The Relevance of Financial and Economic Factors for Determining Banking Risk across Europe

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Abstract

The goal of this study is to identify empirically how country-level development, taking into account the financial and macroeconomic environment, affect the risk profiles of the banking sector in Europe. Through a dataset that covers 3,399 European banks spanning the period 1996–2011, and the methodology of panel regression, the empirical findings document the heterogeneity of banking risk determinants. I examine the implications of bank leverage that manifest itself as spreading and growing instability. The study contributes to and combines the different strands of literature and understanding of the importance of the links between the variables. It also contributes to the literature by focusing on a group of countries from Central and Eastern Europe and the Commonwealth of Independent States that have not been studied before. The extended model provides a causal link between risk in the banking sector and the growth of the financial market and macroeconomy. I apply four measures of country-level development that are available in previous studies: share of foreign ownership in the banking sector; the financial freedom index; the real growth rate; and stock market capitalization. Using these measures, I obtain different results which highlight the fact that the effect of macroeconomic and financial development on banking sector risk-taking is ambiguous.

1. Introduction and motivation

The reversal of financial market integration in Europe during the global financial crisis requires tools to measure and monitor banking sector fragmentation. Another important question to ask in this context is whether the structural, financial, and macroeconomic factors contributing to banking risk are the same in a cross-country analysis and for different stages of country development. To verify the above, I focus on different sub-groups: advanced economies versus emerging economies. It may also be necessary to explain the various issues affecting banking risk. If bank risk-taking is driven by different sets of determinants in European countries, regulators cannot design the same strategies to limit systemic risk for both advanced and emerging markets.

I aim to throw some light on these differences, and, specifically, to address three main questions in my empirical analysis: (i) the importance of changes in business cycles versus other channels for explaining the effect of bank size and lending on bank risk-taking; (ii) the changes in foreign ownership in banks as the channel of influence on risk in banking sector; (iii) the relevance of financial and economic development in the country for determining stability of bank risk; and (iv) the relative importance of changes in bank risk-taking promoted by financial liberalization. I use an international sample of a maximum of 3,399 banks from 41 advanced and developing countries over 1996–2011.

Based on the empirical literature, the identification of banking risk determinants in the Central and Eastern European banking sector appears to be limited. The international regulatory framework of the banking sector, which is dedicated to advanced economies, may not be applicable in emerging markets.

Taking into account the incompleteness of banking sector instability, this paper adopts a combined approach and presents a leverage ratio, which can form the basis of risk-taking by banks in three groups of countries: advanced markets, emerging markets, and the Commonwealth of Independent States countries in Europe.

The contribution of this study is as follows. Firstly, based on the research undertaken by Beck, Demirguc-Kunt, and Levine (2005), Brewer, Kaufman, and Larry (2008), Brunnermeier and Pedersen (2009), I present the bank leverage ratio which can contribute to changing and increasing the instability of individual banks and the entire financial system. I docu-

ment trends in the relative importance of the risk ratio for a large sample of international banks over 10 years to take into account the impact of the business cycle in systemic risk fluctuation. Still open is the question of the pro-cyclical nature of systemic risk (Borio et al., 2001). Secondly, the study explores the implications of the interaction between bank risk-taking and a range of determinants in different countries. The empirical study of the determinants of banking risk diversification will answer the question of which factors were omitted in previous studies and which factors – such as foreign investor ownership or financial liberalization – and financial sector or macroeconomic conditions implicate significant impulses for the spread systemic risk. Finally, I assess what differences in banking risk determinants are associated with countries at different levels of economic development.

2. Literature review and hypotheses

The recent global financial crisis has highlighted the importance of the procyclicality of the banking sector. The phenomenon has transformed banks from the mitigation of risk to pressures of increasing efficiency, potentially affecting financial stability in whole sectors. In the literature, the relationship between the risk taken and the macroeconomic situation is often emphasized. The risk taken by the bank can result from its internal policy, for example, in terms of lending, the ownership structure of capital, access to foreign financing, or structural and macroeconomic factors. But the reactions of banks can be varied between countries with different levels of development. There is no consistency in response to the question of what are the determining factors of higher leverage in the banking sector.

2.1. The influence of size and lending on leverage of banks

One of the most criticized practices in banking has been the simplicity with which it has provided credit in times of economic expansion. Many studies have found that the relative share of loans to total assets is positively correlated with banking instability: increasing leverage and insolvency risk as a result of long-term bank mismanagement. Calmes and Theoret (2013) show that the degree of total leverage is determined by banking activity, and market-oriented banking exerts a stronger influence on leverage during expansion periods. Dell'Ariccia et al. (2014) investigate that reductions in real interest rates (time of prosperity) lead to a higher leverage risk in financial institutions. Additionally, well capitalized banks increase risk, while highly levered banks may decrease it. But this effect varies across countries and over time (De Nicolo et al., 2003; Blasco and Sinkey, 2006; Haq and Heaney, 2012). The percentage of loans to the real sector in total banking assets is noticed as an important factor of a bank's problems. The expansionary credit policy of banks is an encouraging factor and prompts banks to take a higher leverage. This is also coupled with a greater liquidity risk arising from the banks' inability to fund increases in assets (Trujillo-Ponce, 2013). This phenomenon may be

further stimulated by demand from businesses and households. Therefore, its estimation in countries with different levels of development is important. The link between lending and leverage is substantially heterogeneous across different types of banks as well as across European Union (EU) countries (Carlson et al., 2013; Labonne and Lame, 2014) during economic downturns. The procyclicality of the banking sector means gradual changes in risk-taking and perceptions in making decisions of managers. It follows the pattern of undertaking risk-taking during booms and excessive aversion to risk during busts. Vuillemey (2013) finds the procyclicality of banks' credit risk by investigating the resilience of several European banking sectors before and after the global banking crisis. Demirguc-Kunt et al. (2013) emphasize that capital becomes important during the crisis period, particularly for the largest banks. The empirical studies of Beltratti and Stulz (2012) suggest that banks that relied more heavily on deposit funding performed better in the financial crisis. Hogan (2014) finds that the capital and risk-based capital ratios are statistically significant predictors of bank risk, especially in the period following the recent financial crisis. Therefore, I hypothesize the following relationship:

Hypothesis 1. There is a positive relationship between the relative share of loans in the bank's assets and bank's leverage, and the correlation is stronger during the economic boom period.

