Regulations, Market Power and Stability in the Banking Sector of Transition Countries

By

Khurshid Djalilov and Jens Hölscher, Bournemouth University (UK)

Abstract

This study explores the channels through which the regulations impact on stability in the banking sector of the transition countries. We argue that the channels through which the different regulations affecting stability vary between EU-member and non-EU transition countries. Our study considers 370 banks from 20 transition countries for the period 2001-2013, where 11 are EU-member (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) and 9 are non-EU (Albania, Armenia, Azerbaijan, Belarus, Bosnia, Kazakhstan, Macedonia, Serbia, and Ukraine) states. Our results show that higher economic growth and less competitive conditions would lead to a more stable banking sector in early (EU-member) transition countries. Moreover, the stabilisation effect of different regulations such as capital requirement, activity restrictions and supervisors (mainly Central Banks and other government bodies) is higher to the banks with higher market power. For non-EU transition countries we find that higher inflation rates significantly impact on higher levels of risk taking. However, capital requirements have a stabilisation effect and thus its higher level leads to more stable banking sectors in both groups of countries. Overall, our results are consistent with the theory that the outcome of the regulations-reforms varies across countries according to their institutional development and therefore the impact of banking regulation is different between EU-member (early) and non-EU member (late) transition countries.

Keywords: Banks, regulation, transition economies.

JEL Classification: P20, G21, E58

1. Introduction

It has been established that the presence of a sound banking sector is important for ensuring that the financial system and economy run smoothly and efficiently as banks play a crucial role in channelling funds from lenders to borrowers with productive investment projects. However, following the Asian financial crisis in 1997 as well as the recent global financial crisis (2007-2008), the relationship among stability (or risk taking), competition and regulations has attracted increased attention by scholars and policy makers.

Over the last 25 years the banking sectors of transition countries have undergone significant changes. Particularly, the establishment of a two-tier banking systems has been accompanied by consolidation, entry of foreign banks as well as strengthening of prudential regulation and supervision. One may assume that all of these changes posed great challenges to the banks of transition countries as the environment in which they operate changed significantly.

Many recent studies focus on various aspects of the banking sector in transition countries (Grigorian & Manole, 2006; Peresetsky, 2010; Pruteanu-Podpiera, Weill, & Schobert, 2008; Weill, 2003), but the research addressing the impact of regulations on banking stability is limited. Thus, the main aim of this study is to explore the channels through which the regulations impact on stability in the banking sector of the transition countries.

This study is important as it contributes to the existing literature in several aspects. Firstly, it employs a richer dataset that covers the period before, during and after the recent global crisis period (2000-2013) for these countries. Secondly, it includes more transition countries. Thirdly, the paper investigates EU member and non-EU transition countries separately as authors believe that the determinants of banking stability vary across these two groups of countries. This paper builds on research by Agoraki, Delis, and Pasiouras (2011), which is the only study

investigating the effect of regulations on stability in transition countries. The results are interesting not only for academics and bank officials, but also for other stakeholders such as policy-makers, central bankers and other financial authorities. The results show that the lower competition would stabilise the banking sectors of EU member transition countries. Moreover, higher rates of economic growth stabilise the banking sectors of EU member transition countries, while the opposite is true for the impact of inflation on the banking sectors of non-EU transition countries. The paper is structured as follows. Section 2 discusses the background literature. Section 3 describes the data and methods used. Section 4 presents the findings from the empirical analysis, and Section 5 concludes and suggests some policy recommendations.

2. Background literature

There are many studies investigating bank regulations (Barth, Caprio, and Levine 2004; Barth et al. 2013; Beck, Demirgüç-Kunt, and Levine 2006b; Klomp and De Haan 2012), however, the literature on the impacts of regulations on banking sector stability is still limited and inconclusive. Thus, following the aim of the paper, we discuss the studies addressing the effect of bank regulations and supervision on bank stability.

The literature often states two functions of bank capital, where the first views capital as a buffer allowing for the orderly use of assets and thus protecting debt holders from losses, while the second views that it provides incentives for owners and managers to take less risk (Gale 2010; Chortareas, Girardone, and Ventouri 2012). Although experts and scholars disagree on whether the imposition of a minimum capital requirement reduces risk-taking behaviour of bank owners and managers (Blum 1999), it is believed that capital adequacy regulations play an important role in more careful lending and better bank performance (Keeley and Furlong 1990; Kaufman 1992). The theory suggests that high capital requirements increase entry barriers for new banks

allowing existing banks to accumulate power and thus taking less-risky behaviour in the markets with lower levels of competition (Agoraki, Delis, and Pasiouras 2011). However, studies suggest contrasting conclusions on this argument. Some investigations conclude that more stringent capital requirements lead banks to set more strict rules in granting new loans and thus take less risks (Bolt and Tieman 2004; Barth, Caprio, and Levine 2004), while others suggest that high capital requirements harm franchise value and thus encourage banks to take higher risks implying a positive capital-risk nexus (Shrieves and Dahl 1992; Hellmann, Murdock, and Stiglitz 2000).

