Do Macroprudential Policies Lower Firms' Financial Leverage? Firm-level Evidence from China

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Abstract: This paper discusses the effectiveness of macroprudential policies in mitigating the financial leverage of Chinese firms. By analyzing data from 2,442 listed non-financial firms in China, and considering the implementation of macroprudential policies from 2002Q1 to 2020Q4, the study finds that these policies have a measurable impact on reducing firms' leverage, both in terms of ratio and absolute value. The impact, however, is observed to be asymmetric depending on the short- and long-term leverage and the degree of policy tightening or loosening. Moreover, the results indicate that the effect varies among firms based on their ownership, size, and board listing. However, these macroprudential policies do not lead to an increase in bonds, funds or commercial credits. The findings of this research provide a novel perspective on the impact of macroprudential policies on firm deleveraging in China.

Keywords: Macroprudential Policies; Financial Leverage; Asymmetry Effect; Spill-over Effect; Heterogeneity

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1. Introduction

The mitigation of financial systemic risk through the implementation of macroprudential policies (MPs) has become a widely accepted practice, further reinforced by the global financial crisis (GFC), in safeguarding financial stability (Claessens et al., 2013; Giese et al., 2014; Meuleman & Vennet, 2020; Sui et al., 2022). These policies aim to minimize disruptions in the provision of key financial services that are crucial to the real economy (IMF, 2011). The effectiveness of MPs can be measured through their impact on bank credit supply (Akinci & Olmstead-Rumsey, 2018;Mirzaei & Samet, 2022).

According to Farre-Mensa and Ljungqvist (2016), a financially constrained firm faces an inelastic credit supply curve. This implies that a decrease in external credit supply, such as the implementation of tight MPs, would shift the inelastic credit supply curve to the left, resulting in a decrease in the firm's financial leverage. Therefore, based on the aforementioned theory of financial constraints, MPs should lead to a reduction in a firm's leverage through the banking system (Ayyagari et al., 2018).

While the banking system is an integral component of the financial system, it is not the sole measure of its effectiveness. The true test of macroprudential policies (MPs) lies in their ability to positively impact the real economy, beyond just the banking sector. So far, there is rather limited empirical research that analyses the micro-level effects of MPs on nonfinancial firms. A few studies, such as those by Ayyagari et al. (2018), and Yarba and Guner (2020), have attempted to shed light on this topic, but more research is needed to fully understand the impact of MPs on nonfinancial firms.

China places a great emphasis on mitigating banking systemic risk, due to the rapid growth of credit. Bank loans are a primary source of funding for businesses, making the effectiveness of macroprudential tools crucial for the financial stability of the Chinese markets. (Chen et al., 2013). Chinese monetary and financial regulatory authorities have implemented a series of macroprudential policy measures, such as adjusting reserve requirements and loan-to-value ratio limits. The effectiveness of MPs is of vital importance for the financial stability of the Chinese financial markets (Sun & Wang, 2013). China has also built up a significant macroprudential capacity and has deployed these tools extensively (Richter et al., 2019). While there is anecdotal evidence of China’s MPs success in reducing bank loan growth (Klingelhofer & Sun, 2019), there is limited understanding of the impact of these measures on the reduction of leverage among nonfinancial firms.

Hence, this paper aims to address the gap in the literature by investigating the effect of MPs on nonfinancial firms in China. To achieve this, we set out specific research objectives that distinguish our work from previous studies. First, we examine the effects of MPs (tightening/loosening), following Richter et al. (2019), on nonfinancial firms in China, an area of research that has not been previously explored, since most macroprudential policy studies focus on the effect of MPs on macroeconomic factors, such as output, inflation, or banks. By conducting asymmetric tests, we aim to find evidence of heterogeneity at the micro-level.

Second, the paper uses a dataset that includes both state-owned and non-state-owned firms, providing an additional dimension to the discussion about the micro effect of MPs. The analysis also explores variations between firms of different sizes and listing boards, expanding upon the studies by Ayyagari et al. (2018), and Yarba and Guner (2020) which highlight the differences in the effects of MPs on small and large firms.

Finally, this study emphasizes the importance of examining the ownership effects of macroprudential policies since political connections have been identified as a significant factor in corporate financing, particularly in emerging economies (Cull et al., 2015; Gu et al., 2019; Lai et al., 2020). The inclusion of non-state-owned firms in the dataset, which accounts for 68.96% of the sample, enables a deeper exploration of the heterogeneity of the effects of MPs.[1] The study also studies differences between sizes and listing board, providing a comprehensive analysis of the micro-level effects of MPs on nonfinancial firms in China.

To address endogeneity issues, we employ a combination of firm-level data and Chinese macroprudential policy data. By merging macro policy data with a sample of 2,442 Chinese nonfinancial firms during the period 2002Q1 – 2020Q4, we aim to minimize the chances that macroeconomic policies were adopted in response to individual firms or specific industries (Ayyagari et al., 2018; Claessens et al., 2013). Moreover, our examination of the structural impact on financial leverage in terms of short- and long-term objectives aims to differentiate the role of MPs from other economic shocks while exploring the possibility of asymmetrical effects. To accomplish this, we classify MPs based on whether instruments are tight or loose, using a tight indicator. This approach of policy heterogeneity addresses the identification problem, as MPs should be designed asymmetrically during the financial cycle's ups and downs (Richter et al., 2019).

The paper is organized as follows: Section 2 presents a review of the relevant literature and highlights the contributions of the study. Section 3 provides an overview of the sample and the

[1] The sample consists of 758 state-owned firms and 1,684 non-state-owned firms.

empirical framework used. The empirical results of the effect of MPs on firm financial leverage, including a heterogeneity analysis and robustness tests, are presented in Section 4 and 5. Section 6 concludes the paper.

2. Literature review

Macroprudential policies have been extensively used in both advanced and emerging economies as a way of preserving financial stability and moderating levels of leverage, particularly in the wake of the Global Financial Crisis. Several studies have investigated the macro-level effectiveness of MPs across economies, with a particular focus on their impact on macroeconomic variables such as output, inflation, credit growth, and housing prices, as well as their interactions with monetary policies (Gambacorta & Murcia, 2020; Ma, 2020; Mirzaei & Samet, 2022; Richter et al., 2019; Sui et al., 2022). Notably, domestic borrower-based instruments, especially in the context of emerging markets, have been found to be particularly effective in smoothing credit cycles (Fendoğlu, 2017).

The banking system, as the backbone of the financial system, has received significant attention in prior research (Meuleman & Vennet, 2020). There is a general agreement that MPs can reduce banking vulnerabilities (Claessens et al., 2013), credit growth (Mirzaei & Samet, 2022; Richter et al., 2019), housing prices (Akinci & Olmstead-Rumsey, 2018), and fluctuations in real exchange rates (Ouyang & Guo, 2019). There have also been several studies that analyze the effectiveness of Chinese macroprudential policies on macroeconomic variables. For instance, Klingelhofer and Sun (2019) and Sun and Wang (2013) show that macroprudential instruments are effective in limiting the credit growth of Chinese banks. By using a nonlinear Markov Switching Causality model, Sui et al. (2022) also find that Chinese macroprudential tools, particularly credit- and asset-based tools, are effective in maintaining financial stability.

Moreover, a body of empirical research suggests that the successful implementation of MPs is not without its challenges. Issues such as the selection of optimal strategies, time-inconsistency, and coordination with monetary policy have been noted as potential hurdles (Forbes, 2020; Mendoza, 2016). Additionally, regulation of foreign exchanges may not effectively reduce risks, but instead may simply shift them from banks to firms (Ahnert et al., 2021). Studies such as that conducted by Kim and Lee (2017) on Korea suggest that these policies may only be effective for domestic banks, rather than foreign banks. The literature on

MPs also considers the importance of proper institutional arrangements, as discussed in Wu et al. (2013).

Despite an abundance of literature on the subject, a limited number of studies have explored the micro effects of MPs on firms. A recent study by Ayyagari et al. (2018) focuses specifically on the impact of MPs on nonfinancial firms, using a panel dataset of 900,000 nonfinancial firms from 48 economies spanning the years 2003 to 2011. The study finds that MPs tend to lower credit growth for firms. Although their sample includes Chinese firms, the sample size is small, comprising only 113 firms with 255 observations. The authors assume that if MPs effectively decrease banking credit, they should also lower firms' financial leverage through banking financial channels.

As demonstrated by Akinci and Olmstead-Rumsey (2018), MPs may restrict credit growth through different channels. One such channel is through the tightening of reserve requirements and loan-to-value limits, which in turn decreases the supply of bank credit. These measures are likely to lower firms' financial leverage, especially in cases where banks serve as the primary financial intermediaries for firms. This lending channel is particularly significant for Chinese firms, as the country lacks mature public stock and bond markets, resulting in a high dependence on banking credit for corporate external financing. It is worth noting that banks are the main providers of credit in China (Pan & Tian, 2015). Such policy measures may result in increased financing costs for firms, leading to a decrease in the demand for bank loans and subsequently resulting in a decrease in firms' financial leverage (Gulen & Ion, 2015). In light of the above, it is evident that MPs can have a negative impact on firms' financial leverage, mainly for Chinese firms that are heavily reliant on bank loans.

Despite the acknowledged significance of macroprudential policies as a transmission channel for financial leverage, its impact on Chinese firms remains largely unexplored. To the best of our knowledge, this paper is the first to investigate the effects of macroprudential policies on the financial leverage of Chinese firms. The existing literature on this subject is limited, with the closest studies being those conducted by Ayyagari et al. (2018) and Yarba and Guner (2020). Although the Ayyagari et al. (2018) sample includes Chinese firms, its size is quite limited. On the other hand, Yarba and Guner (2020) focus on Turkish firms, and their findings do not necessarily apply to the Chinese context.

3. Data and Methodology

3.1 Data

Our study on the relationship between macroprudential policies and financial leverage of firms in China employs a combination of country-level variables and firm-level data. We refer to the study conducted by Alam et al. (2019) for the selection of macroprudential policy instruments, where they identified and analyzed 17 policy instruments across 161 economies over 1990Q1 to 2020Q4.

The macroprudential policy instruments used are countercyclical capital buffer, capital conservation buffer, capital requirements, limits on leverage, loan loss provision requirements, limits on credit growth, loan restrictions, limits on foreign currency loans, limits on loan-to-value ratio, limits on debt-service-to-income ratio, tax measures, liquidity requirements, limits on loan-to-deposit ratio, limits on foreign exchange positions, reserve requirements, systemically important financial institutions, and others.[2] These policy instruments can be used in either tightening or loosening actions. For each country-quarter, each instrument is represented as an index variable, depending on how many times it has been used. The value of the macroprudential policy instrument is determined as follows: 1 if tightened once, 0 if not used, and -1 if loosened in each quarter. The level of macroprudential policy is also determined as the sum of the 17 macroprudential policy instruments at time *t*.

Regarding the selection of financial variables for firms, Ayyagari et al. (2018) focus on financial leverage, which is determined as total debt divided by total assets. However, as the impact of macroprudential policies on firm leverage is primarily through banking loans, we opt for a different definition of financial leverage as suggested by Chen et al. (2013). This definition defines the financial leverage ratio as total loans divided by total assets. To account for any potential heterogeneity within our sample, we follow the methodology proposed by Jin et al. (2022) and divide our financial leverage sample into two categories: short-term and long-term financial leverage ratios, which are based on the maturity of loans. Moreover, we perform a robustness test by including the firm's leverage ratio, which is defined as the total debt to total assets ratio (please refer to Section 4.5, Table 10).

To account for various factors that may influence a firm's financial leverage, we incorporate several control variables. Our selection of these variables is consistent with prior studies such as of Liu and Tian (2012), Alter and Elekdag (2020), and Jin et al. (2022). More specifically,

[2] There are other macroprudential measures that are not included in the previously mentioned categories, such as stress testing, constraints on the distribution of profits, and structural measures such as limits on exposures between financial institutions.

we include the following control variables in our analysis: (1) the logarithm of total assets (*asset*), as we assume that firms with more assets are likely to have greater access to bank loans; (2) profitability, which we measure using earnings before interest and taxes per asset (*ebit*). The relationship between profitability and leverage is complex and not straightforward; and (3) financial constraints (*finc*). We follow Hadlock & Pierce, (2010), to compute *finc* as follows:

$$-0.737 \times asset_{iq} + 0.043 \times asset_{iq}^2 - 0.04 \times age_{iq}$$

We expect *finc* to be a significant control variable since it has an important impact on firms' capital structure decisions. As "*finc*" increases, a firm is considered to be more financially constrained; (4) fixed asset ratio (*fix*), as we expect a positive correlation with a firm's financial leverage. This is due to the fact that tangible assets can serve as collateral and are easier to value (Huang & Shang, 2019); (5) growth (*saleg*), which is calculated as the growth rate of operating revenue; and (6) tax (*tax*), measured by total tax divided by total profits. Firms with higher tax rate should borrow more to utilize the tax shield effect (Liu and Tian, 2012). Moreover, firm-fixed effects are included to account for characteristics such as ownership structure and location that remain constant within a firm over time, but may vary between firms. The variable (*age*) is used to compute the variable *finc*. For firms that have gone through delisting, *age* is calculated as the year of delisting minus the year of establishment. In the case of firms that have not gone through delisting, *age* is determined by subtracting the year of establishment from 2020.

