

# DETERMINANTS OF SOLVENCY IN SELECTED CEE BANKING SECTORS: DOES AFFILIATION WITH THE FINANCIAL CONGLOMERATE MATTER?

Pavla Klepková Vodová<sup>1</sup>

<sup>1</sup>Department of Finance and Accounting, School of Business Administration in Karviná, Silesian University in Opava, Univerzitní nám. 1934/3, 733 40 Karviná, Czech Republic

To link to this article: <https://doi.org/10.11118/actaun201967020493>

Received: 12. 1. 2018, Accepted: 19. 2. 2018

To cite this article: KLEPKOVÁ VODOVÁ PAVLA. 2019. Determinants of Solvency in Selected CEE Banking Sectors: Does Affiliation with the Financial Conglomerate Matter? *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 67(2): 493–501.

## Abstract

The aim of this paper is to describe the development of bank solvency in six selected Central and Eastern European countries (Bosnia and Herzegovina, Bulgaria, Croatia, Romania, Serbia and Slovenia) and to find out if the share of equity in total assets is influenced by the affiliation of banks with financial conglomerate or if other determinants are more important. The data cover the period from 2011 to 2017. The highest level of capital buffers hold Serbian banks, solvency of Croatian and Slovenian banks is below average. The results of the panel data regression analysis showed that the affiliation of banks with financial conglomerate does not statistically significant affect the simplified solvency ratio in these selected CEE countries. Instead, some bank-specific and macroeconomic factors matter. Especially important is the lagged value of bank solvency. Among other factors, bank profitability and liquidity, quality of its loan portfolio and size of the bank, as well as the economic cycle and price of credit and debt were significant for some countries.

Keywords: solvency, financial ratio, panel data regression analysis, commercial banks, financial conglomerates, banking sector, determinants

## INTRODUCTION

Solvency is important aspect of overall bank business. It is the ability to meet the bank's long-term financial obligation. The bank is considered solvent if the total assets exceed total liabilities, i.e. if the bank has a sufficient capital buffer. Bank capital plays a key role in bank solvency: the more capital banks have, the more robust their buffers are with which to absorb unexpected losses (Bikker and Metzmakers, 2007). Solvency in banking sector is required also by regulators.

As financial conglomerates are often systematically important financial institutions in many countries, it is evident that their solvency is crucial for financial stability of whole banking sectors. In spite of an increasing number of financial conglomerates and of the higher attention of regulators and supervision bodies to financial conglomerates and their solvency, an important gap still exists in the empirical literature. Papers dealing with financial conglomerates are mostly only theoretical, focusing on various aspects of risk management and capital adequacy of

the conglomerate. Empirical studies deals mainly with diversification benefits and conglomerate discounts. We can find studies that examined efficiency and performance of European banks, such as Vander Venet (2002) or Palečková (2018). Vander Venet (2002) found that conglomerates were more revenue efficient than their specialized competitors. The results of Palečková (2018) showed that the commercial banks in financial conglomerates were on average more efficient and profitable than other commercial banks in the banking sectors in CEE countries, even though the commercial banks in financial conglomerates reflected a lower average net interest income than other banks. Nevertheless, she did not conclude that all commercial banks in the financial conglomerate were more efficient and profitable than other banks in the banking sectors. However, we cannot find studies focusing on the link between bank solvency and the affiliation of bank with a financial conglomerate. This paper tries to fill this gap in current empirical research.

Therefore, the aim of this paper is to describe the development of bank solvency in six selected Central and Eastern European (CEE) countries (Bosnia and Herzegovina, Bulgaria, Croatia, Romania, Serbia and Slovenia) and to find out if the share of equity in total assets is influenced by the affiliation of banks with financial conglomerate or if other determinants are more important. The data cover the period from 2011 to 2017. In particular, we will investigate whether banks that belong to a financial conglomerate are more or less solvent than other banks in the sector, i.e. if an affiliation with the financial conglomerate is one of the determinants of bank solvency in selected CEE countries.