2.2. The impact of foreign ownership on bank risk

Moving on to ownership structure, many banking systems are dominated by public ownership, but the increasing foreign bank penetration on bank risk and lending especially in emerging economies is a significant problem stressed in the literature. Jeon et al. (2013) examine bank-level variables from roughly 350 foreign subsidiaries of 68 multinational banks in emerging economies and find evidence of the transmission of financial shocks from the financial crisis from parent banks to foreign subsidiaries. It is strongest among subsidiaries in Central and Eastern Europe (CEE). Anginer et al. (2016) find a positive correlation between the default risk of foreign subsidiaries and their parents during the global financial crisis. This is lower for banks that are more independent from their foreign parents. The risk shocks in subsidiaries are also related with host country bank regulations. Referring to the first hypothesis, Dekle and Lee (2015) find evidence that foreign affiliates operating in internal markets reduced their risk in lending more so than the domestic banks located in these regions. The impact of foreign and state ownership on banking risk was investigated by Lassoued et al. (2016), who find that state-owned banks are encouraged

to take more risks than foreign subsidiaries. But on the other hand, state-owned banks increase the capital ratio to hedge against excessive risk. Regarding its impact on risk-taking, foreign ownership is noticed as a stimulator of risk-taking for several reasons. First, foreign institutions are more efficient and take more risk. Second, foreign banks may show a higher preference for risk compared to domestic banks as they can hedge and better diversify risk.

Against the above findings and on the prominent role of foreign banks in most emerging countries, it is expected that ownership stimulates banking risk.

Hypothesis 2: Foreign ownership has a greater influence on banking risk in emerging countries.

2.3. Financial liberalization as the determinant of bank risk-taking

The literature traditionally highlights that financial liberalization is the main determinant of banking risk, showing several channels through which risk can occur (Demirguc-Kunt and Detragiache, 1999; Kaminsky and Reinhart, 1999). Financial liberalization usually implies the reduction of controls on international capital movements, and more restrictions on bank activities have been viewed by regulators as a useful tool for reducing bank risk (Hovakimian and Kane, 2000). A set of theoretical literature models the relation between financial liberalization and bank risk through increases in risk-taking. This openness for financial institutions to raise foreign currency funding and lending to local borrowers generates additional risk (Kaminsky and Reinhart, 1999; Stiglitz, 2000). Cubillas and Gonzalez (2014) find that financial liberalization involves higher competition in the banking sector in emerging countries and increases risk-taking in developed countries. Conversely, the literature on boom-bust cycles suggests that financial liberalization increases banking risk by undertaking riskier investments more in less economically and developed countries (Tornell and Westermann, 2005).

Moreover, Giannetti (2007) shows that financial liberalization may undermine bank stability in emerging markets, as international investors provide large amounts of funds at a low cost. Also, Allen and Gale (2000) present that financial liberalization may trigger a financial crisis in conditions of uncertainty about future lending creation in the real economy.

According to these arguments, I expect that financial liberalization has a greater influence on bank risk in developed countries, because poor quality institutions increase the ability of financial liberalization to expand opportunities to undertake riskier investments. Thus, my hypothesis is as follows:

Hypothesis 3: Financial liberalization has a negative impact on banking risk in developed countries.

2.4. Macroeconomic and financial market influence on bank leverage

Stock market development and economic growth are among the most important variables identified in the empirical literature on bank risk, and they are correlated with growth performance across countries (Beck and Levine, 2004; Eng and Habibullah, 2011; Levine and Zervos, 1998). Not surprisingly, the link between financial and economic development and banking risk has been an important area of discussion among researchers and policymakers (see, for instance, Beck et al., 2000; Rousseau and Wachtel, 2000; Bangake and Eggoh, 2011; Chow and Fung, 2011; Herwartz and Walle, 2014; al Colle, 2016; and Maudos, 2017). Country-level development and banking risk studies focus on examine two types of relationships: firstly, the link between bank risk taking and economic growth, and secondly, the link between stock market development and banking risk.

In general, the empirical evidence has presented that there is a negative long-run relationship between banking risk indicators and financial and economic growth. Marcucci and Quagliariello (2008) demonstrate the behavior of the default rates of Italian bank creditors and confirm that the risk follows a cyclical pattern. It was observed that the risk ratio decreases during good macroeconomic times and increases during downturns.

Hypothesis 4: Stock market development and economic growth are inversely and significantly related to bank risk in developed countries.

3. Research design and identification of banking risk measures

Testing for the interactions between banking risk and its determinates, I use leverage as the bank risk measure, calculated as:

$$LEV_{n,i,t} = \frac{TA_{n,i,t}}{E_{n,i,t}}$$

(1)

where:

$LEV_{n,i,t}$ is the leverage ratio measure;

E is total bank equity;

TA is total assets;

i is the cross-sectional dimension across banks;

n denotes the country; and

t denotes the time dimension.

The credible leverage ratio is that which ensures the adequate capture of both the on- and off-balance sheet leverage of banks.

I test for the interaction between the solvency risk and its factors. Therefore, the solvency risk is tested using a panel regression model presented as (Eq. 2):

$$
\begin{aligned}
LEV_{n,i,t} = {} & \beta_1 LEV_{n,i,t-l} + \beta_2 SIZE_{n,i,t} + \beta_3 LOANS_{n,i,t} + \beta_4 CRISIS_{i,t} + \beta_5 LOANS\_CRISIS_{i,t} \\
& + \beta_6 FOREIGN_{i,t} + \beta_8 FREE_{i,t} + \beta_8 ECON\_DEVELOP_{i,t} \\
& + \beta_9 FINAN\_DEVELOP_{i,t} + \varepsilon_{i,t}
\end{aligned}
$$

(2)

where:

$Y_{n,i,t}$ is the *n-th* bank risk measure, calculated as $LEV_{n,i,t}$ (Eq. 1) for bank solvency in *i-th* country, observed in period *t*;

l is number of lags for the dependent variable;

β is the regression coefficient (the measure of sensitivity of leverage);

LEV denotes the ratio of bank total assets to equity, defined as the ratio of bank solvency risk. A higher value of LEV implies higher banking risk. Banks typically increase their risk-taking by borrowing to acquire more assets. At the bank level, I control for the size and ratio of bank loans to total assets;

SIZE is the logarithm of total bank assets. I expect that bank size and risk would be negatively related;

LOANS denotes the ratio of bank loans to total assets. This ratio is expected to be positively related to banking risk;

CRISIS denotes the banking crisis dummy (1=banking crisis, 0=none). A banking crisis is defined as systemic if two conditions are met: a. significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations), or b. significant banking policy intervention measures in response to significant losses in the banking system (Laeven and Valencia, 2013);

LOANS_CRISIS is the ratio of bank loans to total assets times the banking crisis dummy. It shows the impact of lending on leverage during economic downturns. The coefficient of the interaction between lending and crisis indicates the presence of the lending crunch effect. A positive coefficient indicates that bank leverage may be constrained by lending during a banking crisis, while a negative coefficient would imply that lending may exert a significant impact on leverage during downturns;

