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DO MACROPRUDENTIAL POLICY INSTRUMENTS AFFECT THE LINK BETWEEN LENDING AND CAPITAL RATIO? – CROSS-COUNTRY EVIDENCE

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Do macroprudential policy instruments affect the link between lending and capital ratio? – cross-country evidence

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Abstract

In this paper we ask about the capacity of macroprudential policies to reduce the positive association between loans growth and the capital ratio. We focus on aggregated macroprudential policy measures and on individual instruments and test whether their effect on the association between lending and capital depends on bank size, the economic development of a country as well as on the extent of capital account openness. Applying the GMM 2-step Blundell and Bond approach to a sample covering over 60 countries, we find that macroprudential policy instruments reduce the impact of capital on bank lending during both crisis and non-crisis times. This result is stronger in large banks than in other banks. Of individual macroprudential instruments, only borrower-targeted LTV caps and DTI ratio weaken the association between lending and capital. Our results also show that the effect of macroprudential policies on the association between lending and the capital ratio in non-crisis periods is stronger in advanced countries than in emerging countries. Additionally, differentiating by the level of capital account openness, we find that macroprudential policies are more effective in increasing the resilience of banks and thus weakening the association between loan supply and capital ratio for relatively closed economies but less effective for relatively open economies. Generally, with our study we are able to support the view that macroprudential policy has the potential to curb the procyclical impact of bank capital on lending and therefore, the introduction of more restrictive international capital standards included in Basel III and of macroprudential policies are fully justified.

Key words: loan supply, capital ratio, procyclicality, macroprudential policy

JEL classification: E32, G21, G28, G32

Contents

1. Introduction

The recent global financial crisis has highlighted the need to go beyond a purely microprudential approach to regulation and supervision of the banking sector. There is a growing consensus among financial practitioners (BCBS, 2010, CGFS, 2012, ESRB, 2014) and researchers (Lim et al., 2011; Claessens et al., 2014; Cerutti et al., 2015) that a set of macroprudential policy standards should be adopted. Such standards should increase the resilience of the banking sector to systemic risk and help curb the credit cycle (CGFS, 2012), thereby decreasing excessive procyclicality (BIS-IMF-FSB, 2011; Borio and Zhu, 2012, p. 246). The empirical literature supports the view that macroprudential policies are able to decrease the vulnerability of the banking sector (see Claessens, 2014 for a review, and Cerutti et al., 2015). The increased resilience of the banking sector means that banks are able to absorb losses of greater magnitude – due to higher capital buffers (or provisions) or better access to funding sources, thus reducing the likelihood of a costly disruption to the supply of credit (CGFS, 2012). Considering this, macroprudential policies are expected to affect the link between loan supply and capital ratios.

It is a well-known tenet in the banking literature that capital adequacy rules have an impact on the behaviour of banks (Borio and Zhu, 2012)[2]. Previous literature stresses the importance of capital ratios for lending behavior, during both good economic conditions and in crisis or recessionary periods, in particular in banks with insufficiently high capital ratios (see Beatty and Liao, 2011; Carlson et al., 2013) or in large banks (Beatty and Liao, 2011). The problem of the effect of capital ratio on bank lending has been studied extensively since the 1990's, when the first Basel Accord was introduced as an international capital standard. Early studies of the association show that bank capital may exert some impact on lending, but this effect is relatively weak (see Jackson et al., 1999). In the wake of the recent global financial crisis, the topic has attracted renewed attention as concerns have arisen that large losses at banks would hinder their capital adequacy and restrain their lending (see e.g. Berrospide and Edge, 2010; Bridges et al., 2014 Labonne and Lame, 2014). Capital is found to affect lending behaviour in large publicly-traded banks by Beatty and Liao (2011) and in US commercial banks by Carlson et al. (2013). Additionally, in a cross-country study Gambacorta and Marqués-Ibáñez (2011) show that publicly traded banks tend to restrict their lending more during recessions or crisis periods.

While policy standards setters argue that the new macroprudential approach to regulation and supervision should reduce procyclicality in banking, in particular by increasing banks' resilience it should diminish the effect of capital ratio on loan supply, the empirical evidence on this subject is limited. We employ a cross-country data-set to examine whether the application of macroprudential policies affects the link between loan supply and capital ratio, before and during the crisis period in a sample of over 4500 banks from 67 countries. The main purpose of the paper is to examine whether macroprudential policy has a significantly negative impact on the positive association between lending and capital ratio. If we identify such a negative effect, we will be able to empirically test the view that macroprudential policy is effective in increasing the resilience of banks and thus affects procyclicality of bank capital regulation.

Based on the previous evidence, we first hypothesize that the link between lending and capital is positive, and is reduced in countries which applied macroprudential policies in the pre-crisis period. Following the capital crunch theory (see Peek and Rosengren, 1995; and Beatty and Liao, 2011), we expect that the link between lending and capital is strengthened in the crisis period, and is reduced in countries in which the use of macroprudential instruments was more extensive in the pre-crisis period and continued to be used during the crisis. As the association between loans growth and capital ratio, in particular during crisis periods is stronger in large banks, we also examine whether macroprudential policy effects on the association differ between large and small banks. We expect the macroprudential policies will have had a diminishing effect on the association between lending and capital to be stronger in large banks.

Previous studies on the effects of the capital ratio on bank lending (see Chiuri et al., 2002) document the fact that these effects are stronger in emerging markets. Additionally, contemporary analyses on

[2] A number of theoretical studies discuss why capital ratios should matter (Dewatripont and Tirole, 1994; Freixas and Rochet, 1997). The general view is that since banks are informationally opaque, adverse selection problems result in premium on risky non-insured liabilities (Myers and Majluf, 1984; for a broader literature review refer to Beatty and Liao, 2014). As bank capital ratios decline, this risk premium increases and banks are less able, and find it considerably more expansive, to issue new liabilities (in particular bonds or unsecured wholesale funding) to fund extension of new loans (Stein, 1998; Van den Heuvel, 2009; Borio and Zhu, 2012). According to capital-crunch theory (predicting that capital adequacy regulation combined with market imperfections leads to pro-cyclical bank lending; see Peek and Rosengren 1995) this problem is particularly evident in economic downturns or in crisis periods (for empirical evidence refer to Beatty and Liao, 2011).

macroprudential policies (see Lim et al., 2011; Claessens et al., 2013; Cerutti et al., 2015) show that they were more extensively employed in 2000-2011 in emerging economies versus advanced economies and in closed-capital-account versus open-capital-account countries. Therefore we examine whether the effects of macroprudential policies differ between country groups. We hypothesize that the reduction of the association between lending and capital due to macroprudential policies is stronger in emerging economies and in closed account countries.

We use the Bankscope database and data-set on macroprudential policies available in Cerutti et al. (2015) to test our hypotheses. We analyze the effects of macroprudential policies on the association between lending and capital ratio using individual commercial bank data from 65 countries over the period of 2000-2011. We control for endogeneity in our data-set applying the two-step GMM Blundell and Bond (1998) robust estimator with finite sample Windmejer's (2005) correction. We find a consistent and strong effect of macroprudential policies on the association between loans growth and capital ratio. We also find evidence in favor of the expectation that bank size matters for the impact of macroprudential policies for the link between lending and capital. Analysis of the role of individual macroprudential policy instruments shows that only two borrower-based instruments, i.e. *LTV-caps* and *DTI* ratios weaken the positive effect of capital ratio on lending. Comparing the effects of macroprudential policies on the association between loans growth and capital ratio in advanced versus emerging and low-income developing countries, we show that the statistically significant impact of macroprudential policies on the association between lending and capital ratio in non-crisis periods is stronger in advanced countries than in emerging countries. Additionally, differentiating by the level of capital account openness, we find that macroprudential policies are more effective in increasing the resilience of banks (and thus weakening the association between loan supply and capital ratio for relatively closed economies) and less effective for relatively open economies.

This paper extends the existing research by including the macroprudential policy indices that may affect the amount of capital private banks maintain and capital buffers of banks, and thus the resilience of banks. Previous studies on the link between lending and capital have been limited to individual countries (United States by Beatty and Liao, 2011 and Carlson et al., 2013; France by Labonne and Lame, 2014; United Kingdom by Mora and Logan, 2011), so that all banks were equally affected by the country's regulations and supervisory policy towards banks. Those studies which focused on the link between lending and capital across countries, have not accounted for macroprudential policy and its instruments (Gambacorta and Marqués-Ibáñez, 2011). In other words, this paper explores the effects of macroprudential policy factors on the association between loan growth and capital ratio during both good times and in the last financial crisis. Unlike previous studies on the link between bank vulnerability and macroprudential policy, we differentiate between large, medium and small banks, because previous evidence shows that capital ratios affect bank lending with a different magnitude, depending on the bank size (see Beatty and Liao, 2011)[3]. We also differentiate between advanced and emerging markets as well as open-capital-account and closed-capital-account countries, and show that the association between loans growth and capital is relatively strong in emerging and closed-capital-account countries, and the effects of macroprudential policies on this association are enhanced in these groups of countries.

The rest of the paper is organized as follows. Section 2 puts our study in the context of research on the role of bank capital for loan supply and the impact of macroprudential policies on bank resilience and thus develops our hypotheses. We describe our sample and research design in Section 3. We discuss results in Section 4. Section 5 concludes our work.

2. Related literature and hypotheses

Our study is related to two broad streams in the literature. The first one consists of studies focusing on the link between lending and capital ratios in the banking industry. The other stream covers the growing literature on the links between macroprudential policy instruments and financial stability. In this section we review the literature of the two streams and based on this literature we put forward our hypotheses. First, we briefly analyze studies focusing on the link between lending and capital ratios. Second, we investigate emerging studies on the effects and effectiveness of macroprudential policy. Third, we investigate why bank size matters

[3] For more general inferences on the role of bank size for systemic risk, refer to Laeven et al. (2014).

for the effects of macroprudential policies on the association between loans growth and capital ratios. Finally, this literature review is our background to hypotheses presented the last subsection of this section.

2.1. Studies on the link between lending and capital ratio

The empirical literature on the role of bank capital on loan supply[4] can be divided into two basic streams. The first focuses on the impact of the Basel I Accord, which was implemented around the world in the beginning of 1990s. This research aimed at answering the question whether the newly introduced uniform capital ratios had an effect on bank behaviour (for a review see Chiuri, Ferri and Majnoni, 2002, p.884) and on the macro-economy. Most of those studies were analyzed by Jackson et al. (1999), thus for brevity we focus particularly on those aspects of this research, which investigate the link between loan growth and capital ratios. A great part of this literature addressed the question of whether the sluggish recovery of the US economy out of the 1990-91 recession, was caused by newly-introduced bank capital regulations (i.e. adoption of Basel I), inhibiting lending activity of banks and consequently acting as a headwind to economic growth. Various authors contribute to this interpretation. Bernanke and Lown (1991), using equations linking bank loan growth to bank capital ratios and employment found that bank loan growth at individual banks between 1990:Q2 and 1991:Q1 was positively linked to initial capital ratios. However, the impact of capital on lending was less notable than the impact of economic environment. This result has been attributed to the fact that Bernanke and Lown's analysis was based on data ending in the first quarter of 1991, i.e. before the credit crunch took place (Berrospide and Edge, 2010). Berger and Udell (1994) admit that the expansion of loans was lower in 1990‑1992 for less-capitalized banks and attempt to measure the importance of various explanations for the slow growth of lending, but do not find the sensitivity of loans to capital ratios to be definitely higher than the one observed during the US recession of the early 1980s. Some support for the impact of bank capital on lending is found by Brinkman and Horvitz (1995), Peek and Rosengren (1995a, 1995b) and Hancock and Wilcox (1998).

In this vein, Peek and Rosengren (1997, 2000) investigate the role of capital ratios for the lending activity of Japanese banks in the US (1997) and for the real activity in the United States. They find that binding risk-based capital requirements, associated with the Japanese stock market decline, resulted in a decrease in lending by Japanese banks in the United States that was both economically and statistically significant (see also Gibbon, 1995 and Owualah, 1999).

In the emerging countries, Chiuri et al. (2002) find that enforcement of capital adequacy regulations – according to the 1988 Basel Accord – significantly trimmed credit supply, particularly at less-well capitalized banks. Moreover, this negative impact was stronger for countries enforcing capital adequacy regulation in the aftermath of a currency or financial crisis. In general, their results suggest that in several emerging economies the revision of bank capital adequacy regulations could well have induced a credit supply retrenchment. Nag and Das (2002) found that Indian banks did asset reallocation as a result of introduction of minimum capital requirements. In a study focusing on Latin America, Barajas et al. (2005) identified a positive, statistically significant, impact of capital ratio (i.e. equity to total assets) on loan growth, meaning the banks with higher capital ratios were able to extend more loans.

The second stream of research on the role of bank capital in bank lending started flourishing in the first half of the 2000s and can be roughly divided into two areas: the first concentrating on the role of bank capital in bank lending under different monetary policy stances (see Kishan and Opiela, 2000, 2006; Nier and Zicchino, 2008) and the second investigating more generally the size of the effect of bank capital on loan supply (see e.g. Berrospide and Edge, 2010; Beatty and Liao, 2011; Gambacorta and Mistrulli, 2011; Carlson et al., 2013; Bridges et al., 2014 and Labonne and Lame 2014). Kishan and Opiela (2000) provide evidence of a credit channel and a bank lending channel of monetary policy in the United States from 1980 to 1995. We test for bank loan supply shifts by segregating banks according to asset size and capital leverage ratio. The loan growth of small undercapitalized banks, small (under $100M) adequately capitalized banks, and small well-capitalized banks is significantly affected by policy. This has important implications for the strength and distributional effects of monetary policy, and for the link between stabilization and regulatory policy.

Kishan and Opiela (2006) investigate the effects of expansionary and contractionary policy separately on the loan behavior of low-capital and high-capital banks, and between pre-Basel/FDICIA and post-

[4] For the general discussion on the role of bank capital see Dewatripont and Tirole (1994), Berger et al., (1995), Freixas and Rochet (1997) and Borio and Zhu (2012).

Basel/FDICIA periods. Their results show that low-capital banks are adversely affected by contractionary policy. Expansionary policy, however, is not effective in stimulating the loan growth of low-capital banks. These results are consistent with lending channel predictions, but only hold in the post-Basel/FDICIA period when the capital constraint is stringent, relative to the pre-Basel/FDICIA period. These asymmetric policy results have implications for the interaction of monetary and capital regulatory policies.

Nier and Zichhino (2008) assess the extent to which loan losses affect banks' provision of credit to companies and households and examine how feedback from losses to a reduction in credit is affected by the monetary policy stance. Using a cross-country data-set of more than 600 banks from 32 countries, they find that losses lead to a reduction in credit and that this effect is more pronounced when either initial bank capitalization is thin or when monetary policy is tight. Moreover, in the face of credit losses, ample capital is more important in cushioning the effect of loan losses when monetary policy is tight. In other words, capital buffers and accommodating monetary policy act as substitutes in offsetting the adverse effect of losses on loan growth. While most of these effects are stronger in crisis times, they also find them to operate both in and outside full-blown banking crises.

Berrospide and Edge (2010), using quarterly consolidated financial statements of bank holding companies in 1992-2009 identify a relatively weak impact of leverage ratio (coefficient 0.145), total capital ratio (coefficient 0.157), Tier 1 CAP (coefficient 0.167) and TCE CAP (coefficient 0.225) on loan growth. Beatty and Liao (2011), using quarterly data on publicly traded US banks, discern that Tier1 capital ratio impacts bank lending only slightly, with estimated coefficient equal 0.044 in general, and increased by 0.068 in recession. The identified impact seems to be stronger in recession in the case of large banks (0.138). But the whole effect in this sample of banks is around 0.158 (i.e. 0.02 plus 0.138). Gambacorta and Marquez-Ibanez (2011) also focus on publicly traded banks in the US and 13 European countries and find a weak impact of both capital adequacy ratio and Tier 1 CAP. In the same vein, Carlson et al. (2013) find that US commercial banks' loan growth was more responsive to capital ratios during and shortly after the recent financial crisis but not at other times. They also find that the leverage ratio had the strongest impact on loan growth compared to capital adequacy and Tier 1 CAP. As for the effect of leverage ratio on loan growth they find that the regression coefficient ranges between 0.127 and 0.159 in 2001-2011, and is higher in 2008-2011 (i.e. for large banks it ranges between 0.606 and 1.063 and for small banks it takes values around 0.256 and 0.454). Moreover, there is a nonlinear effect of capital ratio on lending, as the elasticity of loan growth to capital ratios is definitely higher when capital ratios are relatively low. Bridges et al. (2014) focus on 53 banking groups operating in the UK since 1990 to assess the role of four types of capital ratios (i.e. capital adequacy ratio, trigger capital ratio required by regulators, Tier 1 CAP and leverage), in loan growth. They find that capital ratios affect lending with heterogeneous responses in different sectors of the economy. The association between secured loan growth and capital adequacy ratio, Tier 1 CAP and leverage ratio is positive but statistically insignificant. The effect of the trigger ratio is negative, but turns positive, when we include two lags of it. The relationship between loan growth and leverage, capital adequacy ratio and lagged trigger ratios is strongest in the case of commercial real estate loans. Labonne and Lame (2014) concentrate on French banks and also find evidence of the significant positive effect of bank capital on loan growth.

Generally, the studies mentioned above have found that bank capital does indeed affect bank lending, though this impact is diversified. This diversity may be attributed to heterogeneity of samples which were analyzed (publicly traded banks, commercial banks, bank holding companies, banking groups, banks from France, UK, US, Japan and country classification, e.g. emerging versus advances), bank size, the business cycle stage (boom versus downturn) or financial cycle (non-crisis versus crisis period) as well as to differences in the estimation methods which were applied to calculate the impact of bank capital on lending. This ambiguity in effects of capital ratio on lending as well as the lack of evidence on the role of regulatory policies for the association between lending and capital ratio lead us to look for an answer to question of how the link between lending and capital ratio is affected by macroprudential policies.

2.2. Macroprudential policy and its instruments

The most recent global financial crisis has highlighted fault lines in the existing microprudential institutional arrangements and the need to adopt a macroprudential policy framework. Such a framework focuses on the endogenous nature of systemic risk (Borio, 2003) and should help contain excessive procyclicality of the financial system, including procyclicality of the banking activity (Borio and Zhu, 2012),

and risks stemming from the interconnectedness of individual financial institutions and markets, as well as their exposure to common risk factors (Borio, 2009; Horváth and Wagner, 2012).

