower-targeted and financial institution-targeted policies.

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Table 1. Summary statistics

This table presents summary statistics for all the firm-level variables in Panel A and country-level variables in Panel B. All variables are defined in Appendix B.

Variable	N	Mean	Median	S.D.	Min	Max
<i>Panel A: Firm-level variables</i>						
Short-term financing	3,107,242	0.032	0.026	0.54	-1.9	2
Long-term financing	3,107,242	-0.065	-0.077	0.44	-1.4	1.5
Overall financing growth	3,107,242	-0.016	-0.034	0.3	-0.71	0.89
Investment growth	3,015,094	0.0094	-0.012	0.25	-0.77	1.3
Sales growth	2,726,530	0.033	0.032	0.27	-0.9	1.1
Log (Total assets)	3,107,242	14	14	1.8	0	26
Unlisted	3,107,242	1	1	0.054	0	1
MSME	2,826,954	0.97	1	0.17	0	1
Micro	2,826,954	0.49	0	0.5	0	1
SME	2,826,954	0.48	0	0.5	0	1
Large	2,826,954	0.03	0	0.17	0	1
Young	3,100,998	0.3	0	0.46	0	1
<i>Panel B: Country-level variables</i>						
MPI	3,107,242	1.5	2	0.97	0	8
BOR	3,107,242	0.2	0	0.48	0	2
FIN	3,107,242	1.3	2	0.83	0	6
GDP growth	3,107,242	1	1.7	3.3	-15	15
Real policy rate	3,107,242	-0.088	0.09	2.5	-17	26
GFC	3,107,242	0.33	0	0.47	0	1
Cumulative Intensity	653,356	0.22	0	2.3	-3	7
Δ Cumulative Intensity	605,055	-0.12	0	0.68	-1	3

Table 2. Firms' financing growth and macroprudential policies

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} + \beta_2 Firm\ Size_{it} + \beta_3 Macro_{jt-1} + \beta_4 GFC_t + \eta_i + \varepsilon_{ijt}$. The dependent variable is one of the following three measures of financing growth: *Short-term financing growth*, *Long-term financing growth*, and *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm Size* is proxied by the log of total assets; *Macro* is a vector of macroeconomic variables including the real monetary policy rate and the log change of GDP. *GFC* is the Global Financial Crisis dummy variable for 2008 and 2009 to control for the generally lower growth during this period; η_i are firm fixed effects. All regressions are estimated using ordinary least squares with firm fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Log(Total assets)	-0.133*** (0.013)	-0.132*** (0.012)	-0.134*** (0.013)	-0.144*** (0.011)	-0.144*** (0.011)	-0.148*** (0.011)	-0.147*** (0.011)	-0.147*** (0.010)	-0.149*** (0.011)
GDP growth	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.002)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Real policy rate	-0.000 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
GFC	-0.046*** (0.010)	-0.046*** (0.010)	-0.046*** (0.010)	-0.038*** (0.011)	-0.039*** (0.011)	-0.038*** (0.011)	-0.045*** (0.009)	-0.045*** (0.009)	-0.045*** (0.009)
MPI	-0.006 (0.011)			-0.023 (0.015)			-0.011 (0.010)		
BOR		-0.016 (0.019)			-0.048** (0.019)			-0.023 (0.015)	
FIN			-0.001 (0.017)			-0.014 (0.021)			-0.007 (0.015)
Fixed Effects	----- Firm Fixed Effects -----								
N	3,107,242	3,107,242	3,107,242	3,107,242	3,107,242	3,107,242	3,107,242	3,107,242	3,107,242
Adj. R-sq	-0.000	-0.000	-0.000	0.122	0.122	0.121	0.144	0.144	0.144

Table 3. Firms' financing growth and macroprudential policies: Allowing for firm heterogeneity

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Characteristic_i + \beta_2 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$. *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm characteristics* include MSME dummy (1 for firms with fewer than 250 employees and 0 otherwise) in panel A, and Micro (1-9 employees) and SME dummies (10-249 employees) in panel B and a Young dummy taking the value 1 for firms ≤ 3 years since incorporation in panel C. All estimations control for the log of total assets. Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A. Interaction with MSME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing			Long-term financing			Overall financing growth		
MSME x MPI	-0.009 (0.016)			-0.012 (0.014)			-0.011 (0.010)		
MSME x BOR		-0.086** (0.040)			-0.038* (0.022)			-0.051*** (0.019)	
MSME x FIN			0.010 (0.009)			-0.006 (0.014)			-0.002 (0.006)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510
Adj. R-sq	0.041	0.041	0.041	0.170	0.170	0.170	0.214	0.214	0.214

Panel B. Interaction with Micro and SME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Micro x MPI	-0.064*			-0.031**			-0.035***		
	(0.033)			(0.013)			(0.009)		
SME x MPI	-0.002			-0.009			-0.008		
	(0.019)			(0.014)			(0.011)		
Micro x BOR		-0.096**			-0.042*			-0.064***	
		(0.040)			(0.021)			(0.018)	
SME x BOR		-0.085**			-0.038*			-0.050**	
		(0.041)			(0.022)			(0.019)	
Micro x FIN			-0.089*			-0.041**			-0.040***
			(0.045)			(0.016)			(0.008)
SME x FIN			0.025***			-0.001			0.003
			(0.006)			(0.015)			(0.007)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510
Adj. R-sq	0.041	0.041	0.041	0.170	0.170	0.170	0.215	0.215	0.215