The studies addressing the impact of bank activity restrictions also have contrasting conclusions. Some suggest that bank activity restrictions reduce risk taking complementing deposit insurance and capital requirements in highly competitive markets (Matutes and Vives 2000). One group of studies suggest that restrictions on bank activities influence competition in other segments of the market, which may increase the risk of insolvency (Lepetit et al. 2008). While other studies suggest that lower restrictions on bank activities can also lead to higher competition through harming charter value of banks and thus encouraging them to take higher risks (Gonzalez 2005; Claessens and Laeven 2004). However, the results by Agoraki, Delis, and Pasiouras (2011) support the argument that strict restrictions on bank activities reduce insolvency risk.

There are two dominant views regarding the impact of supervisory power on stability. The first, public interest view, supports the argument that a powerful supervisor can enhance bank governance, efficiency, competition and thus improve stability (Beck, Demirgüç-Kunt, and Levine 2006a). However, Beck, Demirgüç-Kunt, and Levine (2006a) also suggest that powerful supervisors may force banks to allocate loans supporting supervisors' private benefits or political

interests. This is in line with the private interest view arguing that supervisors do not focus on overcoming market failures.

The link between competition and stability has been at the centre of academic-policy debate particularly over the last two decades. There are two dominant views regarding the impact of competition on stability. The first, "competition-fragility," arguing that higher competition diminishes market power of bank, their profit margins and franchise value, which ultimately encourages banks to take higher risks. However, "competition-stability," on the other hand, states that in the markets with limited competition banks tend to gain high market power encouraging them to charge higher rates to loan customers, which makes it difficult to repay loans leading to higher risks. The existing studies provide mixed results on the effect of competition. Berger, Klapper, and Turk-Ariss (2009) suggest that banks with a higher degree of market power have less overall risk exposure supporting "competition-fragility" view. Additionally, some studies argue that an increase in competition will have a larger impact on banks' fragility in countries with stricter activity restrictions (Beck, De Jonghe, and Schepens 2013). However, other studies suggest that greater concentration increases financial fragility and argue that more competitive banking systems are less prone to experience a systemic crisis (Schaeck, Cihak, and Wolfe 2009; Fu, Lin, and Molyneux 2014).

 Overall, our discussions indicate that the literature does not have robust conclusions on the impact of regulations to stabilise banking sectors. The research addressing this problem in transition countries is limited. This paper builds on the research by Agoraki, Delis, and Pasiouras (2011), which is the only study investigating the effect of regulations on stability in transition countries. We advance the existing literature by (1) employing recent and longer period of data; (2) including more transition countries; and (3) investigating EU member and non-EU transition

countries separately. Additionally, we aim to investigate whether regulations have an independent effect on stability or whether this effect is channeled through market power of banks.

3. Data, econometric specifications and variables

3.1 Data

The sample consists of 370 banks from 20 transition economies. Eleven are EU member transition countries, which are considered to be the early transition group. These are: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. The remaining nine countries are non-EU member states of Europe (Albania, Bosnia, Macedonia and Serbia) and the former Soviet Union (Armenia, Azerbaijan, Belarus, Kazakhstan and Ukraine). The data are from *Bankscope* and are an unbalanced panel. All are commercial banks whose financial statements are available for at least three years over the period 2001-2013. All the bank relevant data are in US dollars at a current exchange rate. The statistics for the growth of GDP, GDP per capita and inflation are from the World Bank's World Development Indicators (2014). The overall economic freedom variable is from the Heritage Foundation. The regulatory data are obtained from the World Bank's surveys on "Bank Regulation and Supervision."