Policymakers around the globe are currently working on the design and implementation of macroprudential policy instruments. Many macroprudential policy tools have been proposed in the aftermath of the recent global financial crisis, but some have been used even before the crisis. The toolkit available is quite large and covers existing micro-prudential regulatory instruments as well as instruments applied in monetary policy (e.g. reserve requirements). These instruments can be classified following Claessens (2014) and Claessens et al. (2013)[5], applying two criteria. The first is the activity or entity which fuels systemic risk and includes: (1) restrictions related to borrower, instrument, activity in a specific markets (e.g. real estate lending); (2) restrictions on financial sector balance sheet (assets, liabilities); (3) capital requirements, provisioning, surcharges; (4) taxation and levies; and (5) other restrictions, including those affecting institutional infrastructure. The first set of instruments consists of time varying: caps/limits or rules on debt to income (*DTI)*; loan to value (*LTV*); margins, hair-cuts; lending to sectors; credit growth limits; specific loan loss provisioning, as well as varying restrictions on asset composition and activities. The restrictions on financial sector balance sheet include: (1) time varying caps or limits on FX and interest rate mismatches and on reserve requirements; (2) liquidity limits (e.g. net stable funding ratio (*NSFR*), and liquidity coverage ratio (*LCR*)); (3) institution-specific limits on financial exposures. Among the capital and provisioning instruments are: countercyclical capital requirements (e.g. countercyclical capital buffers), leverage-ratio restrictions, general and dynamic provisioning as well as capital surcharged linked to systemically significant institutions. Suggested taxation and levies covers: levy or tax on specific assets and liabilities (e.g. non-core liabilities). The fifth set of instruments includes: modified accounting rules (e.g. varying rules on mark to market); changes to compensation, market discipline and governance; safety net (e.g. central bank lender of last resort function, fiscal support); resolution standards, institutional infrastructure (e.g. central counterparty, CCPs, standards), varying information disclosure.

The other criterion is the dimension of systemic risk, as defined e.g. by Borio (2009) and the Financial Stability Board, Bank for International Settlements, International Monetary Fund (2011), Committee on the Global Financial System (2012), and Galati and Moessner (2014), i.e.: time-dimension (and externalities related to procyclicality) and cross-section dimension (and interconnectedness externalities) (see Claessens, 2014, p. 5-6). As for the time dimension and procyclicality of the financial sector, many of instruments mentioned in previous paragraph have the potential to stimulate them: time varying *DTI*, *LTV* and credit growth limits; dynamic provisions and adjustment to specific loan-loss provisioning; countercyclical capital buffers and requirements; fixed leverage ratios; reserve requirements; liquidity limits (e.g. *NSFR* and *LCR*). With reference to a cross-section of systemic risk the following instruments are recommended: varying restrictions on asset composition and activities, institution-specific limits on bilateral financial exposures and other balance sheet measures; capital surcharges linked to systemic risk; taxes and levies varying by size, etc (Claessens, 2014, p. 36).

Information on the actual use and effects of macroprudential policies and instruments has expanded in recent years (see Lim et al., 2011; Cerutti et al., 2015), but is rather limited, partly due to the fact that micro-prudential instruments of macro-prudential nature have been applied before the recent crisis, however, without the aim of affecting and reducing of systemic risk. Some data have nevertheless been collected recently for 119 countries by the IMF (see Cerutti et al., 2015) for 2000-13 period. The Cerutti et al. (2015) study documents that suggest macroprudential policies are used more frequently in emerging markets, with foreign exchange tools used more intensely in these markets. Borrower-targeted instruments (such as caps on loan to value (LTV) and debt to income (DTI) ratios) are used relatively more in advanced economies, especially in recent years. This study also shows that almost all countries use some policies to reduce systemic risks arising from intra-financial system vulnerabilities, including those from dominant banks and interconnectedness between banks. Analysis of the data-set developed in Cerutti et al. (2015) shows that many of instruments whose nature is macroprudential were applied in years 2005-2010, which covers the economic and financial boom period of 2005-2006/7 and the crisis and its direct side-effects period (2008-2010). Focusing directly on instruments applied in a boom period preceding the recent crisis and used directly during the crisis period, this study shows that LTV was applied in 13 countries, LTV caps[6] in 16 countries, DTI in 10 countries, dynamic

[5] Other classifications include: Committee on the Global Financial System (2010), Financial Stability Board, Bank for International Settlements, International Monetary Fund (2011); International Monetary Fund (2011a,b; 2013) and Galati and Moessner (2014).

[6] The number of countries in which LTV caps were applied is larger than the number of countries applying simple LTV ratio due to differences in definitions of those instruments. LTV is a ratio which constrains highly-leveraged mortgage

provisions (DP) in 6 countries, limits on leverage (LEV) in 12 countries, interbank exposure limits (*INTER*) in 24 countries, concentration limits (*CONC)* in 66 countries, limits on foreign currency (FC) in 10 countries, reserve requirements (RR) in 35 countries; limits on domestic currency credit growth (CG) in 10 countries, taxes on financial institutions revenues in 10 countries and foreign currency and countercyclical reserve requirements (RR_REV) in 17 countries.

Stylized presentations of transmission mechanism and effectiveness of macroprudential policy tools, such as those included in the report of the Committee on the Global Financial System (2012) and in the report of European Systemic Risk Board (2014), give information about the impact of macroprudential policy instruments on the resilience of the financial sector (in most cases the analysis refers to the banking sector) and on the credit cycle. In particular, borrower-targeted instruments, such as LTV and DTI ratios increase the resilience of the banking system directly through decreasing both the probability of default (PD) and loss given default (LGD) of loans. As for the reductions in PDs, LTV and DTI ratios increase the overall quality of borrowers, because only those who meet LTV and DTI restrictions are included in the sample of borrowers who are financed by banks. Those ratios decrease the LGD by restricting the amount which can be borrowed against the given value of a property (LTV) and against the income of the borrower (DTI). Resilience is also increased indirectly via the impact on credit cycle and expectations (see CGFS, 2012; ESRB, 2014). These instruments may also restrict the quantity of credit (the credit cycle) by limiting the access to bank funding to only certain borrowers, reducing housing demand and decreasing house prices.

The capital related requirements (LEV, countercyclical capital buffers) and dynamic provisions (DP) enhance the resilience of the banking system in a direct and indirect fashion. They affect the resilience directly, due to the fact that additional buffers make banks able to weather losses of a greater magnitude before their solvency is called into question. Therefore, they reduce the likelihood of a costly disruption to the supply of loans and other intermediation services. As regards the indirect impact on resilience, these instruments affect the credit cycle and expectations, thus market participants' behaviors and bank risk-management practices. According to Long-Term Economic Impact Assessment (LEI, see Basel Committee, 2010) estimates a one percentage increase in capital requirements leads to a 20-50% reduction in the likelihood of systemic crisis. With reference to the impact of raising capital and provisioning requirements on the credit cycle, banks have generally four options to respond to such standards: (1) increase lending spreads; (2) decrease dividends and bonuses; (3) issue new capital (troublesome in crisis and in case of privately held banks) or (4) reduce asset holdings. Usage of those options may result in increased cost of credit (which limits the demand for loans) or reduction in the quantity of credit, which directly reduce the financial cycle.

Liquidity based tools, such as LCR or NSFR as well as interbank exposure limits (INTERBANK), similarly to capital requirements and borrower-targeted instruments, enhance the resilience of the banking sector through direct and indirect channels. Direct effects result from the ability of banks to go through the periods of liquidity stress more easily, by enabling them to be less reliant on more volatile short-term wholesale market funding or by providing them with opportunity to sell assets at reasonable prices not affected by fire sales. As in the case of capital-based and borrower-targeted instruments, liquidity requirements' indirect impact on resilience works through their effects on the credit cycle and expectations, which may result in a tightening of banks' risk management practices. With regard to the impact of liquidity requirements of the credit cycle, banks will respond to changes stemming from those standards by: adjusting the composition of assets (increasing the amount of liquid assets) or liabilities (decreasing the amount of short-term or unstable funding); shortening maturities of the loan book; or/and decreasing the amount of assets that require stable funding. In effect these standards may affect prices of loans and directly reduce the supply of loans.

2.2.1. Research on the effectiveness of macroprudential policy instruments

The empirical evidence on the effectiveness of macroprudential policies in managing the resilience of the banking (and financial) sector and the credit cycle, and thus financial stability, is still preliminary. The literature presenting this evidence falls into two groups, of which the first includes cross-country studies and the other covers micro-level evidence mostly based on the use of one, or a few, macroprudential policy instruments. One of the first cross-country studies was a paper by Lim et al. (2011). They explore the links between macroprudential policy instruments (LTV caps, DP, DTI caps, limits on FC, countercyclical capital;

down payments by enforcing or encouraging a limit or determining higher regulatory capital requirement risk weights. In contrast, LTV cap restricts to LTV used as a strictly enforced cap on new loans.

buffers, limits on credit growth) and developments in leverage and credit, using aggregated annual data from 49 countries in years 2000-2010. They document evidence suggesting that the presence of policies such as LTV and DTI limits, ceilings on credit growth, reserve requirements and dynamic provisioning rules can mitigate the procyclicality of credit and leverage (i.e. they reduce the positive sensitivity of credit and leverage to the business cycle, proxied by real GDP growth). Their study also shows that reserve requirements and dynamic provisions are effective in reducing credit growth during booms. This effect is found to be statistically significant. Caps on LTV are associated with generally higher loans growth. As for the leverage growth, they document that only reserve requirements reduce it in a significant way, both generally and in boom periods. In the same vein, IMF (2013) investigates the impact of changes in macroprudential policies on financial vulnerabilities (i.e. credit growth, house price inflation, and portfolio capital inflows) and on the real economy (real output growth and the share of residential investment). This paper shows that both capital requirements and RR strongly influence credit growth. LTV limits and capital requirements are found to strongly affect house-price inflation rates. RR evidently reduce portfolio inflows in emerging markets with floating exchange rates. This study also considers whether the effects are asymmetric between tightening and loosening, but finds no significant indication of such asymmetry.

Crowe et al. (2011) find that LTV caps have the best chance to curb a real estate boom. Similarly, but in a different sample, Vadenbushce et al. (2012) find that capital ratio requirements and non-standard liquidity measures (such as marginal reserve requirements on foreign funding or linked to credit growth) helped slow down house-price inflation in Central, Eastern and Southeastern Europe.

Dell' Ariccia et al. (2012) find that macroprudential instruments can reduce the incidence of general credit booms and decrease the probability that booms end badly. Using specific policies, such as credit and interest controls and open foreign exchange position limits, is found to be effective in reducing the probability that booms ends up in a financial crisis or subsequent economic underperformance. Due to the fact that these policies reduce the risk of a bust, they simultaneously make the whole economy resilient to the disruptions in the financial system.

Claessens et al. (2013, 2014), using panel GMM regressions, investigate how changes in balance sheets – i.e. in leverage, assets and non-core liabilities growth, of some 2800 banks in 48 countries over 2000-2010 respond to specific macroprudential policy instruments. Controlling for endogeneity, country characteristics as well as macroeconomic environment, they find that borrower-targeted instruments – LTV and DTI caps, and CG and FC limits – are effective in reducing the growth in bank's leverage, asset and non-core liabilities. Countercyclical instruments (such as RR and DP) also help mitigate increases in bank leverage, but they are of little effect thorough the cycle. Some of policies are counterproductive during downswing, serving to aggravate declines, which is consistent with ex ante nature of macroprudential tools.

Kutner and Shim (2013) using data from 57 countries spanning more than three decades, investigate the effectiveness of nine non-interest rate policy tools, including macroprudential measures, in stabilizing house prices and housing credit. They find that housing credit growth is significantly affected by changes in the maximum debt-service-to-income (DSTI) ratio, the maximum loan-to-value ratio, limits on exposure to the housing sector and housing related taxes. However, only the DSTI ratio limit has a significant effect on housing credit growth when they apply mean group and panel event study methods.

Zhang and Zoli (2014, 2016) review the use of key macroprudential instruments and capital flow measures in 13 Asian economies and 33 economies in other regions since 2000. They find Asian economies appear to have made greater use of macroprudential tools, especially housing-related measures, than their counterparts in other regions. The effects of macroprudential policy are assessed through an event study, cross-country macro panel regressions, and bank-level micro panel regressions. Their analysis suggests that housing-related macroprudential instruments-particularly LTV ratio caps and housing tax measures – have helped curb housing price growth, credit growth, and bank leverage in Asia.

Cerutti et al. (2015) document the use of macroprudential policies for 119 countries over the 2000-13 period, covering many instruments. They discover that emerging economies use macroprudential policies most frequently, especially foreign exchange related ones, while advanced countries use borrower-based policies more. They also show that usage of macroprudential policies is generally associated with lower growth in aggregated credit, notably in household credit.

However, these effects are less evident in financially more developed and open economies, in which the usage of macroprudential policies comes with greater cross-border borrowing, suggesting that these countries face issues of avoidance. Generally, macroprudential policies can help manage financial cycles, but they work better in the boom than in the bust phase of the financial cycle.

Besides these cross-country, usually aggregate studies, there are also microeconomic studies, often focused on specific risks and market segments. Jiménez et al. (2012) find for Spain that dynamic provisioning can be useful in taming credit supply cycles, even though it did not suffice to stop the boom (see also Saurina, 2009). More importantly, during bad times, dynamic provisioning helps smooth the downturn, upholding firm credit availability and performance during recessions. Using sectoral data, Igan and Kang (2012) find LTV and DTI limits to moderate mortgage credit growth in Korea. And policies appear to reduce real estate cycles in Hong Kong (Wong et al., 2011). The UK is a case where the use of microprudential tools over the period 1998-2007 has been interpreted in a macroprudential perspective. Aiyar et al. (2013) show that bank-specific higher capital requirements dampened lending by banks, with quite strong aggregate effects: an increase in requirements of 1% reduced bank lending by between 5.7% and 7.6%, a high multiplier. Tighter monetary policy also reduced the supply of lending, but not that of large banks.

2.3. The role of bank size in procyclicality

Laeven et al. (2014) present descriptive evidence that large banks may have a more fragile business model (with higher leverage and more marked-based activities) than small banks. In this study they investigate the relation between measures of bank size, marked-based activities, and organizational complexity and measures of banks risk. The empirical analysis shows that large banks, on average, create more individual and systemic risk than smaller banks, especially when they have insufficient capital or unstable funding – both common features of large banks. Additionally, large banks create more systemic risk (but, interestingly, not more individual risk) when they engage more in market based activities or are more organizationally complex. These findings have an important bearing on the current policy debate on financial structure. They generally support the path taken by the Basel III regulatory framework, which focuses on strengthening bank capital and liquidity requirements, and supplementing traditional bank regulation, which focuses on individual bank risk, with macroprudential tools.

Other evidence also supports the view that large banks are riskier. Olszak et al. (2016) show that loan loss provisions of large banks are more negatively associated with the business cycle, consistent with prediction of greater procyclicality of large banks. Some other studies argue that bank size matters for the effect of capital ratio on loan supply. In this respect the results are, however, ambiguous. For example, Hancock and Wilcox (1998) using data for 1989-1992 for the US individual banks, find that in response to declines in their own capital, small banks reduced their loan portfolios considerably more than large banks did. They also find that real economic activity was contracted more by capital declines and loan declines at small banks than at large banks. The importance of bank size was also researched by Bernanke and Lown (1991), Peek and Rosengren (1995b) and Kishan and Opiela (2006), who show that the capital crunch problem was greater for smaller banks relative to larger banks. Their findings may be attributable to regulatory capital regulations being more stringently applied to smaller, relative to larger, banks or to the extent to which small banks have more difficulty raising external financing during recessions. In contrast, Beatty and Liao (2011) and Carlson et al. (2013) show that bank capital is more important as a loan supply determinant in large banks. This divergence in conclusions can be attributed to differences in the sample of banks and time periods that those papers analyzed. Early studies focused mainly on the short recessionary period of the 1990s, thereby their conclusions may be relevant to this time only. Considering the effects of contemporary research (Leaven et al., 2014, Beatty and Liao, 2011; Carslon et al., 2013 and Olszak et al., 2016) we predict that large banks are riskier. This greater risk taking creates pressures on capital, in particular during crisis period. Banks with low capital buffers exhibit greater sensitivity of lending to capital ratios (see Carlson et al., 2013). Therefore capital ratios may have procyclical impact on lending of large banks.

2.5. Hypotheses

To sum up, the analysis of the literature conducted thus far shows that the association between lending and capital ratio may be positive, and this positive association is strengthened during recessionary periods. However, this relationship is diversified across countries. Previous research also shows that many countries have applied macroprudential policies, which may potentially influence the resilience of banks and curb the credit cycle. Therefore, it seems reasonable to ask how the use of macroprudential policies impacts the link between loans growth and capital ratio. In particular, capital-based and provisioning instruments (like leverage

ratio or dynamic provisioning) create additional buffers and thus make banks' immune to losses of a greater magnitude before their solvency is endangered, thus diminishing the likelihood of a costly disruption to the supply of credit. Such a disruption has been identified in publicly-traded banks in the U.S. (Beatty and Liao, 2011), in a cross-country sample of banks (Gambacorta and Marqués-Ibáñez, 2011), in the EU (Olszak et al., 2015) as well as in U.S. Commercial banks (Carlson et al., 2013). Borrower-targeted instruments decrease the PD and LGD of an average bank borrower and enhance the overall quality of bank credit portfolio, and thus decrease the likelihood that banks (and their solvency) will suffer from loan losses during bust periods. Liquidity-based instruments make banks resilient to disruptions to liquidity in financial markets (in particular in the wholesale market, e.g. interbank market), thereby decreasing the impact of losses related to such disruptions on capital adequacy of banks. Considering the fact that macroprudential policy should increase the resilience of individual banks and of the banking sector to disruptions in financial markets (and thus to crisis periods) we expect that this will affect negatively the positive association between lending and capital ratios. Thus we put forward following primary hypothesis:

H1: In countries in which more macroprudential policy instruments are applied, the link between lending and capital ratio is weakened, during both non-crisis periods and during the recent crisis period.

The empirical evidence on the role of bank size for procyclicality suggests that large banks exhibit greater sensitivity of loan loss provisions to business cycle (Olszak et al., 2016) and that large banks lending is more affected by capital ratio (Beatty and Liao, 2011). Recent research on the role of bank size for bank risk, shows that that large banks, on average, create more individual and systemic risk than smaller banks, especially when they have insufficient capital or unstable funding – both common features of large banks (Laeven et al., 2014). The currently implemented macroprudential policies, in particular the capital surcharges on systemically important banks included in Basel III, are designed to increase the resilience of large banks. However, no such specific instruments had been applied in the pre-crisis period. Thus the resilience of large banks could only had been increased due to application of other macroprudential policies, such as borrower based (LTV or DTI) or financial-institutions targeted policies (e.g. dynamic provisions or credit growth limits). These policies have been applied by micro-prudential supervision, which in the supervisory review and evaluation process focuses on large banks. Following these inferences we hypothesize that:

H2: The impact of macroprudential policy instruments on the link between lending and capital is strongest in the sample of large banks.