Panel C. Interaction with Age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Young x MPI	-0.016 (0.014)			-0.025*** (0.008)			-0.007 (0.005)		
Young x BOR		-0.023** (0.010)			-0.023*** (0.006)			-0.014** (0.006)	
Young x FIN			-0.017 (0.032)			-0.040** (0.018)			-0.004 (0.009)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661
Adj. R-sq	0.035	0.035	0.035	0.168	0.168	0.168	0.214	0.214	0.214

Table 4. Firms' financing growth and macroprudential policies: Interacting all country-level variables with firm size and age

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Characteristic_i + \beta_2 Macro_{jt-1} * Firm\ Characteristic_i + \beta_3 GFC_{t-1} * Firm\ Characteristic_i + \beta_4 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$. *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm characteristics* include MSME dummy (1 for firms with fewer than 250 employees and 0 otherwise) in panel A, and Micro (1-9 employees) and SME dummies (10-249 employees) in panel B and a Young dummy taking the value 1 for firms ≤ 3 years since incorporation in panel C. *Macro* is a vector of macroeconomic variables including the real monetary policy rate and the log change of GDP. *GFC* is the Global Financial Crisis dummy variable for 2008 and 2009 to control for the generally lower growth during this period. All estimations control for the log of total assets. Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A: Interaction with MSME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
MSME x GDP growth	0.003 (0.006)	0.002 (0.006)	0.004 (0.006)	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
MSME x Real policy rate	-0.001 (0.008)	-0.001 (0.008)	-0.001 (0.008)	-0.004 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.000 (0.002)	-0.001 (0.002)	-0.000 (0.002)
MSME x GFC	-0.015 (0.052)	-0.011 (0.050)	-0.017 (0.052)	0.031 (0.038)	0.031 (0.039)	0.029 (0.038)	-0.001 (0.023)	0.000 (0.022)	-0.002 (0.023)
MSME x MPI	-0.007 (0.015)			-0.017 (0.016)			-0.011 (0.011)		
MSME x BOR		-0.080* (0.040)			-0.047* (0.026)			-0.050** (0.019)	
MSME x FIN			0.011 (0.012)			-0.011 (0.016)			-0.002 (0.007)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041
Adj. R-sq	0.041	0.041	0.041	0.175	0.175	0.175	0.215	0.215	0.215

Panel B. Interaction with Micro and SME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Micro x GDP growth	0.003 (0.005)	0.002 (0.005)	0.003 (0.005)	-0.002 (0.003)	-0.002 (0.003)	-0.001 (0.003)	0.001 (0.002)	0.000 (0.002)	0.001 (0.002)
Micro x Real policy rate	-0.002 (0.007)	-0.002 (0.007)	-0.001 (0.007)	-0.004 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.001 (0.002)	-0.002 (0.002)	-0.001 (0.002)
Micro x GFC	-0.018 (0.047)	-0.018 (0.045)	-0.017 (0.048)	0.023 (0.035)	0.022 (0.036)	0.023 (0.035)	-0.008 (0.022)	-0.009 (0.022)	-0.009 (0.022)
SME x GDP growth	0.003 (0.006)	0.003 (0.006)	0.004 (0.006)	-0.001 (0.003)	-0.001 (0.003)	-0.000 (0.003)	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)
SME x Real policy rate	-0.001 (0.008)	-0.001 (0.008)	-0.000 (0.008)	-0.004 (0.005)	-0.004 (0.004)	-0.003 (0.004)	-0.000 (0.002)	-0.001 (0.002)	-0.000 (0.002)
SME x GFC	-0.014 (0.053)	-0.011 (0.051)	-0.015 (0.053)	0.032 (0.039)	0.032 (0.039)	0.031 (0.038)	0.000 (0.023)	0.001 (0.023)	-0.001 (0.023)
Micro x MPI	-0.062* (0.033)			-0.037** (0.015)			-0.035*** (0.009)		
SME x MPI	0.000 (0.018)			-0.015 (0.017)			-0.008 (0.012)		
Micro x BOR		-0.091** (0.040)			-0.052** (0.025)			-0.064*** (0.018)	
SME x BOR		-0.080* (0.041)			-0.047* (0.027)			-0.049** (0.019)	
Micro x FIN			-0.087* (0.045)			-0.045** (0.017)			-0.039*** (0.008)
SME x FIN			0.026** (0.010)			-0.006 (0.016)			0.004 (0.008)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041	2,820,041
Adj. R-sq	0.041	0.041	0.041	0.175	0.175	0.175	0.215	0.215	0.215

Panel C. Interaction with age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Young x GDP growth	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Young x Real policy rate	0.003 (0.004)	0.003 (0.004)	0.003 (0.004)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Young x GFC	0.022* (0.012)	0.022* (0.012)	0.022* (0.012)	-0.012 (0.011)	-0.013 (0.011)	-0.012 (0.011)	0.002 (0.007)	0.002 (0.007)	0.002 (0.007)
Young x MPI	-0.015 (0.014)			-0.025*** (0.008)			-0.007 (0.005)		
Young x BOR		-0.021* (0.012)			-0.023*** (0.006)			-0.014** (0.006)	
Young x FIN			-0.018 (0.032)			-0.040** (0.018)			-0.004 (0.009)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	3,092,063	3,092,063	3,092,063	3,092,063	3,092,063	3,092,063	3,092,063	3,092,063	3,092,063
Adj. R-sq	0.034	0.034	0.034	0.173	0.173	0.173	0.215	0.215	0.215