3.2 Econometric specifications and variables

The relevant studies use static and dynamic specifications investigating the risk and stability in banking sectors. Agoraki, Delis, and Pasiouras (2011), the only paper investigating the risk taking behaviour of banks in transition countries, uses instrumental variable and dynamic panel specifications, in which regulations are considered to be endogenous. Particularly, the scholars

consider the reverse causality between risk taking behaviour and regulations, that is regulations impact on risk taking behaviour of banks and risk taking behaviour may also lead to changes in existing regulations in the subsequent periods. This study considers the period 1998-2005, when the transition countries were reforming all economic sectors and the financial sector, particularly, was not stable because of frequent changes in policy and reforms. However, over the last decade the financial sectors in these transition countries have been relatively stable having minor changes in regulations. Therefore, we aim to use static (fixed and random effects) specifications to investigate the following model:

$$lnZ_{i,t} = b_0 + \delta lnZ_{i,t-1} + b_1 lnEA_{i,t} + b_2 \ln(Lerner)_{i,t} + b_3 Regulations_t + b_4 ln(Lerner\ x\ Regulations)_{i,t} +$$
$$+ b_5 Controls_t + \mu_{it} \tag{1}$$

where δ lies between 0 and 1 and shows the speed of adjustment. Particularly, values closer to 0 indicate that the speed of adjustment is high, while values closer to 1 show a very slow adjustment. The *EA, Lerner* and *Regulations* are equity to asset ratio, Lerner index and regulations variables respectively. The *Control* includes bank-level, industry-level and regional control variables.

3.2.1 Dependent variable

Following the recent studies we use the Z score as a dependent variable of stability, which has widely been known as a proxy for risk measurement as well (Agoraki, Delis, and Pasiouras 2011; Fratzscher, König, and Lambert 2016). The Z score is monotonically associated with a measure of a bank's probability of failure and is expressed as follows:

$$Z_{i,t} = \frac{ROAi,t + (\frac{E}{A})_{i,t}}{SD(ROA)i,t} \tag{2}$$

where ROA is return on assets, E/A equity to asset ratio and SD(ROA) denotes standard deviation of ROA. Since the Z score indicates the distance to insolvency a higher Z score implies

that a bank is less risky. As the Z score is highly skewed we use the natural logarithm form of the Z score.

3.2.2 The Lerner Index

Following the recent studies, we calculate the Lerner index to estimate the degree of market power of banks (Agoraki, Delis, and Pasiouras 2011; Beck, De Jonghe, and Schepens 2013; Soedarmono, Machrouh, and Tarazi 2013). The Lerner index has been used as a proxy for competition as well, where values closer to 0 imply perfect competition and values closer to 1 indicate monopoly. It is calculated as follows:

$$L_{i,t} = \frac{P_{i,t}^q - mc_{i,t}}{p_{i,t}^q}$$

where $P_{i,t}^q$ is the price of bank output (the ratio of interest income to total earning assets) and $mc_{i,t}$ is the marginal cost. The following translog function is used to calculate the marginal cost:

$$
\begin{aligned}
lnC_{i,t} = {} & b_0 + b_1 lnq_{i,t} + b_2 \tfrac{1}{2} lnq_{i,t}^2 + b_3 lnd_{i,t} + b_4 \tfrac{1}{2} lnd_{i,t}^2 + b_5 ln\, w1_{i,t} + b_6 \tfrac{1}{2} ln\, w1_{i,t}^2 + b_7 ln\, w2_{i,t} + \\
& b_8 \tfrac{1}{2} ln\, w2_{i,t}^2 + b_9 ln\, w3_{i,t} + b_{10} \tfrac{1}{2} ln\, w3_{i,t}^2 + b_5 (ln\, q_{i,t})(ln\, d_{i,t}) + b_5 (ln\, q_{i,t})(ln\, w1_{i,t}) + b_5 (ln\, q_{i,t})(ln\, w2_{i,t}) + \\
& b_5 (ln\, q_{i,t})(ln\, w3_{i,t}) + b_5 (ln\, d_{i,t})(ln\, w1_{i,t}) + b_5 (ln\, d_{i,t})(ln\, w2_{i,t}) + b_5 (ln\, d_{i,t})(ln\, w3_{i,t}) + \\
& b_5 (ln\, w1_{i,t})(ln\, w2_{i,t}) + b_5 (ln\, w1_{i,t})(ln\, w3_{i,t}) + b_5 (ln\, w2_{i,t})(ln\, w3_{i,t}) + Dummies_t + \varepsilon_{i,t}
\end{aligned}
\qquad (3)
$$

where C is total cost of bank *i* at period *t*. Additionally, *q, d* and *w* are bank output, deposit and input prices respectively. Some existing studies calculate Eq. 3 combining all transition countries into one group (Agoraki, Delis, and Pasiouras 2011). However, considering significant differences among transition countries we calculate Eq. 3 for two groups of countries separately, particularly, early (EU-member) and late (non-EU). To control for cross-bank and cross-country heterogeneity we use variables at bank and country levels such as credit risk (loan loss provisions / gross loans), number of years under EU membership, financial freedom of Heritage Foundation and GDP. Sample for some countries is small and therefore cross-country calculations of marginal cost could provide poor results. However, we calculated the marginal

cost and Lerner index at a single country level too and the results, consistent with the existing studies, were not significantly different (Agoraki, Delis, and Pasiouras 2011).