The association between lending and capital ratio has been shown to be positive (Beatty and Liao, 2011; Gambacorta and Marqués-Ibáñez, 2011; Carlson et al., 2013), implying that bank loan supply is constrained by capital ratio. Generally, the lower the capital ratio of a bank, the higher is its effect on loans growth (Carlson et al., 2013), consistent with the view that banks with lower capital ratio are less resilient. However, macroprudential policies applied in many countries before the recent crisis could have increased the resilience of large banks in particular. Thus the reduction of effect of capital ratio on bank lending could be the most significant in the case of these banks. Therefore we hypothesize that:

H2a. Macroprudential policy instruments reduce the impact of capital ratio on lending in large banks during both non-crisis and crisis period.

Previous studies on the effects of capital ratio on bank lending (see Chiuri et al., 2002) document that these effects are stronger in emerging markets. Additionally, contemporary analyses on macroprudential policies (see Lim et al., 2011; Claessens et al., 2013; Cerutti et al., 2015) show that they were more extensively employed in 2000-2011 in emerging economies versus advanced economies and in closed-capital-account versus open-capital-account countries. Therefore we examine whether the effects of macroprudential policies differ between country groups. In particular, due to the more extensive use of macroprudential policies, banks operating in emerging and closed account countries may be more resilient, and thus their lending may be less affected by capital ratio. We therefore hypothesize that:

H3: The reduction of the association between lending and capital due to macroprudential policies is stronger in emerging economies and in closed-capital-account countries, relative to advanced and open markets.

3. The model specification and data description

3.1. The model specification

The most problematic issue in the measurement of the impact of bank capital on loan extension is the identification of supply and demand factors, which affect lending activity, both during favorable and unfavorable economic conditions. In particular, during recessionary periods, not only loan supply (due to bank capital and liquidity problems) may decrease, but also loan demand of households and firms may decline. This makes difficult any identification of bank capital effects on lending in recessionary or crisis periods. Several approaches have been used in the literature to take account of both supply side and demand side determinants of bank lending. The empirical models that addressed the question of whether a bank-capital induced credit crunch was hindering the recovery were developed in the early- and mid-1990s in the US (see e.g. Bernanke and Lown, 1991; Hancock and Wilcox, 1994a, b; 1997; 1998; Peek and Rosengren, 1995). In our study we apply contemporary adoptions of those models available in several studies (Berrospide and Edge, 2010; Beatty and Liao, 2011; Carlson et al., 2013; Labonne and Lame, 2014; Bridges et al., 2014). We apply a reduced form model (equation (1)), including both supply and demand side of the lending market and macroprudential policies:

Basic model reads as:

$$\begin{aligned}\Delta \mathbf{Loan}_{i,t} = {} & \alpha_1 \Delta \mathbf{Loan}_{i,t-1} + \alpha_2 \mathbf{CAP}_{i,t-1} + \alpha_3 \Delta \mathbf{CAP}_{i,t-1} + \alpha_4 \mathbf{Dep}_{i,t-1} + \alpha_5 \mathbf{Depbank}_{i,t-1} + \alpha_6 \mathbf{QLP}_{i,t-1} \\ & + \alpha_7 \mathbf{size}_{i,t} + \alpha_8 \mathbf{GDPpercapita}_{j,t-1} + \alpha_9 \Delta \mathbf{Unempl}_{j,t-1} \\ & + \alpha_{10} \mathbf{Crisis} + \alpha_{11} \mathbf{Crisis} * \mathbf{CAP}_{i,t-1} + \alpha_{12} \mathbf{Macroprud}_j + \alpha_{13} \mathbf{Macroprud}_j * \mathbf{Crisis} \\ & + \alpha_{14} \mathbf{Macroprud}_j * \mathbf{CAP}_{i,t-1} + \alpha_{15} \mathbf{Macroprud}_j * \mathbf{CAP}_{i,t-1} * \mathbf{Crisis} + \alpha_{16} \sum_{j=1}^{27} \mathbf{Country}_j \\ & + \alpha_{17} \sum_{t=2000}^{2011} \mathbf{T}_t + \vartheta_{i,t} + \varepsilon_t\end{aligned}$$

equation (1)

where:

- i - the number of the bank;
- j - the number of country;
- t - the number of observation for the i-th bank;
- Δ*Loan* – real annual loans growth rate;
- *CAP* - the lagged capital ratio, i.e. equity capital divided by total assets;
- Δ*CAP* - annual change in capital ratio;
- *Dep* – deposits from non-financial customers divided by total assets;
- *Depbank* - deposits from banks divided by total assets;
- *QLP* - is quality of lending portfolio; it equals loan loss provisions divided by average loans;
- *size* - logarithm of assets;
- *GDPG per capita* - real GDP per capita growth. A positive coefficient suggests procyclicality of bank lending;
- Δ*Unempl* - annual change in unemployment rate (this is our measure of demand for loans, see e.g. Bikker and Metzemakers, 2005);
- *Crisis* - dummy variable equal to one in 2008, 2009, 2010 and 0 otherwise. We predict a negative coefficient on Crisis if loan supply declines during crisis for reasons other than capital and liquidity constraints (as do Beatty and Liao, 2011, p. 7);
- *Crisis* * *CAP* - interaction between Crisis and capital ratio (CAP) was added to the model in order to investigate the effect of CAP depending on the crisis (the presence or not of the period of crisis);

- elements $\sum_{j=1}^{27} Country_j$ relate to a set of country dummy variables and $\sum_{t=2000}^{2011} T_t$. to a set of time dummies. Following Foos et al., (2010), Norden and Stoian (2013) and Fang et al. (2014) we include a full set of interacted country-year dummies to indirectly control for macroeconomic conditions;
- $\vartheta_{i,t}$ are unobservable bank-specific effects that are not constant over time but vary across banks; ε_t is a white-noise error term.

In this regression we include also macroprudential policies variable (denoted as *Macroprud*), which covers aggregated indices of macroprudential policy (denoted in the next sections as *Macropr index*) and individual macroprudential policy instruments (denoted in the next sections as *Macropr instr*) – computed for each country separately using data from the period of 2000-2011 available in Cerutti et al. (2015). Secondly, we introduce interaction terms between CAP and macroprudential policy variable which informs about the impact of macroprudential policies on the association between loans growth and capital ratio both in the good times (indicated in the regression as *CAP* Macroprud*) and during the last financial crisis (indicated in the equation as *Macroprud *Crisis*CAP*). A negative (positive) regression coefficient on double interaction of *Macroprud * CAP* implies that in countries with a larger set of macroprudential instruments bank lending is relatively less (more) affected by capital ratio in non-crisis period in comparison to countries in which macroprudential polices were applied less intensively. Thus, such a negative association implies that macroprudential policy instruments did stimulate bank resilience, because they created additional buffers which insulate banks' lending from sensitivity to capital ratio. The other interaction term between *Macroprud *Crisis*CAP* informs us about impact of capital ratio on lending during crisis periods. A positive coefficient on *Macroprud *Crisis*CAP* implies that banks' lending is constrained by capital ratio during the crisis period in countries with more intense macroprudential policies (i.e. with more macroprudential instruments applied). In economic terms such an effect would imply that macroprudential policies were ineffective in enhancing the resilience of individual banks. In contrast, a negative coefficient on this interaction term implies that in countries in which macroprudential policies are used extensively, the effect of capital ratio on lending during crisis is weakened.

The econometric model we use in our study is the system of generalized method of moments (GMM) developed by Blundell and Bond (1998), with robust standard errors and Windmejer's correction[7]. This model is advantageous because it corrects for biases introduced by endogeneity problems. We control for the potential endogeneity in the two-step system GMM estimation procedure, by the inclusion of up to four lags of explanatory bank specific variables (*CAP, ΔCAP, Dep, Depbanks, QLP*) as instruments. The GDPG per capita and ΔUNEMPL as well as the country and the time dummy variables are the only variables considered exogenous. In all regressions we also include one lag of dependent variable to allow for natural convergence (as in Claessens et al., 2013, 2014). The GMM estimator is efficient and consistent if the models are not subject to serial correlation of order two and the instruments are not proliferated. Therefore we apply the test verifying the hypothesis of absence of second-order serial correlation in the first difference residuals (m2). The second test which we apply is the Hansen's J statistic for over-identifying restrictions, which tests the overall validity of the instruments sets. When interpreting the p-values of Hansen's J statistics we follow Roodman's warning (2009) that the Hansen test should not be relied upon too faithfully, as it is prone to weaknesses, the most serious of which is instrument proliferation. A high p-value of the Hansen test is usually the basis of researchers' arguments for the validity of GMM results. Unfortunately, the proliferation of instruments validates the test (see Roodman, 2009: 141).

Additionally, as a robustness check, we decline the number of lags of explanatory endogenous variables to one. In the robustness section we test the sensitivity of our results to change in estimation methods, applying one-step Arellano and Bond (1991) approach. The address the problem of endogeneity, our basic regression (given by equation 1) is also estimated applying ordinary least squares (OLS) and fixed effects (FE) models.

[7] Several other papers have used dynamic GMM models to test the determinants of lending (Barajas et al., 2005; Gambacorta and Marqués-Ibáñez, 2011) and of loans or asset growth in a macroprudential policy context (Claessens et al., 2013, 2014; Cerutti et al., 2015).

3.2. Data description

We use pooled cross-section and time series data of individual banks' balance sheet items and profit and loss accounts from 65 countries and country-specific macroeconomic indicators for these countries, over a period from 2000 to 2011. The balance sheet and profit and loss account data are taken from the Bankscope database, whereas the macroeconomic data were accessed from the World Bank and the IMF web pages. All data included are annual and in US dollars. We apply several filters to remove potential data errors and outliers. We exclude from our sample outlier banks by eliminating the extreme bank-specific observations when a given variable adopts extreme values (e.g. negative capital ratios or negative deposits to total assets which may be the result of misreporting or other data problems). Additionally, in order to conduct the analysis we apply only the data for which there were a minimum of 5 successive values of dependent variable from the period 2000 to 2011. Our final sample consists of 89051 observations and some 8872 banks (for the loans growth variable) (see table 1A in the appendix).

As we are interested in the impact of macroprudential policy on the link between lending and capital, we include indices designed by the IMF and presented in Claessens et al. (2014). In particular, we apply aggregated indices of macroprudential policy i.e.: *MPI aggregated* (which is an average value of macroprudential index available in Cerutti et al., 2015, computed for the period of 2000-2010), *BORROWER* (which is an average value of macroprudential index which covers instruments targeted on taming the risk-taking by borrowers), and *FINANCIAL* (an average value of macroprudential index which covers instruments targeted on taming the risk-taking by financial institutions, in particular by banks). We also test the impact of individual macroprudential policy instruments included in the data-set collected by Cerutti et al. (2015). We focus on instruments applied in years 2000-2011, because we are interested in their role for the link between lending and capital ratio in non-crisis period (up to 2007) and during the recent crisis and its direct aftermath period (2008-2010). These instruments include: loan-to-value ratio (*LTV),* debt-to-income ratio (DTI), dynamic loan-loss provisioning (*DP*), leverage ratio (LEV), limits on interbank exposures (*INTER*), limits on foreign currency loans (*FC*), reserve requirements ratios (RR), limits on domestic currency growth (*CG*), levy/tax on financial institutions (TAX), and derived instruments loan-to-value ratio caps (*LTV_CAP*) and *FX* and/or countercyclical reserve requirements (RR_REV). To test our hypotheses, for each country we construct a dummy variable which takes the value of 1 if the instrument was applied at least since 2005, and 0 otherwise. As is shown in Table A1 in the appendix *LTV* was applied in 11 countries, *LTV_CAP* in 13 countries, *DTI* in 6 countries, *DP* in 2 countries, *LEV* in 6 countries, *INTER* in 16 countries, *CONC* in 35 countries, *FC* in 7 countries, *RR* in 13 countries, *RR_REV* in 5 countries, *CG* in 5 countries and *TAX* in 8 countries.

As previous evidence on macroprudential policy effects shows that there are differences between advanced economies and emerging markets, as well as between closed and open-capital-account economies in many areas of the banking activity (e.g. bank asset growth, bank size, leverage, deposits to loans, see Claessens et al., 2014) and macroeconomic factors (such as GDP per capita real growth) we conduct separate analysis in those subsamples. These differences are also important for the effects of macroprudential policy on bank asset growth and for the effects of bank capital ratio on lending (Chiuri et al., 2002). Given these country differences, we classify countries into emerging versus advanced economy countries (source IMF, as presented in Cerutti et al., 2015) and open versus closed-capital-account countries (source Chinn-Ito Index 2008)[8]. A country is defined as an open-capital-account country if its Chinn-Ito index is larger than the global median in 2005, and a closed-capital-account country if its Chinn-Ito index is smaller than the global median in 2005. Using these classifications our sample covers 31 advanced economies, 31 emerging economies, 3 Low-income developing economies, 28 open capital account countries and 37 closed account countries.

In order to show empirically how loan growth of banks of different size is affected by capital ratios, we divide our sample of banks into three subsamples: large, medium and small. Large banks are the 30% of banks with the largest assets within a given country. Small banks are the 30% of banks with the smallest assets. Medium banks comprise the 40% of other banks.

In table 1 we present descriptive statistics of the variables and degree of correlation amongst dependent and independent variables. Looking at median values of bank-specific variables included in table 1 we can find that large banks loans growth is the highest but these banks operate at lowest values of capital ratios (thus their capital adequacy is the worst). These banks are more reliant on less stable interbank market funding (the median *Depbanks* is 5.29) in comparison to medium or small banks. *Dep* is the lowest in large banks, which suggests that they must use unstable funding in loans extension, which potentially makes them

[8] For country classification refer to table A1 in appendix

more prone to liquidity funding risk. What's more the median and average quality of loan portfolio is the worst in large banks compared to medium and small banks, as exhibited by the highest mean and median *QLP*. Overall, our descriptive statistics for large bank seem to confirm the view (Laeven et al., 2014) that large banks are riskier. Therefore it is possible, that bank lending is more affected by capital ratio in those banks, and in countries applying macroprudential policies these banks that may potentially benefit from increased resilience. Consequently, the impact of capital ratio on loans growth may be considerably reduced in countries which apply macroprudential policy instruments more extensively.

The correlation between loans growth and lagged capital ratio (*CAP*) is positive, which suggests that bank lending may be constrained by the capital ratio (as was found e.g. by Beatty and Liao, 2011; and Carlson et al., 2013). The correlation between size and loans growth is negative, suggesting that large banks extend less loans. The positive correlation coefficient between loans growth and *GDPG per capita* and negative correlation between loans growth and change in unemployment rate imply potential procyclicality of bank lending.

[insert table 1 around here]

Table 2 shows values of medians of bank-specific variables and macroprudential policy indices averaged for each country classification. As for bank-specific variables, two broad patterns stand out. First, loans growth differs considerably between the classification groups. Banks operating in advanced and open-capital-account economies extend generally more loans, because their loans growth is around 3.01 and 3.27 in advanced and open countries, respectively, in comparison to emerging and closed account countries. Average loans growth in the latter groups of economies is 2.41 (emerging) and 2.19 (closed). Second, the capital ratio (*CAP*) and stable deposits ratio (*Dep*) are also considerably different between advanced versus emerging countries and between open account versus closed-capital-account economies. As can be inferred from table 2 median capital ratio is definitely lower in advanced (6.52) and open capital account (8.45) countries than in emerging (11.58) and closed-capital-account countries (10.46). Thus banks operating in advanced and closed-capital-account economies seem to be more exposed to solvency risk. Due to the fact that the share of non-financial sector deposits is lower in advanced and open-capital-account countries, banks operating in these countries are also exposed to greater funding risk. With reference to macroprudential policy indices, the intensity of their use also varies considerably between the groups of countries.

As expected, macroprudential policies are more extensively applied in emerging markets and closed-capital-account economies than in advanced and open-capital-account countries. Considering the fact that macroprudential policies use is more popular across emerging markets and closed-capital-account economies, it is possible that increased resilience of banks in these countries (as visible in higher capital ratios) results in greater reductions of impact of capital ratios on loans growth, in particular during the crisis periods.

[insert table 2 around here]

4. Research results

Table 3 reports the base results. While the full sample consists of some 8000 banks in 65countries (see Table 1), because some of bank variables are not always available and since we drop outliers, and use lags of dependent variables and up to four lags of endogenous explanatory variables, the sample reduces to some 2041 (4545) banks in case of two-step GMM estimator (GLS and FE estimator). Specifications 1-4 present the results of regressing the loans growth on only its own lag and bank-specific and macroeconomic variables in the full sample, using four different estimation techniques, i.e. GLS, FE and two-step system GMM without interacted country and year dummies and two-step system GMM with interacted country and year dummies. In columns 5, 6 and 7 we show results obtained with two-step system GMM for large, medium and small banks, respectively. The coefficients on bank-specific variables are largely as expected when significant. Specifically, in all specifications the coefficient on capital ratio is positive, and with exception of large banks subsample, statistically significant. This supports the view that access to external finance is not frictionless and banks are concerned that they may violate regulatory capital requirements. Thus our results are consistent with the empirical findings of other studies (e.g. Beatty and Liao, 2011; Carlson et al., 2013; Bridges et al., 2014). The fact that large banks do not respond to changes in capital ratio in a statistically significant way is also consistent with previous evidence that in boom periods large banks' lending is not constrained with capital ratio (Beatty and Liao, 2011). The negative and statistically significant coefficient of the previous year's annual change in capital ratio *(*Δ*CAP*) implies that banks which had to increase capital ratio tended to reduce their lending in subsequent period. The sign for the degree to which bank relies on deposit funding (*Dep*) is, as

expected, largely positive when significant, implying that better access to stable funding results in higher loans growth. The same can be inferred for the impact of interbank deposits (*Depbanks*), particularly in large banks. Interestingly, small banks relying on interbank funding tend to reduce loans growth as the use of interbank deposits is more intense. When the quality of lending portfolio (*QLP*) worsens, banks are reluctant to increase their loans growth. This effect is particularly strong only in medium banks. The significant and in all specification statistically significant impact of size on loans growth is consistent with the view that when bank assets are larger, the bank has greater capacity to increase lending and take on more credit risk. Banks' lending is procyclical because in almost all specifications in Table 3 the coefficient on *GDPG per capita* is positive and on Δ*Unempl* is negative (and statistically significant). The negative coefficient on *Crisis* implies that loan supply during crisis declines for reasons other than capital and liquidity constraints (Beatty and Liao, 2011). The negative coefficient on interaction between *Crisis* and *CAP*, which measures the association between loans' growth and capital ratio during crisis period, indicates that the impact of capital ratio on lending during crisis periods is not as expected positive, implying potential insignificance of capital for lending. Such a result may, however, be indicative of huge diversity of association between loans growth and double interaction of capital ratio and *Crisis* dummy. This diversity may be a result of differences in the use of macroprudential policies which can stimulate bank resilience to crisis periods. Therefore we proceed by estimating regressions covering not only bank-specific and macroeconomic determinants of loans growth, but also macroprudential policies.