The financing decisions of a firm are not only determined by its own characteristics, but also by the environment in which the firm operates (Kweh et al., 2020). As such, we have included the quarterly industry median leverage ratio (*ind*) in our analysis to account for industry-specific factors that may not be captured by firm-level variables (Chang et al., 2014).[3] Moreover, to ensure that the effect of macroprudential policies do not compound with other macroeconomic factors, we have also controlled for many macroeconomic variables, including the quarterly growth rate of GDP (*gdpg*), the growth rate of broad money (*bmg*), the lending rate (*lend*), the growth rate of real effective exchange rate (*reerg*), the inflation rate (*cpig*), and quarter-fixed effects (Ayyagari et al., 2018).[4] A list of all variables used in our analysis, along

[3] The classification of industries used in our study aligns with the classifications established by the China Securities Regulatory Commission in 2012. Our sample comprises a total of 17 industries, including: Agriculture, forestry, animal husbandry and fishery; Mining; Manufacturing; Production and supply of electricity, heat, gas and water; Construction; Wholesale and retail; Transportation, warehousing and postal service; Hotels and catering service; Information transmission, software and information technology services; Real estate; Leasing and business services; Scientific research and technical services; Water, environmental and public utility management services; Education; Health and social work; Culture, sports and entertainment; and Other industries.
[4] Quarter-fixed effects refer to the first, second, third quarter and fourth quarter within one year. It is not feasible

with their definitions, can be found in Table 1. Except for macroprudential variables, all other variables used in our analysis are obtained from the China Stock Market & Accounting Research Database (CSMAR) and International Monetary Fund (IMF). CSMAR contains comprehensive financial information of Chinese listed firms and relevant macroeconomic variables.

We focus on the A-share listed firms, which are issued to domestic investors. In accordance with previous literature, we have excluded financial firms and firms classified as ST/*ST from our sample.[5] We eliminated observations with missing value of industry, and negative or zero values for total equities and the number of employees.[6] We restrict our analysis to firms that have a minimum of four observations (one year) over the sample period.

To ensure the comparability of results across our three dependent variables, we exclude any observations for which we lack complete data on all three variables in our sample. Our panel is unbalanced, and to align our data with the macroprudential policy instruments published by Alam et al. (2019), our sample comprises 2,442 Chinese firms from the first quarter of 2002 to the fourth quarter of 2020. There are 5,314 firms, however, due to data availability we ended up with 2,442 firms. Our sample's total market value in relation to China's GDP for 2020 amounts to 61.661%, whereas the entire A-share market's value in relation to GDP for the same year is 78.534%. This indicates that our selected sample is a reasonable reflection of the market.

To minimize the impact of outliers, the top and bottom 1% of all firm-level variables are winsorized. The summary statistics of all variables that are used in our study can be found in Table 1.

The firms included in our sample have an average short-term leverage (*slev*) of 11.40% and a long-term leverage (*llev*) of 5.54%.[7] The "*mp*" variables range from a minimum value of - 4 to a maximum value of 6, revealing that China has implemented the loosest macroprudential

to use time fixed effects due to their tendency to exhibit multicollinearity with macroprudential policies.

5 The acronym ST denotes "special treatment", and is indicative of the fact that the target company is a publicly listed entity with exceptional financial or other circumstances. Specifically, an ST designated company has experienced losses in two consecutive fiscal years, while an *ST labeled company has remained in deficit for three years, thereby jeopardizing its shares' potential delisting.

6 If the industry that the firm belongs to changes across the sample period, we use the latest industry information. We also drop the firms with changing industries. The negative effect of macroprudential policies on leverage still holds. The results are reported in the Appendix (Table A.1).

7 As discussed in Section 3.1, our definition of financial leverage differs from the commonly used definition of total debt divided by total assets. Instead, we define it as total loans divided by total assets. This difference in definition results in mean leverage ratios that significantly deviate from the widely published leverage numbers of Chinese listed firms. If we were to adopt the commonly used definition (total debt divided by total assets), the mean total leverage, short-term leverage and long-term leverage in our sample would be 43.95%, 35.82% and 8.13% respectively (after dropping the top and bottom 1% of leverage ratio). These values are roughly consistent with findings from previous studies (Pan & Tian, 2015).

policies on four occasions per quarter (2008Q4) and the tightest policies on six occasions per quarter (2011Q1 and 2016Q4). Moreover, the positive mean value of "mp" indicates that, on average, China's macroprudential policy is tight on average.

[Insert Table 1 here]

3.2 Methodology

To assess the relationship between macroprudential policies and firms' financial leverage, we estimate the following equation:

$$Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}. \quad (1)$$

where the subscripts i, and q vary according to firms and quarters respectively. The dependent variable is one of the following three measures of firms' financial leverage: short-term financial leverage to total assets (*slev*), long-term financial leverage to total assets (*llev*), and overall financial leverage to total assets (*lev*). The overall financial leverage is the sum of short-term and long-term financial leverage, i.e., *lev=slev+llev*.

The variable *mp* represents the sum of 17 macroprudential tools identified in Alam et al.'s (2019) study. Moreover, the vector *X* comprises several firm-level variables, including the logarithm of total assets (*asset*), earnings before interests and taxes per assets (*ebit*), financial constraints (*finc*), fixed assets as a proportion of total assets (*fix*), the growth rate of operating revenue (*saleg*), and the ratio of total taxes to total profits (*tax*). Similarly, the vector *Z* consists of country-level variables, including the quarterly growth rate of China's GDP (*gdpg*), the quarterly growth rate of broad money (*bmg*) and the lending rate (*lend*), the quarterly growth rate of real effective exchange rate (*reerg*), the inflation rate (*cpig*). The variable *Ind* represents the median leverage ratios specific to each industry, which vary with the dependent variables under consideration. Moreover, λ_i and η_t denote the firm- and quarter-specific fixed effects, respectively. The constant term is represented by α, while the idiosyncratic error term is denoted by ε_{iq}.

To mitigate potential issues arising from reverse causality and account for the time delay necessary for macroprudential policies (MPs) to influence firms' financing decisions, all right-hand side variables in Equation (1) are lagged by one quarter, (see Ayyagari et al., 2018). Akinci and Olmstead-Rumsey (2018) note that the impact of MPs on financial institutions may only become evident years after their implementation, resulting in delayed effects on firms' financing conditions. Finally, the standard errors are robust to heteroscedasticity and clustered by industry to allow for the possibility of correlated error terms across firms within the same industry.[8]

Tightening versus Loosening actions

Next, we investigate the different effects between tightening and loosening actions on firms' financial leverage. As stated by Richter et al. (2019) tightening and loosening actions result in varying effects on credit growth.[9] We define one variable, tightening policies, to indicate whether the overall policies are tightened or not, based on MP:

$$T_q = \begin{cases} 1, if\ mp_q > 0 \\ 0, if\ mp_q \le 0 \end{cases} \tag{2}$$

where *mp* represents the sum of the 17 macroprudential policy tools. We estimate the following specification to test the different effects:

$$Lev_{iq} = \alpha_2 + \lambda_{2i} + \eta_{2t} + \beta_{21}mp_{q-1} + \beta_{22}T_{q-1} + \beta_{23}mp_{q-1} * T_{q-1} + +\gamma_{21}X_{iq-1} + \gamma_{22}ind_{iq-1} + \gamma_{23}Z_{q-1} + \varepsilon_{2iq} \tag{3}$$

aside from T_{q-1}, the definitions of the other variables remain the same with those outlined in Equation (1).The variable T_q and its interaction with MPs help us to distinguish the different effects of tight and loose policies on financial leverage.

4. Empirical Results

4.1 The effect of macroprudential policies on firms' financial leverage

We start our analysis by evaluating the results derived from estimating Eq. (1), as shown in columns (1) – (3) of Table 2. We assess the impact of the macroprudential policy instruments on firms' short-term, long-term, and overall financial leverage ratios while controlling for various firm-level variables, median industry leverage, and country-level variables. By incorporating firm-fixed effects to account for invariable, firm-specific characteristics and quarter-fixed effects to account for temporal variations, we are able to examine the effect of the macroprudential policy instruments.

As illustrated in Table 2, the coefficients on the MPs are significantly negative. For instance,

[8] We also cluster the standard errors by firm's registered province, and drop the firms that change their registered province. The negative effect of macroprudential policies on leverage still holds. The results are reported in the Appendix (Table A.1).

[9] Economy-wide variables tend to respond differently to tight and loose MPs. Richter et al. (2019) argue that tight policies lead to a reduction in GDP, whereas loose policies tend to stimulate economic growth.

the estimated coefficient of *mp* when the dependent variable is *slev*, shows that the tightening of macroprudential policy by one unit will lead to a 0.124 basis points decrease in the short-term financial leverage ratio on average in the next quarter. Given that the standard deviation of short-term financial leverage ratio is 10.44% (as displayed in Table 1), the decrease in leverage incurred by tightening the macroprudential policies represents approximately 1.19% (=0.124/10.444) of the average short-term financial leverage ratio, which is economically significant.

Based on our findings, it appears that MPs have a significant impact on a firm's financial leverage, particularly on short-term financial leverage. Specifically, the coefficient of MPs on short-term financial leverage is three times larger than on long-term leverage. This implies that firms are able to adjust their long-term financial leverage over time in response to these policy changes, but that short-term financial leverage is more immediately affected. Our findings also align with those of Alter and Elekdag (2020), Jin et al. (2022), suggesting that firms tend to increase their leverage as they grow in size and fixed assets, but decrease as they become more profitable. In addition, favorable industry or macroeconomic conditions prompt an increase in leverage.

Our results so far have focused on the relative ratio of firms' financial leverage to assets. To gain a better understanding of the impact of macroprudential policies, we also conduct an analysis to examine whether these policies decrease the scale of financial loans. Thus, we take the logarithm of financial loans as the dependent variable. The results, shown in columns (4) – (6) of Table 2, demonstrate that when the dependent variables are the absolute value of short-term, long-term, and overall financial loans, the coefficients on the MPs are significantly negative at the 1% level, except for the coefficient on long-term financial leverage which is insignificant. These results are consistent with our baseline results where the financial leverage ratios are used as dependent variables, highlighting that MPs not only decrease the proportion of financial debt relative to firm's overall debt but also reduce its volume, especially short-term debt.

For instance, taking column (4) as an example, the coefficient on MPs (*L.mp*) is -0.010, indicating that the absolute level of short-term financial leverage would decrease by 1% when the macroprudential policies are tightened.

[Insert Table 2 here]

4.2 Tightening versus Loosening Macroprudential Policies

Building upon Equation (3), we assess the different effects of MPs by incorporating the indicator of tightening MPs into our analysis. The results, as presented in Table 3, show a negative association between firms' short-term and overall financial leverage and the implementation of tightening MPs (*L.mp#L.T*). Notably, while the effects of tight macroprudential policies are significant and negative, an exception is observed in the case of long-term financial leverage, where the impact appears to be insignificant. This indicates that tightening MPs, compared to loosening MPs, can significantly decrease short-term leverage, while tightening and loosening MPs' effect on long-term leverage has no significant difference. When macroprudential policies tighten, loan supply decreases and financing costs increase, especially for long-term loans, which are known to carry higher interest costs than short-term loans (Lu et al., 2012). This phenomenon is evident in column (5) where firms reduce their long-term loans in response to the tightening of macroprudential policies. However, when the MPs loosen, firms are less inclined to choose expensive long-term loans. This finding is consistent with the insignificant coefficient of L.*lmp* column (8), indicating that the long-term leverage of firms can decrease under both tight and loose MPs. Hence, there is no significant difference in the effect of tight MPs on long-term leverage, as demonstrated by the insignificant coefficient of L.mp#L.T in column (2).

The significant and negative coefficients of the interaction between MPs and tight MPs in Table 3, suggests that the impact of tight policies on firms' leverage is more adverse than that of loose policies, indicating that the former can potentially decrease firms' leverage. Our findings indicate that the effects of MPs vary among the maturity of financial loans. While short-term and overall financial leverage are more impacted by tight MPs, long-term financial leverage does not respond differently to tight or loose MPs.