3.2.3 Other variables

The natural logarithm of equity to total assets (LEA) ratio is used as a proxy for bank capital. Additionally, our analyses consider three types of regulations such as *capital requirement* (CapReq), *restrictions on activities* (Restrict) and *supervisory power* (Supervisor) which are calculated using the World Bank's surveys on Bank Regulation and Supervision (Table 1).

Table 1. Description and sources of other variables

Other variables	Description	Source
Lea	Natural logarithm (equity/total assets)	Bankscope
Size	Natural logarithm (total assets)	Bankscope
Finfreedom	Financial freedom is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. The score ranges from 0 to 100, where a score closer to 100 indicates more independent financial sector.	Heritage Foundation (2014)
Lgrowth	Natural logarithm (GDP growth)	World Bank's World Development Indicators (2014)
Linflation	Natural logarithm (inflation)	World Bank's World Development Indicators (2014)
EU member	This variable shows the number of years a country, in which a bank exists, is under EU membership.	
CapReq	*Capital Requirement* index is calculated based on the World Bank's surveys on Bank Regulation and Supervision. Four versions of the surveys are used - Versions I (2001) for 2000-2001, II (2003) for 2002-2004, III (2007) for 2005-2007 and IV (2012) for 2008-2014.	World Bank's surveys on Bank Regulation and Supervision
Restrict	*Restrictions on activities* index is calculated based on the World Bank's surveys on Bank Regulation and Supervision. Four versions of the surveys are used - Versions I (2001) for 2000-2001, II (2003) for 2002-2004, III (2007) for 2005-2007 and IV (2012) for 2008-2014.	World Bank's surveys on Bank Regulation and Supervision
Supervisor	*Supervisory power* is calculated based on the World Bank's surveys on Bank Regulation and Supervision. Four versions of the surveys are used - Versions I (2001) for 2000-2001, II (2003) for 2002-2004, III (2007) for 2005-2007 and IV (2012) for 2008-2014.	World Bank's surveys on Bank Regulation and Supervision
LlernerxCapReq	Natural logarithm (lerner*capreq)	Bankscope and World Bank's surveys on Bank Regulation and Supervision
LlernerxRestrict	Natural logarithm (lerner*restrict)	Bankscope and World Bank's surveys on Bank Regulation and Supervision
LlernerxSupervisor	Natural logarithm (lerner*supervisor)	Bankscope and World Bank's surveys on Bank Regulation and Supervision

Capital requirement shows initial and overall capital stringency ranging between 0 and 8, where higher scores indicate higher capital stringency. Particularly, initial capital stringency refers to whether the sources of funds (regulatory capital) can include assets other than cash or government securities and borrowed funds, as well as whether the regulatory or supervisory authorities verify these sources. Overall capital stringency, however, shows whether risk elements and value losses are considered when calculating the regulatory capital. The second index (*Restrict*) is calculated by considering whether banks are allowed for securities, insurance and real estate activities as well as for ownership of non-financial firms. This index ranges between 1 and 4 and higher values indicate higher restrictions. Our third Supervisor index considers whether supervisory authorities can take specific actions against bank management, shareholders and auditors. This index ranges between 0 and 14, where higher values indicate more powerful supervisors.

To improve the fit we employ control variables at bank, industry and macro levels. The natural logarithm of total assets is included into the model to control for bank size differences, while the variable of financial freedom (FinFreedom) is used to account for industry differences across transition countries. Additionally, the natural logarithms of GDP growth as well as inflation are employed to control for macroeconomic differences. Moreover, our analyses of EU member transition countries include an EU membership variable (EU member) to account for EU membership effects.

4. Estimation and Results

Table 2 shows the arithmetic mean and the correlations among the variables. The table shows that the natural logarithm forms of the products of the regulations variables with Lerner index

(lerner x capreq, lerner x restrict and lerner x supervisor) have very strong correlations with each other as well as with the natural logarithm form of Lerner index. Therefore, we drop Lerner index when we include these variables (lerner x capreq, lerner x restrict and lerner x supervisor) into the model. Moreover, we use only one of them at a time since there are strong correlations among these variables[1].

To ensure the robustness and sustainability of the results we use two, namely, fixed- and random-effects estimators and presented the results in Tables 3, 4 and 5. Particularly, Table 3 presents the results for the model including all transition countries, while Tables 4 and 5 show the results for EU member and non-EU member transition countries respectively. The results for the regulations variables such as capital requirement (capreq), restrictions (restrict) and supervisory power (supervisor) are not stable implying that there are no direct effects of the regulations to the bank sector stability. The results also indicate that the equity-asset ratio has stabilisation effects in both EU member and non-EU transition countries. Additionally, the results show that the lower competition would also stabilise the banking sectors of EU member transition countries. Moreover, higher rates of economic growth stabilises the banking sectors of EU member transition countries, while the opposite is true for the impact of inflation on the banking sectors of non-EU transition countries. However, the results for size and financial freedom are not stable across models.

