Credit growth and macroprudential policies: preliminary evidence on the firm level[1]

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Abstract

Combining data on 1.3 million firms from 2002 to 2011 operating in 59 countries with changes in macroprudential regulations over this period, we find some evidence that macroprudential policies are associated with lower credit growth, especially for small firms with limited non-bank financing. We also find an impact of macroprudential policies on young firms in emerging markets. Our results point to an important trade-off in financial stability and financial deepening.

Keywords: financial development; macroprudential policies; firm financing

JEL classification: E44, E58, G18, G28

1. Introduction

The trade-off between financial development and stability has dominated academic and policy debates alike, especially in the wake of the Global Financial Crisis (GFC). On the one hand, an extensive literature has documented that small firms are especially financially constrained with negative repercussions for overall economic development (eg Fazzari et al (2000); Beck et al (2005, 2006)). Easing these financing constraints and thus improving resource allocation and, ultimately, economic growth in an economy requires more efficient financial intermediation and financial deepening. On the other hand, the GFC has reinforced the need to reign in credit cycles, which can turn credit booms into credit busts and banking and economic crises (Claessens et al (2011)). Macroprudential tools, utilised for many decades and the focus of increased attention in the post-crisis regulatory reform debate, are designed increase the resilience of financial institutions and borrowers to aggregate shocks, and to contain excessive growth in credit intermediation from procyclical feedback between credit and asset prices (IMF, 2013).

This paper is a first attempt at assessing the effectiveness of macroprudential policies and their impact on firms, thus assessing a potential trade-off between stability and development objectives. Specifically, we document cross-country variation in credit growth over the past decade and examine the relationship between macroprudential policies and the growth in short-term versus long-term debt of firms, controlling for the monetary policy stance, other macroeconomic factors and time-variant firm characteristics. We also explore if there is heterogeneity in this relationship across different types of firm according to their age and size and macroprudential instruments (borrower-targeted versus financial institution-targeted). In exploring the relationship between firm financing and macroprudential tools, we combine firm-level data on more than 1.3 million firms between 2002 and 2011 in 59 countries with detailed data on the use of 12 different types of macroprudential policy instrument in these countries.

We find substantial variation in financial development and credit growth across countries. Specifically, we document a sustained increase in *private credit to GDP* across countries of all income levels in Asia over the past decades. When assessing the relationship between macroprudential regulatory tools and firm financing, we find some evidence that macroprudential policy matters, especially for smaller firms with limited non-bank financing sources. In the overall sample, we find only that the index of borrower-targeted macroprudential policies is negatively associated with growth infirm financing. When we focus on small firms with fewer than 10 employees, we see that both borrower and financial institution targeted macroprudential regulations are negatively associated with growth in short-term debt and overall debt, whereas only borrower-targeted macroprudential policies are negatively associated with growth in long-term debt. While in advanced countries, it is mostly the smaller firms that are affected by macroprudential policies, in emerging markets it is both small and young firms that are affected. In addition, in emerging markets, it is mainly borrower-related macroprudential tools that seem to work, while in advanced countries, both borrower- and bank-related macroprudential tools seem to be effective in reducing firm credit growth. Overall, we find that macroprudential policies targeting borrower leverage are more effective than policies targeted at financial institutions, especially in emerging markets.

Our paper relates to several strands of literature. First, it relates to a literature on firm financing that has documented the importance of financing constraints for firm growth but also the differential effect that such financing constraints have across firms of different sizes and ages. Using either Tobin's Q model or the Euler equation of investment, an extensive literature has documented financing constraints, especially among smaller and younger firms by showing a higher investment-cash flow sensitivity for these firms (Fazzari et al (2000); Abel (1980)). 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)). In our analysis, we use firm-level balance sheet data from a broad cross-section of both listed and private firms, ranging across different size and age groups using the growth of debt as an indicator of access to financing.

Second, our paper builds on and contributes to a small but rapidly expanding literature on the effects of macroprudential policies. The micro-level evidence is rather limited and ours is one of the first papers to document the impact of a wide range of macroprudential policies on firm-level credit growth across a number of countries. The most comprehensive of these studies and the one most closely related to our paper is Cerutti et al (2015), who document the use of various macroprudential policies in 119 countries over the period of 2000–13. In a cross-country setting, they show that usage of borrower-based policies and financial institutions-based policies is associated with lower 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 (DSTI) caps, and 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 (2015) 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.

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 (2016) 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.[5]

The remainder of the paper is structured as follows. Section 2 presents cross-country indicators of credit growth and macroprudential policy tools, both in global comparison and focusing on Asia. Section 3 presents initial findings on the relationship between macroprudential regulation and firm financing. Section 4 concludes.

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[5]   See literature reviews by Galati and Moessner (2011) and Claessens (2014).

2. Credit growth and macroprudential policies

To document trends in financial development both across countries and over time, we use aggregate *private credit to GDP*, which is the total outstanding claims of financial institutions on domestic non-financial enterprises and households, relative to economic activity, from the World Bank's Global Financial Development Database. An extensive literature has documented the positive relationship between *private credit to GDP* and economic growth (eg Beck et al (2000)), although the relationship is non-linear (eg Arcand et al (2015)) and high credit growth has also been shown to be a good crisis predictor (eg Demirgüç-Kunt and Detragiache (2005)).

Figure 1 shows the median value of *private credit to GDP* between 1980 and 2014 across the following four groups of countries: (i) high-income, (ii) upper-middle income, (iii) lower-middle income and (iv) low-income. We see a rapid increase in *private credit to GDP* in high-income countries, especially in the 2000s, followed by a retrenchment after the GFC. Similarly, both upper- and lower-middle income countries have seen a sustained increase in *private credit to GDP* since the early 2000s, while there has been little change in the median low-income country.