To provide a more comprehensive understanding on the different effects of tight and loose MPs, we have disaggregated the overall MPs (*mp*) into two categories: tight MPs (*tmp*) and loose MPs (*lmp*). Specifically, tight MPs (*tmp*) represent the summation of 17 macroprudential instruments if they are tightened, while loose MPs (*lmp*) represents the summation of 17 macroprudential instruments if loosened.[10] The results of our analysis are presented in columns (4) – (9) of Table 3. As expected, we observe that tight MPs have a negative effect, while loose

[10] The macroprudential instrument is assigned a value of 1 if it has been tightened, and 0 otherwise. Then the 17 macroprudential policies are aggregated to create a sum of tightened macroprudential policies (*tmp*). Similarly, the macroprudential instrument is assigned a value of 1 if it has been loosened, and 0 otherwise. Then the 17 macroprudential policies are aggregated to create a sum of loosened macroprudential policies (*lmp*).

MPs have a positive effect.

These results are consistent with our baseline results as both tight MPs and loose MPs (*tmp*, *lmp*) are coded as positive. In essence, our results suggest that the implementation of tight MPs is associated with a reduction in firms' financial leverage, while the implementation of loose MPs is associated with an increase. Notably, the coefficient of loose MPs on long-term leverage remains insignificant in column (8), which is in alignment with the evidence presented in column (2).

[Insert Table 3 here]

5. Heterogeneity and Robustness Tests

5.1 Heterogeneity Tests

A question still remains regarding the possibility that firms with different characteristics and financial constraints, may experience varying impacts from MPs (Ayyagari et al., 2018). To address this question, we have incorporated the interaction between macroprudential policies and firms' characteristics (such as ownerships, sizes, and listing boards) to analyze the differential impact on firms with varying characteristics.

Government connections, are often reflected in the ownership structure of firms, with state-owned enterprises having easier access to bank financing due to their political ties and a higher proportion of bank credit, especially in China (Cull et al., 2015). To account for this factor, we have constructed a binary variable "*state*", that is assigned a value of 1 if the firm is state-owned (i.e., owned or controlled by the central or local government), and 0 otherwise, added in Eq. (1) as follows:

$$Lev_{iq} = \alpha_3 + \lambda_{3i} + \eta_{3t} + \beta_{31} mp_{q-1} + \beta_{32} mp_{q-1} * state_{iq-1} + \gamma_{31} X_{iq-1} + \gamma_{32} ind_{iq-1} + \gamma_{33} Z_{q-1} + \varepsilon_{3iq}. \quad (4a)$$

The results of our analysis are presented in Table 4 and include the interaction of the variable "*state*" with MPs and show a negative association between firms' short-term, long-term, and overall financial leverage and the implementation of MPs.

Notably, the positive coefficients of the interaction between MPs and state-owned firms indicate that macroprudential policy tools are associated with relatively higher financing leverage for state-owned firms compared to non-stated own firms. While the interaction term is insignificant for long-term leverage, the coefficients are significant for both short-term and overall leverage. These results suggest that MPs have a relatively higher effect on reducing financial leverage for non-stated-owned firms compared to state-owned firms.

[Insert Table 4 here]

Larger firms tend to face fewer financing constraints compared to smaller firms (Hadlock & Pierce, 2010), suggesting that the impact of MPs on large firms may be relatively smaller. To investigate this, we measure *size* using the variable *asset,* the logarithm of total assets, in Columns (1) – (3), and the variable *fix*, the ratio of fixed assets to total assets, in Columns (4) – (6). We also add an interaction term between size and MPs in Equation (1), as follows:

$$Lev_{iq} = \alpha_4 + \lambda_{4i} + \eta_{4t} + \beta_{41}mp_{q-1} + \beta_{42}mp_{q-1} * size_{iq-1} + \gamma_{41}X_{iq-1} + \gamma_{42}ind_{iq-1} + \gamma_{43}Z_{q-1} + \varepsilon_{4iq} \quad \text{(4b)}$$

The results presented in Table 5 support the argument that the impact of MPs on large firms is relatively smaller. Notably, the interaction terms between MPs and firm size exhibit significant and positive coefficients, with the exception of the coefficient of MPs with fixed assets (*L.mp#L.fix*) on long-term financial leverage in column (5), which is positive but insignificant. In essence, the results suggest that the impact of the tightening of MPs on the financial leverage of larger firms with more assets or fixed assets is less affected by the tightening of MPs compared to smaller firms.

[Insert Table 5 here]

The Chinese stock exchange market consists of four segments, namely mainboard, small- and medium-sized board, growth enterprise market, and the science and technology innovation board. Mainboard-listed firms are typically asset-intensive, large, and less financially constrained. Thus, we assume that mainboard-listed firms will be less affected by MPs than firms listed on other boards. To test this hypothesis, we include a binary variable *board* equal to one if the firm is listed on the mainboard and zero otherwise, in Equation (1), as follows:

$$Lev_{iq} = \alpha_5 + \lambda_{5i} + \eta_{5t} + \beta_{51}mp_{q-1} + \beta_{52}mp_{q-1} * board_{iq-1} + \gamma_{51}X_{iq-1} + \gamma_{52}ind_{iq-1} + \gamma_{53}Z_{q-1} + \varepsilon_{5iq} \quad \text{(4c)}$$

We then estimate the interaction between board and MPs. The results, presented in Table 6, show that all coefficients of MPs remain significantly negative, and as expected, the interaction terms of MPs with the variable *board* are significantly positive. These results indicate that MPs have a relatively smaller impact on firms listed on the mainboard compared to firms listed on other boards.

[Insert Table 6 here]

5.2 Robustness Tests

In this section, we aim to further assess the robustness of our main results by conducting a series of additional tests. To account for the possibility that the impact of macroprudential policies may persist over time, we use the cumulative MPs index, as suggested by Ayyagari et al. (2018), to capture the intensity effect of macroprudential policies. The cumulative MPs index (*cmp*) is calculated as the cumulative change in macroprudential policies since the start of our sample period (2002Q1).

As shown in Table 7, we replicate the specification outlined in Equation (1), but replace the main explanatory variable with the measure of macroprudential policy intensity (*cmp*) to examine the cumulative effect. The qualitative results remain unchanged with those presented in Table 2, indicating that tighter macroprudential policies are associated with lower levels of financial leverage, as measured by short-term, long-term, or overall financial leverage.

The estimated coefficients indicate the tightening of cumulative MPs by a one unit will lead to a 0.094 basis points in short-term, 0.064 basis points in long-term, and 0.164 basis points in overall financial leverage. The significant effect of cumulative MPs indicates that macroprudential policies have a persistent effect on firms' financial leverage over the long run.

[Insert Table 7 here]

Following Alam et al. (2019), macroprudential policy tools can be classified into two types: *demand* and *supply* tools. *Supply* tools are further classified into three subgroups: *loan*, *capital* and *general* tools, as defined in Table 1. In this study, we focus on *supply* tools, as *demand* tools are primarily aimed at the household sector. Each subgroup is represented by the sum of its constituent tools. Specifically, we use the following equation:

$$loan_q = lcg_q + llp_q + loanr_q + ltd_q + lfc_q \tag{5}$$

where *lcg*, *llp*, *loanr*, *ltd,* and *lfc* represent limits on credit growth, loan loss provision requirements, loan restrictions, limits on loan-to-deposit ratio, and limits on foreign currency loans, respectively.

Table 8 presents our regression results where we replicate the specification outlined in Equation (1), but replace the main explanatory variable with supply, loan, capital, and general instruments as defined in Table 1. The regression coefficients for all instruments are significantly negative, except for *loan* and *capital* instruments in long-term financial leverage, which are insignificant. The results remain robust when we look the effects of sub-tools. Interestingly, our findings are contrary to those of Fendoğlu (2017), who find *demand* tools to be more effective than supply tools when excluding China from their sample. Given the significant role that banking finance plays in firms' financing in China (Pan & Tian, 2015), our results suggest that supply instruments are effective in managing firms' financial leverage.

[Insert Table 8 here]

We further explore the robustness of the relationship between MPs and financial leverage, by examining the effects of different measures of MPs. Specifically, we use data from Cerutti et al. (2016), their data provide a small collection of implementations of six macroprudential instruments at quarterly intervals, expressed as dummy-type indices. To capture the impact of MPs, we use the sum of these six instruments per quarter as a proxy variable (*mpc*), and the cumulative sum of *mpc* to measure the intensity of macroprudential policies (*cmpc*). We then re-estimated Eq. (1) with *mpc* and *cmpc* as the explanatory variables and short-term (*slev*), long-term (*llev*), and overall financial leverage (*lev*) as the dependent variables. The results, presented in Table 9, are consistent with our previous findings.

[Insert Table 9 here]

In Table 10, the debt to asset ratio (*dta)* is employed as dependent variable, as suggested by Alter and Elekdag (2020), who argue that it provides a more comprehensive representation of leverage as it takes into account not only financial leverage, but also trade credit. The independent variables include the MPs and cumulative MPs from both Alam et al. (2019) (*mp* and *cmp*) and Cerutti et al. (2016) (*mpc* and *cmpc*). The results of the analysis in Table 10, indicate a significant and negative association between MPs and debt to asset ratio. As shown in columns (1) and (2), the implementation of tightening and cumulative measures results in an average reduction of 0.222 and 0.171 percentage points, respectively, in the debt to asset ratio.

[Insert Table 10 here]

5.3 Substitution Effects on Other Credit

In addition to bank loans, firms have various options to obtain funding. However, the above results show that MPs have a relatively minor impact on firms' long-term financial decisions. In order to examine the relationship between MPs and long-term financing further, we use the ratio of bonds payable to total assets (*bond*) as the dependent variable and repeat our main regressions. This ratio of bonds payable pertains to the debt that firms obtain for extended operational activities.

In addition to banking leverage, commercial credit plays an important role in financing through commercial transactions. Zhou et al. (2021) suggest that firms can defer their expenses or receive funds in advance to secure financing. However, tight macroprudential policies (MPs) may result in a reduced supply of banking loans, encouraging firms to seek commercial credit as an alternative. This "substitution effect" of MPs can transfer risks from banks to firms, causing an increase in commercial credit. Consistent with Zhou et al.'s methodology, we measure commercial credit (*com*) as the sum of accounts payable, bills payable, and advances received. As per section 3.1, we use the ratio of commercial credit to total assets as the dependent variable in Eq. (1).

The implementation of tight MPs tends to limit the amount of bank credit available to firms. Therefore, we further examine the impact of MPs on firms' financing costs. The financing costs (*cost*) is measured as the ratio of financial expenses to financial leverage.

The columns (1)-(3) of Table 11 show the results for bonds payable, commercial credit, and financing costs respectively. Our analysis indicates that there is no significant evidence that MPs influence bonds payable, as per the results in column (1). This result reinforces the notion that MPs affect bank credit, rather than other financing channel such as bond or equity financing. The negative and significant coefficient of MPs on the commercial credit ratio in column (2) suggests that the tightening of MPs reduces the amount of commercial credit available to firms. This may indicate a liquidity shortage as a result of tight macroprudential policies, highlighting that MPs do not transfer credit risks from banks to firms. Furthermore, our analysis shows a significant and positive effect of tight MPs on firms' financing costs.

[Insert Table 11 here]

5.4 The impact of the global financial crisis

The 2008 global financial crisis resulted in the bankruptcy of several financial institutions and a worldwide economic recession. Consequently, the adverse effects of the GFC may have interacted with the implementation of MPs. To control for yearly shocks, like the GFC, we incorporated year fixed effects. Moreover, we focus on the period excluding the GFC (2008 and 2009). In response to GFC, China launched a stimulus plan worth four trillion from November 2008 to the end of 2010 (Liu et al., 2018). Thus, we only use the sample data from 2011 to 2020 to isolate the positive shock of the stimulus plan on firm's financial leverage. We subsequently replicated our primary regression analysis using Eq. (1).

Table 12 presents our results, with columns (1) – (3) revealing that MPs continue to have a significantly negative impact on firms' short-term and overall leverage, even after controlling for year fixed effects. However, their effect on long-term leverage remains insignificant. Columns (4) – (6) present the results after excluding the data from 2008 and 2009, which are consistent with our main results presented in Table 2. Columns (7) – (9) show the results during the period 2011–2020, with MPs continuing to have a negative impact on firm's financial leverage.

[Insert Table 12 here]

4. Conclusions

This study examines the impact of macroprudential policies on the financial leverage of nonfinancial firms in China from 2002Q1 to 2020Q4. Our analysis reveals that the implementation of macroprudential policies is associated with a reduction in financial leverage, both in terms of ratio and absolute value, particularly in the short-term. For instance, we find that an increase in general capital requirements will result in a 0.124 basis points decrease in a firm's short-term financial leverage in the subsequent quarter, accounting for 1.19% of the sample standard deviation. However, the effect on long-term leverage is less pronounced.