Table 5. Intensity of macroprudential policies

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Intensity\ Macropru_{ijt-1} * Firm\ Characteristic_{it} + \beta_2 Firm\ Size_{it} + \mu_{jt} + \eta_i + \epsilon_{ijt}$. *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Intensity of macropru* is Cumulative Intensity or Δ Cumulative Intensity. *Firm characteristics* include MSME dummy (1 for firms with fewer than 250 employees and 0 otherwise) in panel A, and Micro (1-9 employees) and SME dummies (10-249 employees) in panel B and a Young dummy taking the value 1 for firms ≤ 3 years since incorporation in panel C. All estimations include the log of assets. Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A: Interaction with MSME

	(1)	(2)	(3)	(4)	(5)	(6)
	Short-term financing growth		Long-term financing growth		Overall financing growth	
MSME x Cumulative Intensity	0.125 (0.103)		-0.101** (0.043)		-0.011 (0.037)	
MSME x Δ Cumulative Intensity		0.042 (0.041)		-0.062* (0.030)		-0.009 (0.023)
Fixed effects	----- Firm, Country x Year Fixed Effects -----					
N	564,858	557,964	564,858	557,964	564,858	557,964
Adj. R-sq	0.002	0.003	0.151	0.156	0.178	0.180

Panel B. Interaction with Micro and SME

	(1)	(2)	(3)	(4)	(5)	(6)
	Short-term financing growth		Long-term financing growth		Overall financing growth	
Micro x Cumulative Intensity	0.120 (0.103)		-0.095** (0.041)		-0.011 (0.037)	
SME x Cumulative Intensity	0.125 (0.103)		-0.102** (0.043)		-0.011 (0.037)	
Micro x ΔCumulative Intensity		0.046 (0.047)		-0.052* (0.028)		0.003 (0.026)
SME x ΔCumulative Intensity		0.041 (0.040)		-0.064** (0.030)		-0.010 (0.022)
Fixed effects	----- Firm, Country x Year Fixed Effects -----					
N	564,858	557,964	564,858	557,964	564,858	557,964
Adj. R-sq	0.002	0.003	0.151	0.156	0.178	0.181

Panel C. Interaction with Age

	(1)	(2)	(3)	(4)	(5)	(6)
	Short-term financing growth		Long-term financing growth		Overall financing growth	
Young x Cumulative Intensity	-0.036 (0.032)		0.018 (0.015)		0.002 (0.013)	
Young x ΔCumulative Intensity		-0.052 (0.041)		0.032 (0.025)		-0.004 (0.007)
Fixed effects	----- Firm, Country x Year Fixed Effects -----					
N	607,083	598,082	607,083	598,082	607,083	598,082
Adj. R-sq	-0.006	-0.005	0.146	0.150	0.177	0.179

Table 6. Firms' financing growth and macroprudential policies: Allowing for firm size and age interactions with leverage

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Leverage_{it} + \beta_2 Firm\ Leverage_{it} + \beta_3 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$
Financing Growth is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); Panel A is estimated using a sub-sample of micro firms (1-9 employees), panel B using a sub-sample of SMEs (10-249 employees), and panel C using a sub-sample of young firms (≤ 3 years since incorporation). All estimations include the log of assets. Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A: Micro sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Leverage	-0.829*** (0.128)	-0.976*** (0.130)	-0.827*** (0.131)	-0.567*** (0.059)	-0.520*** (0.060)	-0.581*** (0.059)	-0.779*** (0.054)	-0.828*** (0.051)	-0.785*** (0.054)
MPI x Leverage	-0.160** (0.066)			0.043 (0.035)			-0.058* (0.031)		
BOR x Leverage		-0.127** (0.060)			-0.015 (0.055)			-0.070* (0.042)	
FIN x Leverage			-0.191** (0.086)			0.066 (0.045)			-0.061 (0.040)
Fixed Effects	-----Firm, Country x Year Fixed Effects-----								
N	1,220,523	1,220,523	1,220,523	1,220,523	1,220,523	1,220,523	1,220,523	1,220,523	1,220,523
Adj. R-sq	0.024	0.023	0.024	0.153	0.153	0.153	0.247	0.247	0.247

Panel B. SME sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Leverage	-1.061*** (0.090)	-1.118*** (0.077)	-1.110*** (0.094)	-0.512*** (0.048)	-0.612*** (0.048)	-0.522*** (0.046)	-0.911*** (0.056)	-1.000*** (0.054)	-0.934*** (0.057)
MPI x Leverage	-0.114** (0.048)			-0.101*** (0.033)			-0.109*** (0.029)		
BOR x Leverage		-0.241** (0.104)			-0.069 (0.065)			-0.128* (0.066)	
FIN x Leverage			-0.102 (0.065)			-0.128*** (0.040)			-0.125*** (0.039)
Fixed Effects	-----Firm, Country x Year Fixed Effects -----								
N	1,293,007	1,293,007	1,293,007	1,293,007	1,293,007	1,293,007	1,293,007	1,293,007	1,293,007
Adj. R-sq	0.114	0.114	0.114	0.191	0.190	0.191	0.300	0.298	0.300