Private credit to GDP over time, across income groups   Figure 1
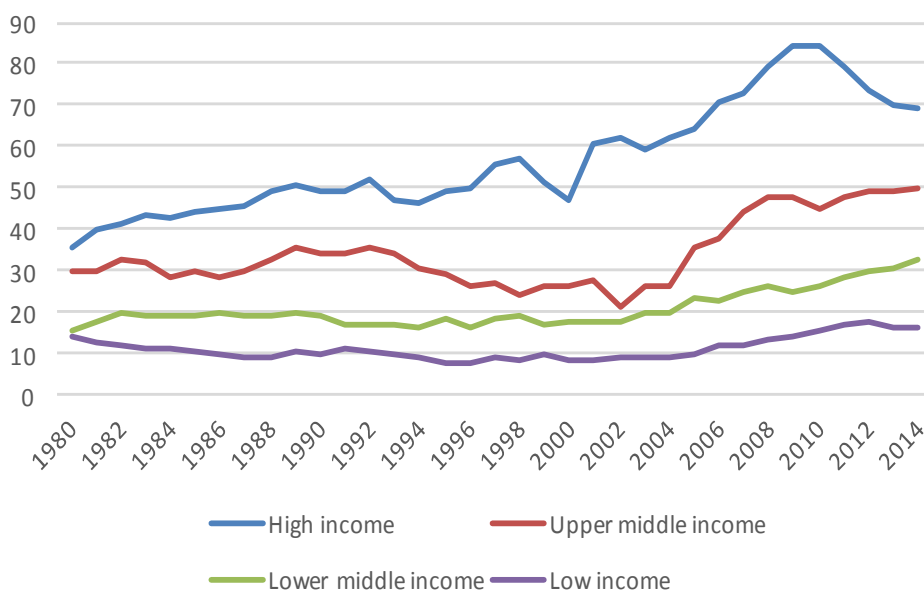
Source: Authors' calculations, based on Global Financial Development Database.

Figure 2 shows the development of *private credit to GDP* across the four income groups in Asia. Compared with global medians, all four income groups in Asia have seen a sustained increase in *private credit to GDP*, most impressively the high-income group. High-income countries in Asia did not suffer from a retrenchment after the GFC. The median low-income country has by now a higher *private credit-to-GDP* ratio than the median lower-middle income country.

Private Credit over time in Asia
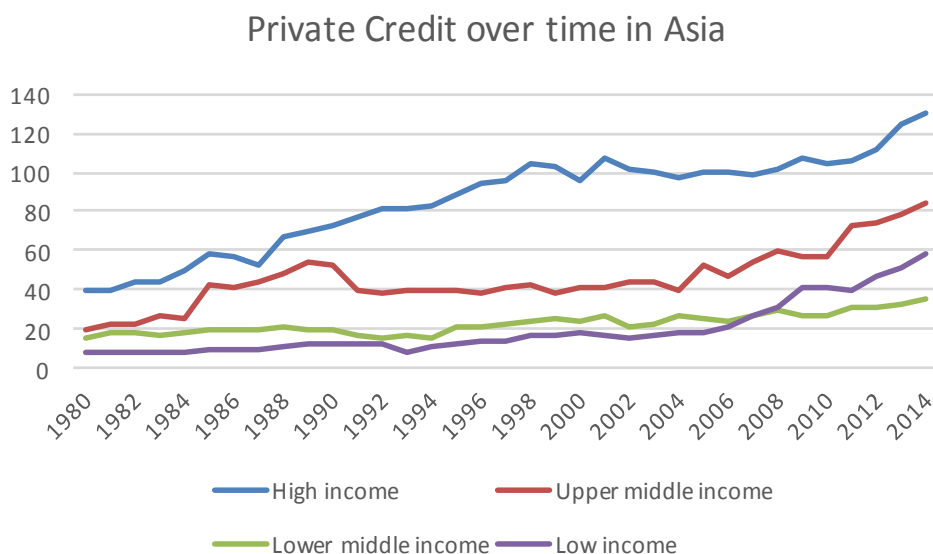
Source: Authors' calculations, based on Global Financial Development Database.

While macroprudential tools have been used for many years across the globe, they have received renewed attention after the GFC. Many Asian countries, on the other hand, have been using macroprudential regulatory tools for many years. Partly, this can be explained by a history of financial repression, as some of these tools (eg reserve requirements, lending caps) can be used both for allocative purposes and for stability objectives. For example, both Hong Kong SAR and Korea have been using loan-to-value caps to mitigate excessive housing price cycles.

The case for macroprudential policies rests on (i) the notion that a high correlation in performance across financial institutions results in contagion effects which can cause idiosyncratic distress to become systemic, and (ii) the potential that strong credit cycles might not only exacerbate business cycles, but also lead to systemic banking distress. In the broadest sense, one can distinguish between a cross-sectional dimension of macroprudential tools (ie higher capital requirements or regulatory restrictions on institutions whose failure would have a stronger negative impact on the overall financial system) and the time-series dimension, which aims at smoothing credit cycles and reducing the impact of such credit cycles on bank solvency.

As in the literature analysing the transmission and impact of monetary policy, assessing the impact of macroprudential policy presents several problems. First, macroprudential policies are endogenous to credit cycles. In particular, macroprudential policies should be observed to tighten during credit booms, and hence, the resulting reverse causation will bias downwards any effect we find for macroprudential policies mitigating credit cycles. In other words, there might be a timing issue confounding the relationship between macroprudential policies and credit flows, making any causal statement difficult. Second, we have to disentangle demand from supply of credit, as changes in macroprudential policies might affect both the demand and supply of credit. Third, changes in macroprudential policies might come about at the same time as changes in other policies, most prominently

monetary policy. Using micro-level data allows us to control to some extent for these different challenges.

To document the use of macroprudential regulatory tools and relate them to firm-level financing growth, we make use of the Global Macroprudential Policy Instruments (GMPI) survey, a recent IMF survey exercise, as described in Cerutti et al (2015). The GMPI survey is very detailed and covers 12 different instruments. We can distinguish between (i) tools targeted at borrowers' leverage and financial positions (BOR) and (ii) tools targeted at financial institutions (FIN). The former includes LTV and DSTI ratios, while the latter includes the following 10 instruments: dynamic loan-loss provisioning; countercyclical capital buffers; 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, ie from the date that they 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.

Figure 3 shows a continuous increase in the use of macroprudential tools between 2000 and 2013 across the globe, with some, rather limited, variation across income groups. Interestingly, it is the upper-middle income countries, where the use of such instruments is the most prominent, while high-income countries use, on average, as many macroprudential tools as lower-middle income countries. Low-income countries use, on average, the fewest macroprudential tools. Figure 4 shows the variation within Asia. On average, Asian countries across all income groups used more macroprudential tools than non-Asian countries, led again by upper-middle income countries and followed by low- and lower-middle income countries and high-income countries. The differences across the four income groups, however, are even smaller than across the global sample.

3. Firm financing and macroprudential policies

This section provides some preliminary evidence on the relationship between the implementation of macroprudential regulatory tools and firm financing trends. In the following subsections, we first describe our data, then discuss the methodology, before presenting some initial results.