Moreover, the impact of macroprudential policies on firms' financial leverage is contingent on the stringency of the regulations. Tight macroprudential policies lead to a reduction in financial leverage, whereas loose policies have the opposite effect. The influence of macroprudential policies on financial leverage is more pronounced in the short term and for the overall financial leverage, while the effect on long-term financial leverage is more evident when the regulations are relaxed. Furthermore, the impact varies among firms of different ownerships, sizes, and listing boards, with non-state-owned, small, and non-mainboard listed firms being more susceptible to the regulations' effects. The study finds that macroprudential policies do not shift risks from banks to firms as commercial credit is reduced.

The negative relationship between strict macroprudential policies in China and lower leverage of nonfinancial firms holds significant implications for policymakers, as it provides new evidence of structural deleveraging. This link implies that tight macroprudential policies should be implemented by authorities seeking to limit firms' financial leverage. With regards to specific policy tools, our findings advocate for the use of tight supply-side tools in the short term. In the long term, firms will adjust their capital structure to align with a macroeconomic environment and sustainable development. Long-term leverage as a result is less affected by macroprudential policies. The heterogeneous effects of macroprudential measures enable structural deleveraging within firms of varying characteristics. The more pronounced deleveraging effects of macroprudential policies appear to be especially effective for non-state-owned, small, and non-mainboard listed firms. This structural effect amplifies the financing difficulties faced by small companies.

However, this study is not without its limitations, and these limitations suggest interesting directions for future research. Firstly, while we examine the overall effect of MPs on financial leverage, we are unable to identify the specific instrument(s) that are effective or ineffective in reducing firm leverage. Secondly, we cannot discern whether the various policy tools coordinate or substitute for each other, such as the possibility of limits on credit growth replacing limits on loan-to-deposit ratio. Thirdly, macroeconomic policies may not only affect firms' financing decisions, but also their investment and production decisions. Our study solely focuses on the influence of MPs on firm leverage, and other interesting aspects deserve further exploration.

References

Ahnert, T., Forbes, K., Friedrich, C., & Reinhardt, D. (2021). Macroprudential FX regulations: Shifting the snowbanks of FX vulnerability? *Journal of Financial Economics, 140*(1), 145-174. doi:10.1016/j.jfineco.2020.10.005

Akinci, O., & Olmstead-Rumsey, J. (2018). How effective are macroprudential policies? An empirical investigation. *Journal of Financial Intermediation, 33*, 33-57. doi:10.1016/j.jfi.2017.04.001

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

Alter, A., & Elekdag, S. (2020). Emerging market corporate leverage and global financial conditions. *Journal of Corporate Finance, 62*. doi:10.1016/j.jcorpfin.2020.101590

Ayyagari, M., Beck, T., & Martinez Peria, M. (2018). The micro impact of macroprudential policies. *IMF Working Paper, 18*(267). doi:10.5089/9781484385654.001

Bräuning, F., & Ivashina, V. (2020). U.S. monetary policy and emerging market credit cycles. *Journal of Monetary Economics, 112*, 57-76. doi:10.1016/j.jmoneco.2019.02.005

Cerutti, M. E., Correa, M. R., Fiorentino, E., & Segalla, E. (2016). Changes in prudential policy instruments—A new cross-country database. International Monetary Fund.

Cetorelli, N., & Goldberg, L. S. (2009). Banking globalization and monetary transmission. *SSRN Electronic Journal*. doi:10.2139/ssrn.1162253

Chang, C., Chen, X., & Liao, G. (2014). What are the reliably important determinants of capital structure in china? *Pacific-Basin Finance Journal, 30*, 87-113. doi:10.1016/j.pacfin.2014.06.001

Chen, M., & Matousek, R. (2020). Do productive firms get external finance? Evidence from Chinese listed manufacturing firms. *International Review of Financial Analysis, 67*. doi:10.1016/j.irfa.2019.101422

Chen, Y., Liu, M., & Su, J. (2013). Greasing the wheels of bank lending: Evidence from private firms in China. *Journal of Banking & Finance, 37*(7), 2533-2545. doi:10.1016/j.jbankfin.2013.02.002

Claessens, S., Ghosh, S. R., & Mihet, R. (2013). Macro-prudential policies to mitigate financial system vulnerabilities. *Journal of International Money and Finance, 39*, 153-185. doi:10.1016/j.jimonfin.2013.06.023

Cull, R., Li, W., Sun, B., & Xu, L. C. (2015). Government connections and financial constraints: Evidence from a large representative sample of Chinese firms. *Journal of Corporate Finance, 32*, 271-294. doi:10.1016/j.jcorpfin.2014.10.012

Farre-Mensa, J., & Ljungqvist, A. (2016). Do measures of financial constraints measure financial constraints?. *The Review of Financial Studies*, 29(2), 271-308. doi: 10.1093/rfs/hhv052

Fendoğlu, S. (2017). Credit cycles and capital flows: Effectiveness of the macroprudential policy framework in emerging market economies. *Journal of Banking & Finance, 79*, 110-128. doi:10.1016/j.jbankfin.2017.03.008

Forbes, K. (2020). The International Aspects of Macroprudential Policy. *NBER working paper*. doi:10.3386/w27698

Gambacorta, L., & Murcia, A. (2020). The impact of macroprudential policies in Latin America: An empirical analysis using credit registry data. *Journal of Financial Intermediation, 42*. doi:10.1016/j.jfi.2019.04.004

Giese, J., Andersen, H., Bush, O., Castro, C., Farag, M., & Kapadia, S. (2014). The Credit-To-Gdp Gap and Complementary Indicators for Macroprudential Policy: Evidence from the Uk. *International Journal of Finance & Economics, 19*(1), 25-47. doi:10.1002/ijfe.1489

Gu, X., Hasan, I., & Zhu, Y. (2019). Political influence and financial flexibility: Evidence from China. *Journal of Banking & Finance, 99*, 142-156. doi:10.1016/j.jbankfin.2018.12.002

Gulen, H., & Ion, M. (2015). Policy Uncertainty and Corporate Investment. *Review of Financial Studies*. doi:10.1093/rfs/hhv050

Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *Review of Financial Studies, 23*(5), 1909-1940. doi:10.1093/rfs/hhq009

Huang, K., & Shang, C. (2019). Leverage, debt maturity, and social capital. *Journal of Corporate Finance, 54*, 26-46. doi:10.1016/j.jcorpfin.2018.11.001

IMF. (2011). Macroprudential policy: An organizing framework. *IMF Policy Papers*.

Jin, M., Liu, J. S., & Chen, Z. F. (2022). Impacts of social trust on corporate leverage: Evidence from China. *International Review of Economics & Finance, 77*, 505-521. doi:10.1016/j.iref.2021.10.018

Kim, K., & Lee, J. Y. (2017). Estimating the effects of FX-related macroprudential policies in Korea. *International Review of Economics & Finance, 50*, 23-48. doi:10.1016/j.iref.2017.03.030

Klingelhofer, J., & Sun, R. R. (2019). Macroprudential policy, central banks and financial stability: Evidence from China. *Journal of International Money and Finance, 93*, 19-41. doi:10.1016/j.jimonfin.2018.12.015

Kweh, Q. L., Ting, I. W. K., Le, H. T. M., & Nourani, M. (2020). Nonlinear impacts of board independence on debt financing: Contingent on the shareholdings of the largest shareholder. *International Journal of Finance & Economics, 26*(2), 2289-2306. doi:10.1002/ijfe.1907

Lai, K., Prasad, A., Wong, G., & Yusoff, I. (2020). Corporate deleveraging and financial flexibility: A Chinese case-study. *Pacific-Basin Finance Journal, 61*. doi:10.1016/j.pacfin.2020.101299

Liu, Q., Pan, X., & Tian, G. G. (2018). To what extent did the economic stimulus package influence bank lending and corporate investment decisions? Evidence from China. *Journal of Banking & Finance*, 86, 177-193. doi: 10.1016/j.jbankfin.2016.04.022

Liu, Q., & Tian, G. (2012). Controlling shareholder, expropriations and firm's leverage decision: Evidence from Chinese Non-tradable share reform. *Journal of Corporate finance*, 18(4), 782-803. doi: 10.1016/j.jcorpfin.2012.06.002

Ma, C. (2020). Financial stability, growth and macroprudential policy. *Journal of International Economics, 122*. doi:10.1016/j.jinteco.2019.103259

Matousek, R., & Rummel, O. (2020). *Cross-border Interbank Contagion Risk Analysis: Evidence from Selected Emerging and Less-developed Economies in the Asia-Pacific Region*: Cambridge University Press.

Mendoza, E. G. (2016). Macroprudential Policy: Promise and Challenges. *SSRN Electronic Journal*. doi:10.2139/ssrn.2872216

Meuleman, E., & Vennet, R. V. (2020). Macroprudential Policy and Bank Systemic Risk. *Journal of Financial Stability, 47*. doi:10.1016/j.jfs.2020.100724

Mirzaei, A., & Samet, A. (2022). Effectiveness of macroprudential policies: Do stringent bank regulation and supervision matter? *International Review of Economics & Finance, 80*, 342-360. doi:10.1016/j.iref.2022.02.037

Ouyang, A. Y., & Guo, S. (2019). Macro-prudential Policies, the Global Financial Cycle and the Real Exchange Rate. *Journal of International Money and Finance, 96*, 147-167. doi:10.1016/j.jimonfin.2019.05.009

Pan, X., & Tian, G. G. (2015). Does banks' dual holding affect bank lending and firms' investment decisions? Evidence from China. *Journal of Banking & Finance, 55*, 406-424. doi:10.1016/j.jbankfin.2014.04.033

Rajan, R. G., & Zingales, L. (2003). The great reversals: the politics of financial development in the twentieth century. *Journal of Financial Economics, 69*(1), 5-50. doi:10.1016/s0304-405x(03)00125-9

Richter, B., Schularick, M., & Shim, I. (2019). The costs of macroprudential policy. *Journal of International Economics, 118*, 263-282. doi:10.1016/j.jinteco.2018.11.011

Rubio, M. (2020). Cross-country spillovers from macroprudential regulation: Reciprocity and leakage. *Journal of International Money and Finance, 103*. doi:10.1016/j.jimonfin.2019.102134

Sui, J. L., Liu, B. Y., Li, Z. G., & Zhang, C. P. (2022). Monetary and macroprudential policies, output, prices, and financial stability. *International Review of Economics & Finance, 78*, 212-233. doi:10.1016/j.iref.2021.11.010

Sun, T., & Wang, B. (2013). How effective are macroprudential policies in China? *IMF Working Paper, 13*(75). doi:10.5089/9781484355886.001

Tillmann, P., Kim, G.-Y., & Park, H. (2019). The spillover effects of U.S. monetary policy on emerging market economies. *International Journal of Finance & Economics, 24*(3), 1313-1332. doi:10.1002/ijfe.1720

Wu, X., Otani, A., Lipinsky, F., Krznar, I., & Lim, C. H. (2013). The macroprudential framework: Policy responsiveness and institutional arrangements. *IMF Working Paper, 13*(166). doi:10.5089/9781484377819.001

Yarba, I., & Guner, Z. N. (2020). Uncertainty, macroprudential policies and corporate leverage: Firm-level evidence. *Central Bank Review, 20*(2), 33-42. doi:10.1016/j.cbrev.2020.03.005

Zhou, M., Li, K., & Chen, Z. (2021). Corporate governance quality and financial leverage: Evidence from China. *International Review of Financial Analysis, 73*. doi:10.1016/j.irfa.2020.101652

Tables

Table 1 Variable definitions, Sources and Summary Statistics.