Panel C. Young sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Leverage	-0.982*** (0.106)	-1.019*** (0.089)	-0.985*** (0.100)	-0.570*** (0.051)	-0.564*** (0.038)	-0.567*** (0.048)	-0.855*** (0.055)	-0.903*** (0.044)	-0.859*** (0.051)
MPI x Leverage	-0.042 (0.077)			0.010 (0.039)			-0.055 (0.044)		
BOR x Leverage		-0.049 (0.115)			0.018 (0.061)			-0.064 (0.056)	
FIN x Leverage			-0.054 (0.092)			0.010 (0.049)			-0.071 (0.052)
Fixed Effects	-----Firm, Country x Year Fixed Effects -----								
N	808,648	808,648	808,648	808,648	808,648	808,648	808,648	808,648	808,648
Adj. R-sq	0.069	0.069	0.069	0.187	0.187	0.187	0.303	0.302	0.303

Table 7. Firms' financing growth and macroprudential policies: Allowing for firm size/age interactions with profitability

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{it-1} * Firm\ ROA_{it} + \beta_2 Firm\ ROA_{it} + \beta_3 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$ *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures). Panel A is estimated using a sub-sample of micro firms (1-9 employees), panel B using a sub-sample of SMEs (10-249 employees), and panel C using a sub-sample of young firms (≤ 3 years since incorporation). All estimations include the log of total assets. Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A: Micro sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
ROA	0.137*** (0.047)	0.246*** (0.042)	0.163*** (0.048)	0.120*** (0.027)	0.093** (0.037)	0.133*** (0.026)	0.139*** (0.023)	0.151*** (0.029)	0.163*** (0.023)
MPI x ROA	0.127*** (0.039)			-0.019 (0.029)			0.027 (0.035)		
BOR x ROA		0.235** (0.093)			0.072** (0.029)			0.167*** (0.052)	
FIN x ROA			0.113** (0.042)			-0.036 (0.034)			0.004 (0.038)
Fixed Effects	-----Firm, Country x Year Fixed Effects -----								
N	1,341,249	1,341,249	1,341,249	1,341,249	1,341,249	1,341,249	1,341,249	1,341,249	1,341,249
Adj. R-sq	-0.001	-0.001	-0.001	0.142	0.142	0.142	0.191	0.191	0.190

Panel B. SME sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
ROA	0.392*** (0.078)	0.336*** (0.061)	0.398*** (0.066)	0.131** (0.055)	0.070 (0.085)	0.157*** (0.054)	0.263*** (0.049)	0.228*** (0.034)	0.278*** (0.042)
MPI x ROA	-0.038 (0.077)			-0.019 (0.040)			-0.011 (0.037)		
BOR x ROA		0.024 (0.164)			0.137 (0.105)			0.078 (0.097)	
FIN x ROA			-0.054 (0.079)			-0.050 (0.067)			-0.028 (0.033)
Fixed Effects	-----Firm, Country x Year Fixed Effects -----								
N	1,338,695	1,338,695	1,338,695	1,338,695	1,338,695	1,338,695	1,338,695	1,338,695	1,338,695
Adj. R-sq	0.094	0.093	0.094	0.191	0.192	0.192	0.232	0.232	0.232

Panel C. Young sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
ROA	0.159*** (0.046)	0.219*** (0.045)	0.176*** (0.043)	0.129*** (0.035)	0.107*** (0.032)	0.147*** (0.034)	0.141*** (0.026)	0.157*** (0.022)	0.165*** (0.026)
MPI x ROA	0.079** (0.031)			-0.006 (0.017)			0.038 (0.022)		
BOR x ROA		0.142** (0.054)			0.066 (0.040)			0.126*** (0.040)	
FIN x ROA			0.080** (0.038)			-0.027 (0.022)			0.022 (0.032)
Fixed Effects	-----Firm, Country x Year Fixed Effects -----								
N	888,460	888,460	888,460	888,460	888,460	888,460	888,460	888,460	888,460
Adj. R-sq	0.039	0.039	0.039	0.193	0.193	0.193	0.245	0.245	0.245

Table 8. Firms' financing growth and macroprudential policies: Allowing for firm size/age interactions with interest coverage

This table estimates the following regression: $Financing\ growth_{ijt} = \alpha_1 + \beta_1 Macropru_{jt-1} * Interest\ coverage_{it} + \beta_2 Interest\ coverage_{it} + \beta_3 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$. *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures). *Interest Coverage* is a dummy that takes the value 1 if interest coverage is less than 1 and 0 otherwise. Panel A is estimated using a sub-sample of micro firms (1-9 employees), panel B using a sub-sample of SMEs (10-249 employees), and panel C using a sub-sample of young firms (≤ 3 years since incorporation). All regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A: Micro sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Int Coverage Dummy	-0.015 (0.018)	-0.034** (0.012)	-0.018 (0.018)	-0.027*** (0.005)	-0.026*** (0.004)	-0.032*** (0.005)	-0.034*** (0.004)	-0.038*** (0.004)	-0.038*** (0.005)
MPI x Int Coverage Dummy	-0.027** (0.011)			-0.002 (0.003)			-0.008** (0.004)		
BOR x Int Coverage Dummy				-0.019** (0.008)			-0.018** (0.008)		
FIN x Int Coverage Dummy	-0.030** (0.013)						0.003 (0.004)		
Fixed Effects	-----			Firm, Country x Year Fixed Effects			-----		
N	1,040,466	1,040,466	1,040,466	1,040,466	1,040,466	1,040,466	1,040,466	1,040,466	1,040,466
Adj. R-sq	-0.006	-0.006	-0.006	0.139	0.140	0.139	0.165	0.165	0.165

