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Macroprudential policy effect on the link between lending and capital ratio – the role of economic development and capital account openness

Introduction

Previous studies on the effects of the capital ratio on bank lending [see Chiuri et al., 2002] document the fact that these effects are much stronger in emerging markets. Additionally, the contemporary analyses of 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 expect that the reduction of the relation between lending and capital due to macroprudential policies is stronger in emerging economies and in closed ones, because these countries have applied microprudential instruments which started to be recognized as macroprundential after the Global Financial Crisis.

We use the Bankscope database and the data-set on macroprudential policies available in Cerutti et al. [2015] to test our hypotheses. We analyze the effects of macroprudential policies on the lending and capital ratio dependency 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.

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 contains the conclusions.

1. Related literature and hypothesis

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 hypothesis.

The empirical literature on the role of bank capital in loan supply can be divided into two basic streams. The first focuses on the impact of the Basel I Accord (in the 1990s) and aims at answering the question whether the newly introduced uniform capital ratios had an effect on bank behaviour [for a review see Chiuri et al. 2002, p. 884] and on the economy in which it operates. The second stream 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; and Labonne and Lame 2014]. Generally, the studies 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 advanced], bank size, the business cycle stage [boom versus downturn] as well as to differences in the estimation methods. In our study we thus test the role of macroprudential policies in this link, controlling for the role of economic development and capital account openness.

The empirical evidence on the effectiveness of macroprudential policies in managing the resilience of the financial sector, and thus financial stability, is still preliminary. The literature presenting this evidence falls into two groups, of which the first includes cross-country studies instruments [Lim et al. 2011; Crowe et al. 2011; Dell' Ariccia et al. 2012; Claessens et al. 2013, 2014; Kutner and Shim 2013; Zhang and Zoli 2014, 2016; Cerutti et al. 2015] and the other covers

micro-level evidence mostly based on the use of one, or a few, macroprudential policies [Jiménez et al. 2012; Aiyar et al. [2013]. The studies in the cross-country context show 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 [Lim et a., 2011]; LTV caps have the best chance to curb a real estate boom [Crowe et al. 2011]. These studies also show that macroprudential instruments can reduce the incidence of general credit booms [Dell' Ariccia et al. 2012] and 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 [Claessens et al. [013, 2014]. Cerutti et al. [2015] 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. Microeconomic studies find that dynamic provisioning can be useful in taming credit supply cycles, even though it did not suffice to stop the boom [Jiménez et al. 2012] and that bank-specific higher capital requirements dampened lending by banks, with quite strong aggregate effects [Aiyar et al. 2013].

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. **We therefore hypothesize that 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 closed markets.**

2. The model specification and data description

2.1. 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. 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; Peek and Rosengren, 1995] and extended in contemporary research [Berrospide and Edge, 2010; Beatty and Liao, 2011; Carlson et al., 2013]. We apply a reduced form model [equation [1]], including both supply and demand side of the lending market and macroprudential policies:

$$\Delta Loan_{i,t} = \alpha_1 \Delta Loan_{i,t-1} + \alpha_2 CAP_{i,t-1} + \alpha_3 \Delta CAP_{i,t-1} + \alpha_4 Dep_{i,t-1} + \\ + \alpha_5 Depbank_{i,t-1} + \alpha_6 QLP_{i,t-1} + \alpha_7 size_{i,t} + \alpha_8 GDPpercapita_{j,t-1} + \\ + \alpha_9 \Delta Unempl_{j,t-1} + \alpha_{10} Crisis + \alpha_{11} Crisis^* CAP_{i,t-1} + \alpha_{12} Macroprud_j + \\ + \alpha_{13} Macroprud_j^* Crisis + + \alpha_{14} Macroprud_j^* CAP_{i,t-1} + \\ + \alpha_{15} Macroprud_j^* CAP_{i,t-1}^* Crisis + \alpha_{16} \Sigma_{j=1}^{65} Country_j + \alpha_{17} \Sigma_{t=2000}^{2011} T_t + \vartheta_{i,t} + \varepsilon_t \quad [1]$$

where:
i – the number of the bank;
j – the number of country;
t – the number of observation for the i-th bank;
$\Delta Loan$ – real annual loans growth rate;
CAP – the lagged capital ratio, i.e. equity capital divided by total assets;
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;
$\Delta Unempl$ – 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] has been added to the model in order to investigate the effect of CAP depending on the crisis [the presence or not of a period of crisis];
elements $\Sigma_{j=1}^{65} Country_j$ relate to a set of country dummy variables and $\Sigma_{t=2000}^{2011} T_t$ to a set of time dummies;
$\vartheta_{i,t}$ – 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*] – 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 the countries with a larger set of macroprudential instruments bank lending is relatively less [more] affected by capital ratio in a non-crisis period in comparison to the 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 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 the 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 the 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[1]. 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*, Δ*CAP*, *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].

2.2. 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. We focus on that period because we want our results to be unbiased by effects of implementation of Basel III standards, which effectively started around 2012 in many countries around the globe. 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. As macroprudential policy measures we include indices designed by the IMF and presented in Claessens et al. [2014], i.e.: *MPI aggregated* [which is an average value of macroprudential

[1] 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].

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 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]. 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.

As expected, macroprudential policies are more extensively applied in emerging markets and closed-capital-account economies than in advanced and open-capital-account countries [see Table 1]. 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 [for more details refer to Olszak et al., 2016].

Table 1
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

Source: Authors' calculations.

3. Results

In Table 2 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 the prediction expressed in our hypothesis, 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 may have increased resilience of banks in emerging markets, which could potentially weaken the positive relation between capital ratio and loan supply. Our results in Table 2 [columns 4–6] are consistent with this prediction, because the coefficients on triple interaction are negative and statistically significant at 1%.

Differentiating by the level of capital account openness, in Table 3, 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 5 in Table 3], 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 a non-crisis period.

Borrower-targeted instruments do not seem to weaken the association between loans growth and capital ratio during the crisis in open-capital-account countries. Additionally, whereas capital ratios do not seem to constrain lending in crisis in open economies, they do constrain bank lending significantly in closed economies.

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Table 2

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

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.

Source: Authors' calculations.

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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 impact of capital ratio on lending is apparently ineffective in these countries. As for closed-capital-account economies, they may have more strictly regulated financial system [less liberalized] and borrowers do not have an 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 result gives us empirical support to a 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.

Table 3

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]

	Open capital account			Closed capital account		
	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6
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***

Table 3 – continued

	Open capital account			Closed capital account		
	MPI aggregated	BORROWER	FINANCIAL	MPI aggregated	BORROWER	FINANCIAL
	1	2	3	4	5	6
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

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.

Source: Authors' calculations.

Conclusions

In this paper, we test whether the association between lending and capital ratio is weakened by macroprudential policies. Comparing the effects of macroprudential policies on the relation 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.

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. However, the effectiveness of macroprudential policy depends on the economic development and capital account openness.

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Macroprudential policy effect on the link between lending and capital ratio – the role of economic development and capital account openness

Summary

In this paper we ask about the role of macroprudential policies to affect the link between lending and capital ratio in countries differing in economic development and capital account openness. To resolve this problem we apply the GMM 2-step Blundell and Bond approach to a sample covering over 60 countries. Our results 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. 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.

***Keywords*:** loan supply, capital ratio, procyclicality, macroprudential policy