---

[1] 'Centring' approach (subtracting mean from each observation) did not reduce the correlations among these variables.

Table 2. Correlation matrix of variables

Variables	Mean*	Z score	Llerner	LEA	Size	Fin freedom	lgrowth	linflation	CapReq	Restrict	Supervisor	llerner x capreq	llerner x restrict
Z score	2.26												
llerner	-0.40	-0.07***											
lea	-2.01	0.25***	-0.09***										
size	6.40	-0.07***	0.20***	-0.53***									
finfreedom	57.10	0.09***	-0.12***	-0.21***	0.20***								
lgrowth	1.37	-0.05***	-0.04**	0.05***	-0.18***	-0.04**							
linflation	1.57	-0.16***	0.07***	0.18***	-0.14***	-0.49***	0.26***						
capReq	5.21	-0.07***	-0.06***	-0.18***	0.16***	-0.15***	-0.13***	-0.01					
restrict	9.49	0.08***	0.08***	0.09***	0.01	0.01	0.15***	0.05***	-0.24***				
supervisor	11.46	-0.02	-0.07***	-0.11***	0.14***	0.25***	-0.26***	-0.33***	0.11***	-0.28***			
llerner x capreq	1.23	-0.14**	0.70***	-0.16***	0.28***	-0.25***	-0.09***	0.17***	0.69***	-0.04**	-0.02		
llerner x restrict	1.82	-0.01	0.85***	-0.02	0.14***	-0.09***	0.06***	0.10***	-0.21***	0.59***	-0.26***	0.54***	
llerner x supervisor	2.03	-0.08***	0.87***	-0.15***	0.25***	0.01	-0.16***	-0.07***	-0.01	-0.10***	0.42***	0.62***	0.65***

*The arithmetic means are calculated without natural logarithms. llerner –natural logarithm of lerner index.

Table 3. All transition countries

Variables	Fixed-effects					Random-effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lagged Z score	0.074*	0.073	0.040*	0.073	0.073	0.600***	0.603***	0.513***	0.604***	0.603***
	(0.045)	(0.045)	(0.022)	(0.045)	(0.045)	(0.034)	(0.034)	(0.039)	(0.034)	(0.034)
lea	0.915***	0.915***	1.010***	0.915***	0.915***	0.482***	0.477***	0.582***	0.477***	0.478***
	(0.088)	(0.089)	(0.033)	(0.089)	(0.089)	(0.047)	(0.047)	(0.055)	(0.047)	(0.047)
llerner	0.079***	0.078***				0.082**	0.079**			
	(0.022)	(0.022)				(0.032)	(0.032)			
size	0.017	0.015	0.028	0.014	0.015	0.059***	0.056***	0.064***	0.056***	0.056***
	(0.026)	(0.026)	(0.018)	(0.026)	(0.026)	(0.012)	(0.012)	(0.014)	(0.012)	(0.012)
finfreedom	-0.001	-0.001	-0.001	-0.001	-0.001	0.001*	0.002**	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
lgrowth	0.008	0.007	0.003	0.007	0.007	0.013	0.017	0.013	0.018	0.017
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)
linflation	-0.014*	-0.017**	-0.018**	-0.017**	-0.017**	-0.045***	-0.049***	-0.044***	-0.049***	-0.049***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)
eumember	-0.002	-0.003	-0.002	-0.003	-0.003	0.009*	0.004	0.005	0.005	0.005
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
capreq		0.004	-0.017**	0.004	0.004		0.014***	-0.018**	0.014***	0.014***
		(0.004)	(0.007)	(0.004)	(0.004)		(0.005)	(0.009)	(0.005)	(0.005)
restrict		0.006*	0.006	-0.003	0.005		-0.001	0.003	-0.010**	-0.001
		(0.003)	(0.004)	(0.004)	(0.003)		(0.004)	(0.004)	(0.005)	(0.004)
supervisor		0.004	0.006	0.004	-0.004		-0.010*	-0.008	-0.010*	-0.018***
		(0.005)	(0.005)	(0.005)	(0.005)		(0.006)	(0.006)	(0.006)	(0.007)
llerner x capreq			0.098***					0.083***		
			(0.023)					(0.029)		
Llerner x restrict				0.079***					0.082**	
				(0.022)					(0.032)	
Llerner x supervisor					0.080***					0.081**
					(0.023)					(0.032)
Constant	3.885***	3.778***	3.932***	3.678***	3.678***	1.382***	1.428***	1.777***	1.325***	1.327***
	(0.182)	(0.184)	(0.152)	(0.180)	(0.180)	(0.153)	(0.169)	(0.186)	(0.162)	(0.162)
Observations	2,145	2,145	2,014	2,145	2,145	2,145	2,145	2,014	2,145	2,145
R-squared	0.726	0.728	0.768	0.728	0.728	0.794	0.800	0.740	0.800	0.800
Number of banks	376	376	368	376	376	376	376	368	376	376