Panel A: Variable Definitions and Sources		
Variable	Definition	Source
	Dependent Variables	
slev	Ratio of short-term loans to total assets	CSMAR
llev	Ratio of long-term loans to total assets	
lev	Ratio of total loans to total assets	
slev1	Logarithm of short-term loans	
llev1	Logarithm of long-term loans	
lev1	Logarithm of total loans	
dta	Ratio of total liabilities to total assets	
bond	Ratio of bonds payable to total assets	
com	Ratio of commercial credit to total assets. Commercial credit is the sum of accounts payable, bills payable and advances received	
cost	Ratio of financing costs to total assets	
	Independent Variables	
mp	Sum of 17 macroprudential instruments, each of the instrument is 1 if tightened in quarter *t*; -1 if loosened and 0 otherwise.	Alam et al. (2019)
tmp	Sum of 17 macroprudential instruments, each of the instrument is 1 if tightened in quarter *t*, and 0 otherwise.	
lmp	Sum of 17 macroprudential instruments, each of the instrument is 1 if loosened in quarter *t*, and 0 otherwise.	
cmp	Cumulative sum of *mp* since 2002Q1	
loan	Sum of limits on credit growth, loan loss provision requirements, loan restrictions, limits on loan-to-deposit ratio, and limits on foreign currency loans.	
capital	Sum of limits on leverage, countercyclical capital buffer, capital conservation buffer, and capital requirements.	
general	Sum of reserve requirements, liquidity requirements, and limits on foreign exchange positions.	
supply	Sum of *loan*, *capital*, and *general*	
mpc	Sum of six macroprudential instruments, The value of the macroprudential policy instrument is determined as follows: 1 if tightened once, 0 if not used, and -1 if loosened in each quarter *t*.	Cerutti et al. (2016)
cmpc	Cumulative sum of *mpc* since 2002Q1	
	Control Variables	
asset	Logarithm of total assets	
ebit	Ratio of earnings before interests and taxes to total assets	
finc	Financial constraints	Following the methodology of Hadlock & Pierce, (2010)
fix	Ratio of fixed assets to total assets	
saleg	The growth rate of operating revenue	
tax	Ratio of taxes to total profits	
ind_lev	Median total financial leverage of each industry	CSMAR
ind_slev	Median short-term financial leverage of each industry	
ind_llev	Median long-term financial leverage of each industry	
gdpg	Quarterly growth rate of GDP	IMF
bmg	Quarterly growth rate of broad money	
lend	Lending rate	
reerg	Quarterly growth rate of real effective exchange rate	
cpig	Quarter growth rate of consumer price index	
tight	A binary variable denoting the effectiveness of macroprudential policies (mp) take the value of 1 if positive, and 0 if otherwise.	CSMAR
state	A dummy variable that takes the value of 1 if firm is stated-owned and 0 otherwise.	
board	A dummy variable that takes the value of 1 if the firm is listed in the mainboard and 0 otherwise	

Table 1 continued. Variable Definitions, Sources and Summary Statistics.

Panel B: Summary Statistics

Variable	N	Mean	S.D.	Min	Max
slev	90,406	11.395	10.444	0.000	42.180
llev	90,406	5.537	8.127	0.000	38.515
lev	90,406	17.008	13.536	0.000	52.979
slev1	77,336	19.777	1.703	15.099	23.943
llev1	60,909	19.261	2.221	13.352	24.720
lev1	79,996	20.192	1.874	14.918	24.853
dta	90,406	43.923	19.658	4.473	83.797
bond	75,027	1.706	3.939	0.000	18.000
com	80,476	16.050	11.875	0.495	55.148
cost	79,991	0.164	19.030	-147.095	30.145
Macroprudential policy instruments					
mp	90,406	0.912	1.778	-4.000	6.000
tmp	90,406	1.280	1.532	0.000	6.000
lmp	90,406	0.368	0.693	0.000	4.000
cmp	90,406	28.671	21.914	-5.000	78.000
mpc	80,558	0.093	1.026	-2.000	2.000
cmpc	80,558	17.128	6.864	0.000	25.000
loan	90,406	0.136	0.521	-1.000	2.000
capital	90,406	0.173	0.466	-1.000	2.000
general	90,406	0.413	1.050	-2.000	3.000
supply	90,406	0.722	1.373	-2.000	5.000
Firm-level variables					
asset	90,406	22.071	1.333	19.838	26.261
ebit	90,406	3.937	3.689	-3.545	17.915
finc	90,406	-3.662	0.261	-4.315	-2.994
fix	90,406	24.006	16.978	0.345	73.024
saleg	90,406	18.613	33.253	-46.206	183.329
tax	90,406	17.825	15.966	-48.339	83.321
ind_slev	90,406	9.260	4.187	0.000	42.180
ind_llev	90,406	2.932	4.426	0.000	22.999
ind_lev	90,406	15.057	6.571	0.000	45.992
Country-level variables					
gdpg	90,406	8.049	3.275	-6.900	14.300
bmg	90,406	14.296	4.451	8.000	29.300
lend	90,406	5.390	0.874	4.350	7.470
reerg	90,406	0.005	0.022	-0.039	0.074
cpig	90,406	0.000	0.010	-0.063	0.030

Notes: CSMAR stands for for the China Stock Market & Accounting Research Database, while IMF stands for the International Monetary Fund. The financial leverage ratio, defined as the total loan to total assets ratio (lev), is comprised of the sum of the short-term loan to total assets ratio (slev) and the long-term loan to total assets ratio (llev). The median industry leverage variable varies with the specific dependent variable being analyzed and it is expressed as percentage. To mitigate the impact of outliers, the upper and lower 1% of all firm-level variables are winsorized.

Table 2. Financial leverage and macroprudential policies.

	slev	*llev*	*lev*	*slev1*	*llev1*	*lev1*
	(1)	(2)	(3)	(4)	(5)	(6)
L.mp	-0.124***	-0.038***	-0.139***	-0.010***	0.003	-0.004***
	(-6.25)	(-3.96)	(-10.36)	(-4.63)	(1.48)	(-3.14)
Firm-level variables						
L.asset	0.883	2.231***	3.249***	0.952***	1.236***	1.140***
	(1.23)	(5.40)	(4.93)	(9.53)	(20.80)	(29.75)
L.ebit	-0.407***	-0.150***	-0.569***	-0.042***	-0.028***	-0.042***
	(-11.64)	(-6.21)	(-15.62)	(-13.08)	(-8.23)	(-17.70)
L.finc	0.843	2.044**	2.946	0.550**	1.192***	0.719***
	(0.39)	(2.51)	(1.42)	(2.63)	(5.13)	(4.01)
L.fix	0.074***	0.039**	0.110***	0.010***	0.006**	0.010***
	(3.90)	(2.15)	(7.11)	(4.44)	(2.58)	(4.47)
L.saleg	0.003	0.009***	0.012***	0.001**	0.001**	0.002***
	(1.61)	(5.46)	(4.07)	(2.70)	(2.52)	(4.34)
L.tax	0.003	0.002	0.005	0.001**	0.001***	0.001**
	(1.28)	(0.47)	(1.15)	(2.44)	(3.61)	(2.16)
Country-level variables						
L.gdpg	0.105***	0.076***	0.155***	0.008**	-0.001	0.007**
	(7.22)	(6.21)	(8.44)	(2.32)	(-0.13)	(2.14)
L.bmg	0.035	0.152***	0.158***	0.002	0.020***	0.008***
	(1.65)	(16.00)	(6.98)	(1.42)	(8.73)	(3.48)
L.lend	0.634***	0.290***	0.888***	0.019*	-0.006	-0.001
	(9.68)	(4.15)	(15.85)	(1.93)	(-0.34)	(-0.21)
L.reerg	-0.342	1.724***	0.710	0.061	0.411**	0.193
	(-0.33)	(3.41)	(0.56)	(0.46)	(2.20)	(1.73)
L.cpig	2.722**	-1.804	2.525	0.835***	0.860***	0.835***
	(2.50)	(-1.32)	(1.27)	(3.54)	(4.08)	(4.49)
L.ind	0.465***	0.474***	0.415***	0.209***	0.182*	0.244***
	(5.46)	(17.07)	(16.87)	(4.61)	(1.95)	(2.96)
_cons	-13.188	-42.136***	-57.565***	-3.701	-8.049***	-7.527***
	(-1.57)	(-5.73)	(-7.85)	(-1.64)	(-7.44)	(-5.09)
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes
# of firms	2,442	2,442	2,442	2,341	2,140	2,352
Adj R2	0.093	0.103	0.124	0.404	0.353	0.528
N	90,406	90,406	90,406	77,333	60,902	79,987

Notes: This table shows the OLS estimates of Eq.(1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' financial leverage, which is either short-term financial leverage to total assets (*slev*), long-term financial leverage to total assets (*llev*), overall financial leverage to total assets (*lev=slev+llev*), the logarithm of short-term loans (*slev1*), the logarithm of long-term loans (*llev1*), or the logarithm of overall loans (*lev1*). *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). The vector *X* comprises several firm-level variables including the logarithm of total assets (*asset*), earnings before interests and taxes per assets (*ebit*), financial constraints (*finc*), fixed assets as a proportion of total assets (*fix*), the growth rate of operating revenue (*saleg*), and the ratio of total taxes to total profits (*tax*). The vector *Z* consists of country-level variables, including the quarterly growth rate of China's GDP (*gdpg*), the quarterly growth rate of broad money (*bmg*), the lending rate (*lend*), the quarterly growth rate of real effective exchange rate (*reerg*), and the inflation rate (*cpig*). The variable *ind* represents the median leverage ratios specific to each industry. Moreover, λ_{1i} and η_{1t} denote the firm and quarter-specific fixed effects respectively. Quarter fixed effects refer to the first, the second, the third and the fourth quarter within one year; the first quarter is the quarter of reference. The constant term is represented by α_1, while the idiosyncratic error term is denoted by ε_{1iq} and L stands for the first lag of the variable. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 3. Tightening versus Loosening Macroprudential Policies.

	slev (1)	*llev* (2)	*lev* (3)	*slev* (4)	*llev* (5)	*lev* (6)	*slev* (7)	*llev* (8)	*lev* (9)
L.mp	-0.050	-0.019	0.010						
	(-1.24)	(-0.69)	(0.25)						
L.mp#L.T	-0.119***	-0.028	-0.223***						
	(-3.71)	(-0.92)	(-3.97)						
L.tmp				-0.133***	-0.042***	-0.171***			
				(-6.38)	(-3.38)	(-7.71)			
L.lmp							0.144***	0.036	0.068*
							(4.15)	(1.28)	(2.01)
L.T	0.112***	0.017	0.156***						
	(2.99)	(0.54)	(4.97)						
Firm-level variables									
L.asset	0.884	2.232***	3.253***	0.877	2.232***	3.250***	0.854	2.223***	3.210***
	(1.23)	(5.40)	(4.95)	(1.22)	(5.41)	(4.96)	(1.18)	(5.38)	(4.81)
L.ebit	-0.408***	-0.150***	-0.569***	-0.407***	-0.150***	-0.568***	-0.408***	-0.150***	-0.569***
	(-11.68)	(-6.22)	(-15.66)	(-11.61)	(-6.21)	(-15.61)	(-11.56)	(-6.22)	(-15.52)
L.finc	0.819	2.035**	2.893	0.835	2.029**	2.891	1.054	2.114**	3.208
	(0.38)	(2.50)	(1.38)	(0.39)	(2.48)	(1.38)	(0.49)	(2.60)	(1.54)
L.fix	0.073***	0.039**	0.109***	0.074***	0.038**	0.109***	0.074***	0.039**	0.111***
	(3.90)	(2.14)	(7.08)	(3.90)	(2.14)	(7.06)	(3.92)	(2.16)	(7.13)
L.saleg	0.003	0.009***	0.012***	0.003	0.009***	0.012***	0.003	0.009***	0.012***
	(1.62)	(5.47)	(4.08)	(1.63)	(5.47)	(4.09)	(1.55)	(5.46)	(4.07)
L.tax	0.003	0.002	0.005	0.003	0.002	0.005	0.003	0.002	0.005
	(1.26)	(0.47)	(1.13)	(1.24)	(0.47)	(1.12)	(1.34)	(0.48)	(1.17)

Table 3 continued. Tightening versus Loosening Macroprudential Policies.

	slev (1)	*llev* (2)	*lev* (3)	*slev* (4)	*llev* (5)	*lev* (6)	*slev* (7)	*llev* (8)	*lev* (9)
				Country-level variables					
L.gdpg	0.104***	0.076***	0.154***	0.100***	0.075***	0.153***	0.084***	0.069***	0.127***
	(7.23)	(6.21)	(8.46)	(7.23)	(5.96)	(8.00)	(6.81)	(6.24)	(8.12)
L.bmg	0.039*	0.152***	0.164***	0.038*	0.153***	0.162***	0.029	0.150***	0.152***
	(1.83)	(16.00)	(7.42)	(1.77)	(16.06)	(7.13)	(1.38)	(16.06)	(6.69)
L.lend	0.626***	0.289***	0.871***	0.612***	0.284***	0.867***	0.610***	0.280***	0.838***
	(9.82)	(4.14)	(15.25)	(9.49)	(3.99)	(15.82)	(9.44)	(3.97)	(15.02)
L.reerg	0.452	1.911***	2.209**	0.560	1.993***	1.636	0.086	1.921***	1.927*
	(0.45)	(4.00)	(2.19)	(0.53)	(3.94)	(1.26)	(0.08)	(4.83)	(1.81)
L.cpig	3.600***	-1.602	4.145*	3.545***	-1.486	4.345*	-2.495**	-3.353**	-3.000
	(3.48)	(-1.05)	(2.00)	(3.11)	(-0.96)	(1.93)	(-2.55)	(-2.15)	(-1.72)
L.ind	0.463***	0.474***	0.413***	0.461***	0.472***	0.411***	0.468***	0.472***	0.413***
	(5.43)	(17.19)	(16.68)	(5.41)	(17.77)	(16.40)	(5.40)	(16.96)	(16.47)
_cons	-13.257	-42.174***	-57.759***	-12.859	-42.142***	-57.572***	-11.623	-41.613***	-55.349***
	(-1.58)	(-5.73)	(-7.94)	(-1.53)	(-5.72)	(-8.01)	(-1.37)	(-5.63)	(-7.36)
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of firms	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442
Adj R2	0.094	0.103	0.124	0.093	0.103	0.124	0.093	0.103	0.123
N	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406