FOREIGN denotes foreign ownership, as a percentage of the total banking assets that are held by foreign banks. A foreign bank is a bank where 50% or more of its shares are owned by foreigners (Claessens and Van Horen, 2014);

FREE denotes financial freedom and is a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector. I use the Index of Financial Reforms of Abiad et al. (2008) and the Financial Freedom component of the Index of Economic Freedom from the Heritage Foundation. Financial freedom is a measure of the extent of government regulation of financial services and the difficulty of opening and operating financial services institutions. The index assigns an overall score on a scale of 0–100, where 0 signifies prohibited financial institutions and 100 signifies negligible government influence. Higher values of the index indicate greater financial freedom;

ECON_DEVELOP denotes the annual growth rate of real GDP (Angkinand and Wihlborg, 2010) (Financial Structure Dataset, World Bank);

FINAN_DEVELOP denotes stock market capitalization to GDP (Financial Structure Dataset, World Bank). These ratios positively influence bank behavior (banks in more advanced financial markets become well capitalized and stable); however, financial market development increases a bank's risk-taking activities $\varepsilon_{i,t}$ is a random component.

To test my hypotheses, I apply a two-step generalized method of moments (GMM) robust estimator for data spanning the years 1996–2011 on individual banks (Arellano and Bond 1991; Blundell and Bond 1998). To test the validity of the instruments, I implemented the Hansen specification test, which, under the null hypothesis of valid moment conditions, is asymptotically distributed as chi-square (Arellano and Bond 1991; Blundell and Bond 1998). All regression parameters are given with the level of significance, which should facilitate interpretation of the results.

Through a dataset that covers 3,399 European banks spanning the period 1996–2011 and using the methodology of panel regression, the empirical findings document the determinants of bank risk-taking. The full range of banks from 41 countries are divided into three groups: a. 26 advanced European countries (Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, the Netherlands, Norway, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom), b. 11 emerging countries of CEE (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Lithuania, Macedonia, Montenegro, Poland, Romania, and Serbia), and c. 4 Commonwealth of Independent State countries in Europe (Belarus, Moldova, Russia, and Ukraine), according to the Financial Structure Dataset proposed by the World Bank. Next, I try to identify the sensitivity of the leverage risk indicators to a number of variables. The study should indicate the general outline of the dependency and diversification of the sources of risk in the indicated groups.

I compute the measure of bank risk using the Bankscope database, which reports bank balance sheet data. I use unconsolidated statements because they are preferred to avoid relevant differences in the balance sheets of headquarters and bank subsidiaries that are compensating each other. The international sample of banks is restricted to banks with the availability of no less than 75% of data. Macroeconomic variables are obtained from the following databases: OECD Statistics, the World Bank, and Thomson Reuters Eikon. I relate the data to the descriptive statistics of the selected variables (Table 1, Appendix A) and the risk models for selected groups of countries.

Table 1. Summary statistics

	MEAN	SD	MIN	MAX
LEV	15.78	27.89	8.20	1589.40
SIZE	13.14	2.30	4.22	21.86
LOANS	12.38	2.50	0.01	20.63
CRISIS	0.45	0.50	0.00	1.00
LOANS_CRISIS	5.53	6.34	0.00	20.63
FOREIGN	18.87	22.72	0.00	100.00
FREE	58.78	18.02	30.00	90.00
ECON_DEVELOP	2.30	4.11	-17.95	13.87
FINAN_DEVELOP	79.06	60.30	0.65	265.13

Source: Author's own study.

Note 1: The sample includes observations from 42 European countries, spanning the period 1996–2011.

Note 2: as *LEV* (Eq. 1) – for bank leverage (%), *SIZE* – logarithm of total banks assets, *LOANS* – as the ratio of bank loans to total assets (%), *CRISIS* – banking crisis dummy (1=banking crisis, 0=none), *LOANS_CRISIS* – as the ratio of bank loans to total assets * the banking crisis dummy, *FOREIGN* – foreign bank assets among total bank assets (%), *FREE* – financial freedom is a measure of banking efficiency (%), *ECON_DEVELOP* – annual growth rate of real GDP (%), and *FINAN_DEVELOP* – stock market capitalization to GDP (%).

Table 1 reports the descriptive statistics for the whole sample of 2,182 banks and Appendix A presents the means of the variables by country. The average value for the LEV variable is 15.78%, with banks in Slovakia reaching on average the highest score (57.29) in advanced countries, followed by Switzerland (33.40); with banks in Lithuania reaching on average the highest score (35.60) in emerging countries, followed by Hungary (17.28); and with banks in Belarus reaching on average the highest score (29.28) in Commonwealth of Independent State countries in Europe, followed by Ukraine (8.56). The lowest score of LEV is Sweden (8.46) among advanced countries, Macedonia (5.82) among emerging countries, and Russia (6.54) among Commonwealth of Independent State countries in Europe. The highest value of LEV volatility measured by standard deviation are also obtained by Slovakia (226.54), Lithuania (156.34), and Belarus (263.45), respectively. The lowest value of LEV volatility is obtained by Sweden (4.81), Serbia (2.91), and Russia (4.23), respectively. While the average value for the LOANS variable is 12.38%. Apart from FOREIGN (maximum is equal to 100.00), the FREE variable appears to have no extreme values (maximum is equal to 90.00).

Regarding foreign ownership, structure varies from 0 to 100%, and is on average 18.87%. The highest foreign ownership is scored by Estonian banks (98%) and the lowest are Spain (2.00) and Switzerland (4.56). Financial development (FINAN_DEVELOP) is on average 79.06%. The highest financial development in banks is found in Switzerland (218.66), followed by the United Kingdom and Luxembourg.

Table 2 reports correlations for leverage, bank-level, foreign ownership, financial liberalization, and financial and macroeconomic development variables. Leverage shows positive correlations between my four variables: SIZE, LOANS, FREE, and FINAN_DEVELOP, ranging from 0.03 to 0.04, all statistically significant at the 1% level. The table also shows a negative correlation between the variables of LOANS_CRISIS, CRISIS, and leverage ratio, indicating that bank risk-taking is lower during economic downturns. Bank leverage is, however, positively correlated with the variable FOREIGN.