Panel B. SME sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Int Coverage Dummy (<1)	-0.124** (0.050)	-0.086*** (0.019)	-0.104*** (0.035)	-0.025** (0.012)	-0.015 (0.013)	-0.037*** (0.010)	-0.045*** (0.015)	-0.040*** (0.007)	-0.049*** (0.011)
MPI x Int Coverage Dummy (<1)	0.059 (0.057)			-0.002 (0.009)			0.002 (0.015)		
BOR x Int Coverage Dummy (<1)		0.094 (0.096)			-0.037 (0.028)			-0.009 (0.024)	
FIN x Int Coverage Dummy (<1)			0.059 (0.066)			0.010 (0.008)			0.007 (0.015)
Fixed Effects	-----			Firm, Country x Year Fixed Effects			-----		
N	1,219,321	1,219,321	1,219,321	1,219,321	1,219,321	1,219,321	1,219,321	1,219,321	1,219,321
Adj. R-sq	0.090	0.089	0.089	0.168	0.168	0.168	0.223	0.223	0.223

Panel C. Young sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Int Coverage Dummy (<1)	-0.037*** (0.011)	-0.044*** (0.015)	-0.040*** (0.009)	-0.027*** (0.009)	-0.034*** (0.008)	-0.033*** (0.009)	-0.028*** (0.007)	-0.038*** (0.005)	-0.035*** (0.007)
MPI x Int Coverage Dummy (<1)	-0.011 (0.008)			-0.013** (0.006)			-0.017*** (0.005)		
BOR x Int Coverage Dummy (<1)		-0.014 (0.012)			-0.024** (0.011)			-0.027** (0.011)	
FIN x Int Coverage Dummy (<1)			-0.012 (0.013)			-0.013 (0.010)			-0.018* (0.009)
Fixed Effects	-----			Firm, Country x Year Fixed Effects			-----		
N	704,860	704,860	704,860	704,860	704,860	704,860	704,860	704,860	704,860
Adj. R-sq	0.032	0.032	0.032	0.175	0.175	0.175	0.241	0.241	0.241

Table 9. Real effects of macroprudential policies

This table estimates the following regression: $Firm\ growth_{ijt} = \beta_1 Macropru_{jt-1} + \beta_2 Firm\ Size_{it} + \beta_3 Macro_{jt-1} + \beta_4 GFC_t + \eta_i + \varepsilon_{ijt}$. The dependent variable is one of the following two measures of firm growth: *Investment growth* and *Sales growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm Size* is proxied by the log of total assets; *Macro* is a vector of macroeconomic variables including the real monetary policy rate and the log change of GDP. *GFC* is the Global Financial Crisis dummy variable for 2008 and 2009 to control for the generally lower growth during this period; η_i are firm fixed effects. All regressions are estimated using ordinary least squares with firm fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment growth			Sales Growth		
GDP growth	0.007*** (0.002)	0.006*** (0.002)	0.007*** (0.002)	0.008*** (0.002)	0.007*** (0.002)	0.008*** (0.002)
Real policy rate	-0.002 (0.002)	-0.002 (0.002)	-0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)
GFC	-0.054*** (0.009)	-0.055*** (0.009)	-0.055*** (0.009)	-0.113*** (0.010)	-0.113*** (0.010)	-0.114*** (0.010)
MPI	-0.016 (0.014)			-0.007 (0.015)		
BOR		-0.053*** (0.013)			-0.044*** (0.013)	
FIN			0.000 (0.017)			0.010 (0.016)
Fixed Effects	-----Firm Fixed Effects-----					
N	26,699,996	26,699,996	26,699,996	23,448,783	23,448,783	2,344,8783
Adj. R-sq	0.213	0.214	0.213	0.169	0.171	0.170

Table 10. Real effects of macroprudential policies: Allow for firm Size/Age heterogeneity

This table estimates the following regression: $Firm\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Characteristic_i + \beta_2 Firm\ Size_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$. The dependent variable is one of the following two measures of firm growth: *Investment growth* and *Sales growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm characteristics* include MSME dummy (1 for firms with fewer than 250 employees and 0 otherwise) in panel A, and Micro (1-9 employees) and SME dummies (10-249 employees) in panel B and a Young dummy taking the value 1 for firms ≤ 3 years since incorporation in panel C. All estimations control for the log of total assets. Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel A: Interaction with MSME

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment Growth			Sales Growth		
MSME x MPI	-0.013 (0.012)			-0.015 (0.014)		
MSME x BOR		-0.064*** (0.013)			-0.072*** (0.012)	
MSME x FIN			0.001 (0.001)			0.002 (0.002)
Fixed effects	----- Firm, Country x Year Fixed Effects -----			----- Firm, Country x Year Fixed Effects -----		
N	21,358,431	21,358,431	21,358,431	19,889,285	19,889,285	19,889,285
Adj. R-sq	0.243	0.243	0.243	0.263	0.263	0.263