Notes: Columns (4)-(9) show the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp1_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp1* includes *tmp* and *lmp*. *tmp* is the sum of 17 macroprudential instruments, each of which is 1 if tightened and 0 otherwise. *lmp* is the sum of 17 macroprudential instruments, each of which is 1 if loosened and 0 otherwise. Columns (1)-(3) of this table show the OLS estimates of Eq. (3): $Lev_{iq} = \alpha_2 + \lambda_{2i} + \eta_{2t} + \beta_{21} mp_{q-1} + \beta_{22} T_{q-1} + \beta_{23} mp_{q-1} * T_{q-1} + \gamma_{21} X_{iq-1} + \gamma_{22} ind_{iq-1} + \gamma_{23} Z_{q-1} + \varepsilon_{2iq}$. *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). *T* is an indicator variable that equals 1 when *mp* is greater than 0, and 0 otherwise. The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with *L*. $\lambda_{1i}, \lambda_{2i}$ and η_{1t}, η_{2t} denote the firm and quarter-specific fixed effects respectively, defined in Table 2. The constant terms are represented by α_1,and $\alpha_2$while the idiosyncratic error terms are denoted by ε_{1iq} and ε_{2iq} Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 4. Macroprudential policies, financial leverage of state-owned firms.

	slev	*llev*	*lev*
	(1)	(2)	(3)
L.mp	-0.157***	-0.058***	-0.198***
	(-6.32)	(-4.61)	(-13.63)
L.mp#L.state	0.073***	0.044	0.128***
	(3.69)	(1.54)	(5.76)
	Firm-level variables		
L.asset	0.881	2.230***	3.246***
	(1.23)	(5.39)	(4.92)
L.ebit	-0.408***	-0.150***	-0.569***
	(-11.64)	(-6.23)	(-15.62)
L.finc	0.877	2.063**	3.004
	(0.41)	(2.55)	(1.44)
L.fix	0.073***	0.038**	0.109***
	(3.89)	(2.13)	(7.11)
L.saleg	0.003	0.009***	0.012***
	(1.60)	(5.45)	(4.06)
L.tax	0.003	0.002	0.005
	(1.27)	(0.47)	(1.14)

Table 4 continued. Macroprudential policies, financial leverage of state-owned firms.

	slev	*llev*	*lev*
	(1)	(2)	(3)
	Country-level variables		
L.gdpg	0.104***	0.076***	0.153***
	(7.16)	(6.06)	(8.30)
L.bmg	0.035	0.151***	0.157***
	(1.64)	(15.97)	(6.95)
L.lend	0.628***	0.286***	0.875***
	(9.44)	(3.94)	(15.51)
L.reerg	-0.302	1.749***	0.784
	(-0.29)	(3.48)	(0.61)
L.cpig	2.375**	-2.013	1.916
	(2.18)	(-1.43)	(0.92)
L.ind	0.465***	0.474***	0.415***
	(5.45)	(17.11)	(16.83)
_cons	-12.958	-42.008***	-57.170***
	(-1.53)	(-5.65)	(-7.81)
Firm	Yes	Yes	Yes
Quarter	Yes	Yes	Yes
# of firms	2,442	2,442	2,442
Adj R2	0.094	0.103	0.124
N	90,406	90,406	90,406

Notes: This table shows the OLS estimates of Eq. (4a): $Lev_{iq} = \alpha_3 + \lambda_{3i} + \eta_{3t} + \beta_{31}mp_{q-1} + \beta_{32}mp_{q-1} * state_{q-1} + \gamma_{31}X_{iq-1} + \gamma_{32}ind_{iq-1} + \gamma_{33}Z_{q-1} + \varepsilon_{3iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). The vectors X and Z comprise several firm-level and country-level variables defined in Table 2. The variable "state" is a dummy variable assigned a value of 1 when the firm is under state ownership, and 0 otherwise. As the firm's ownership remains constant over time, the inclusion of "state" in the regression model results in multicollinearity issues with the fixed effects of the firm. Therefore, the variable "*state*" is omitted from the regression analysis. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with $L.$, λ_{3i} and η_{3t} denote the firm and quarter-specific fixed effects respectively, defined as in Table 2. The constant term is represented by α_3, while the idiosyncratic error term is denoted by ε_{3iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 5. Macroprudential policies, financial leverage, and firm's size.

	slev	*llev*	*lev*	*slev*	*llev*	*lev*
	(1)	(2)	(3)	(4)	(5)	(6)
L.mp	-0.685***	-0.549*	-1.316***	-0.190***	-0.063*	-0.250***
	(-4.21)	(-2.05)	(-8.80)	(-8.68)	(-1.83)	(-4.86)
L.mp#L.asset	0.025***	0.023*	0.053***			
	(3.75)	(1.90)	(8.09)			
L.mp#L.fix				0.284*	0.109	0.472*
				(1.95)	(0.80)	(2.05)
Firm-level variables						
L.asset	0.865	2.215***	3.211***	0.878	2.230***	3.242***
	(1.20)	(5.26)	(4.87)	(1.23)	(5.38)	(4.92)
L.ebit	-0.407***	-0.150***	-0.569***	-0.408***	-0.150***	-0.570***
	(-11.61)	(-6.20)	(-15.58)	(-11.56)	(-6.24)	(-15.54)
L.finc	0.864	2.063**	2.989	0.868	2.051**	2.984
	(0.40)	(2.55)	(1.44)	(0.40)	(2.52)	(1.42)
L.fix	0.073***	0.038**	0.109***	0.071***	0.037*	0.105***
	(3.89)	(2.13)	(7.09)	(3.91)	(2.04)	(7.30)
L.saleg	0.003	0.009***	0.012***	0.003	0.009***	0.012***
	(1.59)	(5.42)	(4.05)	(1.61)	(5.45)	(4.08)
L.tax	0.003	0.002	0.005	0.003	0.002	0.005
	(1.28)	(0.47)	(1.15)	(1.27)	(0.47)	(1.15)

Table 5 continued. Macroprudential policies, financial leverage, and firm's size.

	slev (1)	*llev* (2)	*lev* (3)	*slev* (4)	*llev* (5)	*lev* (6)
			Country-level variables			
L.gdpg	0.103***	0.075***	0.152***	0.104***	0.076***	0.154***
	(7.17)	(5.98)	(8.35)	(7.11)	(6.09)	(8.24)
L.bmg	0.035	0.152***	0.158***	0.036	0.152***	0.158***
	(1.66)	(16.06)	(7.01)	(1.69)	(16.00)	(7.14)
L.lend	0.638***	0.294***	0.895***	0.626***	0.287***	0.874***
	(9.76)	(4.26)	(15.75)	(9.57)	(3.93)	(15.45)
L.reerg	-0.292	1.770***	0.815	-0.246	1.761***	0.874
	(-0.28)	(3.59)	(0.64)	(-0.24)	(3.53)	(0.69)
L.cpig	3.268**	-1.307	3.670*	2.564**	-1.864	2.263
	(2.79)	(-0.93)	(1.83)	(2.30)	(-1.33)	(1.09)
L.ind	0.465***	0.474***	0.415***	0.464***	0.473***	0.414***
	(5.46)	(16.98)	(16.99)	(5.43)	(17.19)	(16.68)
_cons	-12.726	-41.715***	-56.604***	-12.859	-42.031***	-57.051***
	(-1.50)	(-5.51)	(-7.70)	(-1.55)	(-5.64)	(-7.96)
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes
# of firms	2,442	2,442	2,442	2,442	2,442	2,442
Adj R2	0.094	0.103	0.124	0.094	0.103	0.124
N	90,406	90,406	90,406	90,406	90,406	90,406

Notes: This table shows the OLS estimates of Eq. (4b): $Lev_{iq} = \alpha_4 + \lambda_{4i} + \eta_{4t} + \beta_{41} mp_{q-1} + \beta_{42} mp_{q-1} * size_{q-1} + \gamma_{41} X_{iq-1} + \gamma_{42} ind_{iq-1} + \gamma_{43} Z_{q-1} + \varepsilon_{4iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable *size* is measured using the variable *asset,* the logarithm of total assets, in Columns (1)-(3), and the variable *fix*, the ratio of fixed assets to total assets, in Columns (4)-(6). The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with $L.$, λ_{4i} and η_{4t} denote the firm and quarter-specific fixed effects respectively, defined as in Table 2. The constant term is represented by α_4, while the idiosyncratic error term is denoted by ε_{4iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 6. Macroprudential policies, financial leverage of main-board listed firms.

	slev	*llev*	*lev*
	(1)	(2)	(3)
L.mp	-0.345***	-0.093***	-0.420***
	(-5.80)	(-3.80)	(-10.17)
L.mp#L.board	0.256***	0.064**	0.325***
	(4.94)	(2.69)	(8.36)
Firm-level variables			
L.asset	0.881	2.231***	3.247***
	(1.23)	(5.40)	(4.91)
L.ebit	-0.407***	-0.150***	-0.569***
	(-11.59)	(-6.21)	(-15.55)
L.finc	0.924	2.062**	3.047
	(0.43)	(2.54)	(1.46)
L.fix	0.073***	0.038**	0.109***
	(3.88)	(2.13)	(7.09)
L.saleg	0.003	0.009***	0.012***
	(1.55)	(5.44)	(4.02)
L.tax	0.003	0.002	0.005
	(1.24)	(0.46)	(1.12)

Table 6 continued. Macroprudential policies, financial leverage of main-board listed firms.

	slev	*llev*	*lev*
	(1)	(2)	(3)
Country-level variables			
L.gdpg	0.103***	0.076***	0.152***
	(7.19)	(6.14)	(8.31)
L.bmg	0.035	0.152***	0.158***
	(1.65)	(16.00)	(6.96)
L.lend	0.617***	0.286***	0.865***
	(9.10)	(4.01)	(15.14)
L.reerg	-0.176	1.765***	0.925
	(-0.17)	(3.53)	(0.71)
L.cpig	1.712	-2.054	1.245
	(1.51)	(-1.48)	(0.60)
L.ind	0.464***	0.474***	0.414***
	(5.45)	(17.10)	(16.87)
_cons	-12.697	-42.025***	-56.955***
	(-1.50)	(-5.69)	(-7.75)
Firm	Yes	Yes	Yes
Quarter	Yes	Yes	Yes
# of firms	2,442	2,442	2,442
Adj R2	0.094	0.103	0.124
N	90,406	90,406	90,406

Notes: This table shows the OLS estimates of Eq. (4c): $Lev_{iq} = \alpha_5 + \lambda_{5i} + \eta_{5t} + \beta_{51} mp_{q-1} + \beta_{52} mp_{q-1} * board_{q-1} + \gamma_{51} X_{iq-1} + \gamma_{52} ind_{iq-1} + \gamma_{53} Z_{q-1} + \varepsilon_{5iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable "board" is a dummy variable assigned a value of 1 when the firm is listed on the mainboard, and 0 otherwise. Firm's ownership is time invariant, hence *state* is excluded from the regression to tackle the issue of multicollinearity that arises when controlling for firm fixed effects. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with *L.* , λ_{5i} and η_{5t} denote the firm and quarter-specific fixed effects respectively, defined as in Table 2. The constant term is represented by α_5, while the idiosyncratic error term is denoted by ε_{5iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 7. Alternative Macroprudential policy measures. Intensity of macroprudential policy and financial leverage.

	slev	*llev*	*lev*
	(1)	(2)	(3)
L.cmp	-0.094***	-0.064***	-0.164***
	(-2.02)	(-1.67)	(-2.59)
		Firm-level variables	
L.asset	1.419**	2.663***	4.321***
	(2.20)	(6.69)	(10.14)
L.ebit	-0.405***	-0.146***	-0.564***
	(-12.52)	(-5.94)	(-16.20)
L.finc	-4.069*	-2.047	-6.210**
	(-2.02)	(-1.67)	(-2.59)
L.fix	0.070***	0.033	0.100***
	(3.67)	(1.74)	(5.39)
L.saleg	0.001	0.008***	0.009***
	(0.50)	(4.83)	(3.03)
L.tax	0.002	0.001	0.004
	(1.02)	(0.39)	(1.07)