Robust standard errors are in brackets. Coefficients that are significantly different from zero at the 1%, 5% and 10% level are marked with ***, ** and * respectively. Year dummies for 2001-2012 are removed to save space.

Table 4. EU member transition countries

Variables	Fixed-effects					Random-effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lagged Z score	0.069**	0.067**	0.067**	0.067**	0.067**	0.619***	0.616***	0.616***	0.616***	0.616***
	(0.029)	(0.028)	(0.028)	(0.028)	(0.028)	(0.051)	(0.051)	(0.051)	(0.051)	(0.051)
lea	0.975***	0.974***	0.975***	0.973***	0.975***	0.490***	0.493***	0.493***	0.492***	0.493***
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.074)	(0.074)	(0.074)	(0.074)	(0.074)
llerner	0.107***	0.106***				0.092**	0.092**			
	(0.028)	(0.029)				(0.038)	(0.038)			
size	0.023	0.016	0.016	0.016	0.016	0.055***	0.054***	0.055***	0.054***	0.054***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
finfreedom	-0.000	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
lgrowth	0.042***	0.043***	0.042***	0.042***	0.042***	0.068***	0.071***	0.070***	0.070***	0.070***
	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)
linflation	-0.006	-0.008	-0.008	-0.008	-0.008	-0.016	-0.019	-0.019	-0.019	-0.019
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.012)	(0.014)	(0.014)	(0.014)	(0.014)
eumember	0.001	0.008	0.008	0.007	0.007	-0.009	-0.006	-0.006	-0.007	-0.006
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.010)	(0.011)	(0.011)	(0.010)	(0.011)
capreq		0.011	-0.010	0.010	0.011		0.008	-0.008	0.008	0.008
		(0.007)	(0.008)	(0.007)	(0.007)		(0.008)	(0.010)	(0.008)	(0.008)
restrict		0.002	0.001	-0.009**	0.001		-0.002	-0.002	-0.011*	-0.002
		(0.003)	(0.003)	(0.005)	(0.003)		(0.004)	(0.004)	(0.006)	(0.004)
supervisor		0.002	0.003	0.003	-0.007		-0.007	-0.006	-0.007	-0.015*
		(0.007)	(0.007)	(0.007)	(0.007)		(0.008)	(0.008)	(0.008)	(0.009)
llerner x capreq			0.108***					0.086**		
			(0.029)					(0.037)		
llerner x restrict				0.104***					0.093**	
				(0.029)					(0.038)	
llerner x supervisor					0.107***					0.093**
					(0.029)					(0.038)
Constant	4.157***	4.004***	3.951***	3.872***	3.862***	1.628***	1.658***	1.598***	1.546***	1.530***
	(0.199)	(0.236)	(0.239)	(0.243)	(0.242)	(0.224)	(0.266)	(0.266)	(0.268)	(0.269)
Observations	1,169	1,169	1,169	1,169	1,169	1,169	1,169	1,169	1,169	1,169
R-squared	0.757	0.760	0.760	0.759	0.760	0.825	0.823	0.823	0.823	0.823
Number of banks	197	197	197	197	197	197	197	197	197	197

Robust standard errors are in brackets. Coefficients that are significantly different from zero at the 1%, 5% and 10% level are marked with ***, ** and * respectively. Year dummies for 2001-2012 are removed to save space.