Table 2 Correlation matrix

	LEV	SIZE	LOANS	LOANS_ CRISIS	CRISIS	FOREIGN	ECON_ DEVELOP	FINAN_ DEVELOP	
LEV	1.00								
SIZE		1,00							
LOANS	0.04*** (0,00)	0.92*** (0,00)	1.00						
L O A N S _ CRISIS	–0.01* (0,00)	0.07*** (0.00)	0.08*** (0.00)	1.00					
CRISIS	–0.01* (0,07)	–0.06*** (0.00)	–0.06*** (0.00)	0,97*** (0.00)	1.00				
FOREIGN	0.01 (0.25)	0.11*** (0.00)	0.07*** (0.00)	–0.19*** (0.00)	–0.21*** (0.00)	1.00			
FREE	0.04*** (0,00)	0.25*** (0.00)	0.20*** (0.00)	–0.03*** (0.00)	–0.08*** (0.00)	0.23*** (0.00)	1.00		
E C O N _ DEVELOP	–0.01 (0.90)	–0.17*** (0.00)	–0.17*** (0.00)	–0.34*** (0.00)	–0.33*** (0.00)	0.06*** (0.00)	–0.16*** (0.00)	1.00	
F I N A N _ DEVELOP	0.03*** (0.00)	–0.04*** (0.00)	–0.05*** (0.00)	–0.04*** (0.00)	–0.04*** (0.00)	–0.14*** (0.00)	0.47*** (0.00)	0.49*** (0.00)	1.00

Note: P-values in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4. Empirical results

4.1. Determinants of bank risk-taking in advanced countries in Europe

The estimates in Table 3 show the determinants of bank risk-taking in advanced countries in Europe. It presents that bank size has a negative effect on the leverage ratio, as indicated by the negative but not significant coefficient on SIZE in Models (1)-(4). These results imply that as bank assets increase, banks become well capitalized. The reduction in the leverage ratio of banks should subsequently enhance banking stability.

In Model 2, the results indicate that LOANS is positively associated with LEV. This association is statistically significant at the 5% level. This result supports Hypothesis 1, which posits that there is a positive relationship between the relative share of loans in bank assets and bank leverage. But this link is not positive during recession periods, where managers may make decisions on how to finance lending and reduce risk. My results corroborate those of previous studies (Carlson et al., 2013; Labonne and Lame, 2014). In Model 3, I found that the coefficient for FOREIGN is positive, but not significant, and this is in line with Hypothesis 2. However, leverage is positively influenced by FREE. This finding rejects my Hypothesis 3 that financial liberalization has the negative impact on banking risk in developed countries. Concerning the control variables at the country-level: ECON_DEVELOP has a negative, but not significant, effect on LEV, and FINAN_DEVELOP has a positive and significant influence (at the 1% level in Model 4), suggesting that well-performing banks take more risk. This finding rejects my Hypothesis 4.

Table 3. Determinants of bank risk-taking in advanced countries in Europe, 1996–2011

	Model 1	Model 2	Model 3	Model 4
	b/se	b/se	b/se	b/se
L(−1).LEV	0.665***	0.586*	0.960***	0.836***
	(0.12)	(0.26)	(0.11)	(0.09)
L(−2).LEV	0.043	0.047	−0.024	−0.092
	(0.12)	(0.09)	(0.05)	(0.08)
SIZE	−2.976	−1.057	−0.094	−1.295
	(8.45)	(4.48)	(0.78)	(0.88)
LOANS		0.382*	0.393	1.730*
		(3.89)	(0.59)	(0.97)
LOANS_CRISIS		−1.892**	−0.232***	−0.350*
		(0.96)	(0.08)	(0.20)
CRISIS		26.357*	2.980***	4.491*
		(13.98)	(1.08)	(2.37)
FOREIGN			0.020	0.023
			(0.04)	(0.02)
FREE			0.015*	0.006
			(0.01)	(0.02)
ECON_DEVELOP				−0.026
				(0.04)
FINAN_DEVELOP				0.011***
				(0.00)
CONSTANT	9.833	28.040	−4.252	−5.694
	(9.01)	(18.59)	(3.88)	(4.97)
# observations	20424	20392	11322	11322
# banks	2187	2182	2054	2054
AR1	1.0	1.0	−2.8	−2.8
p-value	0.03	0.03	0.0	0.0
AR2	0.7	0.7	1.3	1.5
p-value	0.5	0.5	0.2	0.1
Hansen test	318.1	629.4	345.2	464.9
p-value	0.9	1.0	0.9	0.9

Source: Author's own study.

Note 1: The sample of all banks from 26 European countries (Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Luxembourg, Malta, the Netherlands, Norway, Portugal, San Marino, Slovakia,

Slovenia, Spain, Sweden, Switzerland, and the United Kingdom). Data range 1996–2011. *Note 2*: The model is given by Eq. (2). The symbols have the following meaning: *LEV* (Eq. 1) – for bank solvency risk (%), *SIZE* – logarithm of total banks assets, *LOANS* – as the ratio of bank loans to total assets (%), *CRISIS* – banking crisis dummy (1=banking crisis, 0=none), *LOANS_CRISIS* – as the ratio of bank loans to total assets * the banking crisis dummy, *FOREIGN* – foreign bank assets among total bank assets (%), *FREE* – financial freedom is a measure of banking efficiency (%), *ECON_DEVELOP* – annual growth rate of real *GDP* (%), and *FINAN_DEVELOP* – stock market capitalization to GDP (%). The models have been estimated using the *GMM* estimator with robust standard errors. Standard Errors (se) are given in parentheses. The p-value denotes significance levels at * p < 0.1, ** p < 0.05, and *** p < 0.01, respectively.

4.2. Determinants of bank risk-taking in emerging countries in Europe

In this section, I estimate whether bank risk-taking is driven by different sets of determinants in the emerging countries of Europe (see Table 4). The results show that bank size has a positive effect on the leverage ratio, as indicated by the positive but not significant coefficient on SIZE in Models (1)–(4). These results are different than in advanced countries and imply that bigger banks become less capitalized. The increase in the leverage ratio of banks should subsequently increase bank instability in CEE.

In Model 2, the results show that LOANS is negatively associated with LEV, but this association is not statistically significant, which is likely the effect of the diversity of the financing of lending. However, this link is positive during downturns. This result rejects Hypothesis 1 for emerging countries in Europe. In Model 3, I found that the coefficient for FOREIGN is negative, but not significant, and thus is not in line with Hypothesis 2. However, leverage is positively influenced by financial freedom. This finding supports Hypothesis 3 that financial liberalization has a positive impact on banking risk in developing countries. The results show differences in the influence of financial liberalization on banking risk between developed and developing countries. Regarding country-level development, ECON_DEVELOP has a positive, but not significant effect on LEV, and FINAN_DEVELOP has a negative and not significant influence (Model 4), suggesting that the channel through which macroeconomic and financial development impacts bank risk-taking varies across countries depending on their economic development and institutional quality. This finding rejects Hypothesis 4.