Panel B. Interaction with Micro and SME

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment Growth			Sales Growth		
Micro x MPI	-0.015 (0.010)			-0.015 (0.014)		
SME x MPI	-0.013 (0.012)			-0.015 (0.014)		
Micro x BOR		-0.062*** (0.014)			-0.073*** (0.012)	
SME x BOR		-0.064*** (0.013)			-0.072*** (0.012)	
Micro x FIN			-0.005 (0.007)			0.002 (0.003)
SME x FIN			0.002 (0.001)			0.002 (0.002)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----			----- Firm, Country x Year Fixed Effects -----		
N	21,358,431	21,358,431	21,358,431	19,889,285	19,889,285	19,889,285
Adj. R-sq	0.243	0.243	0.243	0.263	0.263	0.263

Panel C. Interaction with Age

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment Growth			Sales Growth	Sales Growth	Sales Growth
Young x MPI	-0.014*** (0.003)			-0.026*** (0.005)		
Young x BOR		-0.023*** (0.007)			-0.044*** (0.005)	
Young x FIN			-0.014*** (0.004)			-0.025*** (0.008)
Fixed effects	----- Firm, Country x Year Fixed Effects -----					
N	26,584,064	26,584,064	26,584,064	23,341,544	23,341,544	23,341,544
Adj. R-sq	0.259	0.259	0.259	0.258	0.258	0.258

Appendix A. Country and firm coverage

The following table provides the full list of countries in the Orbis sample. The Increase and Decrease columns provide years for when the corresponding macroprudential instrument increased or decreased from the previous year.

Nation	# Observations	# Firms	MPI		FIN		BOR	
			Increase	Decrease	Increase	Decrease	Increase	Decrease
Argentina	762	271						
Australia	797	223						
Belgium	192,630	47,176						
Brazil	405	77						
Bulgaria	10,739	3,762	2005, 2006, 2007	2008	2005, 2007	2008	2006	2008
Canada*	1,418	382	2008					
Chile*	252	69						
China*	255	113	2008, 2011		2008, 2011			
Colombia*	1,859	583	2007		2007			
Croatia*	37,027	10,394	2010		2010			
Cyprus	312	111						
Czech Republic	24,578	7,002						
Estonia	39,503	10,292						
Finland	87,430	22,139						
France	659,089	224,786	2011		2011			
Germany	66,755	20,000	2010		2010			
Hungary	14,289	4,064	2010, 2011		2010, 2011		2010	
Iceland*	7,190	2,075						
Indonesia	758	162	2005		2005			
Ireland*	16,357	4,120						
Israel	674	153	2010, 2011		2011		2010	
Italy	462,776	128,072						
Japan	443,410	103,307						
Kazakhstan	164	62						
Latvia*	11,568	3,507	2007, 2011		2011		2007	

Nation	# Observations	# Firms	MPI		FIN		BOR	
			Increase	Decrease	Increase	Decrease	Increase	Decrease
Lithuania	3,390	956	2011				2011	
Malaysia*	2,459	692						
Malta	2,458	631						
Mexico	266	95						
Netherlands	258	84						
Norway	27,386	7,978	2010				2010	
Pakistan	773	184	2005, 2008		2008		2005	
Philippines*	221	92						
Poland	34,544	10,174	2010				2010	
Portugal*	89,309	26,019	2009		2009			
Republic of Korea*	111,647	28,727	2005, 2007, 2011		2007, 2011		2005	
Russian Federation	78,488	23,499						
Singapore*	386	116						
Slovakia*	3,958	1,256	2011		2011			
Slovenia	14,955	4,657						
South Africa	392	110						
Spain*	325,146	114,817						
Sweden	144,466	34,591	2010				2010	
Switzerland	547	119	2007, 2008		2007, 2008			
Thailand*	26,484	7,119	2011		2011			
Turkey	4,251	1,581	2007, 2009, 2010, 2011		2009, 2010		2007, 2011	
U.K.	134,068	35,319						
USA	20,393	6,935						
Total	3,107,242	898,653						

Appendix B. Variable definitions and sources

The following table summarizes the definition and data source of each variable used in the regression analysis.