[insert table 3 around here]

4.1. Impact of macroprudential policies on association between lending and capital, and bank size

In Table 4, we first investigate the question of whether macroprudential policies reduce the impact of capital ratio on loans growth, and then we test how the effects of macroprudential policies on the association between lending and capital ratio differ between large versus medium and small banks. Consistent with prior studies of the association between loans growth and capital ratio, *CAP* is positively associated with Δ*loans* (Beatty and Liao, 2011; Gambacorta and Marqués-Ibáñez, 2011; Carlson et al., 2013), both during non-crisis periods and during the recent crisis period. The results for the full-sample (see specifications 1, 2 and 3) confirm the view that during the crisis periods the association between loans growth and capital ratio is strengthened relative to non-crisis period. The negative and almost always statistically significant coefficient on *Macropr index* * *CAP*, indicating that macroprudential policies reduce the impact of capital ratio on lending in non-crisis periods. The effect of macroprudential policies on the association between lending and capital ratio is strengthened during the recent crisis, because the coefficient on the triple interaction of *Macropr index*Crisis*CAP* is negative and stronger than the respective coefficient on double interaction (without crisis dummy). To start, in the full sample estimation of loans growth analyzing the impact of macroprudential indices on the association between lending and capital ratio in two regressions (1 and 2), the interaction of *Macropr index* and capital ratio obtains negative coefficients of -0.075 and -0.446 that are statistically significant, indicating that the impact of capital ratio on loans growth is relatively low in countries applying macroprudential policies during non-crisis periods. Furthermore, the triple interactions obtain negative coefficients with significance of at least 5%, indicating that the association between lending and capital ratio during the recent crisis is weakened in countries in which more macroprudential policy instruments are applied. Generally, the full sample results give empirical support to hypothesis H1, that in countries in which more macroprudential policy instruments are applied, the link between lending and capital ratio is weakened, during both non-crisis periods and during the recent crisis period.

In the next set of regressions in Table 4, we present effects of interactions between macroprudential policy indices (*Macropr index*) and capital ratio in banks which differ in size, i.e. in large banks (specifications 4, 5 and 6), medium banks (specifications 7, 8 and 9) and small banks (specifications 10, 11 and 12). Estimated negative coefficients of double interactions, significant in case of borrower-targeted macroprudential policies (see regressions 5 and 8) and stronger in the subsample of large banks (coefficient on *Borrower*CAP* is -0.398), relative to medium (coefficient on *Borrower * CAP* equals -0.239) and small banks, suggest that large banks benefit the most from increased resilience linked to macroprudential approach. From regression 5 (large banks), for instance, we infer that the impact of capital ratio on loans growth during non-crisis periods in countries applying more borrower targeted instruments is -0.385 (-0.395+0.013). In the medium banks' regression, the overall effect of capital ratio on loans growth in countries applying

macroprudential instruments reducing borrower risk is -0.132 (-0236+0.132). Thus sensitivity of lending to capital ratio is more weakened in the sample of large banks, which is consistent with hypothesis H2. Furthermore, the significantly negative coefficients for triple interactions (i.e. *Macropr index*Crisis*CAP*) obtained for large banks (regression 4 and 5) supports hypothesis H2a, predicting that macroprudential policy instruments reduce the impact of capital ratio on lending in large banks during both non-crisis and crisis periods. Some of results in Table 4 should be interpreted with caution, as the m2 test is not always rejected and the Hansen J test for over-identifying restrictions is not always rejected, suggesting problems with instruments. To resolve this problem we will run additional regressions with reduced number of instruments (see Roodman, 2009) in the robustness section.

[insert table 4 around here]

4.1.1. Impact of individual macroprudential policy instruments

Regression results in Table 5 consider individual macroprudential policy instruments one-by-one. We find that of borrower based instruments, only *LTV-caps* and *DTI* ratios weaken the effect of capital ratio on lending. More importantly, after controlling for the bank-specific and macroeconomic factors, the coefficient on double interaction term of *Macropr instr * CAP* is negative as well as being negative on triple interaction term of *Macropr instr*CAP*Crisis* and significant at 1%, indicating that macroprudential instruments (*LTV cap* and *DTI*) weaken the positive association between loans growth and capital ratio. This weakening effect is stronger during the crisis. Generally, we find the results for borrower-targeted instruments to be consistent with the aggregated macroprudential index (see Table 4). Of three borrower-based measures, coefficient on *LTV cap*CAP* is strongly significant and negative, with an effect of -0.538 in non-crisis periods and -4.119 during the recent crisis. As for the *DTI* ratio, we find the effect to be stronger, as the coefficient on double interaction is -0.666 and on triple integration is -5.137. Thus our results for borrower based instruments are consistent with the view that macroprudential policy instruments increase the resilience of banks and with our prediction that macroprudential policies weaken the impact of capital ratio on lending, during both non-crisis and crisis-period, as expressed in hypothesis H1.

Of measures aimed at addressing bank risk, only the buffer oriented dynamic provisions seem to reduce the effect of capital ratio on lending during non-crisis period, with the significant coefficient on double interaction of *DP*CAP* of -1.058. Interestingly, however, their impact on association between loans growth and capital ratio during the recent crisis is positive, implying that DP's use increases the importance of capital ratio for lending in crisis period. Such a result may be indicative of increased risk – taking by banks (and thereby weakened resilience) in countries where dynamic provisions are in use, as evidenced by Ilueca et al. (2015) or of relative incapability of dynamic provisions to increase the resilience of the banking sector to negative shocks to capital which were experienced by many banks during and just after the recent crisis. Overall, when statistically significant, the results seem to support our prediction that in countries in which macroprudential policy instruments are applied, the positive association between lending and capital ratio is weakened (consistent with hypotheses H1).

[insert table 5 around here]

Differentiating banks by size, in Table 6, and for brevity showing only those estimations in which the weakening impact of individual macroprudential instruments is statistically significant during non-crisis and/or crisis period, we find again that borrower-targeted instruments weaken the association between lending and capital ratio. This effect is, moreover, stronger in large banks relative to medium banks, which confirms our prediction expressed in H2, that macroprudential policy instruments impact on the link between lending and capital is strongest in the sample of large banks

[insert table 6 around here]

4.2. Impact of macroprudential policy indices on the link between loans growth and capital ratio versus economic development and capital account openness.

In Table 7 we compare the effects of macroprudential policies on the association between loans growth and capital ratio in advanced versus emerging and low-income developing countries. We do this by running separate regression for each subsample of countries. We find that the statistically significant impact of macroprudential policies on the association between lending and capital ratio in non-crisis periods is stronger

in advanced countries than in emerging countries. In particular, in the regression including interaction of borrower-targeted macroprudential policies (columns 2 and 5), the coefficient on *Macropr index*CAP* is -0.793 in advanced economies, and -0.357 in emerging markets. Such a result may imply that advanced markets benefit from increased resilience of the banking sector during non-crisis periods in those countries which apply macroprudential policies more intensely. Such a result does not give confirmation to prediction expressed in hypothesis H3, that the reduction of the association between lending and capital due to macroprudential policies is stronger in emerging economies relative to advanced economies.

Macroprudential policies have been more intensely applied in emerging countries, in particular in the pre-crisis period. Therefore, they could have increased resilience of banks in emerging markets, which could potentially weaken the positive association between capital ratio and loan supply. Our results in Table 7 (columns 4-6) are consistent with this prediction, because the coefficients on triple interaction are negative and statistically significant at 1%.

[insert table 7 around here]

Differentiating by the level of capital account openness, in Table 8, we find that macroprudential policies are more effective in increasing the resilience of banks and thus weakening the association between loan supply and capital ratio for relatively closed economies and less effective for relatively open economies. Having said that we must stress that the results for borrower-targeted instruments in double interaction of *Macropr index * CAP* remain significant for advanced economies, and the coefficient on the interaction is more than twice as large as in closed economies. In the regression including macroprudential index covering instruments targeted at reduction of borrower risk (i.e. *DTI* and *LTV* ratios) (see columns 2 and 8 in Table 8), we find that the *Macropr index*CAP* obtains a negative coefficient of -0.725 that is significant at 1% in open economies, whereas the coefficient in closed economies is also negative, -0.33%, but definitely weaker. Such a result implies that borrower based macroprudential instruments increase the resilience of banks in open economies and thus reduce the impact of capital ratio on loans growth during non-crisis period. However, in contrast to closed-capital-account countries, borrower targeted instruments do not seem to weaken the association between loans growth and capital ratio during the crisis. Additionally, whereas capital ratios do not seem to constrain lending in crisis in open economies, they do constrain bank lending significantly in closed economies. In particular, the coefficient on double interaction of *Crisis*CAP* is insignificantly negative (-0.034) in open-capital-account countries and significant at 1% and positive in closed countries. Such results may reflect several factors. First, open capital account economies may see more circumvention of macroprudential policies in crisis periods (see Cerutti et al., 2015, p. 10) and borrowers in these countries may substitute to non-bank sources of funding (shadow banking) and get access to funds from cross-border sources. These countries may also benefit more from government bailout during crises, thus the effect of capital ratio on lending is apparently ineffective in these countries. As for closed-capital-account economies, it may be that they have more strictly regulated financial system (less liberalized) and borrowers do not have opportunity to use financing from shadow banks. Additionally, potentially poor development of financial markets (in particular the capital market), makes access to external finance difficult, thus banks are unable to increase their capital base during crisis. Consequently, the effect of capital ratio on lending is stronger and statistically significant in these countries. However, this positive association between lending and capital ratio during the recent crisis seems to be significantly weakened by macroprudential policies, not only those targeted at borrowers, but also those focusing more directly on risk of banks, such as dynamic provisions, credit growth limits, reserve requirements and also the aggregated macroprudential index. In particular, in regressions 4, 5 and 6, estimated coefficients on triple interaction of *Macropr index * Crisis * CAP* is negative and statistically significant at 1%, implying that macroprudential policies effectively increase resilience of commercial banks in closed-capital-account countries and thus weaken the positive association between loans growth and capital ratio. Such a results gives us empirical support to view expressed in hypothesis H3, according to which the reduction of the association between lending and capital due to macroprudential policies is stronger in closed-capital-account countries.

[insert table 8 around here]

4.3. Robustness checks

To build more confidence into our main findings, we employ several robustness checks. Firstly, we estimate our baseline model with significantly reduced numbers of lags of bank-specific variables (*CAP, ΔCAP, Dep, Depbanks, QLP, Size*), to check the sensitivity of our estimation to the number of GMM-style instruments. Secondly, we test the sensitivity of our results to change in the estimation technique, by running regression given by equation 2 with one-step system GMM Arellano and Bond model (1991). And finally, due to the fact that lending of banks reporting consolidated statements may respond differently to explanatory variables, we run additional regression models in this subsample of banks. In particular, previous evidence shows that banks reporting consolidated data exhibit greater sensitivity of loan loss provisions to the business cycle, meaning that their business is more procyclical (see Olszak et al., 2016). They also operate at lower capital ratios, therefore it is possible that their lending may be more sensitive to capital ratio in non-crisis period, consistent with evidence presented by Carlson et al. (2013). We therefore analyze the sensitivity of those banks' loans growth to capital ratio, and the role of macroprudential policies for the link between lending and capital ratio of these banks.

The results for the effect of a reduced number of instruments are presented in Table 9. As can be inferred from Table 9, the double interaction term between macroprudential index and capital ratio is negative and statistically significant in the full sample, which gives stronger support to the results included in Table 5 in the main section and to hypothesis H1, predicting that in countries in which more macroprudential policy instruments are applied, the link between lending and capital ratio is weakened, during both non-crisis periods and during the recent crisis period. In particular, of macroprudential policies, those targeted to contain borrower risk seem to be more important in alleviating the effect of capital ratio on lending in non-crisis periods. Furthermore, macroprudential policies seem effective in reducing the role of the capital ratio during the last financial crisis and its direct aftermath period, because in our robustness regressions, the triple interactions between *Macroprudential index, CAP* and *Crisis* obtain negative statistically significant coefficients in the full sample (see columns 1-3 in Table 9), in the large banks (see columns 4-6 in Table 9) and in the medium banks sample (see columns 7-9 in Table 9). The results presented in Table 9 enable us to further support hypothesis 2 and 2a, because the effect of macroprudential policies is stronger (i.e. negative and statistically significant) in the sample of large banks in comparison to the medium sized banks. In the case of small banks, the role of macroprudential policies for the link between loans and capital ratio does not seem to be significant.

The test of the sensitivity of the results to change in the estimation technique is presented in Table 10. The regression coefficients on double interactions between *Macropr index* and *CAP* and on triple interactions between *Macropr index, Crisis* and CAP do not change saliently when compared to the baseline results in Table 5, because they are negative and statistically significant in the full sample, large banks and medium sized banks. Similarly to what we found in section 4.1, the effect of macroprudential policies on the association between lending and capital ratio is stronger in the sample of large banks than in other banks during both non-crisis times and in the last financial crisis, consistent with our prediction expressed in hypotheses H2 and H2a.

[insert tables 9-10 around here]

The results for the sample of banks reporting consolidated financial statements are given in Table 11. The results included in this table support the view that these banks' lending is more sensitive to capital ratio in non-crisis periods. However, during the last crisis loans growth was not higher in banks with greater capital ratios. Such a result implies that banks consolidating financial statements, because of lower capital ratio in non-crisis periods, and thus scarce capital buffers, are not able to extend lending in crisis times. When we look at double interaction term between *Macropr index* and *CAP*, we can see that macroprudential policies are not effective in reducing the association between lending and capital ratio. However, the negative and statistically significant coefficient on triple interaction between *Macropr index, Crisis* and *CAP* in the full sample and in the large banks subsample implies that in countries in which more macroprudential policies are applied, the impact of capital ratio on lending is reduced during the crisis periods (consistent with the view expressed in hypothesis H1). The estimated impact of macroprudential policies on the association between loans growth and capital ratio is strongest in the case of large banks as distinct from other banks, which gives partial support to prediction expressed in hypothesis H2 and H2a.

[insert table 11 around here]

5. Conclusions

In this paper, we test whether the association between lending and capital ratio is weakened by macroprudential policies. We examine this effect in banks differing in size (large, medium and small) and taking into account country groupings (advanced versus emerging and open versus closed-capital-account economies). We apply several macroprudential polity measures (i.e. aggregated macroprudential policy index, borrower-risk-targeted index and financial-institutions oriented index) as well as individual macroprudential policy instruments (such as e.g. *LTV caps*, *DTI* ratios and dynamic provisions). We test whether macroprudential policies effect on the link between loans growth and capital ratio depends on bank size, economic development and capital account openness. Our sample includes banks from 65 countries and spans the year of 2000-2011 (including pre-crisis periods and the recent crisis and its direct aftermath period).

We find a consistent and strong effect of macroprudential policies on the association between loans growth and capital ratio. The full sample results give empirical support to the prediction that in countries in which more macroprudential policy instruments are applied, the link between lending and capital ratio is weakened, during both non-crisis periods and during the recent crisis period. We also find evidence in favor of the expectation that bank size matters for the impact of macroprudential policies for the link between lending and capital. In particular, the sensitivity of lending to capital ratio is more markedly weakened in the sample of large banks, during both non-crisis and in the recent crisis period. Analysis of the role of individual macroprudential policy instruments shows that only two borrower-based instruments, i.e. *LTV-caps* and *DTI* ratios weaken the positive effect of capital ratio on lending.

Comparing the effects of macroprudential policies on the association between loans growth and capital ratio in advanced versus emerging and low-income developing countries, we show that the statistically significant impact of macroprudential policies on the association between lending and capital ratio in non-crisis periods is stronger in advanced countries than in emerging countries. Such a result may imply that advanced markets benefit from an increased resilience of the banking sector during non-crisis periods in those countries which apply macroprudential policies more intensely. Macroprudential policies have been more intensely applied in emerging countries, in particular in the pre-crisis period. Therefore, they could have increased resilience of banks in emerging markets, weakening the positive association between capital ratio and loan supply. Our results are consistent with this prediction. Differentiating by the level of capital account openness, we find that macroprudential policies are more effective in increasing the resilience of banks and thus weakening the association between loan supply and capital ratio for relatively closed economies and less effective for relatively open economies.

Our finding that macroprudential policies are able to alleviate the impact of capital ratio on lending, in particular during the crisis, may have certain implications for policymakers in the area of implementation of commonly recognized standards targeted at reduction of borrower risk-taking. Our results suggest that more frequent use of these instruments may create additional buffers in large banks and in emerging and closed-capital-account economies, thus making large banks' lending and lending of banks in emerging markets and closed economies less affected by capital ratios in during crisis periods. Therefore, in the current work aimed at creating macroprudential regulations, more attention should be focused on instruments which have the potential to reduce borrower risk.