Table 4. Determinants of bank risk-taking in emerging countries in Europe, 1996–2011

	Model 1	Model 2	Model 3	Model 4
	b/se	b/se	b/se	b/se
L(−1).LEV	−0.411***	−0.377***	−0.330***	0.209***
	(0.05)	(0.06)	(0.05)	(0.03)
L(−2).LEV	−0.318**	−0.253**	−0.274*	0.098
	(0.13)	(0.13)	(0.14)	(0.06)
SIZE	1.902	1.635	3.464	1.092
	(2.56)	(2.07)	(4.89)	(0.68)
LOANS	−0.247	−0.318	2.984	0.353
	(2.16)	(1.84)	(3.06)	(0.66)
LOANS_CRISIS		1.337	2.478	0.513
		(0.97)	(2.26)	(0.98)
CRISIS		−15.501	−31.991	−9.738
		(11.59)	(30.59)	(15.60)
FOREIGN			−0.011	0.063
			(0.08)	(0.04)
FREE			0.038	0.260**
				(0.15)
ECON_DEVELOP				0.171
				(0.40)
FINAN_DEVELOP				−0.027
				(0.03)
CONSTANT	−5.732	−1.611	20.462	−38.085*
	(8.32)	(6.67)	(34.62)	(16.66)
# observations	1746	1746	971	920
# banks	234	234	219	214
AR1	1.1	1.2	1.1	0.9
p−value	0.03	0.02	0.03	0.04
AR2	−0.6	−0.6	−0.6	−0.7
p−value	0.5	0.5	0.6	0.5
Hansen test	146.1	207.0	195.6	196.5
p−value	0.3	0.3	0.1	0.5

Source: Author's own study.

Note 1: The sample of all banks from 11 European countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Lithuania, Macedonia, Montenegro, Poland, Romania, and Serbia). Data range 1996–2011.

Note 2: The model is given by Eq. (2). The symbols have the following meaning: *LEV* (Eq. 1) – for bank solvency risk (%), *SIZE* – logarithm of total banks assets, *LOANS* – as the ratio of bank loans to total assets (%), *CRISIS* – banking crisis dummy (1=banking crisis, 0=none), *LOANS_CRISIS* – as the ratio of bank loans to total assets * the banking crisis dummy, *FOREIGN* – foreign bank assets among total bank assets (%), *FREE* – financial freedom is a measure of banking efficiency (%), *ECON_DEVELOP* – annual growth rate of real GDP (%), and *FINAN_DEVELOP* – stock market capitalization to GDP (%). The models have been estimated using the GMM estimator with robust standard errors. Standard Errors (se) are given in parentheses. The p-value denotes significance levels at * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$, respectively.

4.2. Determinants of bank risk-taking in Commonwealth of Independent State countries in Europe

I now analyze whether size, lending, foreign ownership, or financial freedom influence banking risk in Commonwealth of Independent State countries in Europe. To address this issue, I sequentially add each proxy for these variables and examine their interactions with banking leverage. Table 5 reports the results for this sample of countries and separately for four models. Among the control variables, SIZE coefficients are positive and significant for Models (1)–(4), which suggests that large banks cannot diversify their risk because they do not have opportunities to pursue a wider variety of loans or other activities. In Model 2, the results indicate that LOANS is negatively associated with LEV. This association is statistically significant at the 5% level. This result rejects Hypothesis 1, which posits that there is a positive relationship between the relative share of loans in bank assets and bank leverage. This link is also positive during recession periods. In Model 3, I found that the coefficient for FOREIGN is negative, and not significant. This is not in line with Hypothesis 2. However, leverage is positively influenced by FREE. This finding supports Hypothesis 3 that financial liberalization has a positive impact on banking risk in developing countries. The results show differences in the influence of financial liberalization on banking risk between developed and developing countries. Finally, in Model 4, FINAN_DEVELOP has positive and significant influence, suggesting that the channel through which financial development impacts bank risk-taking might generate instability in Commonwealth of Independent State countries.

Table 5. Determinants of bank risk-taking in Commonwealth of Independent State countries in Europe, 1996–2011

	Model 1	Model 2	Model 3	Model 4
	b/se	b/se	b/se	b/se
L(−1).LEV	−0.017	−0.011	0.146*	0.126
	(0.01)	(0.01)	(0.06)	(0.07)
L(−2).LEV	−0.003	−0.004	−0.092*	−0.118*
	(0.01)	(0.00)	(0.04)	(0.05)
SIZE	1.609***	1.667***	1.561***	1.368***
	(0.27)	(0.37)	(0.27)	(0.25)
LOANS	−0.513**	−0.697*	−0.609**	−0.348
	(0.25)	(0.41)	(0.26)	(0.23)
LOANS_CRISIS		0.134	0.107	0.049
		(0.19)	(0.08)	(0.07)
CRISIS		−1.879	−1.670*	−0.524
		(2.10)	(0.86)	(0.81)
FOREIGN			−0.017	−0.015
			(0.02)	(0.02)
FREE			0.020	0.016
			(0.02)	(0.03)
ECON_DEVELOP				0.009
				(0.01)
FINAN_DEVELOP				0.012**
				(0.01)
CONSTANT	−6.278***	−4.479*	−4.909***	−7.160***
	(1.43)	(1.88)	(1.39)	(1.49)
# observations	4459	4459	4018	3890
# banks	983	983	966	940
AR1	−1.8	−1.8	−1.6	−1.6
p-value	0.01	0.01	0.01	0.01
AR2	−1.0	−1.1	0.9	1.1
p-value	0.3	0.3	0.4	0.3
Hansen test	278.9	345.5	332.5	329.7
p-value	0.1	0.0	0.0	0.1

Source: Author's own study.

Note 1: The sample of all banks from 4 European countries (Belarus, Moldavia, Russia, Ukraine). Data range 1996–2011.

Note 2: The model is given by Eq. (2). The symbols have the following meaning: *LEV* (Eq. 1) – for bank solvency risk (%), *SIZE* – logarithm of total banks assets, *LOANS* – as the ratio of bank loans to total assets (%), *CRISIS* – banking crisis dummy (1=banking crisis, 0=none), *LOANS_ CRISIS* – as the ratio of bank loans to total assets * the banking crisis dummy, *FOREIGN* – foreign bank assets among total bank assets (%), *FREE* – financial freedom is a measure of banking efficiency (%), *ECON_DEVELOP* – annual growth rate of real GDP (%), and *FINAN_ DEVELOP* – stock market capitalization to GDP (%). The models have been estimated using the *GMM* estimator with robust standard errors. Standard Errors (se) are given in parentheses. The p-value denotes significance levels at * p < 0.1, ** p < 0.05, and *** p < 0.01, respectively.