These countries have some common and different features. Their financial systems can be characterized as bank-oriented and concentrated on a model of universal banking. Banks have a dominant role in financial intermediation. Financial conglomerates are often present and systematically important in these countries. On the other side, activities of banks in the financial markets significantly differ, as well as the macroeconomic conditions. An empirical analysis can therefore yield interesting results. The choice of these six countries was also influenced by our research project which focuses on ten Central and Eastern European countries. As the group of Visegrad countries was analysed in our previous paper (Klepková Vodová, 2019), now we focus just on Bosnia and Herzegovina, Bulgaria, Croatia, Romania, Serbia and Slovenia.

The paper is structured as follows. The next section provides review of the relevant literature, describes methodology and data. Then we focus on the results of the analysis and the discussion. The final section offers concluding remarks.

## MATERIALS AND METHODS

### Review of the relevant literature

As it was mentioned above, in order to be solvent, banks hold a sufficient capital buffer. Banks usually hold more capital than it is required by the regulator. Motives for that behaviour may be strategic or reputational. According to Novokmet (2015), these motives have to be supported by the following considerations: (i) cheaper refinancing and borrowing in the future, (ii) avoiding the costs of regulatory interventions in case of insufficient capitalization, (iii) reducing pro-cyclical effects of bank capital (i.e. granting loans in a recession), (iv) financing mergers and acquisitions, (v) expansion in the business of banking, (vi) a more flexible bank management, and (vii) protection against unexpected losses. Thus, banks should weigh the costs and benefits from holding a certain level of capital. The costs consist from the remuneration costs of capital requested by the shareholders, the costs of the franchise value loss, the costs of reputation loss, bankruptcy costs, the costs of regulatory interventions and sanctions and the costs of adjustment to the requirements of the regulator and the market participants (Ayuso *et al.*, 2004).

Studies focusing on determinants of bank capital adequacy in the CEE countries are limited. D'Avack and Lévasseur (2007) researched capital buffers of banks in ten CEE countries; Fonseca and González (2010) analyzed the bank and country determinants of capital buffers of banks from 70 countries. Some of them were from the region of Central and Eastern Europe. Jokipii and Milne (2008) analyzed commercial banks from the European Union countries. Due to the limited number of empirical studies, it can be useful to look also on studies investigating determinants of capital adequacy in other countries, e.g. Bikker and Hu (2002), Ayuso *et al.* (2004), Lindquist (2004), Bikker and Metzmakers (2007), Boucinha and Ribeiro (2007), Stolz (2007), Francis and Osborne (2009), Stolz and Wedow (2011), and Novokmet (2015). As a dependent variable, most studies uses capital buffers, while some researches use also capital adequacy indicator and some other use an indicator of regulatory capital over total assets. We will follow Bikker and Metzmakers (2007) who use equity to total assets ratio.

The above mentioned studies tested a list of explanatory variables. Some of them are macroeconomic; the others are bank-specific. Economic trends (economic cycles) are usually described by the gross domestic product growth. All research confirmed that capital buffers increase in periods of economic downturn, and they tend to decrease in periods of economic expansion.

Among other macroeconomic variables, studies focused on price of debt and price of credit. In case of price of debt, two studies proved positive link (Fonseca and González, 2010; and Fonseca *et al.*, 2010) while one study found negative link which means that banks with a lower capitalization pay higher costs of debt financing (Lindquist, 2004). Fonseca *et al.* (2010) found that price of credit in previous period positively influence bank solvency.

In case of bank-specific variables, studies usually tested also lagged dependent variable. Positive impact was found by Bikker and Metzmakers (2007), Boucinha and Ribeiro (2007), Stolz (2007), Jokipii and Milne (2008), Francis and Osborne (2009), Fonseca and González (2010), Stolz and Wedow (2011). Their results mean that banks gradually adjust their capital to the targeted level. On the contrary, Novokmet (2015) proved negative impact which means the growth of capital buffers in one period will have a negative impact on the capital buffers in the following period, i.e. The growth of capital buffers in one period leads to a decrease in the capital buffers in the following period.