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Appendix

[insert table A1 around here]

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TABLES to be inserted in the main text:

Table 1. Descriptive statistics and correlations of the main regression variables

Panel A: Descriptive statistics

	ΔLoan (in %)	CAP (in %)	ΔCAP (in %)	Dep (in %)	Depbanks (in %)	QLP (in %)	size	GDPGper capita (in %)	ΔUnempl
					Full sample				
mean	3.35	11.12	-0.16	75.18	12.92	0.79	12.26	1.54	0.23
median	1.23	9.75	0.01	82.71	4.42	0.36	11.91	1.68	0.00
sd	13.23	5.68	2.82	20.71	19.04	1.64	1.87	2.82	1.15
min	-49.86	0.00	-41.66	0.00	0.00	-19.90	3.74	-17.95	-5.40
max	199.47	50.00	41.97	99.83	97.00	19.99	21.85	30.34	9.70
					Large				
mean	3.79	9.90	-0.08	72.15	13.00	0.86	13.76	1.63	0.22
median	1.65	9.08	0.03	79.67	5.29	0.39	13.14	1.68	0.00
sd	13.50	4.57	2.46	21.03	17.88	1.64	1.82	2.92	1.15
min	-49.85	0.01	-35.82	0.00	0.00	-17.56	7.10	-17.95	-5.40
max	199.47	50.00	37.36	99.83	97.00	19.89	21.85	30.34	9.70
					Medium				
mean	3.50	11.03	-0.22	75.70	13.28	0.77	12.12	1.55	0.23
median	1.31	9.74	0.00	83.17	4.22	0.36	11.77	1.68	0.00
sd	13.01	5.54	2.99	20.56	19.97	1.57	1.32	2.84	1.16
min	-49.86	0.07	-41.66	0.00	0.00	-19.90	4.19	-17.95	-5.40
max	198.42	49.95	41.97	98.96	96.55	19.63	18.29	30.34	9.70
					Small				
mean	2.61	12.74	-0.17	78.09	11.87	0.73	10.69	1.43	0.26
median	0.62	10.86	-0.01	85.10	2.77	0.31	10.62	1.68	0.00
sd	13.20	6.66	2.97	20.07	19.29	1.76	1.09	2.66	1.14
min	-49.85	0.00	-41.42	0.00	0.00	-17.17	3.74	-17.95	-5.40
max	198.43	50.00	38.46	98.73	96.69	19.99	16.38	30.34	9.70

Panel B: Correlations

					Full sample				
ΔLoan	1								
CAP	0.0215***	1							
ΔCAP	-0.238***	0.151***	1						
Dep	-0.056***	-0.340***	-0.009**	1					
Depbanks	0.062***	-0.037***	-0.033***	-0.494***	1				
QLP	-0.022***	0.063***	-0.091***	-0.128***	-0.023***	1			
size	0.073***	-0.305***	0.029***	-0.203***	0.129***	0.077***	1		
GDPG per capita	0.056***	0.076***	-0.039***	-0.185***	-0.011*	-0.054***	0.047***	1	
ΔUnempl	-0.018***	-0.051***	0.002	0.145***	-0.100***	0.109***	-0.053***	-0.689***	1
					Large				
ΔLoan	1								
CAP	-0.005	1							
ΔCAP	-0.159***	0.184***	1						

Dep	-0.046***	-0.170***	-0.002	1					
Depbanks	0.088***	-0.102***	-0.047***	-0.563***	1				
QLP	-0.041***	0.106***	-0.075***	-0.125***	-0.068***	1			
size	0.061***	-0.294***	0.046***	-0.314***	0.155***	0.073***	1		
GDPG per capita	0.089***	0.056***	-0.029***	-0.153***	0.015	-0.082***	0.047***	1	
ΔUnempl	-0.050***	-0.027***	-0.004	0.141***	-0.130***	0.164***	-0.062***	-0.675***	1
					Medium				
ΔLoan	1								
CAP	0.024***	1							
ΔCAP	-0.314***	0.150***	1						
Dep	-0.037***	-0.390***	-0.014***	1					
Depbanks	0.053***	-0.015	-0.024**	-0.504***	1				
QLP	-0.013**	0.055***	-0.084***	-0.124***	-0.016	1			
size	0.063***	-0.271***	0.041***	-0.128***	0.127***	0.086***	1		
GDPG per capita	0.061***	0.075***	-0.059***	-0.180***	-0.033***	-0.044***	0.048***	1	
ΔUnempl	-0.028***	-0.053***	0.015***	0.139***	-0.074***	0.093***	-0.068***	-0.682***	1
					Small				
ΔLoan	1								
CAP	0.067***	1							
ΔCAP	-0.219***	0.146***	1						
Dep	-0.084***	-0.583***	0.001	1					
Depbanks	0.037**	0.011	-0.034**	-0.362***	1				
QLP	-0.012*	0.058***	-0.127***	-0.126***	0.043**	1			
size	0.094***	-0.192***	-0.035***	0.033***	0.181***	0.053***	1		
GDPG per capita	-0.002	0.133***	-0.021***	-0.226***	-0.013	-0.035***	-0.027***	1	
ΔUnempl	0.038***	-0.092***	-0.011*	0.154***	-0.101***	0.062***	-0.007	-0.717***	1

Δloan- real loans growth; CAP – equity capital divided by total assets; ΔCAP – annual change in capital ratio; Dep – nonfinancial borrowers deposits divided by total assets; Depbanks – interbank deposits divided by total assets; QLP – loan loss provisions divided by average loans; size – logarithm of total assets; GDPG per capita – real GDP per capita growth; ΔUnempl – is change in annual unemployment rate.

Table 2. Average values of bank-specific variables, macroprudential indices, and country classification.

	Advanced	emerging	low-income developing	open	closed
Δloan (in %)	3.01	2.41	1.20	3.27	2.19
CAP (in %)	6.52	11.58	13.38	8.45	10.46
ΔCAP (in %)	-0.02	-0.15	-0.09	-0.02	-0.16
Dep (in %)	51.33	70.12	72.57	61.40	64.59
Depbanks (in %)	9.59	9.60	5.34	11.60	7.53
QLP (in %)	0.37	1.31	1.86	0.52	1.31
Size: average	12.23	15.19	11.64	14.37	13.61
Size: median	14.67	13.56	11.58	14.40	13.55
MPI aggregated	1.06	2.21	1.12	1.21	2.14
BORROWER	0.27	0.37	0.00	0.25	0.38
FINANCIAL	0.79	1.84	1.12	0.97	1.76
# countries	31	31	3	37	28
# banks	7562	1255	55	7679	1193
# observations	78663	9887	501	79664	9387

This table provides a description of the sample in advanced, emerging, low-income, open-capital-account and closed-capital-account countries. The average values are derived from Table 1A in the appendix; Δ*loan*- real loans growth; *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; size – logarithm of total assets; *MPI aggregated* - an average value of macroprudential index available in Cerutti et al., 2015, computed for the period of 2000-2010; *BORRROWER* - an average value of the macroprudential index which covers instruments targeted on taming risk-taking by borrowers; *FINANCIAL* - an average value of macroprudential index which covers instruments targeted on taming the risk-taking by financial institutions, in particular by banks; # - denotes the number of.

Table 3. Baseline results without macroprudential policies

	GLS – full sample	Fe - full sample	GMM two step - full sample	GMM two step - full sample	GMM two step - large	GMM two step - medium	GMM two step - small
	1	2	3	4	5	6	7
Δloan(-1)	0.079***	-0.095***	0.297***	0.038*	0.032	0.027	0.000
	(11.71)	(-10.57)	(9.83)	(1.93)	(1.07)	(0.76)	(0.01)
CAP	0.143***	0.418***	0.161***	0.200***	0.072	0.227***	0.236***
	(6.50)	(9.46)	(3.32)	(3.61)	(0.86)	(3.74)	(2.85)
ΔCAP	-0.097***	-0.247***	-0.013	-0.153***	-0.049	-0.203***	-0.161*
	(-3.09)	(-6.18)	(-0.35)	(-3.57)	(-0.76)	(-3.31)	(-1.92)
Dep	0.014**	0.019	-0.009	-0.002	0.019*	0.006	-0.023
	(2.41)	(1.05)	(-1.31)	(-0.30)	(1.65)	(0.52)	(-1.32)
Depbanks	0.033***	-0.018	0.030**	0.051***	0.095***	0.018	-0.048
	(4.26)	(-0.89)	(2.47)	(3.44)	(3.85)	(0.93)	(-1.63)
QLP	-0.072	0.102	-0.180***	-0.096	0.136	-0.227*	-0.126
	(-1.49)	(1.53)	(-2.58)	(-1.05)	(0.81)	(-1.74)	(-0.79)
size	0.698***	4.034***	0.780***	1.303***	1.057***	1.173***	1.690***
	(11.59)	(13.70)	(8.51)	(11.26)	(6.79)	(7.48)	(5.42)
GDPG per capita	0.175***	-0.109**	0.093***	0.170***	0.311***	0.071	-0.030
	(5.87)	(-2.43)	(2.82)	(3.79)	(4.17)	(1.03)	(-0.37)
ΔUnempl	-0.371***	-0.614***	0.325*	-0.403***	-0.481***	-0.335**	-0.530
	(-3.37)	(-4.89)	(1.71)	(-3.77)	(-2.84)	(-2.30)	(-1.35)
Crisis	-1.575***	-4.304***	-1.907***	-1.055	-0.709	-1.308	-1.521
	(-3.53)	(-7.61)	(-3.34)	(-1.41)	(-0.56)	(-1.29)	(-0.94)
Crisis*CAP	-0.082**	0.008	-0.122***	-0.091*	-0.139	-0.106	0.008
	(-2.48)	(0.20)	(-2.81)	(-1.68)	(-1.40)	(-1.45)	(0.08)
Intercept	-8.067***	-55.3***	-9.134***	-16.5***	-15.0***	-13.8***	-17.3***
	(-7.43)	(-12.37)	(-5.17)	(-7.46)	(-4.76)	(-5.17)	(-3.94)
R-sq within	0.002	0.0374					
R-sq between	0.2153	0.0354					
R-sq overall	0.0391	0.0123					
F stat.		F(11, 11996)					
		42.35					
F test that all u_i=1		F(4544, 11996)					
		0.8					
m1			-10.56***	-10.30***	-6.63***	-6.97***	-4.07***
m2			1.62	-1.91*	-2.46**	0.19	-1.32
Hansen test			0.00	0.00	0.996	0.159	1.000
#observations	16552	16552	12440	12440	6903	7260	2389
#banks	4545	4545	2041	2041	1992	1808	745
year dummies/ country dummies/ interacted country and year dummies	yes / yes /no	yes / yes / no	yes / yes /no	yes / yes / yes	yes / yes / yes	yes / yes / yes	yes / yes / yes

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; ΔCAP – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbank*s – interbank

deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. Bank size is captured by total average assets in the whole research period: large is a dummy variable equal to 1 if a bank belongs to the 30% corresponding to the largest banks; medium is a dummy variable equal to 1 if a bank belongs to the next 40% of banks; small is a dummy variable equal to 1 if a bank belongs to the last 30% of banks with the smallest assets. Reported regressions are estimated with OLS, FE and the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 4. Effects of average macroprudential policy index (MPI_AGGREGATED), macroprudential policy instruments targeted at borrowers (BORROWER) and macroprudential policy instruments targeted at financial institutions (FINANCIAL).

	Full sample			large			medium			small		
Type of macroprudential policy index	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6	7	8	9	10	11	12
Δloan(-1)	-0.001	-0.041	0.016	0.005	-0.032	0.014	-0.012	-0.025	-0.009	-0.026	-0.028	-0.026
	(-0.02)	(-1.51)	(0.72)	(0.14)	(-0.89)	(0.47)	(-0.30)	(-0.62)	(-0.27)	(-0.90)	(-0.95)	(-0.89)
CAP	0.275***	0.168**	0.201**	0.163	0.013	0.168	0.199**	0.132*	0.167*	0.327***	0.316***	0.326***
	(3.11)	(2.40)	(2.54)	(1.30)	(0.12)	(1.30)	(2.15)	(1.72)	(1.81)	(2.83)	(3.68)	(2.81)
ΔCAP	-0.120**	-0.165***	-0.102**	-0.025	-0.074	-0.022	-0.152**	-0.185***	-0.153**	-0.143*	-0.153*	-0.141
	(-2.43)	(-3.31)	(-2.27)	(-0.39)	(-1.28)	(-0.34)	(-2.37)	(-2.74)	(-2.31)	(-1.69)	(-1.80)	(-1.64)
Dep	0.008	0.020*	-0.002	0.023	0.007	0.019	0.023	0.031*	0.016	-0.030	-0.013	-0.027
	(0.67)	(1.76)	(-0.15)	(1.54)	(0.50)	(1.35)	(1.50)	(1.90)	(0.98)	(-1.07)	(-0.50)	(-0.93)
Depbanks	0.062***	0.068***	0.036**	0.141***	0.124***	0.132***	0.016	0.020	-0.001	-0.081***	-0.064**	-0.086***
	(3.40)	(4.08)	(2.37)	(5.77)	(4.49)	(5.28)	(0.68)	(0.86)	(-0.04)	(-2.70)	(-2.33)	(-2.80)
QLP	0.153	0.005	0.182*	0.322	0.254	0.343*	0.005	-0.116	0.007	0.109	0.077	0.092
	(1.25)	(0.05)	(1.83)	(1.62)	(1.35)	(1.66)	(0.04)	(-0.78)	(0.05)	(0.63)	(0.42)	(0.49)
size	1.318***	0.973***	1.265***	1.069***	0.796***	1.130***	0.816***	0.569**	0.775***	2.340***	2.235***	2.215***
	(5.98)	(4.76)	(5.89)	(4.05)	(3.03)	(4.28)	(3.07)	(2.17)	(2.97)	(4.44)	(4.59)	(4.31)
GDPG per capita	0.089*	-0.027	0.157**	0.276***	0.124	0.348***	-0.026	-0.118	-0.004	0.027	0.049	0.006
	(1.65)	(-0.48)	(2.40)	(2.73)	(1.40)	(3.10)	(-0.27)	(-1.29)	(-0.03)	(0.26)	(0.49)	(0.05)
ΔUnempl	-0.614***	-0.686***	-0.569***	-0.642***	-0.751***	-0.544***	-0.601***	-0.632***	-0.605***	-0.396	-0.276	-0.452
	(-5.20)	(-5.53)	(-4.51)	(-3.22)	(-3.75)	(-2.84)	(-3.77)	(-3.95)	(-3.80)	(-0.90)	(-0.65)	(-0.99)
Crisis	-10.87***	-4.901***	-5.115**	-9.187***	-4.878***	-3.919	-6.47***	-3.512***	-2.903	1.344	-0.446	3.308
	(-4.90)	(-5.53)	(-2.57)	(-3.16)	(-3.79)	(-1.35)	(-2.86)	(-3.75)	(-1.31)	(0.40)	(-0.21)	(0.88)
Crisis*CAP	0.751***	0.212***	0.269	0.632**	0.126	0.123	0.349*	0.099	0.066	-0.125	-0.048	-0.236
	(4.12)	(3.08)	(1.64)	(2.33)	(1.27)	(0.46)	(1.91)	(1.38)	(0.38)	(-0.69)	(-0.43)	(-1.21)
Macropr index	0.485	4.858***	0.253	0.900	3.918*	0.844	0.186	2.623*	0.043	0.195	0.243	0.537
	(1.18)	(3.18)	(0.41)	(1.24)	(1.83)	(0.91)	(0.40)	(1.69)	(0.08)	(0.34)	(0.16)	(0.64)

Macropr index * Crisis	8.173***	41.328***	4.313**	6.401***	32.501***	2.990	4.709***	31.607***	2.425	-1.428	-1.052	-3.304
	(4.75)	(5.70)	(2.54)	(3.06)	(5.17)	(1.29)	(2.59)	(3.84)	(1.37)	(-0.88)	(-0.18)	(-1.49)
Macropr index * CAP	-0.075**	-0.446***	-0.069	-0.104	-0.398*	-0.113	-0.060	-0.239*	-0.064	-0.043	-0.119	-0.066
	(-2.19)	(-3.41)	(-1.37)	(-1.51)	(-1.91)	(-1.31)	(-1.54)	(-1.66)	(-1.32)	(-1.10)	(-1.18)	(-1.11)
Macropr index *Crisis*CAP	-0.684***	-3.545***	-0.355**	-0.591***	-2.781***	-0.261	-0.362**	-2.739***	-0.182	0.066	0.145	0.188
	(-4.77)	(-4.79)	(-2.53)	(-3.06)	(-4.24)	(-1.24)	(-2.51)	(-3.67)	(-1.30)	(0.65)	(0.41)	(1.20)
Intercept	-17.5***	-12.0***	-15.3***	-16.5***	-9.2**	-17.3***	-8.6**	-5.3	-7.0*	-25.2***	-25.3***	-23.9***
	(-4.68)	(-3.52)	(-4.41)	(-3.46)	(-2.03)	(-3.62)	(-2.09)	(-1.31)	(-1.70)	(-3.92)	(-4.22)	(-3.85)
m1	-9.37***	-9.16***	-9.45***	-6.15***	-6.04***	-6.20***	-6.21***	-6.26***	-6.34***	-3.75***	-3.73***	-3.75***
m2	-1.76*	-1.19	-2.04**	-2.36**	-1.79*	-2.62**	-0.04	0.23	-0.15	-1.15	-1.13	-1.16
Hansen test	0.000	0.000	0.000	1.000	0.998	1.000	0.677	0.597	0.620	1.000	1.000	1.000
Obs	12440	12440	12440	5056	5056	5056	5654	5654	5654	1730	1730	1730
banks	2041	2041	2041	742	742	742	913	913	913	386	386	386

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; QLP – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: GDPG per capita – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. *Macropr index* covers one of three types of macroprudential policy indices: *MPI aggregated*, *BORROWER* and *FINANCIAL*. Bank size is captured by total average assets in the whole research period: large is a dummy variable equal to 1 if a bank belongs to the 30% corresponding to the largest banks; medium is a dummy variable equal to 1 if a bank belongs to the next 40% of banks; small is a dummy variable equal to 1 if a bank belongs to the last 30% of banks with the smallest assets. Reported regressions are estimated with the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 5. Impact of individual macroprudential policy indices – full sample results