Conclusion

I analyze how country-level development affects bank risk-taking and differentiate potential channels. I separate this influence through changes in three samples of countries that I broadly associate with the expansion of opportunities to take risk. I use a GMM dynamic panel estimators procedure to estimate a simultaneous equations model using data for a maximum of 3,399 banks in 41 European countries over the period 1996–2011. I apply four measures of country-level development that are available in previous studies: share of foreign ownership in the banking sector, financial freedom index, real growth rate, and stock market capitalization. Using these measures, I obtain different results which highlight the fact that the effect of macroeconomic and financial development on bank risk-taking is ambiguous.

The results, therefore, suggest that the channel through which size impacts bank risk-taking differs across countries in Europe depending on their economic development. Firstly, in developed countries, size reduces risk through increases in bank lending, whereas in developing countries, it increases financial stability through lack of risk diversification. This suggests that banks in developing countries cannot diversify their risk, because they have not had opportunities to pursue a wider variety of loans or other activities. Secondly, the procyclicality of the banking sector means gradual changes in risk-taking and perceptions in bank managers' decisions. It follows the pattern of risk-taking during booms and excessive aversion to risk during busts. Thirdly, bank risk-taking might change because of the diversity of the financing of lending and this link is influenced by downturns in the economy.

In summary, the results of the study of banking risk in European countries confirms the theoretical discussion about the differences in a cross-country analysis and for different stages of country development. In this paper, I complement the existing literature by providing new insights into the impact of financial and macroeconomic development on the degree of risk-taking of the European banks that have experienced financial crises over the past two decades. The findings may inform the current debate on changes in the international regulation of the banking sector and the definition of systemically important financial institutions.

Appendix A

General statistics for selected variables used in model for groups of European countries

COUNTRY	STAT	LEV	SIZE	LOANS	FOREIGN	FREE	ECON_ DEVELOP	FINAN_ DEVELOP	# OBS.	# BANK
ADVANCED	**mean**	**20.88**	**12.65**	**11.87**	**22.30**	**69.35**	**1.95**	**93.99**	**25937**	**2330**
	sd	58.59	2.03	2.44	23.05	16.69	2.36	67.09		
AUSTRIA	mean	17.15	13.03	12.11	24.56	70.00	1.63	37.19	1645	164
	sd	46.33	1.68	2.24	3.10	0.00	2.36	11.71		
BELGIUM	mean	21.37	15.26	13.90	23.42	74.68	1.47	67.47	457	46
	sd	11.94	2.18	2.67	15.76	5.01	1.85	15.91		
CYPRUS	mean	23.47	13.74	12.87	16.47	70.00	3.13	47.24	135	18
	sd	23.72	1.56	1.83	4.20	0.00	2.18	18.30		
CZECH REPUBLIC	mean	19.48	15.09	14.28	83.73	84.27	3.38	24.92	199	19
	sd	27.33	1.58	1.73	0.72	4.97	3.87	3.70		
DENMARK	mean	9.11	13.29	12.73	17.28	90.00	0.58	63.88	1166	100
	sd	5.67	1.93	1.95	4.18	0.00	2.83	10.15		
ESTONIA	mean	9.69	12.88	12.30	98.44	87.19	5.58	28.69	73	6
	sd	5.05	1.74	1.96	1.72	4.57	5.32	10.05		
FINLAND	mean	17.95	15.57	14.50	82.37	77.45	0.56	83.33	91	12
	sd	8.91	2.20	2.74	4.34	4.40	4.88	33.22		
FRANCE	mean	18.67	14.95	14.11	5.66	61.50	0.91	79.66	1810	158
	sd	24.28	2.13	2.25	0.47	8.97	1.88	12.93		
GERMANY	mean	18.23	14.36	13.60	12.74	54.29	1.18	43.76	7992	579
	sd	8.57	1.40	1.84	5.25	4.95	3.08	6.57		
GREECE	mean	19.67	15.86	15.42	10.93	50.09	0.64	50.61	196	17
	sd	32.88	1.70	1.74	4.34	5.38	4.16	15.64		
ICELAND	mean	17.95	15.57	14.50	82.37	77.45	0.56	83.33	102	26
	sd	8.91	2.20	2.74	4.34	4.40	4.88	33.22		
IRELAND	mean	20.69	17.26	16.01	38.07	88.62	1.19	44.20	134	12
	sd	12.74	1.55	2.50	2.10	3.48	4.70	15.31		
ITALY	mean	13.03	15.00	14.42	4.84	60.05	-0.15	38.21	1707	150
	sd	7.78	1.65	1.89	2.12	5.75	2.65	9.15		
LATVIA	mean	11.00	13.30	12.29	62.14	65.71	2.71	9.66	275	22
	sd	4.82	1.49	2.27	5.53	7.31	10.22	2.65		
LUXEM- BOURG	mean	27.39	15.05	13.10	96.59	84.26	2.90	181.82	973	84
	sd	26.24	1.72	2.28	2.41	4.95	3.84	42.18		
MALTA	mean	17.95	15.57	14.50	82.37	77.45	0.56	83.33	55	8
	sd	8.91	2.20	2.74	4.34	4.40	4.88	33.22		

COUNTRY	STAT	LEV	SIZE	LOANS	FOREIGN	FREE	ECON_ DEVELOP	FINAN_ DEVELOP	# OBS.	# BANK
NETHER-LANDS	mean	23.35	15.78	14.69	6.87	86.58	1.55	80.77	305	35
	sd	33.45	1.93	2.36	3.52	4.77	2.52	17.30		
NORWAY	mean	12.71	13.23	13.04	19.92	53.48	1.01	61.39	1085	139
	sd	11.86	1.42	1.41	9.34	4.77	1.59	11.27		
PORTUGAL	mean	13.87	14.72	13.95	23.37	53.90	0.49	39.50	267	30
	sd	9.77	2.15	2.57	2.86	4.90	1.92	5.88		
SAN MARINO	mean	12.42	13.95	12.82	0.00	0.00	3.66	0.00	50	6
	sd	5.96	.87	.81	0.00	0.00	2.04	0.00		
SLOVAKIA	mean	57.29	14.16	13.47	89.53	81.91	5.36	97.11	141	13
	sd	226.54	1.10	1.24	2.95	8.15	4.63	78.46		
SLOVENIA	mean	14.42	14.53	14.13	24.31	50.00	2.26	30.11	168	17
	sd	6.89	1.09	1.12	1.34	0.00	4.74	8.76		
SPAIN	mean	19.25	16.04	15.44	2.00	76.37	1.48	88.61	1021	88
	sd	14.21	1.96	2.40	0.00	4.82	2.88	9.73		
SWEDEN	mean	8.46	12.54	12.17	14.00	90.00	4.32	91.19	751	81
	sd	4.81	1.79	1.76	0.00	0.00	0.00	0.00		
SWITZER-LAND	mean	33.40	12.74	12.21	4.56	79.96	2.45	218.66	3652	354
	sd	32.55	1.20	1.56	1.28	7.62	1.97	27.63		
UNITED KINGDOM	mean	19.34	14.70	13.18	13.54	88.55	1.16	117.12	1487	146
	sd	51.71	2.64	3.04	2.93	3.53	2.46	14.34		
EMERGING AND DE-VELOPING	mean	27.95	12.91	11.94	60.16	62.33	4.37	27.03	2355	253
	sd	89.63	2.12	2.36	27.00	9.96	3.68	8.63		
ALBANIA	mean	9.99	13.40	12.86	78.12	64.47	3.95	20.29	70	11
	sd	5.90	1.46	1.55	3.32	4.99	4.15	8.88		
BOS-NIA-HER-ZEGOV.	mean	11.35	12.64	12.07	90.00	61.75	3.11	25.45	222	23
	sd	26.29	1.17	1.29	1.46	3.82	3.83	9.69		
BULGARIA	mean	9.99	13.40	12.86	78.12	64.47	3.95	20.29	247	24
	sd	5.90	1.46	1.55	3.32	4.99	4.15	8.88		
CROATIA	mean	9.63	13.01	12.46	90.00	64.17	1.54	47.97	379	35
	sd	6.40	1.64	1.69	1.06	4.94	4.28	21.69		
HUNGARY	mean	17.28	13.62	13.02	65.09	68.25	1.42	26.09	175	23
	sd	54.68	1.99	2.09	1.39	3.82	3.47	5.60		

