Do the macro-prudential policies jeopardise banking competition? [1]

By

Ali Mirzaei[a] and Tomoe Moore[b]

[a] Finance Department, School of Business Administration,
American University of Sharjah, PO Box 26666,
Sharjah, United Arab Emirates, Tel: + 97 165154645, amirzaei@aus.edu

[b] Department of Economics and Finance, Brunel University London,
Uxbridge, Middlesex, UB8 3PH, UK.
Tel: + 44 1895274000, Fax: +44 1895269770, tomoe.moore@brunel.ac.uk

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Abstract

Macro-prudential policies that are adopted to strengthen the resilience of the financial sector to systemic risk impose additional restrictions on bank lending and other activities, altering the structure of the banking sector. In this paper, we empirically investigate the extent to which macro-prudential instruments affect one of the bank characteristics, bank competition, for a sample of 58 countries. The robust finding is that macro-prudential policies are adversely affecting bank competition, in particular, this is driven by liquidity- and capital-related instruments. The negative effect can, however, be mitigated in countries with high institutional quality and high bank supervisory powers.

1. Introduction

It is a burdensome exercise to promote an efficient and competitive banking system, while maintaining sufficient regulatory oversight to enhance confidence in the safety and stability of the financial system. One policy that may affect the structure and hence the performance of the banking sector is the wave of macro-prudential policies (MP) used by the authorities as an overarching framework to address the stability of the financial system. Existing literature, indeed, suggests that MP can be a crucial element of the toolkit aimed at overall financial stability enhancement[2], especially, for countries exposed to international shocks. However, the adoption of such policies may also entail some costs. In particular, in as much as MP affect resource allocation, they may potentially limit (efficient) financial sector development. Moreover, badly adopted or wrongly implemented tools imply further distortions and possibly even work perversely (Claessens et al. 2013).

It is argued that MP may dampen profits, but boost mergers and acquisitions resulting in a more concentrated banking sector, in particular, when small banks become vulnerable to the policies. For example, with the decline of bank loans due to credit-related MP, banks may suffer from fewer economies of scale and a lesser degree of product and loan diversification. This adverse effect is likely to be stronger in medium sized and small banks, affecting their franchise value, which might induce more mergers and acquisitions. In terms of capital-related MP, well-capitalized banks increase banks' creditworthiness, reducing cost of funding and assuring a lower risk of bankruptcy. Note also that they can possibly increase their portfolio of highly profitable assets, because the accompanying potential risk can be insulated by holding adequate capital. However, small banks may not be able to hold capital in excess of the regulatory minimum, and in order to survive stringent requirements, they may be merged into bigger banks. Another channel through which macroprudential policies affect bank

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[2] Galati and Moessner (2013), for instance, focused on the effectiveness and transmission mechanism of macro-prudential instruments, whereas Claessens et al. (2013) confirm that countries stand to benefit from greater use of MP to reduce the risks arising in their banking systems.

competition is that for instance, tougher capital requirements may act as a barrier for new entrants, thus reducing competition. Therefore, there are concerns that MP may act as a hindrance to the sound operation of the banking sector, which warrants further research and special attention into the side effects of MP.

This paper investigates the impact of MP on one of the crucial bank characteristics, bank competition in countries that have adopted macro-prudential tools. To the best of our knowledge, no study has attempted to analyse the impact of adopted macro-prudential tools on market structure in banks, despite the fact that the policy should have a significant impact on the operation and structure of the banking sector. For example, Claessens et al. (2013) find that macro-prudential measures aimed at borrowers and countercyclical buffers reduce leverage, asset and liabilities growth. Lim et al. (2011) find that credit-related instruments, reserve requirements and dynamic provisioning rules are associated with reductions in the procyclicality of credit and leverage. Such shrinkage of activities on the balance sheet due to MP is likely to adversely affect the level of competitiveness in the banking sector.

We specify macro-prudential instruments as a systemic variable into the competition model with the country-specific control variables for a sample of 58 countries covering 2000 to 2013. The Section 2 is for methodology and date followed by empirical results in Section 3. The Section 4 is for concluding remarks.

2. Methodology and Data

To assess the effect of macro-prudential measures on bank competition, we establish the following model:

$$y_{ct} = \delta_0 + \delta_1 . y_{ct-1} + \delta_2 . MacroP_{ct} + \sum_l \theta_l . X_{l,ct} + \delta_3 . Crisis_t + \varepsilon_{ct} \qquad (1)$$

where c denotes country and t year. The dependent variable is bank competition as measured by the Lerner index. It is the price-cost margin, often used in several studies of banking competition (e.g. Anginer et al. 2014). $MacroP_{ct}$ is an indicator for macro-prudential policies.