Another important determinant is an indicator of credit risk of the bank, such as the share of nonperforming loans in total loans or the share of loan loss reserves in total loans. Bikker and Metzmakers (2007), Lindquist (2004), Boucinha and Ribeiro (2007) found negative impact on capital adequacy which means that loan loss reserves are a substitute for the capital surplus. On the other hand, with increase in the credit portfolio riskiness, some banks may prefer to increase capital buffers, as in Stolz (2007), Jokipii and Milne (2008), Francis and Osborne (2009), Novokmet (2015). Francis and Osborne (2009) also found the level of risk in the current period is negatively connected with capital, while the level of risk in the previous period is positively connected with capital.

In case of bank size, bank liquidity and growth of loans, many studies came to the same results. Large banks have smaller capital buffers than small banks (Ayuso *et al.*, 2004; Lindquist, 2004; Boucinha and Ribeiro, 2007; Jokipii and Milne, 2008; Francis and Osborne, 2009; Fonseca and

González, 2010; Stolz and Wedow, 2011). Growth of loans provided to nonbank customer means that capital adequacy will decrease, as the risk-weighted assets will increase (Ayuso *et al.*, 2004; Jokipii and Milne, 2008; Novokmet, 2015). In addition to the aforementioned studies, positive link between bank liquidity and solvency was proved by Stolz (2007), Stolz and Wedow (2011).

Capital adequacy may be influenced also by profitability of the bank. In the short run, high profitability may increase capital ratios since profits are a source of capital. According to the pecking order theory, more profitable banks may retain earnings to fund known investment opportunities, as internal funds are the least information-intensive source of funds (Myers and Majluf, 1984). However, the causality between capital adequacy and bank profitability may be either negative or positive in the long run. A more profitable bank may choose to hold lower capital ratios, because (i) the bank knows that it will be able to draw on internal funds to fund expected investment opportunities or avoid regulatory censure, or (ii) the bank wants to use the tax deductibility advantage offered by debt. On the contrary, the positive causality from profits to capital in the long run may be a result of (i) increase in the bank's perceived charter value which provide an incentive to hold higher capital ratios, or (ii) higher retained excess profits in order to fulfil managers' own personal projects or ambitions (Osborne *et al.*, 2012). Negative relationship between bank capital and profitability was founded by Ayuso *et al.* (2004), Berger (1995), Boucinha and Ribeiro (2007), Jokipii and Milne (2008) or Osborne *et al.* (2012), positive relationship was proved by Angbazo (1997), Demirgüç-Kunt and Huizinga (1999), Vander Vennet (2002), Nier and Baumann (2006), Athanasoglou *et al.* (2006), Hutchison and Cox (2007), Flannery and Rangan (2008) or Novokmet (2015).

## Methodology and data

First, we will evaluate the level of bank solvency for each bank in the sample using an indicator of bank solvency. Due to the lack of consistent data, it is possible to use neither total capital ratio, nor Tier 1 ratio. The only capital adequacy indicator which we could use for all banks in all countries is only the share of equity in total assets (CAP). The higher the equity-to-asset ratio, the lower risk of bank insolvency. It is a very simplified way how to measure bank capital adequacy (solvency). This ratio does not reflect different quality of bank capital (tier 1, tier 2) or different riskiness

of bank activities. However, we follow Bikker and Metzmakers (2007) who used this ratio, too.

In order to find out determinants of bank solvency, we use the panel data regression analysis:

$$CAP_{it} = \alpha + \beta'X_{it} + \delta_i + \varepsilon_i$$

where  $CAP_{it}$  is the share of equity in total assets for bank  $i$  at time  $t$ ,  $X_{it}$  is vector of explanatory variables for bank  $i$  at time  $t$ ,  $\alpha$  is constant,  $\beta'$  is a row vector of coefficient that represents the slope of explanatory variables,  $\delta_i$  represents fixed effects for bank  $i$ , and  $\varepsilon_i$  is the error term.