Type of macroprudential instrument	LTV	LTV CAP	DTI	DP	LEV	INTER	CONC	FC	RR	RR REV	CG	TAX
	1	11	2	3	4	5	6	7	8	12	9	10
Δloan(-1)	0.022	-0.035	-0.057**	-0.038	0.024	0.024	0.024	0.023	0.020	0.019	0.023	0.016
	(1.03)	(-1.30)	(-1.99)	(-1.41)	(1.17)	(1.12)	(1.14)	(1.08)	(0.95)	(0.90)	(1.05)	(0.75)
CAP	0.432***	0.156**	0.451***	0.409***	0.394***	0.436***	0.520***	0.427***	0.440***	0.156**	0.425***	0.125**
	(7.56)	(2.26)	(7.03)	(6.62)	(6.31)	(6.57)	(4.58)	(7.29)	(7.15)	(2.35)	(7.26)	(2.01)
ΔCAP	-0.146***	-0.163***	-0.227***	-0.207***	-0.149***	-0.148***	-0.154***	-0.154***	-0.170***	-0.129***	-0.161***	-0.101**
	(-2.84)	(-3.30)	(-4.12)	(-3.81)	(-3.00)	(-2.86)	(-3.30)	(-2.97)	(-3.16)	(-2.70)	(-3.11)	(-2.20)
Dep	0.032**	0.018	0.031**	0.025**	0.026**	0.027**	-0.010	0.028**	0.026**	0.006	0.026**	0.016
	(2.49)	(1.61)	(2.53)	(2.09)	(1.99)	(2.37)	(-0.87)	(2.54)	(2.37)	(0.56)	(2.24)	(1.20)
Depbanks	0.073***	0.065***	0.091***	0.070***	0.067***	0.080***	0.050***	0.080***	0.077***	0.060***	0.074***	0.057***
	(4.22)	(3.84)	(5.32)	(4.35)	(3.78)	(4.79)	(2.90)	(4.86)	(4.49)	(3.71)	(4.38)	(3.33)
QLP	0.029	0.008	-0.045	-0.031	0.022	0.021	0.076	0.046	0.151	0.120	0.030	0.101
	(0.29)	(0.08)	(-0.43)	(-0.32)	(0.21)	(0.21)	(0.73)	(0.44)	(1.40)	(1.12)	(0.29)	(0.95)
size	1.657***	0.971***	1.365***	1.237***	1.606***	1.714***	1.789***	1.665***	1.741***	1.294***	1.686***	1.084***
	(8.19)	(4.70)	(7.09)	(6.39)	(7.44)	(8.55)	(9.15)	(8.06)	(8.44)	(5.85)	(8.33)	(3.36)
GDPG per capita	0.175**	-0.011	-0.082	-0.040	0.174***	0.158**	0.210***	0.176***	0.177***	0.176***	0.193***	0.174**
	(2.54)	(-0.20)	(-1.51)	(-0.72)	(2.58)	(2.34)	(3.16)	(2.64)	(2.81)	(2.62)	(2.74)	(2.49)
ΔUnempl	-0.413***	-0.705***	-0.507***	-0.708***	-0.375***	-0.420***	-0.415***	-0.426***	-0.481***	-0.462***	-0.408***	-0.446***
	(-3.43)	(-5.67)	(-4.11)	(-5.79)	(-3.20)	(-3.61)	(-3.43)	(-3.66)	(-4.12)	(-3.53)	(-3.50)	(-3.63)
Crisis	-0.768	-4.634***	-4.594***	-2.881***	-1.191	-0.377	-2.451	-1.020	-0.901	-0.905	-0.934	-0.139
	(-0.89)	(-5.22)	(-5.66)	(-3.88)	(-1.54)	(-0.39)	(-1.13)	(-1.19)	(-1.01)	(-0.98)	(-1.13)	(-0.12)
Crisis*CAP	-0.068	0.196***	0.164**	0.042	-0.050	-0.064	0.049	-0.043	-0.050	-0.065	-0.067	-0.128
	(-1.10)	(2.89)	(2.49)	(0.71)	(-0.88)	(-0.95)	(0.26)	(-0.70)	(-0.78)	(-0.97)	(-1.12)	(-1.61)
Macropr instr	-0.754	6.039***	8.268***	9.732**	-2.596	0.006	0.446	-2.987	-5.281***	-3.766	-6.711***	1.404
	(-0.40)	(3.22)	(3.59)	(2.14)	(-0.80)	(0.00)	(0.30)	(-1.53)	(-3.24)	(-1.20)	(-2.79)	(0.47)

Macropr instr * Crisis	-5.013	47.477***	62.294***	-10.490	13.617	-2.042	1.863	0.538	-3.410	2.658	-6.037	-13.758**
	(-1.51)	(5.38)	(4.68)	(-0.38)	(0.83)	(-0.82)	(0.71)	(0.10)	(-0.92)	(0.56)	(-0.75)	(-2.56)
Macropr instr * CAP	-0.109	-0.538***	-0.666***	-1.058*	0.064	0.019	-0.174	0.123	0.231*	0.162	0.333*	-0.331
	(-0.70)	(-3.36)	(-3.86)	(-1.66)	(0.24)	(0.18)	(-1.46)	(0.76)	(1.89)	(0.73)	(1.85)	(-1.29)
Macropr instr *Crisis*CAP	0.323	-4.119***	-5.137***	4.982	-0.966	-0.090	-0.146	-0.238	0.128	-0.276	0.557	1.137**
	(1.14)	(-4.54)	(-3.69)	(1.05)	(-0.79)	(-0.43)	(-0.67)	(-0.53)	(0.44)	(-0.79)	(0.75)	(2.25)
Intercept	-26.0***	-11.8***	-21.3***	-18.79***	-24.6***	-26.9***	-25.7***	-26.1***	-27.1***	-16.3***	-26.15***	-13.46***
	(-8.15)	(-3.46)	(-6.75)	(-6.03)	(-7.26)	(-8.12)	(-7.59)	(-7.93)	(-8.15)	(-4.50)	(-8.09)	(-2.90)
m1	-9.45***	-9.19***	-8.89***	-8.96***	-9.49***	-9.45***	-9.45***	-9.44***	-9.43***	-9.48***	-9.44***	-9.47***
m2	-2.07**	-1.21	-1.33	-1.86*	-2.04**	-2.02**	-2.02**	-2.01**	-2.05**	-2.10**	-2.07**	-2.19**
Hansen test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
# observations	12440	12440	12440	12440	12440	12440	12440	12440	12440	12440	12440	12440
# banks	2041	2041	2041	2041	2041	2041	2041	2041	2041	2041	2041	2041

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include*: CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; Depbanks – interbank deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: GDPG per capita – real GDP growth per capita; ΔUnempl – annual change in unemployment rate. *Macropr instr* covers individual macroprudential policy instruments, i.e.: loan-to-value ratio (*LTV*), loan-to-value ratio caps (*LTV_CAP*) debt-to-income ratio (*DTI*), dynamic loan-loss provisioning (*DP*), leverage ratio (*LEV*), limits on interbank exposures (*INTER*), limits on foreign currency loans (*FC*), reserve requirements ratios (*RR*), limits on domestic currency growth (*CG*), levy/tax on financial institutions (*TAX*), and *FX* and/or countercyclical reserve requirements (*RR_REV*). To test our hypotheses, for each country we construct a dummy variable which takes the value of 1 if the instrument was applied at least since 2005, and 0 otherwise. Reported regressions are estimated with the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 6. Macroprudential policy instruments and the link between lending and capital ratio – the role of bank size

Type of macroprudential instrument	LTV CAP	DTI	DP	LTV CAP	DTI	DP	LTV CAP	DTI	DP
		large			medium			small	
	1	2	3	4	5	6	7	8	9
Δloan(-1)	-0.023	-0.063	-0.050	-0.024	-0.048	-0.056	-0.027	-0.013	-0.022
	(-0.67)	(-1.63)	(-1.01)	(-0.60)	(-1.10)	(-1.34)	(-0.89)	(-0.00)	(-0.71)
CAP	0.016	0.174*	0.174*	0.121	0.463***	0.455***	0.310***	0.201	0.256***
	(0.16)	(1.84)	(1.80)	(1.49)	(5.58)	(5.35)	(3.56)	(0.00)	(3.43)
ΔCAP	-0.070	-0.132*	-0.189***	-0.184***	-0.256***	-0.257***	-0.158*	-0.105	-0.107
	(-1.19)	(-1.95)	(-2.59)	(-2.62)	(-3.22)	(-3.15)	(-1.78)	(-0.00)	(-1.24)
Dep	0.008	0.008	0.012	0.030*	0.041**	0.031*	-0.016	-0.038	-0.020
	(0.63)	(0.55)	(0.74)	(1.84)	(2.30)	(1.74)	(-0.59)	(-0.00)	(-0.69)
Depbanks	0.120***	0.143***	0.146***	0.018	0.033	0.021	-0.071**	-0.150	-0.085***
	(4.41)	(4.92)	(5.50)	(0.76)	(1.42)	(0.92)	(-2.46)	(-0.00)	(-2.96)
QLP	0.265	0.125	0.137	-0.116	-0.211	-0.197	0.058	0.152	0.063
	(1.41)	(0.69)	(0.70)	(-0.79)	(-1.36)	(-1.24)	(0.33)	(0.00)	(0.35)
size	0.846***	0.967***	0.923***	0.524*	1.189***	1.199***	2.198***	0.524	2.001***
	(3.27)	(4.11)	(3.71)	(1.94)	(4.39)	(4.16)	(4.50)	(0.00)	(4.09)
GDPG per capita	0.165*	-0.030	0.081	-0.113	-0.205**	-0.183*	0.041	0.093	-0.056
	(1.85)	(-0.32)	(0.58)	(-1.20)	(-2.16)	(-1.88)	(0.40)	(0.00)	(-0.55)
ΔUnempl	-0.740***	-0.630***	-0.696**	-0.651***	-0.506***	-0.733***	-0.238	-0.602	-0.423
	(-3.71)	(-3.14)	(-2.44)	(-4.09)	(-3.15)	(-4.30)	(-0.56)	(-0.00)	(-1.08)
Crisis	-4.409***	-5.468***	-3.358**	-3.151***	-3.745***	-2.835***	-0.699	-3.081	-1.939
	(-3.41)	(-4.17)	(-2.13)	(-3.31)	(-3.90)	(-3.11)	(-0.32)	(-0.00)	(-0.94)
Crisis*CAP	0.088	0.189*	-0.006	0.076	0.093	0.022	-0.043	0.069	0.042
	(0.90)	(1.71)	(-0.05)	(1.06)	(1.16)	(0.29)	(-0.36)	(0.00)	(0.36)
Macropr instr	4.349*	11.763***	7.515	3.565*	8.463***	15.068***	0.722	-7.247	-10.548
	(1.84)	(3.39)	(1.16)	(1.67)	(3.66)	(3.07)	(0.26)	(-0.00)	(-1.05)
Macropr instr * Crisis	34.91***	56.814***	-168.12**	36.622***	66.97***	-3.644	0.027	24.868	42.196**
	(4.74)	(5.53)	(-2.02)	(3.79)	(4.26)	(-0.16)	(0.00)	(0.00)	(2.08)
Macropr instr * CAP	-0.475**	-0.992***	-0.586	-0.293	-0.709***	-1.698**	-0.142	0.382	0.492
	(-2.09)	(-3.35)	(-0.41)	(-1.46)	(-4.32)	(-2.56)	(-0.98)	(0.00)	(0.96)
Macropr instr *Crisis*CAP	-3.059***	-5.069***	34.641**	-3.259***	-5.246***	3.906	0.197	-0.162	-1.074
	(-3.94)	(-4.17)	(2.27)	(-3.62)	(-3.54)	(1.14)	(0.35)	(-0.00)	(-0.87)
Intercept	-10.21**	-12.91***	-12.98***	-4.5	-17.57***	-17.078***	-24.54***	0.000	-20.85***
	(-2.29)	(-3.21)	(-2.90)	(-1.06)	(-4.19)	(-3.91)	(-4.11)	(.)	(-3.76)
m1	-6.07***	-5.89***	-5.04***	-6.25***	-6.09***	-6.14***	-3.73***	-0.00	-3.73***
m2	-1.94 *	-1.66*	-2.24**	0.14	0.45	-0.02	-1.11	-0.00	-0.88
Hansen test	0.998	0.994	0.997	0.542	0.530	0.466	1.000	0.000	1.000
# observations	5056	5056	5056	5654	5654	5654	1730	1730	1730
#banks	742	742	742	913	913	913	386	386	386

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; Depbanks – interbank deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; *size* – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. Macropr Instr covers individual macroprudential policy instruments, i.e.: loan-to-value ratio (*LTV*), loan-to-value ratio caps (*LTV_CAP*) debt-to-income ratio (*DTI*) and dynamic loan-loss provisioning (*DP*). To test our

hypotheses, for each country we construct a dummy variable which takes the value of 1 if the instrument was applied at least since 2005, and 0 otherwise. Bank size is captured by total average assets in the whole research period: large is a dummy variable equal to 1 if a bank belongs to the 30% corresponding to the largest banks; medium is a dummy variable equal to 1 if a bank belongs to the next 40% of banks; small is a dummy variable equal to 1 if a bank belongs to the last 30% of banks with the smallest assets. Reported regressions are estimated with the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 7. Analysis in country subsamples – impact of macroprudential policy index on the link between lending and capital and economic development

	advanced			emerging			low-income developing		
	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6	7	8	9
Δloan(-1)	-0.077***	-0.074***	-0.074***	-0.017	-0.058	0.015	0.058	0.058	0.058
	(-2.85)	(-2.72)	(-2.69)	(-0.43)	(-1.33)	(0.39)	(1.33)	(1.55)	(1.25)
CAP	0.304*	0.319**	0.221	0.187*	0.094	0.077	0.136	0.179**	0.133
	(1.89)	(2.26)	(1.42)	(1.77)	(1.39)	(0.74)	(1.18)	(2.41)	(1.08)
ΔCAP	-0.381***	-0.393***	-0.384***	-0.064	-0.087	-0.053	-0.156**	-0.209**	-0.156*
	(-3.41)	(-3.48)	(-3.47)	(-1.26)	(-1.63)	(-1.08)	(-2.32)	(-2.43)	(-1.90)
Dep	-0.047	-0.033	-0.051	-0.027*	-0.002	-0.027*	0.026	0.042	0.023
	(-1.50)	(-1.04)	(-1.64)	(-1.70)	(-0.16)	(-1.87)	(0.93)	(1.37)	(0.65)
Depbanks	-0.079**	-0.077*	-0.083**	0.098***	0.091***	0.050**	0.040	0.054	0.037
	(-2.00)	(-1.87)	(-2.12)	(3.55)	(3.15)	(2.05)	(0.62)	(1.34)	(0.50)
QLP	-0.049	-0.004	-0.050	0.167	0.165	0.230**	-0.020	-0.159	-0.018
	(-0.18)	(-0.01)	(-0.18)	(1.58)	(1.55)	(2.42)	(-0.13)	(-0.95)	(-0.11)
size	0.384	0.241	0.393	1.840***	1.037***	1.806***	0.344	0.503	0.344
	(1.07)	(0.64)	(1.07)	(5.73)	(4.02)	(5.49)	(1.09)	(1.27)	(1.09)
GDPG per capita	-0.271**	-0.265**	-0.269**	0.318***	0.263***	0.477***	0.053	0.043	0.057
	(-2.25)	(-2.20)	(-2.23)	(6.06)	(4.98)	(8.30)	(0.64)	(0.57)	(0.69)
ΔUnempl	0.414*	0.428*	0.426*	-1.223***	-1.199***	-1.144***	0.672	0.177	0.591
	(1.81)	(1.85)	(1.95)	(-8.04)	(-7.98)	(-7.43)	(0.49)	(0.14)	(0.37)
Crisis	-1.543	-3.84***	-1.68	-21.28***	-6.883***	-12.36***	-0.970	-0.418	-1.014
	(-0.68)	(-2.96)	(-0.66)	(-5.58)	(-4.89)	(-3.82)	(-0.30)	(-0.19)	(-0.29)
Crisis*CAP	-0.178	-0.006	-0.148	1.640***	0.377***	0.942***	0.026	-0.020	0.029
	(-0.86)	(-0.05)	(-0.65)	(5.37)	(3.71)	(3.48)	(0.13)	(-0.14)	(0.13)
Macropr index	0.481	8.99***	-0.546	0.463	4.227***	-0.640	1.056	dropped	0.889
	(0.51)	(2.59)	(-0.43)	(0.93)	(2.63)	(-1.01)	(0.20)		(0.17)
Macropr index * Crisis	-3.246	-4.712	-3.236	14.544***	45.531***	11.184***	-2.024	dropped	-1.758
	(-1.61)	(-0.64)	(-1.17)	(5.51)	(5.86)	(4.02)	(-0.38)		(-0.34)
Macropr index * CAP	-0.103	-0.793**	0.031	-0.051	-0.357***	0.022	-0.080	dropped	-0.074
	(-1.14)	(-2.44)	(0.25)	(-1.22)	(-2.67)	(0.44)	(-0.20)		(-0.19)

Macropr index *Crisis*CAP	0.262	0.171	0.227	-1.215***	-3.845***	-0.917***	0.139	dropped	0.117
	(1.29)	(0.20)	(0.76)	(-5.45)	(-5.06)	(-3.86)	(0.35)		(0.31)
Intercept	4.046	4.678	4.923	-24.18***	-13.28***	-22.396***	-6.417	-10.489	-6.109
	(0.56)	(0.63)	(0.69)	(-5.08)	(-3.58)	(-4.68)	(-1.01)	(-1.60)	(-0.88)
m1	-7.15***	-7.12	-7.15***	-6.03***	-6.08***	-5.99***	-1.97**	-2.08**	-1.97**
m2	-2.08**	-2.10**	-2.01**	-1.38	-0.01	-2.71***	-1.81*	-1.95*	-1.82*
Hansen test	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
#observations	5804	5804	5804	6471	6471	6471	165	165	165
#banks	818	818	818	1181	1181	1181	42	42	42

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. *Macropr index* covers one of three types of macroprudential policy indices: *MPI aggregated*, *BORROWER* and *FINANCIA*L. Reported regressions are estimated with the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that the coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of; dropped – denotes coefficients not estimated due to co-linearity.