Table 7 continued. Alternative Macroprudential policy measures. Intensity of macroprudential policy and financial leverage.

	slev	*llev*	*lev*
	(1)	(2)	(3)
Country-level variables			
L.gdpg	0.017	0.024***	0.020
	(1.06)	(3.07)	(1.33)
L.bmg	-0.031**	0.111***	0.055*
	(-2.69)	(11.22)	(1.96)
L.lend	0.785***	0.484***	1.190***
	(13.62)	(6.83)	(16.70)
L.reerg	2.768**	3.118***	5.593***
	(2.68)	(7.58)	(5.91)
L.cpig	-3.316***	-4.236***	-4.525**
	(-3.36)	(-3.07)	(-2.41)
L.ind	0.347***	0.454***	0.283***
	(4.00)	(14.59)	(5.91)
_cons	-38.325***	-64.602***	-106.881***
	(-4.48)	(-9.95)	(-17.36)
Firm	Yes	Yes	Yes
Quarter	Yes	Yes	Yes
# of firms	2,442	2,442	2,442
Adj R2	0.100	0.111	0.140
N	90,406	90,406	90,406

Notes: This table shows the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11}mp_{q-1} + \gamma_{11}X_{iq-1} + \gamma_{12}ind_{iq-1} + \gamma_{13}Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019) since 2002Q1 (*cmp*), we have the main explanatory variable with the measure of macroprudential policy intensity (cmp) to examine the cumulative effects. The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. Firm's ownership is time invariant, hence *state* is dropped in the regression due to multicollinearity with firm fixed effects. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with L , λ_{1i} , η_{1t}, α_1, and ε_{1iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 8. Supply-side macroprudential policies and financial leverage.

	slev	*llev*	*lev*	*slev*	*llev*	*lev*	*slev*	*llev*	*lev*	*slev*	*llev*	*lev*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L.supply	-0.144***	-0.034**	-0.162***									
	(-6.44)	(-2.74)	(-7.34)									
L.loan				-0.278***	-0.042	-0.205***						
				(-5.69)	(-1.02)	(-5.80)						
L.capital							-0.133*	0.004	-0.138***			
							(-1.90)	(0.11)	(-3.39)			
L.general										-0.144***	-0.048***	-0.194***
										(-3.97)	(-2.99)	(-6.88)
Firm-level variables												
L.asset	0.874	2.228***	3.240***	0.866	2.225***	3.223***	0.842	2.222***	3.207***	0.863	2.227***	3.230***
	(1.22)	(5.39)	(4.92)	(1.19)	(5.36)	(4.85)	(1.16)	(5.38)	(4.83)	(1.20)	(5.39)	(4.90)
L.ebit	-0.407***	-0.150***	-0.569***	-0.407***	-0.150***	-0.569***	-0.408***	-0.150***	-0.569***	-0.407***	-0.150***	-0.568***
	(-11.64)	(-6.21)	(-15.62)	(-11.54)	(-6.22)	(-15.52)	(-11.58)	(-6.23)	(-15.58)	(-11.53)	(-6.22)	(-15.57)
L.finc	0.859	2.057**	2.964	1.006	2.095**	3.158	1.055	2.109**	3.196	0.899	2.064**	2.986
	(0.40)	(2.52)	(1.42)	(0.47)	(2.60)	(1.51)	(0.49)	(2.58)	(1.53)	(0.41)	(2.53)	(1.43)
L.fix	0.074***	0.039**	0.110***	0.074***	0.039**	0.110***	0.074***	0.039**	0.110***	0.074***	0.039**	0.110***
	(3.90)	(2.15)	(7.08)	(3.89)	(2.16)	(7.10)	(3.91)	(2.16)	(7.10)	(3.92)	(2.16)	(7.13)
L.saleg	0.003	0.009***	0.012***	0.003	0.009***	0.012***	0.003	0.009***	0.012***	0.003	0.009***	0.012***
	(1.60)	(5.46)	(4.08)	(1.57)	(5.46)	(4.05)	(1.59)	(5.47)	(4.08)	(1.59)	(5.46)	(4.08)
L.tax	0.003	0.002	0.005	0.003	0.002	0.005	0.003	0.002	0.005	0.003	0.002	0.005
	(1.26)	(0.47)	(1.13)	(1.27)	(0.48)	(1.15)	(1.29)	(0.48)	(1.16)	(1.27)	(0.47)	(1.15)

Table 8 continued. Supply-side macroprudential policies and financial leverage.

	slev (1)	*llev* (2)	*lev* (3)	*slev* (4)	*llev* (5)	*lev* (6)	*slev* (7)	*llev* (8)	*lev* (9)	*slev* (10)	*llev* (11)	*lev* (12)
						Country-level variables						
L.gdpg	0.104***	0.074***	0.154***	0.094***	0.070***	0.136***	0.080***	0.067***	0.127***	0.092***	0.073***	0.144***
	(7.58)	(5.94)	(7.99)	(7.91)	(5.31)	(7.93)	(7.37)	(6.01)	(7.67)	(6.54)	(6.20)	(7.86)
L.bmg	0.036	0.151***	0.159***	0.039*	0.152***	0.159***	0.029	0.150***	0.151***	0.035	0.151***	0.157***
	(1.68)	(15.92)	(6.94)	(1.80)	(15.33)	(6.71)	(1.40)	(15.56)	(6.60)	(1.61)	(15.96)	(6.93)
L.lend	0.611***	0.281***	0.861***	0.588***	0.275***	0.830***	0.569***	0.273***	0.812***	0.619***	0.285***	0.878***
	(9.54)	(3.97)	(15.74)	(9.27)	(3.82)	(15.66)	(8.40)	(3.74)	(15.20)	(8.86)	(4.04)	(15.63)
L.reerg	0.441	2.017***	1.604	2.153*	2.339***	3.164**	1.261	2.195***	2.536*	-0.130	1.757***	0.650
	(0.42)	(4.04)	(1.28)	(1.78)	(4.48)	(2.40)	(1.15)	(4.78)	(2.06)	(-0.11)	(3.37)	(0.48)
L.cpig	3.416**	-1.950	3.319	-0.871	-3.055*	-1.927	-2.321**	-3.203**	-3.082*	3.167**	-1.506	4.183*
	(2.85)	(-1.36)	(1.47)	(-0.88)	(-2.03)	(-1.12)	(-2.52)	(-2.21)	(-1.90)	(2.24)	(-1.18)	(1.77)
L.ind	0.462***	0.472***	0.412***	0.460***	0.471***	0.411***	0.460***	0.470***	0.409***	0.467***	0.472***	0.417***
	(5.42)	(17.55)	(16.39)	(5.33)	(18.12)	(16.20)	(5.28)	(17.93)	(15.82)	(5.46)	(17.17)	(16.57)
_cons	-12.772	-41.957***	-57.122***	-12.028	-41.717***	-55.891***	-10.926	-41.563***	-55.017***	-12.461	-41.926***	-56.950***
	(-1.52)	(-5.69)	(-7.86)	(-1.40)	(-5.57)	(-7.50)	(-1.28)	(-5.61)	(-7.44)	(-1.48)	(-5.69)	(-7.85)
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of firms	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442	2,442
Adj R2	0.093	0.103	0.124	0.093	0.103	0.123	0.093	0.103	0.123	0.093	0.103	0.124
N	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406	90,406

Notes: This table shows the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp* is a group of macroprudential policies from Alam et al. (2019), which is either *supply*, *loan*, *capital* or *general*. The macroprudential policy instruments each group includes is consistent with Alam et al. (2019). More specifically, *supply* = *loan* + *capital* + *general*. The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with L , λ_{1i} , η_{1t}, α_1, and ε_{1iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 9. An alternative macroprudential policies database.

	slev	*llev*	*lev*	*slev*	*llev*	*lev*
	(1)	(2)	(3)	(4)	(5)	(6)
L.mpc	-0.184***	-0.057***	-0.213***			
	(-8.80)	(-3.96)	(-11.55)			
L.cmpc				-0.173***	-0.059**	-0.260***
				(-6.02)	(-2.76)	(-5.04)
			Firm-level variables			
L.asset	1.159	2.247***	3.553***	1.456*	2.364***	4.100***
	(1.43)	(5.08)	(4.93)	(1.86)	(5.60)	(7.25)
L.ebit	-0.403***	-0.149***	-0.566***	-0.399***	-0.146***	-0.559***
	(-10.49)	(-5.83)	(-14.33)	(-10.77)	(-5.59)	(-14.28)
L.finc	2.136	1.713*	4.179*	-1.263	0.324	-1.280
	(0.89)	(2.03)	(1.87)	(-0.56)	(0.28)	(-0.47)
L.fix	0.075***	0.036*	0.109***	0.072***	0.034*	0.102***
	(3.54)	(2.04)	(6.54)	(3.38)	(1.87)	(5.59)
L.saleg	0.003	0.009***	0.012***	0.002	0.009***	0.011***
	(1.51)	(5.08)	(3.96)	(1.13)	(4.89)	(3.57)
L.tax	0.004	0.003	0.008*	0.004	0.003	0.007
	(1.52)	(0.82)	(1.76)	(1.27)	(0.79)	(1.64)
			Country-level variables			
L.gdpg	0.162***	0.199***	0.359***	0.048	0.134***	0.206***
	(3.26)	(6.78)	(8.35)	(1.08)	(6.45)	(3.73)
L.bmg	0.021	0.135***	0.129***	0.069***	0.154***	0.212***
	(1.03)	(13.54)	(5.27)	(3.06)	(12.28)	(9.35)
L.lend	0.526***	0.180**	0.635***	1.221***	0.459***	1.694***
	(6.02)	(2.24)	(9.11)	(9.83)	(4.69)	(9.64)
L.reerg	-1.709*	0.427	-1.845	7.603***	3.713***	11.711***
	(-2.04)	(0.65)	(-1.30)	(4.52)	(6.13)	(7.97)
L.cpig	-6.662*	-12.564***	-18.073***	-4.471	-9.705***	-13.704**
	(-1.82)	(-6.83)	(-6.00)	(-1.15)	(-6.13)	(-2.55)
L.ind	0.439***	0.446***	0.362***	0.334***	0.437***	0.261***
	(4.69)	(16.91)	(12.31)	(3.18)	(13.76)	(4.00)
_cons	-14.344	-43.900***	-59.380***	-32.799***	-51.716***	-90.897***
	(-1.55)	(-5.54)	(-7.16)	(-3.39)	(-7.34)	(-14.43)
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes
# of firms	2,339	2,339	2,339	2,339	2,339	2,339
Adj R2	0.094	0.097	0.122	0.098	0.098	0.129
N	80,558	80,558	80,558	80,558	80,558	80,558

Notes: This table shows the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11}mp_{q-1} + \gamma_{11}X_{iq-1} + \gamma_{12}ind_{iq-1} + \gamma_{13}Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. We use data from Cerutti et al. (2016), their data provide a small collection of implementations of six macroprudential instruments at quarterly intervals, expressed as dummy-type indices. To capture the impact of MPs, we use the sum of these six instruments per quarter as a proxy variable (*mpc*), and the cumulative sum of *mpc* to measure the intensity of macroprudential policies (*cmpc*). The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with L, λ_{1i}, η_{1t}, α_1, and ε_{1iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 10. Alternative measure of leverage: debt to asset ratio.

	dta (1)	*dta* (2)	*dta* (3)	*dta* (4)
L.mp	-0.222***			
	(-18.54)			
L.cmp		-0.171***		
		(-4.77)		
L.mpc			-0.307***	
			(-8.38)	
L.cmpc				-0.238***
				(-3.52)
Firm-level variables				
L.asset	7.204***	8.407***	7.607***	8.138***
	(30.14)	(25.72)	(29.50)	(27.99)
L.ebit	-0.803***	-0.792***	-0.777***	-0.765***
	(-16.67)	(-15.54)	(-15.15)	(-14.33)
L.finc	-0.701	-11.271***	-0.525	-6.171**
	(-0.58)	(-3.17)	(-0.51)	(-2.45)
L.fix	0.103**	0.090**	0.105**	0.097**
	(2.81)	(2.50)	(2.77)	(2.68)
L.saleg	0.037***	0.034***	0.038***	0.037***
	(11.57)	(12.17)	(12.23)	(12.54)
L.tax	0.010**	0.009**	0.014***	0.014***
	(2.45)	(2.52)	(3.24)	(3.22)
Country-level variables				
L.gdpg	0.212***	0.055***	0.540***	0.317***
	(11.16)	(3.96)	(8.57)	(4.82)
L.bmg	0.217***	0.115***	0.178***	0.258***
	(10.63)	(4.21)	(7.20)	(8.82)
L.lend	1.208***	1.601***	0.851***	1.908***
	(15.99)	(13.88)	(8.71)	(9.03)
L.reerg	1.044	7.686***	-2.133	12.442***
	(0.45)	(4.91)	(-0.88)	(5.82)
L.cpig	-4.953**	-14.713***	-37.344***	-30.057***
	(-2.56)	(-6.83)	(-10.40)	(-7.66)
L.ind	0.278***	0.214***	0.223***	0.184***
	(17.96)	(5.97)	(10.94)	(4.20)
_cons	-139.643***	-196.277***	-146.500***	-177.859***
	(-19.37)	(-11.58)	(-21.69)	(-12.51)
Firm	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes
# of firms	2,442	2,442	2,339	2,339
Adj R2	0.253	0.265	0.247	0.251
N	90,406	90,406	80,558	80,558