3.1. Data

We combine a firm-level database with a data set on macroprudential policies, complementing both with other macroeconomic data. Appendix Table A1 lists the countries in our sample with the respective number of firms entering the sample.
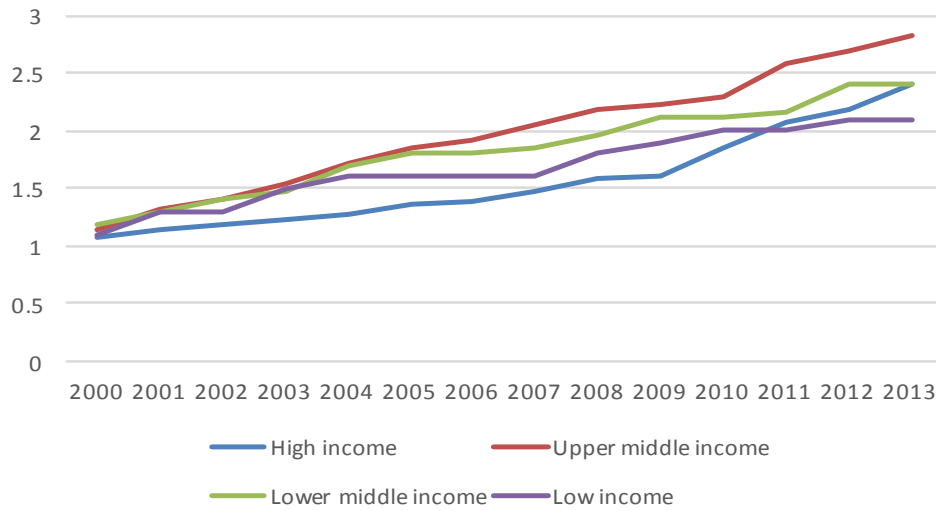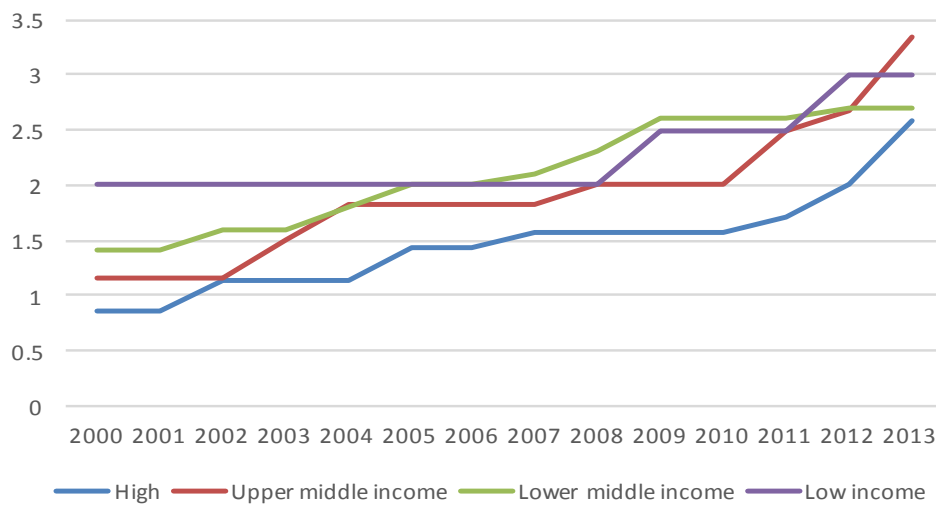
We use data from Orbis, a commercial database distributed by Bureau van Dijk containing basic firm-level information including data on external financing for over 1.3 million companies across 59 countries over the period of 2002 to 2011. Compared with other databases, the unique advantage of using Orbis 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 negative or zero values for total assets and employees.

As seen in Appendix Table A1, we have a wide variation in the number of firms across countries, ranging from 356,000 firms in France and over 180,000 firms in Italy and Spain, respectively, to fewer than 100 firms in Austria, Costa Rica, Ghana, Jordan, Morocco, New Zealand and Peru, respectively.[6] 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: *growth in short-term debt* (with residual maturity of less than one year), *growth in long-term debt* (with residual maturity of one year of more) and *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. To reduce the impact of outliers, we winsorise each dependent variable at the 5th and 95th percentiles. We then 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. We control for the log of total assets to account for changes in external financing due to firm growth.

The summary statistics in Table 1 show a high variation in external financing growth among firms in our sample, ranging from −165% to 169% for short-term financing and −137% to 136% for long-term financing. 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, with the effect being stronger for the smallest and youngest firms.

We combine the firm-level data with country panel data on the use of different macroprudential tools from the Global Macroprudential Policy Instruments (GMPI) survey as described above. Following Cerutti et al (2015), we aggregate the information on the specific instruments into two indicators covering two broad areas of macroprudential policy: tools targeted at borrowers' leverage and financial positions (BOR) and tools targeted at financial institutions (FIN).[7]

We control for several country-level time-variant factors to ensure that we do not confound the effect of macroprudential tools with other policies or macro factors. 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.

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). The use is more widespread in emerging markets than in advanced countries.