The most crucial task is to determine the appropriate explanatory variables. The selection of explanatory variables is based on the studies cited above and contains both bank-specific and macroeconomic variables. As the aim of this paper is to find out if selected (above mentioned) financial ratios are influenced by the affiliation of banks with financial conglomerate or if other determinants are more important, we also employ a dummy variable CONG which represents whether the bank belongs to the financial conglomerate. We focus on banks from five selected financial conglomerates (Erste Group, KBC Group, Raiffeisen Bank International AG, Société Générale Group and UniCredit Group).

As bank-specific variables, we focused on liquidity (LITA, i.e. The share of liquid assets in total assets; NIP, i.e. The share of net interbank position in total assets), quality of a bank's credit portfolio (NPL, i.e. The share of non-performing loans in total loans), size of the bank (TOA, i.e.

logarithm of total assets of the bank), profitability of the bank (ROA, i.e. The share of net profit in total assets of the bank; ROE, i.e. The share of net profit in equity of the bank). All bank-specific variables were obtained from the Moody's Analytics BankFocus database and the annual reports of commercial banks. All the data are reported on an unconsolidated basis.

Macroeconomic and sectoral variables include growth rate of gross domestic product (GDP, i.e. GDP volume % change), interest rate on loans (IRL), interest rate on deposits (IRD). All these data were provided by World Bank. More information about variables are provided in Tab. I.

The data set used data of commercial banks during the 2011–2017 period. Due to the homogeneity of the data set, we include only data from commercial banks that are operating as independent legal entities. We exclude branches of foreign banks, mortgage banks, building societies and state banks with special purposes. The national panels are unbalanced because some banks do not report or exist over the full period of analysis. The sum of total assets of selected commercial banks covered more than 70% of total assets of banking sector.

## RESULTS

The first part of this section presents the median values of the share of equity in total assets which was calculated for each bank in the sample. The second part of this section focuses on factors that determine bank solvency measured by this ratio.

### I: Variables definition

Variable	Variable	Source
<b>CAP</b>	Dependent variable; the share of equity in total assets	BankFocus
<b>CONG</b>	Dummy variable for the affiliation of banks with the financial conglomerate (1 for banks which belongs to the Erste Group, KBC Group, Raiffeisen Bank International AG, Société Générale Group or UniCredit Group, 0 for other banks)	Own
<b>GDP</b>	GDP growth (annual %) (NY.GDP.MKTP.KD.ZG)	World Bank
<b>IRD</b>	Deposit interest rate (%) (FR.INR.DPST)	World Bank
<b>IRL</b>	Lending interest rate (%) (FR.INR.LEND)	World Bank
<b>LITA</b>	The share of liquid assets in total assets	BankFocus
<b>NIP</b>	The share of net interbank position in total assets	BankFocus
<b>NPL</b>	The share of non-performing loans in total loans	BankFocus
<b>ROA</b>	Return on assets: the share of net profit in total assets	BankFocus
<b>ROE</b>	Return on equity: the share of net profit in equity	BankFocus
<b>TOA</b>	Logarithm of total assets of the bank	BankFocus

Source: author's processing

### Development of bank solvency in selected CEE countries

Median values of the share of equity in total assets for individual countries and for the six selected countries as a whole are presented in Tab. II.

As we can see, the level of capital buffer differs significantly among individual countries and individual years. Solvency of Serbian banks is very high for the whole analyzed period. On the other hand, capital adequacy of Croatian and Slovenian banks is below average. Solvency of Bulgarian and Bosnian banks differs in the first and second part of the analyzed period: Bosnian banks are more solvent at the beginning of the analyzed period, Bulgarian banks at the second half of the period. The capital buffer of Romanian banks fluctuates about average of the six selected CEE countries.