T**able 8.** Analysis in country subsamples – impact of macroprudential policy index on the link between lending and capital and capital account openness

	Open capital account			Closed capital account		
	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6
Δloan(-1)	-0.069***	-0.067**	-0.063**	-0.024	-0.071	0.013
	(-2.63)	(-2.55)	(-2.42)	(-0.61)	(-1.56)	(0.35)
CAP	0.189	0.279**	0.124	0.257**	0.147*	0.101
	(1.32)	(2.34)	(0.86)	(2.24)	(1.78)	(0.94)
ΔCAP	-0.369***	-0.380***	-0.359***	-0.080	-0.104**	-0.060
	(-3.62)	(-3.68)	(-3.43)	(-1.48)	(-2.00)	(-1.26)
Dep	-0.031	-0.007	-0.040	-0.041***	-0.014	-0.035**
	(-1.02)	(-0.23)	(-1.30)	(-2.69)	(-1.06)	(-2.47)
Depbanks	-0.067*	-0.044	-0.067*	0.110***	0.095***	0.060**
	(-1.92)	(-1.18)	(-1.96)	(3.28)	(3.32)	(2.34)
QLP	0.060	0.098	0.046	0.079	0.048	0.147
	(0.26)	(0.40)	(0.19)	(0.75)	(0.48)	(1.55)
size	0.160	0.141	0.174	2.264***	1.326***	2.090***
	(0.47)	(0.65)	(0.53)	(7.11)	(5.31)	(6.43)
GDPG per capita	-0.269**	-0.281***	-0.283**	0.306***	0.230***	0.478***
	(-2.33)	(-2.58)	(-2.46)	(5.65)	(4.37)	(8.43)
ΔUnempl	0.076	0.064	0.092	-1.084***	-1.127***	-1.004***
	(0.36)	(0.30)	(0.45)	(-7.27)	(-7.13)	(-7.16)
Crisis	-1.951	-3.287***	-2.044	-22.227***	-6.221***	-12.344***
	(-0.87)	(-2.65)	(-0.80)	(-5.68)	(-4.46)	(-3.84)
Crisis*CAP	-0.116	-0.034	-0.098	1.670***	0.317***	0.912***

	(-0.59)	(-0.25)	(-0.42)	(5.42)	(3.20)	(3.52)
Macropr index	0.098	7.302**	-0.419	0.387	4.235**	-0.985
	(0.11)	(2.40)	(-0.36)	(0.71)	(2.51)	(-1.48)
Macropr index * Crisis	-1.643	-0.461	-1.553	15.274***	50.808***	11.209***
	(-0.94)	(-0.07)	(-0.64)	(5.63)	(5.40)	(4.14)
Macropr index * CAP	-0.060	-0.725***	-0.001	-0.058	-0.339**	0.039
	(-0.80)	(-2.61)	(-0.01)	(-1.28)	(-2.47)	(0.75)
Macropr index *Crisis*CAP	0.098	-0.128	0.061	-1.265***	-4.380***	-0.910***
	(0.64)	(-0.19)	(0.25)	(-5.54)	(-4.53)	(-4.01)
Intercept	6.913	4.118	7.743	-29.4***	-16.8***	-25.7***
	(1.07)	(0.75)	(1.25)	(-5.87)	(-4.28)	(-5.34)
m1	-7.29***	-7.29***	-7.31***	-5.89***	-5.84***	-5.87***
m2	-1.92*	-1.89*	-1.85*	-1.66*	-0.14	-3.13***
Hansen test	0.000	0.000	0.000	0.000	0.000	0.000
#observations	6318	6318	6318	6122	6122	6122
#banks	885	885	885	1156	1156	1156

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; *size* – logarithm of total assets. Macroeconomic variables include: GDPG per capita – real GDP growth per capita; ΔUnempl – annual change in unemployment rate. *Macropr index* covers one of three types of macroprudential policy indices: *MPI aggregated*, *BORROWER* and *FINANCIAL*. Reported regressions are estimated with the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 9. Sensitivity of results to a collapsed number of instruments – full sample estimations of aggregated macroprudential policy indices

	Full sample			large			medium			small		
Type of macroprudential policy index	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6	7	8	9	10	11	12
Δloan(-1)	0.013	-0.030	0.031	-0.001	-0.033	0.012	0.022	0.014	0.034	0.006	0.004	0.006
	(0.54)	(-1.07)	(1.42)	(-0.04)	(-0.85)	(0.36)	(0.62)	(0.32)	(0.95)	(0.20)	(0.13)	(0.19)
CAP	0.275***	0.196***	0.171**	0.118	-0.053	0.094	0.178**	0.143*	0.140	0.258**	0.276***	0.216*
	(2.98)	(2.68)	(2.14)	(0.71)	(-0.48)	(0.59)	(1.97)	(1.68)	(1.47)	(2.13)	(2.89)	(1.89)
ΔCAP	-0.111**	-0.155***	-0.085*	-0.027	-0.064	-0.014	-0.128**	-0.171***	-0.125*	-0.117	-0.131	-0.114
	(-2.21)	(-3.00)	(-1.68)	(-0.40)	(-1.01)	(-0.19)	(-1.99)	(-2.73)	(-1.92)	(-1.30)	(-1.49)	(-1.29)
Dep	0.006	0.020*	-0.005	0.024	0.011	0.020	0.025	0.031*	0.016	-0.043	-0.029	-0.042
	(0.50)	(1.83)	(-0.47)	(1.64)	(0.83)	(1.47)	(1.57)	(1.83)	(1.14)	(-1.57)	(-1.05)	(-1.44)
Depbanks	0.065***	0.069***	0.036**	0.146***	0.132***	0.135***	0.021	0.020	0.003	-0.072**	-0.063**	-0.079**
	(3.67)	(4.05)	(2.13)	(6.00)	(4.88)	(5.24)	(0.97)	(0.87)	(0.12)	(-2.47)	(-2.06)	(-2.56)
QLP	0.226*	0.009	0.239**	0.329*	0.323*	0.378**	0.121	-0.021	0.108	0.030	-0.011	0.019
	(1.77)	(0.09)	(2.17)	(1.71)	(1.79)	(2.07)	(0.76)	(-0.14)	(0.72)	(0.17)	(-0.07)	(0.11)
size	1.356***	1.020***	1.278***	1.042***	0.750***	1.072***	0.839***	0.613**	0.818***	2.351***	2.242***	2.270***
	(6.26)	(4.81)	(5.85)	(3.65)	(2.62)	(3.49)	(3.50)	(2.31)	(3.22)	(4.30)	(4.25)	(4.07)
GDPG per capita	0.090*	-0.024	0.159**	0.272***	0.138	0.348***	-0.032	-0.119	0.006	0.026	0.050	0.014
	(1.78)	(-0.44)	(2.49)	(2.77)	(1.57)	(3.24)	(-0.35)	(-1.28)	(0.06)	(0.24)	(0.51)	(0.13)
ΔUnempl	-0.617***	-0.668***	-0.553***	-0.656***	-0.738***	-0.566***	-0.575***	-0.610***	-0.561***	-0.358	-0.245	-0.370
	(-6.05)	(-5.25)	(-4.51)	(-3.29)	(-3.71)	(-2.91)	(-3.69)	(-3.70)	(-3.57)	(-0.78)	(-0.57)	(-0.85)
Crisis	-11.334***	-5.033***	-5.396***	-9.209***	-5.170***	-4.280	-7.591***	-3.556***	-4.281*	-0.018	-1.246	1.581
	(-4.93)	(-5.50)	(-2.67)	(-2.78)	(-3.67)	(-1.28)	(-3.57)	(-3.47)	(-1.88)	(-0.01)	(-0.57)	(0.44)
Crisis*CAP	0.797***	0.220***	0.289*	0.649**	0.169	0.170	0.468***	0.107	0.188	-0.025	-0.004	-0.141
	(4.16)	(3.08)	(1.74)	(2.12)	(1.54)	(0.54)	(2.58)	(1.33)	(1.03)	(-0.16)	(-0.03)	(-0.72)
Macropr index	0.520	5.273***	0.103	0.774	3.155	0.688	0.015	2.480	-0.253	-0.232	-0.107	-0.400
	(1.26)	(3.43)	(0.17)	(0.94)	(1.44)	(0.64)	(0.03)	(1.62)	(-0.54)	(-0.42)	(-0.05)	(-0.44)
Macropr index * Crisis	8.483***	37.106***	4.490**	6.419***	31.288***	3.167	5.447***	32.399***	3.547**	-0.849	-0.522	-2.523

	(4.71)	(6.25)	(2.55)	(2.77)	(4.50)	(1.23)	(3.01)	(3.80)	(1.97)	(-0.54)	(-0.12)	(-1.14)
Macropr index * CAP	-0.078**	-0.492***	-0.057	-0.091	-0.326	-0.092	-0.042	-0.219	-0.036	-0.016	-0.091	-0.010
	(-2.29)	(-3.77)	(-1.19)	(-1.14)	(-1.59)	(-0.93)	(-1.08)	(-1.63)	(-1.13)	(-0.43)	(-0.74)	(-0.17)
Macropr index *Crisis*CAP	-0.713***	-3.173***	-0.367**	-0.593***	-2.691***	-0.280	-0.436***	-2.802***	-0.282**	0.026	0.117	0.147
	(-4.72)	(-5.28)	(-2.54)	(-2.81)	(-3.65)	(-1.19)	(-3.05)	(-3.64)	(-2.06)	(0.28)	(0.36)	(0.96)
Intercept	-18.2***	-13.0***	-15.1***	-15.8***	-8.335	-15.9***	-9.290**	-6.341	-7.8*	-23.8***	-23.98***	-22.1***
	(-4.79)	(-3.61)	(-4.20)	(-2.89)	(-1.63)	(-2.81)	(-2.53)	(-1.49)	(-1.92)	(-3.27)	(-3.69)	(-3.22)
m1	-9.38***	-9.10***	-9.48***	-6.08***	-5.97***	-6.10***	-6.40***	-6.27***	-6.41***	-3.74***	-3.74***	-3.73***
m2	-1.49	-1.18	-1.78*	-2.40**	-1.83*	-2.59**	0.40	0.72	0.38	-0.92	-0.92	-0.93
Hansen test	0.000	0.000	0.000	0.976	0.932	0.966	0.247	0.082	0.155	1.000	1.000	1.000
#observations	12440	12440	12440	5056	5056	5056	5654	5654	5654	1730	1730	1730
#banks	2041	2041	2041	742	742	742	913	913	913	386	386	386

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include*: CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; *QLP* – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. *Macropr index* covers one of three types of macroprudential policy indices: *MPI aggregated, BORROWER* and *FINANCIAL*. Bank size is captured by total average assets in the whole research period: large is a dummy variable equal to 1 if a bank belongs to the 30% corresponding to the largest banks; medium is a dummy variable equal to 1 if a bank belongs to the next 40% of banks; small is a dummy variable equal to 1 if a bank belongs to the last 20% of banks with the smallest assets. Reported regressions are estimated with the dynamic two-step system-GMM estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 10. Sensitivity of results to change in estimation technique – 1-step system GMM (Arellano&Bond,1991)

	full			large			medium			small		
	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6	7	8	9	10	11	12
Δloan(-1)	0.007	-0.032**	0.023*	0.005	-0.032*	0.015	-0.004	-0.017	0.001	-0.016	-0.015	-0.014
	(0.56)	(-2.41)	(1.79)	(0.32)	(-1.90)	(0.87)	(-0.18)	(-0.84)	(0.03)	(-0.68)	(-0.65)	(-0.63)
CAP	0.617***	0.519***	0.481***	0.320***	0.158**	0.276***	0.534***	0.480***	0.470***	0.331***	0.314***	0.333***
	(10.19)	(12.21)	(8.36)	(3.04)	(2.23)	(2.77)	(7.54)	(9.09)	(6.90)	(3.95)	(4.76)	(4.04)
ΔCAP	-0.151***	-0.193***	-0.136***	-0.046	-0.103	-0.042	-0.194***	-0.216***	-0.190***	-0.096	-0.104*	-0.093
	(-4.11)	(-5.29)	(-3.70)	(-0.64)	(-1.45)	(-0.59)	(-3.81)	(-4.25)	(-3.72)	(-1.56)	(-1.68)	(-1.50)
Dep	0.022**	0.038***	0.016*	0.027**	0.011	0.024*	0.035***	0.043***	0.027**	-0.039	-0.025	-0.037
	(2.48)	(4.13)	(1.72)	(2.05)	(0.84)	(1.79)	(2.89)	(3.52)	(2.16)	(-1.62)	(-1.06)	(-1.49)
Depbanks	0.084***	0.090***	0.062***	0.152***	0.137***	0.142***	0.027*	0.031**	0.013	-0.086***	-0.077***	-0.092***
	(6.63)	(7.11)	(4.75)	(7.21)	(6.62)	(6.65)	(1.73)	(1.97)	(0.79)	(-3.27)	(-2.87)	(-3.44)
QLP	0.097	-0.038	0.100	0.280**	0.212*	0.313**	-0.083	-0.199**	-0.075	0.103	0.072	0.095
	(1.30)	(-0.52)	(1.32)	(2.24)	(1.72)	(2.50)	(-0.82)	(-2.00)	(-0.74)	(0.74)	(0.52)	(0.68)
size	1.807***	1.497***	1.749***	1.374***	1.042***	1.421***	1.490***	1.318***	1.476***	2.491***	2.358***	2.367***
	(14.00)	(11.98)	(13.74)	(7.14)	(5.52)	(7.44)	(8.17)	(7.38)	(8.15)	(6.96)	(6.51)	(6.67)
GDPG per capita	0.094**	-0.029	0.169***	0.290***	0.125*	0.363***	-0.019	-0.105**	0.012	0.036	0.063	0.020
	(2.51)	(-0.76)	(4.56)	(4.60)	(1.96)	(5.85)	(-0.37)	(-2.03)	(0.24)	(0.37)	(0.64)	(0.20)
ΔUnempl	-0.554***	-0.625***	-0.468***	-0.631***	-0.763***	-0.526***	-0.510***	-0.527***	-0.492***	-0.317	-0.199	-0.383
	(-4.87)	(-5.55)	(-4.09)	(-3.36)	(-4.14)	(-2.80)	(-3.29)	(-3.42)	(-3.15)	(-1.00)	(-0.63)	(-1.20)
Crisis	-11.128***	-5.128***	-6.648***	-9.124***	-5.513***	-4.612**	-7.035***	-3.934***	-4.550***	0.441	-1.049	2.707
	(-9.65)	(-7.97)	(-5.46)	(-5.16)	(-5.45)	(-2.54)	(-5.00)	(-4.53)	(-3.11)	(0.18)	(-0.60)	(1.05)

Crisis*CAP	0.785***	0.218***	0.408***	0.620***	0.183*	0.197	0.400***	0.121*	0.196*	-0.054	-0.014	-0.201
	(8.20)	(4.41)	(4.06)	(3.49)	(1.96)	(1.08)	(3.51)	(1.86)	(1.67)	(-0.42)	(-0.16)	(-1.49)
Macropr index	0.715**	6.298***	-0.114	0.865*	4.440***	0.533	0.172	3.815**	-0.217	0.127	-0.014	0.537
	(2.04)	(5.94)	(-0.26)	(1.66)	(2.96)	(0.85)	(0.42)	(2.54)	(-0.45)	(0.18)	(-0.01)	(0.60)
Macropr index * Crisis	8.217***	37.509***	5.399***	5.797***	32.410***	2.955**	4.795***	30.520***	3.341***	-1.218	-1.196	-3.539**
	(10.50)	(15.54)	(5.45)	(5.34)	(10.39)	(2.19)	(5.39)	(9.25)	(3.04)	(-0.91)	(-0.27)	(-2.03)
Macropr index * CAP	-0.100***	-0.612***	-0.038	-0.101**	-0.461***	-0.081	-0.062*	-0.372***	-0.040	-0.037	-0.095	-0.065
	(-3.39)	(-6.41)	(-1.05)	(-1.97)	(-2.83)	(-1.36)	(-1.86)	(-2.64)	(-1.07)	(-1.00)	(-0.83)	(-1.29)
Macropr index *Crisis*CAP	-0.708***	-3.234***	-0.471***	-0.536***	-2.774***	-0.270**	-0.384***	-2.681***	-0.265***	0.046	0.166	0.209*
	(-10.41)	(-13.94)	(-5.48)	(-4.89)	(-7.88)	(-2.02)	(-5.10)	(-8.41)	(-2.88)	(0.58)	(0.62)	(1.93)
Intercept	-29.1***	-24.4***	-26.4***	-23.0***	-14.7***	-23.2**	-22.1***	-20.0***	-20.7***	-26.6***	-26***	-25.3 ***
	(-13.30)	(-11.76)	(-12.52)	(-6.45)	(-4.26)	(-6.63)	(-7.87)	(-7.36)	(-7.55)	(-6.24)	(-6.05)	(-6.16)
m1	-38.05***	-37.86***	-38.22***	-27.98***	-28.00***	-27.98***	26.73***	-27.04***	-26.58***	-16.58***	-16.54***	16.63***
m2	-2.48**	-1.96*	-2.83***	-3.46***	-2.78*	-3.73***	0.12	0.48	-0.01	-1.92*	-1.88*	-1.94*
Sargan test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
# observations	12440	12440	12440	5056	5056	5056	5654	5654	5654	1730	1730	1730
# banks	2041	2041	2041	742	742	742	913	913	913	386	386	386

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets*; QLP* – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; ΔUnempl – annual change in unemployment rate. *Macropr index* covers one of three types of macroprudential policy indices: *MPI aggregated*, *BORROWER* and *FINANCIAL*. Bank size is captured by total average assets in the whole research period: large is a dummy variable equal to 1 if a bank belongs to the 30% corresponding to the largest banks; medium is a dummy variable equal to 1 if a bank belongs to the next 40% of banks; small is a dummy variable equal to 1 if a bank belongs to the last 30% of banks with the smallest assets. Reported regressions are estimated with the dynamic one-step system-GMM estimator as proposed by Arellano and Bond (1991) for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Table 11. Additional results for consolidated data

	full sample	large	medium	small	full sample	large	medium	small
	GMM 2 step lag(1 1)	GMM 2 step lag(1 1)	GMM 2 step lag(1 1)	GMM 2 step lag(1 1)	GMM 1 step lag(1 4)	One step lag(1 4)	One step lag (1 4)	One step lag(1 4)
	1	2	3	4	5	6	7	8
Δloan(-1)	0.350***	0.279***	0.289***	0.181***	0.209***	0.212***	0.205***	0.151***
	8.440	4.990	5.040	3.860	11.790	9.070	8.060	6.360
CAP	1.424***	1.188***	0.990**	0.408	1.385***	1.233***	0.873***	0.423*
	4.900	3.200	2.290	1.140	8.040	4.580	3.210	1.760
ΔCAP	-0.847***	-0.697**	0.030	-0.942***	-0.368***	-0.344*	0.290	-0.781***
	-3.440	-1.980	0.080	-3.820	-2.870	-1.740	1.230	-3.410
Dep	-0.032	-0.075*	0.004	-0.247	-0.072*	-0.086**	0.011	-0.217**
	-0.550	-1.660	0.060	-1.170	-1.920	-2.100	0.200	-2.400
Depbanks	0.004	0.104*	0.047	-0.136	0.062*	0.141***	0.070	-0.113**
	0.070	1.690	1.000	-1.550	1.890	2.980	1.560	-2.300
QLP	-0.150	-0.706*	-0.776*	1.019	-0.053	-0.642**	-0.460	1.084***
	-0.290	-1.780	-1.610	1.060	-0.240	-2.160	-1.270	2.610
size	0.959	-1.693*	-2.747	-0.870	-0.306	-1.697*	-4.001***	-0.547
	0.900	-1.650	-1.500	-0.370	-0.390	-1.930	-2.940	-0.280
GDPG per capita	0.338***	0.491***	0.568***	0.692**	0.706***	0.655***	0.785***	0.826***
	2.580	3.120	3.100	2.290	7.200	5.090	4.950	3.550
ΔUnempl	-2.140***	-2.796***	-1.753	-2.222***	-2.252***	-2.808***	-1.801***	-2.167***
	-7.590	-8.150	-4.140	-2.950	-8.430	-7.780	-3.970	-3.320
CRISIS	0.956	-1.236	4.658	11.308*	3.659	-0.941	4.978	11.678**
	0.330	-0.300	1.240	1.790	1.340	-0.290	1.230	2.160
Crisis*CAP	-0.660*	-0.692	-0.903*	-1.242***	-0.891***	-0.703*	-0.896**	-1.265***
	-1.820	-1.300	-1.880	-2.630	-2.990	-1.730	-2.060	-2.850
Macropr index	-0.391	-1.438	-0.513	0.921	-0.225	-1.511	-0.163	2.019
	-0.270	-1.130	-0.220	0.300	-0.230	-1.440	-0.110	1.030
Macropr index*Crisis	3.849*	5.340**	2.124	-5.324	2.769	5.490***	1.501	-5.442
	1.840	2.330	0.720	-1.270	1.360	2.880	0.540	-1.490
Macroprud	0.120	0.177	0.174	0.074	0.107	0.187	0.150	-0.022

index*CAP								
	0.680	0.930	0.630	0.270	1.020	1.350	0.940	-0.140
Macroprud index *Crisis*CAP	-0.527**	-0.537*	-0.391	0.282	-0.400*	-0.565**	-0.329	0.287
	-2.030	-1.760	-1.060	0.720	-1.770	-2.460	-1.070	0.870
Intercept	-9.010	17.693	17.709	28.423	3.183	18.082*	26.585**	23.637
	-0.770	1.580	1.060	1.240	0.410	1.950	2.260	1.470
m1	-7.78***	-5.33***	-4.42**	-4.64**	-24.24***	-19.33***	-16.75***	-11.35***
m2	2.22**	0.82	1.03	0.89	1.59	0.52	0.83	0.88
Hansen/Sargan test	0.991	1.000	1.000	1.000	0.000	0.000	0.000	0.000
# observations	5497	2277	2022	1198	5497	2277	2022	1198
# banks	746	270	280	196	746	270	280	196

This table presents the coefficient estimates of loans growth on bank – specific determinants, macroeconomic variables and macroprudential indices. The bank-specific determinants include: *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; QLP – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. *Macropr index* covers one of three types of macroprudential policy indices: *MPI aggregated*, *BORROWER* and *FINANCIAL*. Bank size is captured by total average assets in the whole research period: large is a dummy variable equal to 1 if a bank belongs to the 30% corresponding to the largest banks; medium is a dummy variable equal to 1 if a bank belongs to the next 40% of banks; small is a dummy variable equal to 1 if a bank belongs to the last 30% of banks with the smallest assets. Reported regressions are estimated with the dynamic two-step system-GMM (with up to one lag of bank-specific variables) estimator as proposed by Blundell-Bond (1998) with Windmeijer's (2005) finite-sample correction and Arellano and Bond (1991) (with up to four lags of bank-specific variables) for the period of 2000-2011 for panel data with lagged dependent variable. All regressions include country and year dummies and interactions between country and year dummies. T-statistics are given in parentheses. ***, ** or * next to coefficients indicate that coefficients are significantly different from zero at the 1%, 5%, or 10% levels, respectively. # - denotes the number of.