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

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

Descriptive statistics

Table 1

	Mean	Median	Standard deviation	Minimum	Maximum	Observations
Panel A: Firm variables						
Short-term financing growth	0.0319	0.0258	0.5354	−1.6546	1.6877	3,143,321
Long-term financing growth	−0.0656	−0.0773	0.4399	−1.3659	1.3607	3,143,321
Overall financing growth	−0.0155	−0.0335	0.2960	−0.7135	0.8944	3,143,321
Log (Total assets)	14.3372	14.2395	1.6434	11.4746	17.3467	3,143,321
Panel B: Firms with fewer than 10 employees						
Short-term financing growth	0.0127	0.0117	0.5434	−1.6546	1.6877	1,328,198
Long-term financing growth	−0.0807	−0.0921	0.4406	−1.3658	1.3607	1,328,198
Overall financing growth	−0.0380	−0.0595	0.2985	−0.7135	0.8944	1,328,198
Log (Total assets)	13.3390	13.2398	1.2072	11.4746	17.3467	1,328,198
Panel C: Firms with employees between 10 and 50						
Short-term financing growth	0.0485	0.0374	0.5320	−1.6546	1.6877	971,782
Long-term financing growth	−0.0427	−0.0620	0.4417	−1.3659	1.3607	971,782
Overall financing growth	0.0108	−0.0058	0.2935	−0.7135	0.8944	971,782
Log (Total assets)	14.9490	14.9641	1.1396	11.4746	17.3467	971,782
Panel D: Firms with employees 50 and 250						
Short-term financing growth	0.0557	0.0443	0.5136	−1.6546	1.6877	398,302
Long-term financing growth	−0.0324	−0.0517	0.4366	−1.3658	1.3607	398,302
Overall financing growth	0.0219	0.0056	0.2863	−0.7135	0.8944	398,302
Log (Total assets)	16.2771	16.4036	0.9445	11.4746	17.3467	398,302
Panel E: Firms with three or fewer years since incorporation						
Short-term financing growth	0.0333	0.0131	0.5351	−1.6546	1.6877	224,245
Long-term financing growth	−0.0624	−0.0740	0.4214	−1.3655	1.3607	224,245
Overall financing growth	−0.0435	−0.0804	0.2962	−0.7135	0.8944	224,245
Log (Total assets)	13.1035	12.8177	1.4273	11.4746	17.3467	224,245
Panel F: Country variables						
GDP growth	3.5350	3.7689	4.0179	−14.8142	15.2404	411
Real policy rate	0.2087	0.3433	4.6918	−16.9571	25.6001	411
MPI	1.7348	1	1.7711	0	8	411
BOR	0.3723	0	0.6553	0	2	411
FIN	1.3625	1	1.4081	0	6	411
Panel G: Advanced countries						
GDP growth	2.2782	2.6807	3.7712	−14.7244	11.9022	206
Real policy rate	0.2097	0.0433	2.9654	−14.1279	13.6856	206
MPI	1.1408	1	1.1580	0	5	206
BOR	0.2379	0	0.5289	0	2	206
FIN	0.9029	1	1.0266	0	3	206
Panel H: Emerging markets						
GDP growth	4.8177	5.1500	3.8247	−14.8142	14.1950	189
Real policy rate	0.1328	0.7542	6.1398	−16.9571	25.6001	189
MPI	2.4444	2	2.0868	0	8	189
BOR	0.5079	0	0.7553	0	2	189
FIN	1.9365	2	1.5899	0	6	189

3.2. Methodology

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:

$$y_{ijt} = \alpha_1 + \beta_1 \text{Macro-pru}_{jt-1} + \beta_2 \text{Firm Size}_{it} + \beta_3 \text{Macro}_{jt-1} + \beta_4 \text{GFC}_t + \eta_i + \varepsilon_{ijt}, \quad (1)$$

where i denotes firm, j country and t year. The dependent variable is one of the following three variables: *log change in short-term debt*, *log change in long-term debt* and *log change in total financing* (defined as the sum of short- and long-term debt). *Macro-pru* 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 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.

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. η_i is a vector of firm-fixed effects, to allow us to assess the effect of macroprudential policies on firms' financing growth controlling for any time-invariant firm characteristics. 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.

To investigate whether the impact of macroprudential policies varies with firm size and age, we run the above regression also for several subsamples of firms. Specifically, we run regressions for a sample of firms of one to nine employees, 10 to 49 employees and 50 to 249 or fewer employees,[8] as well as for a sample of firms that are three years or younger (since incorporation).[9] As they are more bank-dependent, we expect the effect of macroprudential policies to be stronger for smaller firms. We would therefore expect any impact of macroprudential policies to be stronger for smaller and younger firms.

3.3 Results

The results in Table 2 show a significant and negative relationship between macroprudential instruments and small firms' financing growth, while we find a less significant result for larger firms. The results in Panel A show a negative and significant (at the 10% level) relationship between firms' overall debt growth and changes in the overall index of macroprudential policies (MPI). A closer look at the components of MPI shows that this is driven mainly by the changes in borrower-related macroprudential policies (BOR). We find no significant relationship between short-term and long-term debt growth and changes in macroprudential policies.

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[8]   The employee ranges we consider coincide with the European Commission definition of micro (less than 10), small (from 10 to 49), and medium (from 50 to 249) firms.

[9]   We only include firms until three years after their incorporation. We classify firms according to the median employees across all observations available during the sample period.

Firms' financing growth and macroprudential policies

Table 2

Panel A: Overall sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.005**	0.005*	0.005**	0.007***	0.007***	0.008***	0.007***	0.007***	0.007***
	(2.15)	(1.95)	(2.23)	(3.71)	(3.73)	(3.81)	(3.43)	(3.45)	(3.57)
Log (Total assets)	−0.001	−0.001	−0.001	0.011***	0.011***	0.012***	0.004***	0.004***	0.004***
	(−0.77)	(−0.79)	(−0.75)	(4.92)	(4.92)	(4.93)	(2.86)	(2.86)	(2.89)
Real policy rate	−0.003	−0.003	−0.002	0.001	0.001	0.001	−0.001	−0.001	−0.001
	(−1.41)	(−1.42)	(−1.29)	(0.40)	(0.42)	(0.50)	(−0.62)	(−0.56)	(−0.47)
GFC	−0.052***	−0.052***	−0.053***	−0.050***	−0.051***	−0.051***	−0.057***	−0.058***	−0.058***
	(−4.52)	(−4.09)	(−4.71)	(−4.63)	(−4.67)	(−4.66)	(−6.79)	(−6.93)	(−6.83)
MPI	−0.005			−0.011			−0.016*		
	(−0.28)			(−0.87)			(−1.88)		
BOR		−0.028			−0.023			−0.031*	
		(−1.15)			(−1.09)			(−1.84)	
FIN			0.007			−0.008			−0.013
			(0.23)			(−0.47)			(−1.05)
N	3658784	3658784	3658784	3658784	3658784	3658784	3658784	3658784	3658784
Adj. R-squared	0.014	0.014	0.014	0.024	0.024	0.024	0.035	0.035	0.035

Panel B: Firms with one to nine employees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.007**	0.007**	0.007**	0.003	0.003	0.003	0.006**	0.006***	0.006***
	(2.34)	(2.35)	(2.32)	(0.91)	(0.94)	(0.95)	(2.69)	(2.72)	(2.71)
Log (Total assets)	−0.100***	−0.107***	−0.103***	−0.073***	−0.076***	−0.076***	−0.109***	−0.111***	−0.111***
	(−3.03)	(−3.05)	(−3.10)	(−3.00)	(−3.14)	(−3.08)	(−5.89)	(−5.78)	(−5.99)
Real policy rate	0.006	0.007	0.006	−0.010	−0.009	−0.009	−0.002	−0.001	−0.002
	(0.84)	(0.97)	(0.86)	(−1.66)	(−1.63)	(−1.63)	(−0.75)	(−0.52)	(−0.69)
GFC	−0.053	−0.057	−0.049	−0.079***	−0.083***	−0.077***	−0.058***	−0.062***	−0.057**
	(−1.32)	(−1.48)	(−1.19)	(−2.91)	(−3.02)	(−2.89)	(−2.70)	(−2.93)	(−2.58)
MPI	−0.097***			−0.069**			−0.060***		
	(−3.60)			(−2.34)			(−2.89)		
BOR		−0.073**			−0.101***			−0.081***	
		(−2.40)			(−5.03)			(−3.37)	
FIN			−0.123***			−0.067			−0.061*
			(−3.88)			(−1.53)			(−1.97)
N	1328198	1328198	1328198	1328198	1328198	1328198	1328198	1328198	1328198
Adj. R-squared	0.022	0.018	0.023	0.142	0.140	0.140	0.168	0.164	0.166