#### Panel data regression analysis

To identify the determinants of bank solvency in selected CEE countries, we employ an econometric package EViews 9. After tests of stationarity, normality and multicollinearity, we proceed with regression estimation. First we included all explanatory variables that might have an effect on the dependent variable (all explanatory variables considered in the analysis are those mentioned in section Methods and Materials). To reduce the number of explanatory variables, we used information criteria (Akaike, Schwarz and Hannan-Quinn). The results recorded in Tab. III.

Dummy variable CONG, which represented whether the bank belongs to the financial conglomerate, was statistically significant in none of selected CEE countries. We can therefore say that the affiliation with financial conglomerate does not statistically significant affect the simplified solvency ratio (the share of equity in total assets) in six

selected CEE countries. Instead, other bank-specific and macroeconomic factors matter.

The lagged dependent variable was statistically significant in all analyzed banking sectors. Besides it, solvency of banks from Bosnia and Herzegovina is determined by lagged value of the CAP ratio, growth rate of gross domestic product lagged by one year, bank profitability expressed by return on assets, and size of the bank (TOA). In case of Bulgaria, growth rate of GDP, interest rate on deposit and size of the bank matter. For Croatian banks, interest rate on loans, bank profitability and size of the bank are important for their solvency. The level of solvency of Romanian banks is influenced mainly by the growth rate of GDP, interest rate on loans and bank profitability. Three other variables were statistically significant for Serbian banks: bank liquidity (share of liquid assets in total assets, LITA), quality of loan portfolio (share of nonperforming loans in total loans, NPL) and again size of the bank. Finally, bank solvency is affected by interest rate on loans, quality of loan portfolio and size of the bank.

### DISCUSSION

The previous section shows that different variables may be statistically significant in different countries. Also, their impact on bank solvency may vary. It is very easy to see from Tab. IV which variables were statistically significant in individual countries and what was their impact on bank solvency (positive or negative).

As it was mentioned above, the lagged dependent variable was statistically significant in all analyzed banking sectors. The positive sign of the regression coefficient is consistent with the fact that banks gradually adjust their capital to the targeted level and with findings of Bikker and Metzmakers (2007), Boucinha and Ribeiro (2007), Stolz (2007), Jokipii and Milne (2008), Francis and Osborne (2009), Fonseca and González (2010) and Stolz

II: Median values of the CAP ratio (in %)

	2011	2012	2013	2014	2015	2016	2017
<b>Bosnia and Herzegovina</b>	16.17	17.30	15.14	14.39	14.54	14.73	13.88
<b>Bulgaria</b>	12.68	12.62	15.12	19.48	19.69	18.82	17.15
<b>Croatia</b>	15.13	15.25	16.56	16.30	16.40	16.72	18.02
<b>Romania</b>	16.80	16.09	15.75	13.98	17.88	19.76	21.10
<b>Serbia</b>	23.60	19.79	19.89	19.40	20.85	22.22	23.10
<b>Slovenia</b>	11.70	11.63	14.01	17.12	18.06	16.75	15.91
<b>Selected CEE countries</b>	15.96	16.21	16.45	16.61	18.06	18.44	18.32

Source: author's calculations

## III: Determinants of the CAP ratio in selected CEE countries

Variable	Bosnia and Herzegovina		Bulgaria		Croatia	
	Coefficient	Std. dev.	Coefficient	Std. dev.	Coefficient	Std. dev.
Constant	33.62***	17.21	30.86	65.20	82.18*	25.16
CAP (-1)	0.98*	0.08	0.49*	0.10	0.26*	0.09
GDP			-2.15***	1.54		
GDP (-1)	-0.35***	0.18				
IRD			-2.11***	2.35		
IRL					-0.64**	0.27
ROA	0.30**	0.12			0.80*	0.15
TOA	-2.09***	1.33	-0.93***	4.67	-4.82**	1.85
Adj. R <sup>2</sup>		0.84		0.87		0.84
D-W stat.		2.11		2.06		2.09
Total obs.		104		84		108