Notes: This table shows the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11}mp_{q-1} + \gamma_{11}X_{iq-1} + \gamma_{12}ind_{iq-1} + \gamma_{13}Z_{q-1} + \varepsilon_{1iq}$.The dependent variable is liabilities to assets ratio (*dta*). The independent variables include the MPs and cumulative MPs from both Alam et al. (2019) (*mp* and *cmp*) and Cerutti et al. (2016) (*mpc* and *cmpc*). The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with L , λ_{1i} , η_{1t}, α_1, and ε_{1iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 11. Substitution effects on other credit.

	bond (1)	*com* (2)	*cost* (3)
L.mp	0.000	-0.066***	0.161**
	(0.07)	(-4.75)	(2.32)
	Firm-level variables		
L.asset	0.997***	1.064**	1.063***
	(8.93)	(2.90)	(3.36)
L.ebit	-0.064***	-0.125***	-0.036
	(-5.03)	(-6.93)	(-0.88)
L.finc	-1.221	-5.664***	-0.404
	(-1.64)	(-3.06)	(-0.39)
L.fix	-0.005	-0.038*	0.158***
	(-0.84)	(-1.82)	(3.38)
L.saleg	-0.004***	0.023***	0.004
	(-6.24)	(11.60)	(0.91)
L.tax	-0.001*	0.005**	-0.003
	(-1.96)	(2.37)	(-1.37)
	Country-level variables		
L.gdpg	-0.032	0.250***	0.037
	(-1.45)	(7.43)	(0.90)
L.bmg	-0.036***	0.129***	0.006
	(-3.53)	(6.18)	(0.31)
L.lend	0.064	0.430***	-0.996***
	(1.46)	(6.16)	(-3.35)
L.reerg	-2.874***	3.362*	0.622
	(-7.19)	(2.02)	(0.31)
L.cpig	-0.460	-18.123***	5.533*
	(-0.92)	(-5.50)	(1.89)
L.ind	0.367***	0.319***	0.630*
	(6.58)	(5.26)	(1.86)
_cons	-23.665***	-37.925***	-27.729***
	(-12.69)	(-5.68)	(-5.29)
Firm	Yes	Yes	Yes
Quarter	Yes	Yes	Yes
# of firms	2,212	2,352	2,352
Adj R2	0.192	0.091	0.015
N	75,024	79,267	79,989

Notes: This table shows the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' credit or financing cost, which is either bonds payable to total assets (*bond*), commercial credits to total assets (*com*) or financing costs to total assets (*cost*). mp represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). The vectors *X* and *Z* comprise several firm-level and country-level variables defined in Table 2. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with L ,λ_{1i} ,η_{1t}, α_1, and ε_{1iq}. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Table 12. The impact of the Global Financial Crisis.

	Adding year fixed effects			Excluding 2008 and 2009			2011-2020		
	slev	*llev*	*lev*	*slev*	*llev*	*lev*	*slev*	*llev*	*lev*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
L.mp	-0.043**	0.002	-0.047***	-0.142***	-0.041***	-0.153***	-0.087***	-0.020**	-0.082***
	(-2.44)	(0.26)	(-6.34)	(-9.02)	(-3.80)	(-10.72)	(-5.52)	(-2.25)	(-4.94)
					Firm-level variables				
L.asset	1.639**	2.818***	4.568***	0.980	2.194***	3.298***	1.142**	2.766***	3.962***
	(2.80)	(7.15)	(11.51)	(1.39)	(5.47)	(4.96)	(2.73)	(8.48)	(10.19)
L.ebit	-0.401***	-0.146***	-0.562***	-0.410***	-0.147***	-0.569***	-0.263***	-0.111***	-0.377***
	(-11.82)	(-6.14)	(-16.16)	(-11.30)	(-6.98)	(-14.11)	(-11.34)	(-8.85)	(-12.15)
L.finc	-6.220**	-3.818**	-9.582***	0.658	1.753**	2.478	-11.338***	-0.573	-11.567***
	(-2.86)	(-2.31)	(-3.92)	(0.30)	(2.22)	(1.16)	(-13.36)	(-0.43)	(-5.16)
L.fix	0.071***	0.038*	0.105***	0.073***	0.041**	0.111***	0.066***	0.037**	0.103***
	(3.62)	(2.02)	(5.29)	(4.34)	(2.42)	(6.86)	(3.35)	(2.48)	(7.02)
L.saleg	0.001	0.007***	0.008**	0.003	0.009***	0.012***	0.002	0.004	0.006*
	(0.32)	(4.50)	(2.75)	(1.46)	(5.56)	(4.05)	(1.69)	(1.73)	(1.87)
L.tax	0.003	0.001	0.005	0.002	0.001	0.004	0.002	-0.002	-0.000
	(1.12)	(0.48)	(1.22)	(0.76)	(0.35)	(0.80)	(1.43)	(-0.80)	(-0.07)

Table 12 continued. The impact of the Global Financial Crisis.

	Year fixed effects			Excluding 2008 and 2009			2011-2020		
	slev	*llev*	*lev*	*slev*	*llev*	*lev*	*slev*	*llev*	*lev*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Country-level variables					
L.gdpg	0.020**	-0.017**	-0.000	0.097***	0.063***	0.131***	0.168***	0.069***	0.221***
	(2.62)	(-2.39)	(-0.02)	(7.72)	(5.85)	(9.13)	(6.55)	(4.08)	(6.65)
L.bmg	-0.019	0.020**	0.003	0.076**	0.185***	0.231***	0.177***	0.225***	0.379***
	(-1.53)	(2.26)	(0.34)	(2.73)	(15.29)	(10.11)	(5.79)	(7.94)	(8.82)
L.lend	0.373***	-0.143	0.285***	0.709***	0.345***	0.991***	1.435***	0.652***	2.036***
	(6.56)	(-1.34)	(3.55)	(6.05)	(5.52)	(9.67)	(10.87)	(8.23)	(10.12)
L.reerg	1.134	0.063	-0.678	-0.603	-0.085	-1.034	3.291***	1.653	5.345***
	(1.19)	(0.15)	(-0.56)	(-0.76)	(-0.13)	(-0.92)	(3.87)	(1.67)	(5.46)
L.cpig	2.705*	-5.297***	-1.566	-3.476	-4.728	-9.834***	30.234***	13.922***	38.901***
	(1.75)	(-5.28)	(-0.65)	(-0.97)	(-1.71)	(-3.52)	(11.15)	(5.58)	(9.15)
L.ind	0.417***	0.534***	0.368***	0.501***	0.497***	0.445***	0.226***	0.395***	0.287***
	(4.36)	(13.16)	(9.81)	(5.60)	(15.17)	(22.27)	(4.15)	(11.98)	(7.66)
_cons	-46.674***	-66.764***	-115.096***	-17.162*	-43.140***	-62.162***	-69.662***	-66.442***	-136.079***
	(-4.87)	(-11.24)	(-14.33)	(-1.92)	(-5.99)	(-8.16)	(-6.22)	(-9.41)	(-9.98)
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	No	No	No	No	No	No
# of firms	2,442	2,442	2,442	2,442	2,442	2,442	2,418	2,418	2,418
Adj R2	0.104	0.116	0.145	0.097	0.108	0.125	0.056	0.096	0.115
N	90,406	90,406	90,406	82,940	82,940	82,940	61,908	61,908	61,908

Notes: This table shows the OLS estimates of Eq. (1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}$. The dependent variable is a measure of firms' financial leverage and it is defined in Table 2. *mp* represents the sum of 17 macroprudential policy instruments from Alam et al. (2019). The vectors X and Z comprise several firm-level and country-level variables defined in Table 2. The variable *ind* represents the median leverage ratios and it is also defined in Table 2, along with L , λ_{1i} , η_{1t}, α_1, and ε_{1iq}. Columns (1)-(3) include year fixed effects. The sample period in columns (4)-(6) excludes 2008-2009, while columns (7)-(9) covers the period 2011-2020. Standard errors are heteroscedasticity robust and clustered by industry. *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.

Appendix

Table A.1. Different clustered errors.

	Clustered by industry			Clustered by province		
	slev	llev	lev	slev	llev	lev
	(1)	(2)	(3)	(1)	(2)	(3)
L.mp	-0.112***	-0.052***	-0.140***	-0.124***	-0.035***	-0.140***
	(-6.76)	(-3.94)	(-9.67)	(-10.61)	(-5.98)	(-13.00)
Firm-level variables						
L.asset	1.095*	2.025***	3.304***	0.953***	2.281***	3.352***
	(2.01)	(6.01)	(6.05)	(5.46)	(11.05)	(13.04)
L.ebit	-0.406***	-0.160***	-0.578***	-0.400***	-0.145***	-0.556***
	(-12.27)	(-6.26)	(-16.99)	(-13.20)	(-10.74)	(-19.73)
L.finc	0.437	1.645*	1.979	0.665	2.127**	2.798*
	(0.25)	(1.88)	(0.95)	(0.63)	(2.27)	(1.77)
L.fix	0.077***	0.039***	0.113***	0.074***	0.041***	0.113***
	(4.19)	(3.76)	(7.14)	(6.04)	(3.18)	(7.72)
L.saleg	0.004**	0.010***	0.014***	0.003**	0.010***	0.013***
	(2.15)	(6.86)	(6.15)	(2.07)	(8.53)	(7.31)
L.tax	0.001	0.003	0.005	0.004	0.001	0.006
	(0.65)	(1.25)	(1.29)	(1.07)	(0.46)	(1.35)
Country-level variables						
L.gdpg	0.104***	0.086***	0.164***	0.106***	0.074***	0.155***
	(9.59)	(4.52)	(6.40)	(6.32)	(5.44)	(7.82)
L.bmg	0.031*	0.155***	0.155***	0.039*	0.151***	0.161***
	(1.81)	(11.36)	(5.99)	(1.90)	(6.27)	(8.17)
L.lend	0.596***	0.326***	0.909***	0.650***	0.291***	0.921***
	(8.93)	(3.56)	(12.77)	(5.87)	(3.42)	(9.46)
L.reerg	0.601	1.479***	1.123	-0.210	1.821**	0.845
	(0.62)	(3.00)	(0.76)	(-0.21)	(2.09)	(0.78)
L.cpig	2.226*	-2.177	2.137	2.540	-1.845	2.220
	(1.95)	(-1.62)	(1.18)	(1.39)	(-1.33)	(1.06)
L.ind	0.436***	0.516***	0.424***	0.466***	0.458***	0.420***
	(6.45)	(22.41)	(18.11)	(13.07)	(12.23)	(16.69)
_cons	-19.210***	-39.490***	-63.003***	-15.658***	-42.963***	-60.887***
	(-3.27)	(-5.81)	(-10.32)	(-3.47)	(-8.36)	(-9.46)
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Quarter	Yes	Yes	Yes	Yes	Yes	Yes
# of firms	2,156	2,156	2,156	2,399	2,399	2,399
Adj R2	0.083	0.096	0.129	0.093	0.102	0.127
N	75,233	75,233	75,233	88,038	88,038	88,038

Notes: This table shows the OLS estimates of Eq.(1): $Lev_{iq} = \alpha_1 + \lambda_{1i} + \eta_{1t} + \beta_{11} mp_{q-1} + \gamma_{11} X_{iq-1} + \gamma_{12} ind_{iq-1} + \gamma_{13} Z_{q-1} + \varepsilon_{1iq}$. All variables are as defined in Table 2. Columns (1)-(3) drop firms with changing industries, and columns (4)-(6) drop firms with changing registered provinces. Standard errors are heteroscedasticity robust and clustered by industry in columns (1)-(3) and clustered by province in columns (4)-(6). *t-statistics* are in parentheses. *, **, *** indicate significance at 10%, 5%, 1% respectively.