The potential impact of the global financial crisis on bank competition is captured by a dummy variable ($Crisis_t$). X_{ct} is a vector of country-level time-variant control variables. We consider the following variables: share of non-interest income; capital ratio; non-performing loans ratio; concentration ratio (a proxy for the structure of the banking system); bank activity restriction; financial conglomerate and bank entry requirement to account for contestability of the respective markets; financial development[3]; deposit insurance dummy; GDP growth and inflation[4]. Due to the endogeneity issue, in particular, banks in emerging economies where the financial system is imperfect, are highly exposed to adverse shocks, leading to an inefficient banking sector. This may, in turn, force policy makers to undertake MP[5]. Hence, we employ Generalized Method of Moments (GMM) and we also present the results based on bank-level data.

The published data at the country-level in the Global Financial Development Database (World Bank) are utilised for the Lerner Index. We also use the Lerner index based on our own estimation at the bank-level using the Bankscope database[6].

The macro-prudential data are retrieved from a comprehensive IMF survey, Global Macro-prudential Policy Instruments covering 2000 to 2013. See Cerutti et al. (2017). We choose 9 instruments due to data availability: loan to value ratio (LTV); debt to income ratio

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[3] The ratio of the sum of domestic credit to private sector and stock market capitalization of listed companies to GDP.

[4] We have also included year dummies. Note, however, the inclusion of country dummies resulted in poor econometrics performance, hence it is not specified. It is conceivable that country-level variables such as financial development, GDP growth and inflation may capture the country specific effects.

[5] Note that we run a MP regression with MP as the dependent variable and control variables and crisis dummy variable as the independent variables. The results are, indeed, indicative of the endogeneity: For example, non-performing loans and activity restriction affect credit-related macro-prudential policies, and capital ratio, conglomerate and financial development affect capital-related policies. The results are available upon request from the authors.

[6] The Lerner index is computed as $L_{it} = \frac{P_{it} - MC_{it}}{P_{it}}$, where P is the price charged by bank i at time t on their assets and MC is the marginal cost. Translog cost function is utilised to derive the total cost (TC). MC is estimated: $MC_{it} = \frac{\partial TC_{it}}{\partial q_{it}}$ where q is the total assets (see e.g. Mirzaei and Moore 2014 for more detail, among others).

(DTI); limits on foreign currency loans (FC); limits on domestic currency loans (CG); reserve requirement ratio (RR); limits on interbank exposures ($INTER$); general countercyclical capital buffer/requirement; time-varying/dynamic loan loss provisioning (DP), general countercyclical capital buffer/requirement (CTC) and leverage ratio for banks (LEV). For each of these policy measures, Cerutti et al. (2017) created a yearly binary variable assigning a value of one if the measure was undertaken, and zero otherwise. Following Lim et al. (2011), we aggregate these measures along the three categories of *credit-related* that is the sum of the scores of LTV, DTI, FC and CG, *liquidity-related* of RR and $INTER$ and *capital-related* of CTC, DP and LEV. In order to take account of potential interactions within each category, we also construct an overall aggregate index of MP (*Total*) that is the sum of scores of all nine instruments[7]. Out of 119 countries reported in Cerutti et al. (2017), 58 countries are selected where the value of *total* for a country is at least 1.

[Figure 1 about here]

Fig. 1 shows total number of macro-prudential measures used over 2000-2013 by country and by instrument type. The increased usage of MP is more evident in emerging economies than advanced economies. This is due to the fact that emerging countries have relatively underdeveloped financial sectors and face volatile capital flows (Cerutti et al. 2017). It appears that both credit-related and liquidity-related instruments were used more frequently than were capital-related policies.

Finally, we retrieve other data from standard financial databases: the Global Financial Development Database, the World Bank Survey on Bank Regulation, and the World Development Indicators. The detailed description of the variables are found in Mirzaei and Moore (2014).

The summary statistics of all the variables are presented in Appendix.

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[7] This amounts to the value of *total* variable being between 0 and 9 for a given country.