Variable	Romania		Serbia		Slovenia	
	Coefficient	Std. dev.	Coefficient	Std. dev.	Coefficient	Std. dev.
Constant	22.66*	4.58	255.44*	42.84	111.81***	56.91
CAP (-1)	-0.02***	0.10	0.32*	0.08	0.39*	0.12
GDP	0.73***	0.43				
IRL	-0.45***	0.33			-5.73***	3.61
LITA			0.28**	0.11		
NPL			-0.24*	0.06	-0.16**	0.06
ROA	-0.77*	0.19				
TOA			-18.15*	3.15	-1.94***	1.22
Adj. R <sup>2</sup>		0.86		0.76		0.65
D-W stat.		2.02		1.96		1.81
Total obs.		75		118		74

Note: The starred coefficient estimates are significant at the 1% (\*), 5% (\*\*) or 10% (\*\*\*) level.

Source: author's calculations

## IV: Effects of variables in individual countries - BYLO

Variable	Countries in which this variable was statistically significant
CAP(-1)	Bosnia and Herzegovina (+), Bulgaria (+), Croatia (+), Romania (-), Serbia (+), Slovenia (+)
CONG	
GDP	Bosnia and Herzegovina (-), Bulgaria (-), Romania (+)
IRD	Bulgaria (-)
IRL	Croatia (-), Romania (-), Slovenia (-)
LITA	Serbia (+)
NIP	
NPL	Serbia (-), Slovenia (-)
ROA	Bosnia and Herzegovina (+), Croatia (+), Romania (-)
ROE	
TOA	Bosnia and Herzegovina (-), Bulgaria (-), Croatia (-), Serbia (-), Slovenia (-)

Source: author's processing

and Wedow (2011). The exception is Romanian banking sector: as in Novokmet (2015), the growth of capital buffers in one period leads to a decrease in the capital buffers in the following period.

Size of the bank, measured by the logarithm of bank total assets (TOA), was statistically significant in five countries (the exception is Romania). The negative sign of the regression coefficient indicates that small banks are more solvent than large banks. This conclusion is in accordance with previous studies (Ayuso *et al.*, 2004; Lindquist, 2004; Boucinha and Ribeiro, 2007; Jokipii and Milne, 2008; Francis and Osborne, 2009; Fonseca and González, 2010; Stolz and Wedow, 2011).

Although all research confirmed that capital buffers increase in periods of economic downturn, and they tend to decrease in periods of economic expansion, we obtained the same results for Bosnia and Herzegovina and for Bulgaria. Romanian banking sector is again an exception, as the link between economic cycle and bank solvency is opposite. Romanian banks behave cyclically as they increase their capital buffers during periods of economic expansion and decrease during economic downturns.

The negative impact of price of credit (IRL) on solvency of Croatian, Romania and Slovenian bank is not in accordance with conclusions of previous studies. However, it can be explained easily: higher values of the lending interest rate may be perceived as a signal of higher credit risk. Therefore, it may be connected with providing loans which will be of worse quality which in turn may threaten bank capital (as loan loss reserves are a substitute for the capital surplus). This is proved also by negative sign of the regression coefficient for nonperforming loans (NPL) for Slovenia (and Serbia as well) and by results of Bikker and Metzmakers (2007), Lindquist (2004), Boucinha and Ribeiro (2007).