Table 5. Non-EU transition countries

Variables	Fixed-effects					Random-effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lagged Z score	0.071	0.069	0.019	0.069	0.069	0.606***	0.609***	0.436***	0.609***	0.608***
	(0.059)	(0.060)	(0.028)	(0.060)	(0.060)	(0.045)	(0.044)	(0.055)	(0.044)	(0.044)
lea	0.874***	0.874***	1.031***	0.874***	0.874***	0.460***	0.456***	0.658***	0.456***	0.457***
	(0.127)	(0.129)	(0.050)	(0.129)	(0.129)	(0.063)	(0.062)	(0.081)	(0.062)	(0.062)
llerner	0.036	0.036				0.129*	0.123*			
	(0.026)	(0.028)				(0.068)	(0.065)			
size	0.013	0.014	0.041	0.013	0.013	0.034*	0.030	0.036	0.030	0.030
	(0.042)	(0.043)	(0.033)	(0.043)	(0.043)	(0.020)	(0.021)	(0.025)	(0.021)	(0.021)
finfreedom	-0.001	-0.001	-0.001	-0.001	-0.001	0.001	0.002**	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
lgrowth	-0.004	-0.004	-0.008	-0.004	-0.004	-0.010	-0.001	-0.004	-0.001	-0.001
	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.015)	(0.016)	(0.013)	(0.016)	(0.016)
linflation	-0.041**	-0.040**	-0.035*	-0.040**	-0.040**	-0.080***	-0.081***	-0.052***	-0.081***	-0.082***
	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.020)	(0.021)	(0.018)	(0.021)	(0.020)
capreq		0.002	-0.024	0.002	0.001		0.014*	-0.058***	0.015*	0.014*
		(0.006)	(0.015)	(0.006)	(0.006)		(0.008)	(0.019)	(0.008)	(0.008)
restrict		-0.023	-0.020	-0.027	-0.024		-0.026*	-0.029	-0.039**	-0.027*
		(0.029)	(0.032)	(0.029)	(0.029)		(0.016)	(0.019)	(0.016)	(0.016)
supervisor		0.006	0.011	0.006	0.001		-0.021**	-0.016*	-0.021**	-0.035***
		(0.009)	(0.007)	(0.009)	(0.008)		(0.010)	(0.009)	(0.010)	(0.012)
llerner x capreq			0.083**					0.135**		
			(0.037)					(0.056)		
llerner x restrict				0.037					0.126*	
				(0.028)					(0.066)	
llerner x supervisor					0.038					0.127*
					(0.028)					(0.065)
Constant	3.606***	3.757***	3.943***	3.709***	3.722***	1.565***	1.931***	2.777***	1.772***	1.799***
	(0.236)	(0.401)	(0.432)	(0.401)	(0.401)	(0.256)	(0.335)	(0.309)	(0.321)	(0.321)
Observations	976	976	845	976	976	976	976	845	976	976
R-squared	0.714	0.715	0.786	0.715	0.715	0.777	0.784	0.662	0.784	0.783
Number of id	179	179	171	179	179	179	179	171	179	179

Robust standard errors are in brackets. Coefficients that are significantly different from zero at the 1%, 5% and 10% level are marked with ***, ** and * respectively. Year dummies for 2001-2012 are removed to save space.

The products of regulations with Lerner index are all significant with positive signs implying stabilisation effects of these variables in EU member transition countries. Particularly, banking regulations and policies such as capital requirement, restrictions on activities and supervisory power have stabilisation effects through banks with higher market power in EU member transition countries. However, this is not the case for non-EU member transition countries, where only the product of Lerner index with capital requirement (lerner x capreq) has stabilisation effects. The results imply that transition countries of both groups could improve the level of the stabilisation via decreasing the level of competition. Moreover, they suggest that banking regulations do not affect all banks uniformly and the factors impacting on banking stability are different in two different groups of transition countries. Our results are consistent with the studies supporting the view of "competition-fragility" (Berger, Klapper, and Turk-Ariss 2009) as well as tightening regulations to stabilise banking sectors (Fratzscher, König, and Lambert 2016).

5. Conclusion

This study investigates the channels through which the regulations impact on stability in the banking sector of the transition countries. We argue that the channels through which regulations affecting stability vary between EU-member and non-EU transition countries. Our results show that higher economic growth and less competitive conditions would lead to a more stable banking sector in early (EU-member) transition countries. Moreover, the stabilisation effects of different regulations such as capital requirement, restrictions and supervisors (mainly Central Banks and other government bodies) take place through the banks with higher market power. For non-EU transition countries we find that higher inflation rates significantly impact on higher levels of risk taking. However, only capital requirements have direct and indirect (via market

power) stabilisation effects and thus higher capital requirements will lead to more stable banking sectors in non-EU transition countries. Overall, our results are consistent with the theory that the outcome of the regulations-reforms varies across countries according to their institutional development and therefore the impact of banking regulation is different between EU-member (early) and non-EU member (late) transition countries.

References:

1. Agoraki, Maria-Eleni K., Manthos D. Delis, and Fotios Pasiouras. 2011. "Regulations, Competition and Bank Risk-Taking in Transition Countries." *Journal of Financial Stability* 7 (1): 38–48.

2. Barth, James R., Gerard Caprio, and Ross Levine. 2004. "Bank Regulation and Supervision: What Works Best?" *Journal of Financial Intermediation* 13 (2): 205–248.