COUNTRY	STAT	LEV	SIZE	LOANS	FOREIGN	FREE	ECON_ DEVELOP	FINAN_ DEVELOP	# OBS.	# BANK
LITHUANIA	mean	35.60	13.97	13.50	91.70	84.00	2.79	20.83	134	11
	sd	156.34	1.35	1.49	0.91	4.93	8.14	7.36		
MACE- DONIA	mean	5.82	11.94	11.02	61.88	64.00	3.88	13.02	158	15
	sd	3.28	1.30	1.96	6.20	4.93	2.24	5.98		
MONTE- NEGRO	mean	8.08	12.68	12.31	89.82	50.00	-2.70	81.87	58	8
	sd	4.03	0.87	0.91	8.07	0.00	4.10	3.46		
POLAND	mean	11.05	14.28	13.60	75.26	63.21	4.52	31.24	484	51
	sd	5.98	1.52	1.64	2.01	6.82	1.47	6.90		
ROMANIA	mean	9.63	13.01	12.46	91.70	84.00	2.79	20.83	125	21
	sd	6.40	1.64	1.69	0.91	4.93	8.14	7.36		
SERBIA	mean	6.04	13.18	12.66	73.52	50.00	-1.33	27.09	303	31
	sd	2.91	1.15	1.16	0.50	0.00	1.87	5.39		
COMMON- WEALTH OF INDEPEN.	mean	5.92	10.14	9.33	10.28	34.65	6.96	69.32	6815	1135
	sd	3.92	1.57	1.81	6.28	6.80	1.59	20.84		
BELARUS	mean	29.28	11.13	10.32	19.88	25.22	7.23	0	109	18
	sd	263.45	1.66	2.16	5.43	13.587	3.27	0		
MOLDOVA	mean	7.61	10.91	10.26	51.74	61.30	8.12	6.63	41	8
	sd	8.63	1.16	1.31	20.81	9.20	4.09	2.27		
RUSSIA	mean	6.54	11.06	10.30	10.54	37.96	3.83	66.42	6154	1037
	sd	4.23	1.82	2.04	1.49	4.03	5.31	17.43		
UKRAINE	mean	8.56	12.91	12.43	41.17	50.00	6.33	32.40	403	59
	sd	4.97	1.22	1.33	11.25	0.00	3.50	13.66		
TOTAL	mean	15.78	13.14	12.38	18.87	58.78	2.30	79.06	35107	3718
	sd	27.89	2.30	2.50	22.72	18.02	4.11	60.30		

Note: *LEV* (Eq. 1) – for bank leverage (%), *SIZE* – logarithm of total banks assets, *LOANS* – as the ratio of bank loans to total assets (%), *CRISIS* – banking crisis dummy (1=banking crisis, 0=none), *LOANS_CRISIS* – as the ratio of bank loans to total assets* the banking crisis dummy, *FOREIGN* – foreign bank assets among total bank assets (%), *FREE* – financial freedom is a measure of banking efficiency (%), *ECON_DEVELOP* – annual growth rate of real *GDP* (%), and *FINAN_DEVELOP* – stock market capitalization to GDP (%).

References

Abiad, A., Detragiache, E., Tressel, T., 2008. *A new database of financial reforms*. In: IMF Working Papers No. 08/266.

Allen, F., Gale, D., 2000. *Financial contagion*. Journal of Political Economics, 108: 1–33.

Anginer, D., Cerutti, E., Martinez Peria, M. S., 2016. *Foreign Bank Subsidiaries' Default Risk during the Global Crisis: What Factors Help Insulate Affiliates from their Parents?* Journal of Financial Intermediation, Available online 3 June 2016, ISSN 1042-9573, http://dx.doi. org/10.1016/j.jfi.2016.05.004.

Angkinand, A., Wihlborg, C., 2010. *Deposit insurance coverage, ownership, and banks' risk-taking in emerging markets*. Journal of International Money and Finance, 29(2): 252–274.

Arellano, M., Bond, S., 1991. *Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations*. Review of Economic Studies, 58: 277–297.

Bangake, C., Eggoh, J. C., 2011. *Further evidence on finance-growth causality: A panel data analysis*. Economic Systems, 35(2): 176–188.

Beck, T., Demirguc-Kunt, A., Levine, R., 2005. *Bank Concentration, Competition, and Crises: First results*. The World Bank Development Research Group Working Papers, February.

Beck, T., Levine, R., 2004. *Stock markets, banks, and growth: Panel evidence*. Journal of Banking & Finance, 28(3), 423–442.

Beck, T., Levine, R., Loayza, N., 2000. *Finance and the sources of growth*. Journal of Financial Economics, 58(2000): 261–300.

Beltratti A., Stulz R., M., 2012. *The credit crisis around the globe: Why did some banks perform better?* Journal of Financial Economics 105 (2012), 1–17, doi:10.1016/j.jfineco.2011.12.005

Blasco, M., Sinkey, J., 2006. *Bank asset structure, real-estate lending, and risk-taking*. Quarterly Review of Economics and Finance, 46: 53–81.

Blundell, R., Bond, S., 1998. *Initial conditions and moment conditions in dynamic panel data models*. Journal of Econometrics, 87: 115–143.

Borio, C., Furfine, C., Lowe, P., 2001. *Procyclicality of the financial system and financial stability: issues and policy options*. BIS Papers No 1, Bank for International Settlements.