3. Empirical results

[Table 1 about here]

The empirical results in Table 1 indicate that *Credit-related* is not significant at the 5% statistical level. Claessens et al. (2013) find that measures aimed at borrowers' LTV and DTI caps and credit growth and foreign currency lending limits are effective in reducing the growth in bank's asset and liabilities. Such measures are expected to exert adverse effects on banks and banks are likely to re-structure their competitive position (Claessens et al. 2013 and Aiyar et al. 2014). The insignificant result, however, implies that banks appear to be indifferent in their competitive behaviour to the policy-induced decline in bank loans. One possible explanation is that the reduced assets may decrease banks' revenues as a whole in a country, forcing individual banks to focus more on the survival of their business as a priority, rather than to engage in any form of competitive strategy[8].

Liquidity-related and *Capital-related* are positively and statistically significant, implying that the policy has a negative effect on competition. Financial institutions-based policies, such as limits on leverage and dynamic provisioning together with bank-specific, higher capital requirements seem to be deteriorating bank competition. It is argued that for instance, reserve requirements and dynamic provisioning rules are associated with reductions in the leverage (Cerutti et al. 2017). It also finds that both (time-varying) capital requirements and *RR*s are significantly negatively-associated with credit growth (IMF 2013). Such a structural change in the balance sheet is translated into lower competition.

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[8] It is argued that the relationship between credit standard and bank competition may be affected by the business cycle, where it is positive during an expansionary period due to a lower probability of default. Low screening activity in credit expansion creates intense price competition among lenders and loans are extended to lower-quality borrowers (Ruckes 2004). In order to ascertain this contention, we have separately estimated the model for only emerging countries where growth is, in general, higher than for the advanced economies. However, we find no relationship between credit-related MP and competition for these economies. The results are available upon request from the authors.

Complicating the assessment of the effectiveness of macro-prudential tools is that measures are often not taken in isolation, but in combination with various instruments, hence the insignificant effect of *Credit-related* may not be indispensable. The overall MP indicator, *MacroP(total)* indeed shows a significant positive effect, clearly indicating the adverse effect of the policy shock on the market structure of the banking sector.

Note that in countries where banks compete aggressively, policy makers may respond to this risk-taking behaviour by undertaking MP to avoid systemic risk, raising the issue of endogeneity. Although we have used the two-step system GMM estimator to account for this, the issue of reverse causality is still inherent in country-level studies and this may not fully solve the problem. Hence, as a robustness test, we re-estimated Eq.(1) by using bank-level data of the Lerner index as the dependent variable. We conjecture that policy makers are unlikely to respond to the degree of market power of individual banks. The result shown in Column (6) again supports the initial result.

[Table 2 about here]

We extend our analysis by taking into account the heterogeneity in the relationship of macro-prudential measures and bank competition across different countries, according to their degree of institutional quality and the quality of bank supervisory power. $MacroP_{ct}$ is interacted by the KKZ and bank supervisory power, respectively[9]. The KKZ indicator measures the quality of institutional development in the country, computed using information on six issues of voice accountability, political stability, a government's effectiveness, regulatory quality, rule of law, and control of corruption. It is argued that official supervision could overcome market failure caused by imperfect information, consequently boosting the governance of bank lending and reducing corruption (Beck et al. 2006). Moreover, powerful and independent supervisory authorities in a well-developed financial system are less prone to financial shocks (Chortareas et al. 2012). The results in Table 2 show that the coefficients on

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[9] The data are collected from Worldwide Governance Indicator for KKZ and World Bank Survey on bank regulation for supervisory powers.

the interaction terms are either insignificant or significantly negative. This implies that if *liquidity-related* and *capital-related* are interacted with either supervisory power or KKZ index, the contraction of competition is either eradicated or reversed. This result is complementary to the study by Barth et al. (2004) and Barth et al. (2013), who find that the presence of high institutional quality and active supervisory agencies appears to improve banks' efficiency and their ability to face any financial distress.

4. Concluding remarks

Although the macro-prudential implementation appears to be fruitful in terms of building the resilience of an economy and a reduction of the probability of a crisis, our empirical results reveal that it may jeopardise bank competition. Our extended analysis, however, suggests that in order to alleviate the adverse impact of prudential regulations on bank performance, the policies have to be underpinned by robust supervision and better institutional arrangements.

Competition in the current study is only one segment of bank performance. The cost should be different from one segment to the other segment of banks' performance. A further study will be required to explore adverse "leakages" of policy implementation that is related to the regulatory burden, distortions or other unintended consequences when MP are undertaken.