3. Barth, James R., Chen Lin, Yue Ma, Jesús Seade, and Frank M. Song. 2013. "Do Bank Regulation, Supervision and Monitoring Enhance or Impede Bank Efficiency?" *Journal of Banking & Finance* 37 (8): 2879–2892.

4. Beck, Thorsten, Olivier De Jonghe, and Glenn Schepens. 2013. "Bank Competition and Stability: Cross-Country Heterogeneity." *Journal of Financial Intermediation* 22 (2): 218–244.

5. Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine. 2006a. "Bank Concentration, Competition, and Crises: First Results." *Journal of Banking & Finance* 30 (5): 1581–1603.

6. Beck, Thorsten, Aslı Demirgüç-Kunt, and Ross Levine. 2006b. "Bank Supervision and Corruption in Lending." *Journal of Monetary Economics* 53 (8): 2131–2163.

7. Berger, Allen N., Leora F. Klapper, and Rima Turk-Ariss. 2009. "Bank Competition and Financial Stability." *Journal of Financial Services Research* 35 (2): 99–118.

8. Blum, Jürg. 1999. "Do Capital Adequacy Requirements Reduce Risks in Banking?" *Journal of Banking & Finance* 23 (5): 755–771.

9. Bolt, Wilko, and Alexander F. Tieman. 2004. "Banking Competition, Risk and Regulation*." *The Scandinavian Journal of Economics* 106 (4): 783–804.

10. Chortareas, Georgios E., Claudia Girardone, and Alexia Ventouri. 2012. "Bank Supervision, Regulation, and Efficiency: Evidence from the European Union." *Journal of Financial Stability* 8 (4): 292–302.

11. Claessens, Stijn, and Luc Laeven. 2004. "What Drives Bank Competition? Some International Evidence." *Journal of Money, Credit and Banking*, 563–583.

12. Fratzscher, Marcel, Philipp Johann König, and Claudia Lambert. 2016. "Credit Provision and Banking Stability after the Great Financial Crisis: The Role of Bank Regulation and the Quality of Governance." *Journal of International Money and Finance*. In press.

13. Fu, Xiaoqing Maggie, Yongjia Rebecca Lin, and Philip Molyneux. 2014. "Bank Competition and Financial Stability in Asia Pacific." *Journal of Banking & Finance* 38: 64–77.

14. Gale, Douglas. 2010. "Capital Regulation and Risk Sharing." *International Journal of Central Banking* 6 (4): 187–204.

15. Gonzalez, Francisco. 2005. "Bank Regulation and Risk-Taking Incentives: An International Comparison of Bank Risk." *Journal of Banking & Finance* 29 (5): 1153–1184.

16. Hellmann, Thomas F., Kevin C. Murdock, and Joseph E. Stiglitz. 2000. "Liberalization, Moral Hazard in Banking, and Prudential Regulation: Are Capital Requirements Enough?" *American Economic Review*, 147–165.

17. Kaufman, George G. 1992. "Capital in Banking: Past, Present and Future." *Journal of Financial Services Research* 5 (4): 385–402.

18. Keeley, Michael C., and Frederick T. Furlong. 1990. "A Reexamination of Mean-Variance Analysis of Bank Capital Regulation." *Journal of Banking & Finance* 14 (1): 69–84.

19. Klomp, Jeroen, and Jakob De Haan. 2012. "Banking Risk and Regulation: Does One Size Fit All?" *Journal of Banking & Finance* 36 (12): 3197–3212.

20. Lepetit, Laetitia, Emmanuelle Nys, Philippe Rous, and Amine Tarazi. 2008. "Bank Income Structure and Risk: An Empirical Analysis of European Banks." *Journal of Banking & Finance* 32 (8): 1452–1467.

21. Matutes, Carmen, and Xavier Vives. 2000. "Imperfect Competition, Risk Taking, and Regulation in Banking." *European Economic Review* 44 (1): 1–34.

22. Schaeck, Klaus, Martin Cihak, and Simon Wolfe. 2009. "Are Competitive Banking Systems More Stable?" *Journal of Money, Credit and Banking* 41 (4): 711–734.

23. Shrieves, Ronald E., and Drew Dahl. 1992. "The Relationship between Risk and Capital in Commercial Banks." *Journal of Banking & Finance* 16 (2): 439–457.

24. Soedarmono, Wahyoe, Fouad Machrouh, and Amine Tarazi. 2013. "Bank Competition, Crisis and Risk Taking: Evidence from Emerging Markets in Asia." *Journal of International Financial Markets, Institutions and Money* 23: 196–221.