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies (continued)

Table 2

Panel C: Firms with three or fewer years since incorporation

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.014***	0.014***	0.014***	0.002	0.001	0.001	0.007***	0.007***	0.007***
	(3.13)	(3.20)	(3.06)	(0.59)	(0.51)	(0.54)	(3.51)	(3.61)	(3.42)
Log (Total assets)	–0.388***	–0.383***	–0.389***	–0.228***	–0.230***	–0.232***	–0.281***	–0.281***	–0.281***
	(–6.94)	(–6.83)	(–6.95)	(–7.36)	(–7.64)	(–7.46)	(–9.18)	(–9.21)	(–9.00)
Real policy rate	–0.001	–0.001	–0.001	–0.004	–0.003	–0.003	–0.003	–0.003	–0.003
	(–0.21)	(–0.24)	(–0.21)	(–0.69)	(–0.68)	(–0.65)	(–0.79)	(–0.78)	(–0.79)
GFC	–0.052	–0.053	–0.052	–0.035	–0.034	–0.034	–0.042	–0.041	–0.041
	(–1.18)	(–1.20)	(–1.18)	(–1.21)	(–1.19)	(–1.18)	(–1.63)	(–1.64)	(–1.63)
MPI	0.016			–0.045			–0.007		
	(0.33)			(–1.47)			(–0.21)		
BOR		–0.027			–0.044			–0.009	
		(–0.56)			(–0.86)			(–0.23)	
FIN			0.059			–0.056			–0.006
			(0.63)			(–1.23)			(–0.11)
N	224245	224245	224245	224245	224245	224245	224245	224245	224245
Adj. R-squared	0.031	0.031	0.032	0.211	0.210	0.211	0.256	0.256	0.256

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

In Panel B, we limit our sample to firms with a median number of employees of nine or fewer over the sample period and find stronger results. There is a negative and significant relationship between changes in all three macroprudential indices' and small firms' short-term, long-term and total debt growth, with the notable exception of FIN in the regression of long-term funding growth. Specifically, macroprudential tightening by applying one additional instrument that is borrower-related (loan-to-value or debt service-to-income ratio) results in 7.3 percentage points lower short-term external debt growth, while one additional instrument that is bank-related results in 12.3 percentage points lower short-term external debt growth. The relationship between changes in macroprudential instruments and firms' long-term financing growth also enters negatively and significantly, although in this case it is driven by macroprudential tools aimed at borrowers; the coefficient on macroprudential tools aimed at banks enters negatively but insignificantly. We also find a negative and significant relationship between changes in macroprudential tools and firms' overall financing growth, in this case driven by both borrower-targeted and bank-targeted tools, although the latter enters significantly only at the 10% level. In unreported regressions, we find that, in the case of the sample of firms with 10 to 49 employees, there is only a negative and significant relationship between firms' long-term financing growth and changes in borrower-related macroprudential tools. None of the other coefficients enters significantly. When we consider the sample of firms with 50 to 249 employees, none of the macroprudential policies enters significantly. Finally, the results in Panel C do not show any significant relationship between firms' short-term, long-term or overall financing growth and macroprudential policies for a set of firms that are three years or younger

Turning to the control variables, we find a positive relationship between economic growth and firms' financing growth and a negative relationship with firm size as measured by the log of total assets. Financing growth during the GFC is significantly lower. The real policy rate enters negatively and significantly in the regressions of long-term and overall financing growth in Panel A, but not in the case of short-term financing growth. This variable is not significant in any of the regressions across the different subsamples.

In summary, we find strong evidence that firms' financing growth changes with changes in macroprudential policies, especially for smaller firms with fewer options for outside financing. There is somewhat stronger evidence that borrower-related macroprudential tools are more effective, most likely because they are harder to circumvent and also because smaller firms are often able to borrow against the owners' personal collateral. The ability to borrow for individuals is likely to be affected by loan-to-value and leverage ratios.

The results in Tables 3 and 4 consider two subsamples: advanced countries and emerging markets. One can consider several reasons why the relationship between firms' financing growth and macroprudential tools might vary across these two country groups. On the one hand, financial systems in most advanced countries offer more non-bank financing options so that we would expect a less strong and significant impact of macroprudential tools on firms in these countries. On the other hand, not only might it be harder to enforce prudential policies in emerging markets, but as these tools have been used for a longer time, firms might have found alternative financing sources over the years to counter the effect of macroprudential policies.

Firms' financing growth and macroprudential policies in advanced economies　　Table 3

Panel A: Overall sample

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.006***	0.006***	0.006***	0.008***	0.008***	0.008***	0.007***	0.007***	0.007***
	(3.48)	(3.42)	(3.47)	(7.12)	(7.07)	(7.16)	(5.94)	(5.90)	(5.96)
Log (Total assets)	–0.133***	–0.132***	–0.133***	–0.125***	–0.125***	–0.128***	–0.139***	–0.139***	–0.140***
	(–7.75)	(–8.06)	(–7.83)	(–10.02)	(–9.90)	(–10.11)	(–9.46)	(–9.54)	(–9.58)
Real policy rate	–0.005***	–0.005***	–0.005***	–0.005*	–0.005*	–0.005**	–0.004**	–0.004**	–0.004**
	(–3.56)	(–3.50)	(–3.65)	(–2.03)	(–1.95)	(–2.08)	(–2.38)	(–2.32)	(–2.43)
GFC	–0.039***	–0.039***	–0.039***	–0.034***	–0.035***	–0.034***	–0.037***	–0.038***	–0.037***
	(–3.64)	(–3.57)	(–3.75)	(–2.89)	(–2.94)	(–2.91)	(–3.46)	(–3.48)	(–3.47)
MPI	0.002			–0.016			–0.007		
	(0.15)			(–0.86)			(–0.63)		
BOR		–0.004			–0.029			–0.011	
		(–0.22)			(–1.52)			(–0.74)	
FIN			0.006			–0.007			–0.006
			(0.38)			(–0.29)			(–0.32)
N	2922400	2922400	2922400	2922400	2922400	2922400	2922400	2922400	2922400
Adj. R-squared	–0.023	–0.023	–0.023	0.093	0.093	0.093	0.105	0.105	0.105