Brewer, E., Kaufman, G., Larry, D., 2008. *Bank Capital Ration Across Countries: Why Do They Vary?* Journal of Financial Services Research, 34: 177–201.

Brunnermeier, M., Pedersen, K. L. H., 2009. *Market Liquidity and Funding Liquidity*. Review of Financial Studies, 22: 2201–2238.

Calmes, C., Theoret, R., 2013. *Market-oriented banking, financial stability and macro-prudential indicators of leverage*. Journal of International Financial Markets, Institutions and Money, 27: 13–34, ISSN 1042–4431, http://dx.doi.org/10.1016/j.intfin.2013.07.004

Carlson, M., Shan, H., Warusawitharana, M., 2013. *Capital ratios and bank lending: A matched bank approach*. Journal of Financial Intermediation 22(4): 663-687, doi:10.1016/j.jfi.2013.06.003.

Chow, W.W., Fung, M. K., 2011. *Financial development and growth: A clustering and causality analysis*. Journal of International Trade and Economic Development, 35(3), 1–24.

Claessens, S., Van Horen, N., 2014. *Foreign Banks: Trends and Impact*. Journal of Money, Credit and Banking, 46: 295–326.

Claessens, S., Van Horen, N., 2014. *The Impact of the Global Financial Crisis on Banking Globalization*, DNB WP No. 459.

Cubillas, E., Gonzalez, F., 2014. *Financial liberalization and bank risk-taking: International evidence*. Journal of Financial Stability, 11: 32–48, ISSN 1572-3089, http://dx.doi.org/10.1016/j.jfs.2013.11.001.

Dal Colle, A., 2016. *The mechanics of commercial banking liberalization and growth*, Journal of Banking & Finance. ISSN 0378-4266, http://dx.doi.org/10.1016/j.jbankfin.2016.04.014.

De Nicolo, G., Geadah, S., Rozhkov, D., 2003. *Bridging the great divide: Poorly developed financial systems in the CIS-7 countries may jeopardize their sustained growth*. Finance and Development, 40: 42–45.

Dekle, R., Lee, M., 2015 *Do foreign bank affiliates cut their lending more than the domestic banks in a financial crisis?* Journal of International Money and Finance, 50: 16–32, ISSN 0261-5606, http://dx.doi.org/10.1016/j.jimonfin.2014.08.005.

Dell'Ariccia, G., Laeven, L., Marquez, R., 2014. *Real interest rates, leverage, and bank risk-taking.* Journal of Economic Theory, 149: 65–99, ISSN 0022-0531, http://dx.doi.org/10.1016/j.jet.2013.06.002.

Demirguc-Kunt, A., Detragiache, E., 1999. *Financial liberalization and financial fragility.* In: World Bank Policy Research Working, No. 1917.

Demirguc-Kunt, A., Detragiache, E., Merrouche, O., 2013. *Bank capital: Lessons from the financial crisis.* Journal of Money, Credit and Banking, 45: 1147–1164.

Eng, Y., Habibullah, M. S., 2011. *Financial development and economic growth nexus: Another look at the panel evidence from different geographical regions.* Banks and Bank Systems, 6(1): 62–71.

Giannetti M., 2007. *Financial liberalization and banking crises: The role of capital inflows and lack of transparency,* Journal of Financial Intermediation, 16(1): 32–63, ISSN 1042-9573, http://dx.doi.org/10.1016/j.jfi.2006.04.001.

Haq, M., Heaney, R. 2012. *Factors determining European bank risk.* Journal of International Financial Markets, Institutions and Money, 22: 696–718.

Herwartz, H., Walle, Y. M., 2014. *Determinants of the link between financial and economic development: Evidence from a functional coefficient model.* Economic Modelling, 37(2): 417–427.

Hogan, T. L., 2014. *Capital and risk in commercial banking: A comparison of capital and risk-based capital ratios.* The Quarterly Review of Economics and Finance, 57: 32–45, ISSN 1062-9769, http://dx.doi.org/10.1016/j.qref.2014.11.003.

Hovakimian, A., Kane, E. J., 2000. *Effectiveness of capital regulation at US commercial banks,* 1985–1994. Journal of Finance 55: 451–469.

Jeon, B. N., Olivero, M. P., Wu, J., 2013. *Multinational banking and the international transmission of financial shocks: Evidence from foreign bank subsidiaries.* Journal of Banking & Finance 37(3): 952–972. ISSN 0378-4266, http://dx.doi.org/10.1016/j.jbankfin.2012.10.020.

Kaminsky, G., Reinhart, C. M., 1999. *The twin crises: the causes of banking and balance of payments problems.* American Economic Review 89 (3): 473–500.

Labonne, C., Lame, G., 2014. *Credit Growth and Bank Capital Requirements: Binding or Not?* Banque de France Working Paper, No 481.

Laeven, L., Valencia, F., 2013. *Systemic Banking Crises Database: An Update,* IMF WP/12/163.

Lassoued, N., Sassi, H., Ben Rejeb Attia, M., 2016. *The impact of state and foreign ownership on banking risk: Evidence from the MENA countries.* Research in International Business and Finance, 36: 167–178, ISSN 0275–5319, http://dx.doi.org/10.1016/j.ribaf.2015.09.014.

Levine, R., Zervos, S., 1998. *Stock markets, banks and economic growth.* American Economic Review, 88(3): 537–558.

Marcucci, J., Quagliariello, M., 2008. *Is bank portfolio riskiness procyclical? Evidence from Italy using a vector autoregression.* Journal of International Financial Markets, Institutions and Money, 18(1): 46–63, ISSN 1042-4431, http://dx.doi.org/10.1016/j.intfin.2006.05.002.

Maudos, J., 2017. *Income structure, profitability and risk in the European banking sector: The impact of the crisis,* Research in International Business and Finance, 39(A): 85–101, ISSN 0275-5319, http://dx.doi.org/10.1016/j.ribaf.2016.07.034.

Rousseau, P. L., Wachtel, P., 2000. *Banks, stock markets and China's great leap forward.* Emerging Markets Review, 8(3), 206–217.

Stiglitz, J., 2000. *Capital market liberalization, economic growth, and instability.* World Development 28(6): 1076–1085.

Tornell, A., Westermann F., 2005. Boom-bust cycles and financial liberalization. Cambridge, MA, EE.UU.: MIT Press.

Trujillo-Ponce, A., 2013. *What determines the profitability of banks? Evidence from Spain.* Accounting and Finance, 53: 561–586.

Vuillemey G., 2013, Solvency vs. Liquidity. A Decomposition of European Banks' Credit Risk over the Business Cycle, International Economics, 137, doi: 10.1016/j.inteco.2013.10.004