Appendix: Summary statistics of all variables for full sample

Variable	Obs.	Mean	S.D.	Min.	0.25	Mdn.	0.75	Max.
Bank competition/stability								
Lerner index	766	0.26	0.14	-0.01	0.17	0.24	0.33	0.75
Macroprudential								
Total	812	1.56	1.33	0.00	1.00	1.00	2.00	6.00
Credit related	812	0.75	0.96	0.00	0.00	0.00	1.00	4.00
Liquidity related	812	0.53	0.62	0.00	0.00	0.00	1.00	2.00
Capital related	812	0.28	0.49	0.00	0.00	0.00	1.00	2.00
Controls								
Share of non-interest inc. (%)	809	36.97	14.74	2.28	27.41	35.14	44.23	90.22
Equity capital (%)	726	9.44	4.10	3.00	6.50	8.70	11.60	30.50
NPLs (%)	727	6.52	6.40	0.10	2.20	4.04	8.70	34.90
Concentration (%)	752	79.26	18.55	30.53	67.43	83.61	96.92	100.00
Activity restriction	702	7.24	1.97	3.00	6.00	7.00	9.00	12.00
Financial conglomerate	665	6.75	1.69	3.00	6.00	7.00	8.00	12.00
Entry requirement	750	7.46	1.07	3.00	7.00	8.00	8.00	8.00
Financial dev. (%)	698	127.69	104.09	4.08	51.01	104.96	176.52	710.44
Deposit insurance	812	0.76	0.43	0.00	1.00	1.00	1.00	1.00
GDP growth (%)	812	3.93	3.85	-14.81	1.76	3.95	6.17	17.32

Inflation (%)	812	5.84	7.87	-27.63	1.74	3.98	7.88	89.24
Institutions								
KKZ index	754	0.31	0.82	-1.18	-0.35	0.20	0.93	1.91
Supervisory power	586	10.99	2.42	4.00	9.00	11.00	13.00	16.00

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Table 1: Macroprudential policy and bank competition

| Spe. | Country-level data | | | | Bank-level data | | | |
| | Lerner index | | | | Lerner index | | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag dep.	0.632***	0.670***	0.668***	0.652***	0.540***	0.541***	0.537***	0.535***
	[11.05]	[11.47]	[11.51]	[11.69]	[12.29]	[12.29]	[12.11]	[12.05]
Macroprudential (total)	0.012**				0.020**			
	[2.06]				[2.00]			
Credit related		0.006				0.015		
		[0.92]				[1.31]		
Liquidity related			0.038**				0.019	
			[2.37]				[0.96]	
Capital related				0.040***				0.078**
				[2.67]				[2.39]
Control variables	√	√	√	√	√	√	√	√
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sargan test (p-value)	0.54	0.40	0.55	0.50	0.10	0.08	0.09	0.09
AR(1)-(p-value)	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
AR(2)-(p-value)	0.37	0.38	0.39	0.35	0.23	0.24	0.25	0.26
# Countries	58	58	58	58	58	58	58	58
N	438	438	438	438	4604	4604	4604	4604

Note: The t-ratio is in parenthesis. The detailed results of control variables are available from authors upon request.

Table 2: Extended model with KKZ and supervisory power

Spe.	Liquidity related			Capital related	
	(1)	(2)		(3)	(4)
Lag dep.	0.620***	0.677***	Lag dep.	0.599***	0.758***
	[16.99]	[11.03]		[14.73]	[13.65]
Liquidity related	0.056***	0.095***	*Capital related*	0.039***	0.260**
	[3.50]	[3.06]		[3.74]	[2.57]
Liquidity related ×	-0.022		*Capital related ×*	-0.038**	
KKZ index	[-0.92]		*KKZ index*	[-2.18]	
Liquidity related ×		-0.005**	*Capital related ×*		-0.018**
Supervisory power		[-2.24]	*Supervisory power*		[-2.31]
Control variables (incl. KKZ	√	√	*Control variables (incl. KKZ*	√	√
and			*and power)*		
power)					
Year dummies	Yes	Yes	*Year dummies*	Yes	Yes
Sargan test (p-value)	0.56	0.99	Sargan test (p-value)	0.64	0.62
AR(1)-(p-value)	0.00	0.00	AR(1)-(p-value)	0.00	0.00
AR(2)-(p-value)	0.35	0.94	AR(2)-(p-value)	0.35	0.99
# Countries	58	58	# Countries	58	58
N	410	347	N	410	347

Note: The t-ratio is in parenthesis. The detailed results of control variables are available from authors upon request.

Fig. 1: Macroprudential instruments

Total number of macroprudential instruments used in 58 countries over 2000-2013 by instrument type