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies in advanced economies
(continued)

Table 3

Panel B: Firms with one to nine employees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.006**	0.007**	0.007**	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(2.23)	(2.38)	(2.29)	(4.08)	(4.27)	(4.11)	(4.76)	(5.14)	(4.66)
Log (Total assets)	–0.092***	–0.102***	–0.096***	–0.097***	–0.098***	–0.100***	–0.119***	–0.121***	–0.122***
	(–3.09)	(–2.99)	(–3.18)	(–3.82)	(–3.80)	(–3.84)	(–6.49)	(–6.27)	(–6.68)
Real policy rate	–0.006	–0.005	–0.005	–0.006*	–0.006*	–0.006*	–0.005*	–0.005*	–0.004*
	(–1.56)	(–1.29)	(–1.49)	(–1.90)	(–1.75)	(–1.99)	(–1.88)	(–1.74)	(–1.90)
GFC	–0.056***	–0.063***	–0.052***	–0.034**	–0.038**	–0.034**	–0.043***	–0.046***	–0.042***
	(–3.14)	(–4.41)	(–2.85)	(–2.24)	(–2.37)	(–2.22)	(–3.42)	(–3.53)	(–3.35)
MPI	–0.106***			–0.043**			–0.041***		
	(–4.20)			(–2.23)			(–2.91)		
BOR		–0.050***			–0.088***			–0.067**	
		(–3.07)			(–3.04)			(–2.14)	
FIN			–0.130***			–0.029*			–0.034***
			(–7.35)			(–1.88)			(–2.94)
N	1293633	1293633	1293633	1293633	1293633	1293633	1293633	1293633	1293633
Adj. R-square	–0.017	–0.023	–0.017	0.115	0.115	0.113	0.132	0.131	0.130

Panel C: Firms with three or fewer years since incorporation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.008**	0.008**	0.008**	0.002	0.002	0.002	0.004**	0.004**	0.004**
	(2.21)	(2.19)	(2.20)	(1.04)	(1.02)	(0.99)	(2.39)	(2.37)	(2.36)
Log (Total assets)	–0.297***	–0.296***	–0.297***	–0.239***	–0.240***	–0.240***	–0.265***	–0.265***	–0.264***
	(–5.09)	(–5.03)	(–5.22)	(–7.56)	(–7.75)	(–7.07)	(–8.37)	(–8.41)	(–7.92)
Real policy rate	–0.001	–0.002	–0.001	–0.007**	–0.007**	–0.007**	–0.006	–0.006	–0.006
	(–0.19)	(–0.20)	(–0.21)	(–2.27)	(–2.11)	(–2.36)	(–1.52)	(–1.42)	(–1.70)
GFC	–0.057	–0.057	–0.057	–0.035	–0.034	–0.034	–0.042**	–0.042**	–0.042**
	(–1.50)	(–1.51)	(–1.51)	(–1.37)	(–1.35)	(–1.35)	(–2.67)	(–2.68)	(–2.70)
MPI	–0.000			–0.015			0.010		
	(–0.01)			(–0.38)			(0.28)		
BOR		–0.007			–0.007			0.008	
		(–0.12)			(–0.10)			(0.14)	
FIN			0.008			–0.023			0.011
			(0.21)			(–0.67)			(0.27)
N	215270	215270	215270	215270	215270	215270	215270	215270	215270
Adj. R-squared	–0.006	–0.006	–0.006	0.227	0.227	0.227	0.265	0.265	0.265

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies in emerging markets

Table 4

Panel A: Overall sample

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.008**	0.008**	0.008**	0.006**	0.007**	0.007**	0.006**	0.006**	0.006**
	(2.12)	(2.09)	(2.13)	(2.25)	(2.26)	(2.35)	(2.15)	(2.14)	(2.22)
Log (Total assets)	–0.090*	–0.086	–0.094*	–0.152***	–0.155***	–0.156***	–0.149***	–0.150***	–0.151***
	(–1.87)	(–1.57)	(–2.02)	(–8.42)	(–8.48)	(–8.63)	(–8.30)	(–8.86)	(–8.16)
Real policy rate	0.000	–0.000	0.000	0.002	0.002	0.002	0.001	0.001	0.001
	(0.04)	(–0.06)	(0.11)	(0.94)	(1.06)	(1.08)	(0.53)	(0.58)	(0.63)
GFC	–0.058***	–0.058***	–0.059***	–0.037**	–0.037**	–0.037**	–0.053***	–0.053***	–0.053***
	(–3.34)	(–3.38)	(–3.34)	(–2.16)	(–2.19)	(–2.14)	(–4.61)	(–4.71)	(–4.55)
MPI	0.002			–0.034**			–0.020		
	(0.08)			(–2.28)			(–1.54)		
BOR		–0.046			–0.073***			–0.045**	
		(–1.46)			(–6.22)			(–2.13)	
FIN			0.023			–0.031			–0.016
			(0.41)			(–1.32)			(–0.85)
N	220484	220484	220484	220484	220484	220484	220484	220484	220484
Adj. R-squared	0.025	0.026	0.026	0.143	0.143	0.142	0.161	0.162	0.161

Panel B: Firms with one to nine employees

	(1) Short-term financing growth	(2) Short-term financing growth	(3) Short-term financing growth	(4) Long-term financing growth	(5) Long-term financing growth	(6) Long-term financing growth	(7) Overall financing growth	(8) Overall financing growth	(9) Overall financing growth
GDP growth	0.011	0.011	0.011	–0.005	–0.004	–0.005	0.005	0.005	0.005
	(1.66)	(1.63)	(1.65)	(–0.56)	(–0.56)	(–0.58)	(0.86)	(0.86)	(0.84)
Log (Total assets)	–0.118	–0.122	–0.120	–0.061	–0.069	–0.062	–0.108**	–0.114**	–0.109**
	(–1.41)	(–1.43)	(–1.44)	(–1.10)	(–1.22)	(–1.10)	(–2.46)	(–2.50)	(–2.46)
Real policy rate	0.023	0.024	0.023	–0.019	–0.017	–0.020	0.000	0.002	–0.000
	(1.64)	(1.70)	(1.65)	(–1.41)	(–1.40)	(–1.39)	(0.01)	(0.42)	(–0.09)
GFC	–0.052	–0.055	–0.049	–0.192**	–0.193**	–0.187**	–0.100	–0.102	–0.097
	(–0.40)	(–0.42)	(–0.38)	(–2.39)	(–2.41)	(–2.32)	(–1.48)	(–1.53)	(–1.39)
MPI	–0.074			–0.116*			–0.090**		
	(–1.54)			(–1.91)			(–2.19)		
BOR		–0.117*			–0.117***			–0.105***	
		(–1.97)			(–4.66)			(–3.15)	
FIN			–0.083			–0.165			–0.121*
			(–0.98)			(–1.64)			(–1.79)
N	34542	34542	34542	34542	34542	34542	34542	34542	34542
Adj. R-squared	0.106	0.105	0.105	0.180	0.172	0.181	0.213	0.203	0.212