Variable	Definition	Source
Short-term financing	Log change in short-term debt (with maturity less or equal than a year)	ORBIS
Long-term financing	Log change in long-term debt (with maturity greater than a year)	ORBIS
Overall financing growth	Log change in total financing (defined as the sum of short- and long-term debt).	ORBIS
Investment growth	Growth in investment computed as the log change in fixed assets	ORBIS
Sales growth	Growth in turnover computed as the log change in operating turnover.	ORBIS
Log(Total assets)	Log of total assets, proxying for firm size	ORBIS
Leverage	Ratio of loans and long-term debt to total assets	ORBIS
ROA	Return on assets defined as the EBIT to total assets ratio	ORBIS
Interest Coverage (<1)	Dummy taking value 1 for companies with <1 interest coverage (defined as the ratio of EBIT to interest expense)	ORBIS
MSME	Dummy taking value 1 for micro, small, and medium companies and 0 otherwise	ORBIS
Young	Dummy taking value 1 for companies that are <=3 years of age when they appear in our sample	ORBIS
MPI	Macroprudential Index (0-12) = LTV_CAP + DTI + DP + CTC + LEV + SIFI + INTER + CONC + FC + RR_REV + CG + TAX	Cerutti, Claessens, and Laeven (2015)
BOR	Borrower-Targeted Instruments (0-2) = LTV_CAP + DTI	Cerutti, Claessens, and Laeven (2015)
FIN	Financial Institution-Targeted Instruments (0-10) = DP + CTC + LEV + SIFI + INTER + CONC + FC + RR_REV + CG + TAX	Cerutti, Claessens, and Laeven (2015)
LTV	Loan-to-Value Ratio: Constrains highly levered mortgage down payments by enforcing or encouraging a limit or by determining regulatory risk weights.	Cerutti, Claessens, and Laeven (2015)
DTI	Debt-to-Income Ratio: Constrains household indebtedness by enforcing or encouraging a limit.	Cerutti, Claessens, and Laeven (2015)
DP	Time-Varying/Dynamic Loan-Loss Provisioning: Requires banks to hold more loan-loss provisions during upturns.	Cerutti, Claessens, and Laeven (2015)
CTC	General Countercyclical Capital Buffer/Requirement: Requires banks to hold more capital during upturns.	Cerutti, Claessens, and Laeven (2015)
LEV	Leverage Ratio: Limits banks from exceeding a fixed minimum leverage ratio.	Cerutti, Claessens, and Laeven (2015)

Variable	Definition	Source
SIFI	Capital Surcharges on SIFIs: Requires Systemically Important Financial Institutions to hold a higher capital level than other financial institutions.	Cerutti, Claessens, and Laeven (2015)
INTER	Limits on Interbank Exposures: Limits the fraction of liabilities held by the banking sector or by individual banks.	Cerutti, Claessens, and Laeven (2015)
CONC	Concentration Limits: Limits the fraction of assets held by a limited number of borrowers.	Cerutti, Claessens, and Laeven (2015)
FC	Limits on Foreign Currency Loans: Reduces vulnerability to foreign-currency risks.	Cerutti, Claessens, and Laeven (2015)
RR	Reserve Requirement Ratios: Limits credit growth; can also be targeted to limit foreign-currency credit growth.	Cerutti, Claessens, and Laeven (2015)
CG	Limits on Domestic Currency Loans: Limits credit growth directly.	Cerutti, Claessens, and Laeven (2015)
TAX	Levy/Tax on Financial Institutions: Taxes revenues of financial institutions.	Cerutti, Claessens, and Laeven (2015)
LTV_CAP	Loan-to-Value Ratio Caps: Restricts to LTV used as a strictly enforced cap on new loans, as opposed to a supervisory guideline or merely a determinant of risk weights.	Cerutti, Claessens, and Laeven (2015)
RR_REV	FX and/or Countercyclical Reserve Requirements: Restricts to RR which i) imposes a wedge of on foreign currency deposits (as determined by the answer to question 9.1.4.2 "Please specify the level of reserve requirements applied to specific bases identified in the question above on the last day of the year preceding the submission of this survey"), or ii) is adjusted countercyclically (as determined by the answer to the question 9.1.8 "Please specify whether this tool is intended to be adjusted countercyclically.")	Cerutti, Claessens, and Laeven (2015)
GDP growth	GDP growth rate (annual %)	World Development Indicators
Real policy rate	Real monetary policy rate (%), defined as the discount rate minus the inflation rate.	IFS Central Bank Policy Rate when available, otherwise Discount Rate or Repurchase Agreement Rate. ECB deposit facility rate for Eurozone countries.

Variable	Definition	Source
GFC	Global Financial Crisis dummy – takes value 1 for years 2008 and 2009 and 0 otherwise.	
Cumulative Intensity	Cumulative change in the loan-to-value ratio cap which are limits on loans to residential borrowers from 2000-Q1, computed Q4 every year. Missing if the instrument is not available in the country.	Cerutti, Correa, Fiorentino and Segalla (2017)
Δ Cumulative Intensity	Year-to-year change in the Q4 values of cumulative intensity defined above.	Cerutti, Correa, Fiorentino and Segalla (2017)

Appendix C. Financing growth and macroprudential policies: Adding industry-year fixed effects

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Characteristic_i + \beta_2 Firm\ Size_{it} + \mu_{jt} + \delta_{kt} + \eta_i + \varepsilon_{ijt}$. *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm characteristics* include MSME dummy (1 for firms with fewer than 250 employees and 0 otherwise) in panel A, and Micro (1-9 employees) and SME dummies (10-249 employees) in panel B and a Young dummy taking the value 1 for firms ≤ 3 years since incorporation in panel C. All estimations control for the log of total assets. Regressions are estimated using ordinary least squares with firm, country x year, and industry-year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively

Panel A: Interaction with MSME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
MSME x MPI	0.002 (0.017)			-0.010 (0.010)			-0.005 (0.006)		
MSME x BOR		-0.088* (0.044)			-0.021 (0.016)			-0.032*** (0.011)	
MSME x FIN			0.025*** (0.008)			-0.009 (0.013)			0.001 (0.006)
Fixed Effects	----- Firm, Country x Year, Industry x Year Fixed Effects -----								
N	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510
Adj. R-sq	0.041	0.041	0.041	0.170	0.170	0.170	0.214	0.214	0.214