Appendix

Table A1. Sample medians by country and country classification

	Country	Δloan	CAP	ΔCAP	Dep	Depbanks	QLP	size	GDPG per capita	ΔUnempl	# observations (Loans growth)	# banks (loans growth)	Country classification	
1	Argentina	0.77	12.22	-0.03	40.82	2.18	1.73	12.50	7.03	-0.60	479	56	Closed	Emerging
2	Australia	4.43	6.20	-0.03	52.00	2.83	0.20	16.11	1.73	-0.40	192	21	Open	Advanced
3	Austria	2.00	8.77	-0.02	51.96	18.19	0.57	13.04	1.51	-0.05	510	57	Open	Advanced
4	Belgium	1.91	5.37	0.02	56.17	24.50	0.13	14.56	1.22	-0.10	230	25	Open	Advanced
5	Brazil	2.61	14.66	-0.38	30.08	5.41	2.22	13.56	2.34	-0.60	730	82	Closed	Emerging
6	Bulgaria	3.43	11.53	-0.31	64.95	9.00	0.82	12.55	6.50	-1.25	175	19	Closed	Emerging
7	Canada	3.80	11.41	0.26	71.33	18.36	0.21	13.16	1.66	-0.30	106	11	Open	Advanced
8	Chile	2.66	10.01	-0.15	61.99	1.88	0.85	14.37	3.28	-0.35	162	21	Open	Emerging
9	China	6.42	5.11	-0.10	78.26	4.50	0.80	15.62	9.21	-0.10	430	54	Closed	Emerging
10	Colombia	1.02	11.37	0.00	68.27	8.33	1.99	14.46	2.61	-0.20	173	17	Closed	Emerging
11	Croatia	4.41	12.57	-0.44	68.64	2.94	0.84	12.45	4.10	-0.65	274	29	Open	Emerging
12	Cyprus	4.47	7.24	-0.22	81.40	1.99	1.07	13.07	1.63	-0.05	53	7	Open	Advanced
13	Czech Republic	8.46	7.59	0.09	72.50	7.21	0.34	14.67	3.54	-0.50	140	15	Open	Advanced
14	Ecuador	1.50	9.99	-0.09	78.04	3.67	1.27	11.65	2.05	-0.05	254	27	Closed	Emerging
15	El Salvador	0.95	10.90	0.40	67.53	.	1.60	12.89	1.62	-0.20	99	10	Closed	Emerging
16	Estonia	4.66	10.45	-0.08	54.63	11.19	0.42	12.75	7.64	-0.70	55	6	Open	Advanced
17	Finland	5.94	5.43	-0.19	40.00	11.11	0.02	16.56	2.39	-0.40	50	5	Open	Advanced
18	France	2.59	6.77	-0.01	51.85	18.35	0.40	14.15	1.34	-0.10	979	102	Open	Advanced
19	Germany	2.25	7.11	0.00	56.58	22.63	0.57	13.57	1.38	-0.25	1086	114	Open	Advanced
20	Ghana	1.04	10.95	-0.39	70.59	9.75	3.20	11.93	3.04	-0.10	139	16	Closed	Low-Income Developing
21	Hong Kong	1.48	10.50	0.00	75.00	3.36	0.75	15.87	4.82	-0.80	231	27	Open	Advanced
22	Hungary	1.36	10.01	0.14	33.25	44.07	1.07	13.14	4.02	0.15	100	11	Open	Emerging
23	Iceland	-0.92	5.80	0.10	22.71	8.96	0.75	15.43	1.91	0.20	5	1	Open	Advanced
24	India	2.55	5.77	0.05	80.95	2.79	0.94	15.54	6.23	-0.10	606	54	Closed	Emerging
25	Indonesia	1.64	10.67	0.13	76.92	2.24	0.72	13.59	3.77	-0.35	382	41	Open	Emerging

26	Ireland	3.07	4.71	-0.24	38.46	31.58	0.18	16.71	2.53	0.25	87	10	Open	Advanced
27	Israel	1.45	6.12	0.11	85.00	1.91	0.70	16.34	2.83	-0.45	92	9	Open	Advanced
28	Italy	4.97	8.18	-0.17	48.14	8.71	0.56	14.77	0.69	-0.35	725	80	Open	Advanced
29	Jamaica	0.11	11.81	0.35	65.30	2.56	0.57	13.36	0.45	-0.25	56	6	Open	Emerging
30	Japan	7.88	4.79	0.04	90.91	0.61	0.44	16.86	1.38	-0.10	1281	120	Open	Advanced
31	Jordan	1.42	10.26	0.57	75.65	10.91	0.78	15.83	3.21	-0.10	22	2	Open	Emerging
32	Kazakhstan	2.31	13.63	-0.99	59.43	10.04	1.48	12.45	8.79	-0.50	82	9	Closed	Emerging
33	Kenya	0.65	14.47	-0.06	76.49	3.29	1.29	11.58	1.68	0.00	251	28	Closed	Low-Income Developing
34	Latvia	5.09	9.17	-0.43	71.96	10.14	0.56	12.81	8.09	-0.75	195	20	Open	Advanced
35	Lithuania	6.45	9.05	-0.46	61.86	20.80	0.76	13.54	8.07	-0.70	93	10	Closed	Emerging
36	Malaysia	2.54	8.76	0.10	66.23	12.61	0.65	15.61	3.53	-0.05	247	24	Closed	Emerging
37	Malta	3.14	7.64	0.53	85.36	3.39	0.13	14.31	1.95	-0.20	28	3	Open	Advanced
38	Mexico	0.53	11.58	-0.38	52.45	9.81	1.65	13.46	1.82	0.10	160	22	Open	Emerging
39	Morocco	4.59	8.06	-0.25	77.42	5.71	0.88	15.42	3.62	-0.25	71	7	Closed	Emerging
40	Netherlands	4.32	8.24	0.04	67.27	13.58	0.07	14.81	1.35	0.00	144	19	Open	Advanced
41	New Zealand	2.43	4.91	0.01	61.76	2.75	0.12	15.91	1.86	-0.15	79	8	Open	Advanced
42	Norway	3.56	6.63	-0.35	52.51	10.92	0.16	14.77	1.22	0.15	90	11	Open	Advanced
43	Pakistan	0.67	7.91	0.13	74.13	9.70	1.06	14.22	1.59	-0.10	176	18	Closed	Emerging
44	Peru	3.04	10.08	0.10	63.83	14.00	1.57	13.79	4.55	-0.10	105	11	Closed	Emerging
45	Philippines	0.97	12.04	-0.52	74.07	0.29	1.34	14.08	2.63	-0.15	213	23	Closed	Emerging
46	Poland	4.20	10.03	-0.21	53.53	25.77	0.68	13.81	3.72	-0.15	283	34	Closed	Emerging
47	Portugal	4.71	6.75	0.01	36.00	31.01	0.73	15.04	0.90	0.65	122	15	Open	Advanced
48	Romania	1.19	13.18	-0.69	56.12	17.66	1.32	12.82	6.44	0.10	170	19	Closed	Emerging
49	Russian Federation	1.12	15.41	-0.57	17.01	1.36	0.64	11.11	6.22	-0.75	3466	557	Closed	Emerging
50	Singapore	1.98	11.84	0.05	62.61	12.14	0.14	15.14	4.83	-0.15	87	9	Open	Advanced
51	Slovakia	2.82	8.49	0.05	70.97	10.12	0.87	13.82	5.01	-0.80	81	9	Open	Advanced
52	Slovenia	2.23	8.65	-0.26	59.68	17.68	1.05	14.46	3.42	-0.10	109	12	Open	Advanced
53	South Africa	1.96	8.36	-0.04	73.78	6.27	0.88	12.44	2.00	-0.05	146	14	Closed	Emerging
54	South Korea	2.39	5.40	0.22	61.90	0.21	0.93	16.99	4.13	-0.10	155	15	Closed	Advanced
55	Spain	4.20	6.27	-0.10	56.72	21.70	0.52	14.81	1.37	-0.15	314	37	Open	Advanced
56	Sri Lanka	0.35	7.40	-0.12	74.03	2.38	0.96	13.42	5.06	-0.65	123	12	Closed	Emerging
57	Sweden	6.63	10.64	-0.16	77.11	1.52	0.13	13.48	2.21	0.15	145	16	Open	Advanced
58	Switzerland	5.45	11.51	0.07	54.17	5.61	0.17	12.65	1.44	-0.05	1093	115	Open	Advanced
59	Thailand	2.37	8.96	0.07	74.45	4.09	0.94	15.66	3.98	-0.15	178	18	Closed	Emerging

60	Tunisia	1.49	8.86	-0.28	71.43	4.87	1.39	14.15	3.28	-0.20	145	15	Closed	Emerging
61	Turkey	0.17	11.99	0.50	64.64	5.03	2.13	15.10	4.93	0.10	63	8	Closed	Emerging
62	Uganda	1.91	14.70	0.17	70.62	2.98	1.09	11.40	3.17	0.00	111	11	Closed	Low-Income Developing
63	Ukraine	2.69	12.03	-0.83	58.16	18.05	1.99	12.67	6.61	-0.45	224	25	Closed	Emerging
64	United Kingdom	2.91	8.88	-0.10	48.17	20.61	0.34	14.40	1.95	-0.05	928	101	Open	Advanced
65	United States	1.07	9.78	0.03	84.57	2.00	0.32	11.64	1.27	0.10	69271	6562	Open	Advanced
	Total										89051	8872	closed= 28 countires	advanced= 31 countries
													open= 37countries	Emerging = 31 countries
														Low-income developing = 3 countries

This table provides a description of the sample. It includes sample medians of 2000-2011 and the number of banks and observations for the dependent variable. The classification of countries is taken from Cerutti et al. (2015); Δ*Loans* – real loans growth; *CAP* – equity capital divided by total assets; Δ*CAP* – annual change in capital ratio; *Dep* – nonfinancial borrowers deposits divided by total assets; *Depbanks* – interbank deposits divided by total assets; QLP – loan loss provisions divided by average loans; size – logarithm of total assets. Macroeconomic variables include: *GDPG per capita* – real GDP growth per capita; Δ*Unempl* – annual change in unemployment rate. n.a. denotes countries not covered in the classification; #denotes full number of observations or banks

Table A2. Values of macroprudential policy indices and macroprudential instruments use in 2000-2011

	Type of macroprudential index			Type of macroprudential policy instrument											
Country	MPI aggregated	borrower	financial	LTV	LTV_CAP	DTI	DP	LEV	Inter	CONC	FC	RR	RR_REV	CG	TAX
Argentina	4.6	0.0	4.6	1	0	0	0	0	1	1	1	1	1	1	0
Australia	1.0	0.0	1.0	0	0	0	0	0	1	0	0	0	0	0	0
Austria	0.1	0.0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Belgium	2.0	0.0	2.0	0	0	0	0	0	0	1	0	0	0	0	1
Brazil	2.0	0.0	2.0	0	0	0	0	0	0	1	0	1	1	0	0
Bulgaria	2.6	0.5	2.2	0	0	0	0	0	0	1	0	0	0	0	0
Canada	3.5	0.5	3.0	0	0	0	0	1	1	1	0	0	0	0	0
Chile	6.0	2.0	4.0	1	1	1	0	1	1	1	0	0	0	0	1
China	3.3	1.3	2.0	0	1	1	1	0	0	1	0	0	0	0	0
Colombia	6.4	2.0	4.4	1	1	1	0	0	1	1	1	1	0	0	1
Croatia	1.1	0.0	1.1	0	0	0	0	0	1	0	0	0	0	0	0
Cyprus	0.7	0.7	0.0	0	1	0	0	0	0	0	0	0	0	0	0
Czech Republic	1.0	0.0	1.0	0	0	0	0	0	0	1	0	0	0	0	0
Ecuador	4.6	0.8	3.8	0	0	1	0	1	0	1	0	0	0	1	1
El Salvador	1.0	0.0	1.0	0	0	0	0	0	0	1	0	1	0	0	0
Estonia	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Finland	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
France	2.0	0.0	2.0	0	0	0	0	0	1	1	0	0	0	0	0
Germany	0.2	0.0	0.2	0	0	0	0	0	0	0	0	0	0	0	0
Ghana	2.6	0.0	2.6	0	0	0	0	0	0	1	0	0	0	1	1
Hong Kong	3.0	2.0	1.0	1	1	1	0	0	0	1	0	0	0	0	0
Hungary	0.3	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Iceland	1.9	0.0	1.9	0	0	0	0	0	0	1	1	0	0	0	0
India	1.4	0.0	1.4	0	0	0	0	0	0	1	0	0	0	0	0
Indonesia	0.5	0.0	0.5	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Israel	1.1	0.1	1.0	0	0	0	0	0	0	1	0	0	0	0	0
Italy	2.0	0.0	2.0	0	0	0	0	0	1	1	0	0	0	0	0
Jamaica	1.5	0.0	1.5	0	0	0	0	1	0	0	0	0	0	0	1
Japan	1.0	0.0	1.0	0	0	0	0	0	0	1	0	0	0	0	0
Jordan	2.6	0.0	2.6	0	0	0	0	1	0	1	1	0	0	0	0
Kazakhstan	1.0	0.0	1.0	0	0	0	0	0	0	0	0	1	1	0	0
Kenya	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Latvia	0.4	0.4	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Malaysia	2.0	1.0	1.0	1	1	0	0	0	0	0	0	0	0	1	0
Malta	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	1.8	0.0	1.8	0	0	0	0	0	1	1	0	0	0	0	0
Morocco	3.0	0.0	3.0	0	0	0	0	0	1	1	1	0	0	0	0
Netherlands	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
New Zealand	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	1.2	0.2	1.0	0	0	0	0	0	0	1	0	0	0	0	0
Pakistan	5.9	1.5	4.4	1	1	0	0	0	1	1	1	1	0	0	1
Peru	3.3	0.0	3.3	0	0	0	0	0	1	1	0	1	1	0	0
Philippines	1.8	0.0	1.8	0	0	0	0	0	0	1	0	1	0	0	1
Poland	1.1	0.1	1.0	0	0	0	0	0	0	1	0	0	0	0	0

Portugal	0.2	0.0	0.2	0	0	0	0	0	0	0	0	0	0	0	0
Romania	2.7	1.0	1.7	0	1	1	0	0	1	1	0	1	0	0	0
Russian Federation	1.0	0.0	1.0	0	0	0	0	0	0	1	0	0	0	0	0
Singapore	1.8	1.0	0.8	1	1	0	0	0	0	1	0	1	0	0	0
Slovakia	1.0	1.0	0.0	1	1	0	0	0	0	0	0	0	0	0	0
Slovenia	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
South Africa	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
South Korea	1.7	1.4	0.4	1	1	0	0	0	0	0	0	0	0	0	0
Spain	3.0	1.0	2.0	1	1	0	1	0	0	1	0	0	0	0	0
Sri Lanka	1.0	0.0	1.0	0	0	0	0	0	0	1	0	1	0	0	0
Sweden	0.1	0.1	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Switzerland	1.0	0.0	1.0	0	0	0	0	0	0	0	0	0	0	0	0
Thailand	0.7	0.7	0.0	0	1	0	0	0	0	0	0	0	0	0	0
Tunisia	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
Turkey	1.6	0.4	1.3	0	0	0	0	0	0	1	0	0	0	0	0
Uganda	0.7	0.0	0.7	0	0	0	0	0	1	0	0	0	0	0	0
Ukraine	3.6	0.0	3.6	0	0	0	0	0	1	1	1	1	1	0	0
United Kingdom	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0
United States	2.9	0.0	2.9	1	0	0	0	1	1	1	0	1	0	0	0

This table includes values of macroprudential policy indices and of individual macroprudential policy instruments per country. Macroprudential policy index covers one of three types of macroprudential policy indices: MPI aggregated, *BORROWER* and *FINANCIAL*. Individual macroprudential policy instruments include: loan-to-value ratio (*LTV*), loan-to-value ratio caps (*LTV_CAP*) debt-to-income ratio (*DTI*), dynamic loan-loss provisioning (*DP*), leverage ratio (*LEV*), limits on interbank exposures (*INTER*), limits on foreign currency loans (*FC*), reserve requirements ratios (*RR*), limits on domestic currency growth (*CG*), levy/tax on financial institutions (*TAX*), and *FX* and/or countercyclical reserve requirements (*RR_REV*). To test our hypotheses, for each country we construct a dummy variable which takes the value of 1 if the instrument was applied at least since 2005, and 0 otherwise.