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

Firms' financing growth and macroprudential policies in emerging markets
(continued)   Table 4

Panel C: Firms with three or fewer years since incorporation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Short-term financing growth	Short-term financing growth	Short-term financing growth	Long-term financing growth	Long-term financing growth	Long-term financing growth	Overall financing growth	Overall financing growth	Overall financing growth
GDP growth	0.018*	0.019**	0.017*	0.004	0.003	0.003	0.011**	0.011***	0.011**
	(2.03)	(2.32)	(1.90)	(0.54)	(0.49)	(0.45)	(2.74)	(2.93)	(2.61)
Log (Total assets)	–0.552***	–0.543***	–0.560***	–0.213***	–0.218***	–0.217***	–0.302***	–0.303***	–0.305***
	(–4.84)	(–4.65)	(–4.93)	(–3.29)	(–3.38)	(–3.33)	(–4.81)	(–4.74)	(–4.88)
Real policy rate	0.003	0.004	0.003	–0.001	–0.001	–0.002	0.003	0.003	0.002
	(0.37)	(0.46)	(0.38)	(–0.17)	(–0.14)	(–0.22)	(0.52)	(0.55)	(0.49)
GFC	–0.032	–0.037	–0.028	–0.046	–0.044	–0.044	–0.042	–0.042	–0.041
	(–0.32)	(–0.37)	(–0.28)	(–0.66)	(–0.65)	(–0.62)	(–0.64)	(–0.64)	(–0.61)
MPI	0.025			–0.082			–0.032		
	(0.27)			(–1.67)			(–0.60)		
BOR		–0.098***			–0.123			–0.066**	
		(–3.35)			(–1.70)			(–2.29)	
FIN			0.124			–0.093			–0.023
			(0.71)			(–1.17)			(–0.22)
N	8971	8971	8971	8971	8971	8971	8971	8971	8971
Adj. R-squared	0.087	0.088	0.089	0.158	0.157	0.157	0.234	0.234	0.233

t statistics in parentheses. *, ** and *** mean statistical significance at the 10%, 5% and 1% level, respectively.

The results in Table 3 show no significant relationship between firms' short-term, long-term and overall financing growth and macroprudential tools in the overall sample of firms in advanced countries (Panel A), while we again find strong evidence that different types of macroprudential policy affect short-term, long-term and overall financing growth in the case of smaller firms with fewer than 10 employees in advanced economies (Panel B). In unreported regressions, we also find some evidence that borrower-related macroprudential policies affect the long-term financing growth of firms with 10 to 49 employees, while there is no evidence of a significant impact of macroprudential policies in the sample of firms with 50 to 249 employees in advanced countries. Similarly, we do not find any evidence of an effect of macroprudential policies on financing growth of firms with three or fewer years since incorporation in advanced countries (Panel C). Turning to the control variables, we find similar results as in Table 3, with the exception of the real monetary policy rate, which enters negatively and significantly across all regressions in Panel A and across several subsample regressions.

The results in Table 4 for the sample of firms in emerging markets show a somewhat stronger impact of macroprudential policies in these countries. First, we find some evidence of an effect of borrower-related macroprudential policies on firms' long-term and overall financing growth (Panel A), although there is no significant relationship with the short-term financing growth of firms in emerging markets. We find rather strong evidence that borrower-related macroprudential tools

have an impact on small firms' long-term and overall financing growth (Panel B), and significant (at the 10% level) evidence of a negative relationship between macroprudential tools and small firms' short-term financing growth in emerging markets. In unreported regressions, we also find a negative relationship between borrower-targeted macroprudential policies and long-term funding growth for the sample of firms with 10 to 49 employees and no evidence for a significant relationship between macroprudential tools and firms' financing growth in emerging markets in a sample of firms with 50 to 249 employees. Finally, we find some evidence that young firms' short-term and overall financing growth is affected by changes in borrower-related macroprudential tools (Panel C). The fact that we find some negative effects for young firms in emerging markets, while we do not find any evidence for any such effect on young firms in advanced economies, could be due to the fact that angel or venture capital financing is more likely to be available for firms in advanced countries than it is in emerging markets. Turning to the control variables, we again find a negative and significant relationship of financing growth with firm size and a more tenuous positive relationship between GDP growth and financing growth. The real monetary policy rate rarely enters significantly and we have a less strong relationship between financing growth and the GFC than in the sample of advanced countries.

In summary, we confirm many of our main findings in the subsamples of advanced countries and emerging markets, but also find some critical differences. First, in advanced countries, it is mostly the smaller firms that are affected by macroprudential policies, while in emerging markets it is both small and young firms that are affected. Second, in emerging markets, it is mainly borrower-related macroprudential tools that seem to work, while in advanced countries it is both borrower- and bank-related macroprudential tools that work.

4. Conclusion

This paper shows that there has been financial deepening and credit growth across countries of all income levels in Asia. We also assess the effect of macroprudential policies on firms' funding growth across a broad cross-section of firms and countries, differentiating between firms of different sizes and ages, emerging markets and advanced countries, and different types of macroprudential policy. We find evidence that the smallest firms (those with fewer than 10 employees) are more likely to be affected by macroprudential policies. We find some evidence that younger firms are more affected in emerging markets. We also find that borrower-targeted policies are more effective than policies targeted at financial institutions. Overall, these findings are consistent with the broader literature on financing constraints, which shows that smaller firms are more affected by financing constraints and by monetary policy measures. The findings that borrower-targeted policies are more effective than measures targeted at banks are consistent with previous findings that macroprudential measures targeted at banks are subject to leakage (Aiyar et al (2014)).