Panel B. Interaction with Micro and SME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing			Overall financing growth		
Micro x MPI	-0.052*			-0.032**			-0.031***		
	(0.029)			(0.013)			(0.009)		
SME x MPI	0.008			-0.008			-0.002		
	(0.020)			(0.011)			(0.007)		
Micro x BOR		-0.096**			-0.025			-0.044***	
		(0.044)			(0.016)			(0.010)	
SME x BOR		-0.087*			-0.021			-0.031**	
		(0.044)			(0.016)			(0.012)	
Micro x FIN			-0.072*			-0.047***			-0.039***
			(0.038)			(0.015)			(0.011)
SME x FIN			0.039***			-0.003			0.006
			(0.009)			(0.013)			(0.006)
Fixed Effects	----- Firm, Country x Year, Industry x Year Fixed Effects -----								
N	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510	2,821,510
Adj. R-sq	0.061	0.061	0.061	0.182	0.182	0.182	0.229	0.229	0.229

Panel C. Interaction with Age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Young x MPI	-0.014 (0.013)			-0.025*** (0.008)			-0.006 (0.005)		
Young x BOR		-0.019** (0.008)			-0.021*** (0.007)			-0.012** (0.006)	
Young x FIN			-0.015 (0.030)			-0.041** (0.016)			-0.004 (0.008)
Fixed Effects	----- Firm, Country x Year, Industry x Year Fixed Effects -----								
N	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661	3,093,661
Adj. R-sq	0.050	0.050	0.050	0.175	0.175	0.175	0.224	0.224	0.224

Appendix D. Financing growth and macroprudential policies: Controlling for firm creditworthiness

This table estimates the following regression: $Financing\ growth_{ijt} = \beta_1 Macropru_{jt-1} * Firm\ Characteristic_i + \beta_2 Firm\ Size_{it} + \beta_3 Firm\ Creditworthiness_{it} + \mu_{jt} + \eta_i + \varepsilon_{ijt}$. *Financing Growth* is one of the following three variables: *Short-term financing growth*, *Long-term financing growth* or *Overall financing growth*. *Macropru* is an indicator of macroprudential policies: MPI (overall index), BOR (borrower targeted measures), FIN (financial institution targeted measures); *Firm characteristics* include MSME dummy (1 for firms with fewer than 250 employees and 0 otherwise) in panel A, and Micro (1-9 employees) and SME dummies (10-249 employees) in panel B and a Young dummy taking the value 1 for firms ≤ 3 years since incorporation in panel C. *Firm Creditworthiness* includes leverage, profitability (ROA) and a dummy for interest coverage < 1 . All estimations control for the log of total assets (*Firm Size*). Regressions are estimated using ordinary least squares with firm and country x year fixed effects, and weighted by the number of observations in each country. Standard errors clustered at the country level. All variables are defined in Appendix B. *, **, and *** represent significance at 10%, 5%, and 1% levels respectively

Panel A. Interaction with MSME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Leverage	-1.195*** (0.103)	-1.193*** (0.103)	-1.194*** (0.103)	-0.654*** (0.041)	-0.653*** (0.040)	-0.654*** (0.041)	-1.051*** (0.055)	-1.050*** (0.055)	-1.051*** (0.055)
ROA	0.035 (0.087)	0.037 (0.087)	0.036 (0.087)	-0.027 (0.062)	-0.026 (0.061)	-0.027 (0.062)	0.019 (0.028)	0.020 (0.028)	0.019 (0.028)
Interest Coverage	0.001* (0.000)	0.001* (0.000)	0.001* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
MSME x MPI	-0.004 (0.021)			-0.013 (0.018)			-0.004 (0.009)		
MSME x BOR		-0.061 (0.041)			-0.036** (0.017)			-0.038** (0.014)	
MSME x FIN			0.011 (0.028)			-0.008 (0.022)			0.006 (0.005)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	2,129,221	2,129,221	2,129,221	2,129,221	2,129,221	2,129,221	2,129,221	2,129,221	2,129,221
Adj. R-sq	0.062	0.062	0.062	0.174	0.174	0.174	0.278	0.278	0.278

*, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Panel B. Interaction with Age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth			Long-term financing growth			Overall financing growth		
Leverage	-1.009*** (0.124)	-1.009*** (0.124)	-1.008*** (0.124)	-0.661*** (0.056)	-0.661*** (0.056)	-0.661*** (0.056)	-1.010*** (0.051)	-1.010*** (0.051)	-1.010*** (0.051)
ROA	-0.053 (0.117)	-0.053 (0.117)	-0.053 (0.117)	0.088 (0.059)	0.088 (0.059)	0.088 (0.059)	0.028 (0.027)	0.028 (0.027)	0.028 (0.027)
Interest Coverage	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Young x MPI	-0.015 (0.010)			-0.022*** (0.005)			-0.009 (0.005)		
Young x BOR		-0.027* (0.013)			-0.027*** (0.009)			-0.018** (0.007)	
Young x FIN			-0.012 (0.023)			-0.028*** (0.009)			-0.004 (0.010)
Fixed Effects	----- Firm, Country x Year Fixed Effects -----								
N	2,276,376	2,276,376	2,276,376	2,276,376	2,276,376	2,276,376	2,276,376	2,276,376	2,276,376
Adj. R-sq	0.064	0.064	0.064	0.188	0.188	0.188	0.294	0.294	0.294