Bank solvency of Bosnian, Croatian and Romanian banks is influenced also by bank profitability (ROA). However, the impact differs. In case of Bosnia and Herzegovina and Croatia, positive relationship was confirmed. This is in accordance with findings of Angbazo (1997), Demirgüç-Kunt and Huizinga (1999), Vander Vennet (2002), Nier and Baumann (2006), Athanasoglou *et al.* (2006), Hutchison and Cox (2007), Flannery and Rangan (2008) or Novokmet (2015); and it is a result of higher incentives to hold higher capital buffers. In contrary, the link between bank profitability and solvency is negative for Romanian banks. More profitable banks hold lower capital ratios because of expected investment opportunities or tax reasons. Such positive relationship was proved by Angbazo (1997), Demirgüç-Kunt and Huizinga (1999), Vander Vennet (2002), Nier and Baumann (2006), Athanasoglou *et al.* (2006), Hutchison and Cox (2007), Flannery and Rangan (2008) or Novokmet (2015).

Price of debt (expressed by interest rate on deposits, IRD) influences the level of bank solvency in Bulgaria. In accordance with Lindquist (2004), less solvent banks pay higher costs of debt financing.

The last statistically significant variable was a liquidity ratio, the share of liquid assets in total assets (LITA). The higher this ratio, the higher the bank liquidity and the higher the solvency of Serbian banks. Positive link between bank liquidity and solvency was proved by Stolz (2007), Stolz and Wedow (2011).

The affiliation of the bank with financial conglomerate (CONG), bank liquidity expressed by the share of net interbank position in total assets (NIP) and bank profitability measured by return on equity (ROE) were statistically significant in no analyzed country.

## CONCLUSION

The aim of this paper was to describe the development of bank solvency in six selected Central and Eastern European (CEE) countries (Bosnia and Herzegovina, Bulgaria, Croatia, Romania, Serbia and Slovenia) and to find out if the share of equity in total assets is influenced by the affiliation of banks with financial conglomerate or if other determinants are more important.

Due to the lack of data, we have to use a simplified measure of bank solvency, the share of equity in total assets. First, we evaluated the level of bank solvency for each bank in the sample. The level of capital buffer differs significantly among individual countries and individual years. Serbian banks are the most solvent for the whole analyzed period. On the other hand, capital adequacy of Croatian and Slovenian banks is below average.

The results of the panel data regression analysis showed that the affiliation of banks with financial conglomerate does not statistically significant affect the simplified solvency ratio in these selected CEE countries. Instead, some macroeconomic and bank-specific variables matter. The lagged value

of bank solvency was statistically significant in all analyzed banking sectors. With the exception of Romania, banks gradually adjust their capital to the targeted level. Size of the bank is important for five countries; small banks are more solvent than large banks.

Bank solvency is also linked with economic cycle, price of credit and debt, bank profitability, liquidity and quality of its loan portfolio, at least in some countries.

There are many way which may improve the research about the determinants which affect the commercial banks' solvency in the future. First, we can simply extend the time series and divide the analysis into pre-crisis, crisis and post-crisis periods. Another possibility is to extend the research into other banking sectors, e.g. to include other central and eastern European countries. It would be also possible to include other variables, mainly better measures of bank solvency.

#### Acknowledgements

Publication of this paper was supported by the Czech Science Foundation (Project GAČR 16-17796S, Affiliation with financial conglomerate as a determinant of performance and risk of banks). The support is gratefully acknowledged.