The efficiency of borrower-targeted policy measures raises additional questions. In many cases, such restrictions apply only to residential real estate lending, which is consistent with the fact that only the smallest firms are significantly affected by such restrictions, as in these cases owners might collateralise funding with their personal real estate. This might also explain why younger firms in emerging markets are

affected by borrower-targeted policies, while younger firms in advanced countries are not affected by any of the macroprudential policies, most likely relying on non-bank funding.

Returning to the theme we started with, our findings point to a clear trade-off between financial stability and financial deepening. As in the case of capital account restrictions (Forbes (2007)), smaller firms are the ones most affected by macroprudential tools, which points to a trade-off in the implementation of these policies.

References

Aiyar, S, C W Calomiris and T Wieladek (2014): "Does macroprudential regulation leak? Evidence from a UK policy experiment", *Journal of Money, Credit, and Banking*, vol 46(1), pp 181–214.

Akinci, O and J Olmstead-Rumsey (2015): "How effective are macroprudential policies? An empirical investigation", *Federal Reserve Board International Finance Discussion Papers* 1136.

Arcand, J L, E Berkes and U Panizza (2015): "Too much finance?", *Journal of Economic Growth*, vol 20, pp 105–148

Beck, T, A Demirgüç-Kunt and V Maksimovic (2005): "Financial and legal constraints to firm growth: does firm size matter?", *Journal of Finance*, vol 60, pp 137–177.

Beck, T, A Demirgüç-Kunt, L Laeven and V Maksimovic (2006): "The determinants of financing obstacles", *Journal of International Money and Finance*, vol 25, pp 932–52.

Beck, T, R Levine and N Loayza (2000): "Finance and the sources of growth", *Journal of Financial Economics*, vol 58(1-2), pp 261–300.

Bruno, V, I Shim and H S Shin (2016): "Comparative assessment of macroprudential policies," *Journal of Financial Stability*, forthcoming.

Camors, C D and J-L Peydro (2014): "Macroprudential and monetary policy: loan-level evidence from reserve requirements", working paper.

Cerutti, E, S Claessens and L Laeven (2015): "The use and effectiveness of macroprudential policies: new evidence", *IMF Working Papers* 15/61.

Claessens, S (2014): "An overview of macroprudential policy tools", *IMF Working Papers* 14/214.

Claessens, S, A Kose and M Terrones (2011): "Financial cycles: What? How? When?", In: R Clarida and F Giavazzi (*eds*): NBER International Seminar on Macroeconomics, University of Chicago Press, pp 303–343.

Claessens, S, S Ghosh and R Mihet (2013): "Macroprudential policies to mitigate financial system vulnerabilities", *Journal of International Money and Finance*, vol 39, pp 153–185.

Craig, R S and C Hua (2011): "Determinants of property prices in Hong Kong SAR: implications for policy", *IMF Working Papers* 11/277.

Crowe, C W, D Igan, G Dell'Ariccia and P Rabanal (2011): "How to deal with real estate booms", *IMF Staff Discussion Note* 11/02.

Dell'Ariccia, G, D Igan, L Laeven and H Tong (2012): "Policies for macrofinancial stability: how to deal with credit booms?", *IMF Staff Discussion Note* 12/06.

Demirgüç-Kunt, A and E Detragiache (2005): "Cross-country empirical studies of systemic bank distress: a survey", *National Institute Economic Review*, vol 192(1), pp 68–83.

Forbes, K (2007): "One cost of the Chilean capital controls: increased financial constraints for smaller traded firms", *Journal of International Economics*, vol 71(2), pp 294–323.

Galati, G and R Moessner (2011): "Macroprudential policy—a literature review," *BIS Working Papers* no 337.

Glocker, C and P Towbin (2012): "The macroeconomic effects of reserve requirements", *WIFO Working Paper* no 420.

Igan, D and H Kang (2011): "Do loan-to-value and debt-to-income limits work? Evidence from Korea", *IMF Working Papers* 11/297.

IMF (2013). Key Aspects of Macroprudential Policy. IMF Policy Paper, International Monetary Fund, Washington, DC.

Jimenez, G, S Ongena, J-L Peydro and J Saurina (2013): "Macroprudential policy, countercyclical bank capital buffers and credit supply: evidence from the Spanish dynamic provisioning experiments", *European Banking Center Discussion Paper* no 2012-011.

Lim, C H, F Columba, A Costa, P Kongsamut, A Otani, M Saiyid, T Wezel and X Wu (2011): "Macroprudential policy: what instruments and how are they used? Lessons from country experiences", *IMF Working Papers* 11/238.

Tovar, C, M Garcia-Escribano and M V Martin (2012): "Credit growth and the effectiveness of reserve requirements and other macroprudential instruments in Latin America", *IMF Working Papers* 12/142.

Vandenbussche, J, U Vogel and E Detragiache (2015): "Macroprudential policies and housing prices – a new database and empirical evidence for central, eastern and southeastern Europe", *Journal of Money, Credit and Banking*, vol 47(S1), pp 343–377.

Vargas, H, C Varela, Y Betancourt and N Rodriguez (2010): "Effects of reserve requirements in an inflation targeting regime: the case of Colombia", *Borradores de Economía*, no 587. Banco de la República (Colombia).

Zhang, L and E Zoli (2014): "Leaning against the wind: macroprudential policy in Asia", *IMF Working Papers* 14/22.

Appendix

Country and firm coverage

Appendix Table A1

Country	Number of firms	Country	Number of firms
Argentina	451	Latvia	10028
Australia	612	Lithuania	1606
Belgium	63560	Malaysia	1273
Brazil	88	Malta	842
Bulgaria	6760	Mexico	165
Canada	606	Montenegro	110
Chile	105	Netherlands	126
China	694	New Zealand	33
Colombia	1012	Norway	12115
Croatia	15387	Pakistan	275
Cyprus	260	Peru	75
Czech Republic	11681	Philippines	262
Ecuador	61	Poland	15333
Estonia	13392	Portugal	44544
Finland	29158	Romania	914
France	355851	Russia	30986
Germany	38123	Singapore	229
Hungary	6035	Slovakia	2479
Iceland	2967	Slovenia	12097
India	377	South Africa	159
Indonesia	219	Spain	182826
Ireland	5078	Sweden	44816
Israel	291	Switzerland	115
Italy	188487	Thailand	10992
Japan	142120	Turkey	3153
Jordan	62	United Kingdom	54645
Kazakhstan	158	United States	12165
Korea	40966	**Total**	**1366924**