### REFERENCES

- ANGBAZO, L. 1997. Commercial bank net interest margins, default risk, interest rate risk, and off-balance sheet banking. *Journal of Banking and Finance*, 21(1): 55–87.
- AYUSO, J., PÉREZ, D. and SAURINA, J. 2004. Are Capital Buffers Pro-cyclical? Evidence from Spanish Panel Data. *Journal of Financial Intermediation*, 13(2): 249–264.
- ATHANASOGLU, P. 2011. *Bank Capital and Risk in the South Eastern European Region*. MPRA Paper 32002. MPRA:
- BERGER, A. N. 1995. The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking*, 27(2): 432–456.
- BIKKER, J. A. and HU, H. 2002. *Cyclical Patterns in Profits, Provisioning and Lending of Banks*. Staff Report of De Nederlandsche Bank, 86. Nederlandsche Bank.
- BIKKER, J. A. and METZEMAKERS, P. A. J. 2007. Is Bank Capital Procyclical? A Cross-Country Analysis. *Kredit und Kapital*, 40(2): 225–264.
- BOUCINHA, M. and RIBEIRO, N. 2007. The Determinants of Portuguese Banks' Capital Buffers. In: *Financial Stability Report*. Lisbon: Banco de Portugal.
- D'ARACK, F. and LEVASSEUR, S. 2007. *The Determinants of Capital Buffers in CEECs*. Working Paper of Observatoire Francais des Conjonctures Economiques, 2007-28. Sciences Po.
- DEMIRGÜC-KUNG, A. and HUIZINGA, H. 1999. Determinants of commercial bank interest margins and profitability: Some international evidence. *The World Bank Economic Review*, 13(2): 379–408.
- FLANNERY, M. and RANGAN, K. P. 2008. What Caused the Bank Capital Build-up of the 1990s? *Review of Finance*, 12(2): 391–429.
- FONSECA, A. R. and GONZÁLEZ, F. 2010. How bank capital buffers vary accros countries: The influence of costs of deposits, market power and bank regulation. *Journal of Banking and Finance*, 34(4): 892–902.
- FONSECA, A. R., GONZÁLEZ, F. and PEREIRA DA SILVA, L. 2010. *Cyclical Effects of Bank Capital Buffers with Imperfect Credit Markets: International Evidence*. Working Paper n. 2016. Banco Central do Brasil.
- FRANCIS, W. and OSBORNE, M. 2009. *On the Behaviour and Determinants of Risk-Based Capital Ratios: Revisiting the Evidence from UK Banking Institutions*. Occasional Paper Series 31. Financial Services Authority.
- HUTCHISON, D. E. and COX, R. A. K. 2007. Causal relationship between bank capital and profitability. *Annals of Financial Economics*, 3(1): 40–51.
- JOKIPPI, T. and MILNE, A. 2008. The Cyclical Behaviour of European Bank Capital Buffers. *Journal of Banking and Finance*, 32(8): 1440–1451.
- KLEPKOVÁ VODOVÁ, P. 2019. Determinants of Bank Liquidity and Solvency in the Visegrad Countries: Does Affiliation with the Financial Conglomerate Matter? *DANUBE: Law and Economic Review*. Under Review.
- LINDQUIST, K. G. 2004. Banks' Buffer Capital: How Important is Risk. *Journal of International Money and Finance*, 23(3): 493–513.
- MYERS, S. and MAJLUF, N. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2): 187–221.



- NIER, E. and BAUMANN, U. 2006. Market discipline, disclosure and moral hazard in banking. *Journal of Financial Intermediation*, 15(3): 332–361.
- NOVOKMET, A. K. 2015. Cyclicalities of bank capital buffers in South-Eastern Europe: endogenous and exogenous aspects. *Financial Theory and Practice*, 39(2): 139–169.
- OSBORNE, M., FUERTES, A. M. and MILNE, A. 2012. *Capital and Profitability in Banking: Evidence from U. S. Banks*. Cass University Working Paper.
- PALEČKOVÁ, I. 2018. *Performance Measurement in Banking: Empirical Application to Central and Eastern Europe*. Praha: Professional Publishing.
- STOLZ, S., 2007. *Bank Capital and Risk-Taking: The Impact of Capital Regulation, Charter Value, and the Business Cycle*. Berlin: Springer-Verlag.
- STOLZ, S. and WEDOW, M. 2011. Banks' Regulatory Capital Buffer and the Business Cycle: Evidence for Germany. *Journal of Financial Stability*, 7(2): 98–110.
- VANDER VENNET, R. 2002. Cost and Profit Efficiency of Financial Conglomerates and Universal Banks in Europe. *Journal of Money, Credit, and Banking*, 34(1): 254–282.

Contact information

Pavla Klepková Vodová: klepkova@opf.slu.cz