

# Macroeconomic Environment and Banking Sector Soundness in CEE Countries

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## Abstract

*The aim of our paper is to empirically investigate the impact of the changes in macroeconomic environment on the financial soundness of the banking sector (as measured by bank Z-score) in 11 Central and Eastern European countries, over the period 2000-2014. The results of our empirical study indicate that the financial soundness of the banking sector in our sample countries is heavily influenced by unemployment and inflation rates, foreign exchange rate, current account balance, public debt, and financial depth. Overall, our study underlines the crucial importance of ensuring a healthy and sound macroeconomic environment for the financial soundness of banks. Also, our research highlights that, out of all the macroeconomic factors analyzed, the dynamics of bank credit to the private sector is the main risk factor for the soundness of the banking sector in CEE countries, which calls for its rigorous monitoring.*

**Key words:** banks, bank soundness, financial risks, Z-score, macroeconomic variables

**J.E.L. classification:** G21, E44, C23

## 1. Introduction

The financial system in CEE countries is mainly focused on banks, so their soundness plays a very important role in ensuring overall financial stability. In the years before the recent international crisis, the CEE countries have experienced a rapid expansion of the banking sector, which was accompanied by the accumulation of considerable macroeconomic imbalances (accelerating credit growth, significantly increase in the share of foreign currency loans, high asset prices, high rates of non-performing loans, significant debt of certain sectors and large external imbalances), exposing countries to significant financial risks that became evident once the crisis emerged (Sorsa *et al.*, 2007; Klingen *et al.*, 2013; Ghita-Mitrescu and Duhnea, 2015).

The expansion of the banking market in the CEE countries was interrupted when the recent international crisis emerged. The extremely negative impact of the crisis on banks and the real economy underlined the importance that the financial soundness of the banking sector has for macroeconomic stability and revived the interest of academics and policy makers to measure the soundness of the banking sector and identify the factors that impact on it.

In this context, our study aims to identify the key macroeconomic factors with impact on the financial soundness of banks, expressed by Z-score, in 11 Central and Eastern European countries (namely Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia), for a period of 15 years (2000-2014).

The overview of the literature reveals the existence of a large number of studies investigating the factors with potential impact on the health and financial soundness of banks, either for a panel of countries or a specific country. Maechler *et al.* (2010) examine the impact of certain financial risks and risks from the macroeconomic environment on bank stability in emerging Europe (10 countries that joined the EU in 2004 and 8 countries in the surrounding region), for the period 1997-2004, and the way the vulnerabilities in the financial system can be mitigated by a strong

regulatory and prudential framework. The results of their study indicate, in particular, that credit quality and financial depth are associated with a greater bank stability, while supervisory and regulatory policies could also improve the stability of financial institutions. Mirzaei *et al.* (2013) examine the factors affecting the profitability and stability of the banking sector in 40 advanced and emerging economies, for the period 1999-2008. Overall, the study results highlight the existence of significant differences between the two groups of countries. From the perspective of the macroeconomic environment, the authors show that it has a significant impact on banking sector stability. The empirical analysis performed by Vallascas and Keasey (2012) shows, for a sample of listed banks in 17 European countries, that some bank features (bank size, share of non-interest income, asset growth) and the macroeconomic environment (GDP growth rate, inflation rate) significantly affect banking stability. The authors also point out that, by setting restrictions on the absolute size of a bank, individual bank stability can be strengthened and the contribution to systemic risk of large banks compared to the domestic economy can be reduced.

Several studies (Schaeck and Čihák, 2008; Uhdea and Heimeshoff, 2009; Beck *et al.*, 2013; Liu *et al.*, 2013; Schaeck and Čihák, 2014) focused on assessing the impact of banking competition and concentration on the soundness and financial stability of banks, using macroeconomic factors as control variables. Thus, Schaeck and Čihák (2008) examine how competition affects the soundness of banks using data for a sample of banks from 12 European countries and the U.S., for the period 1995-2005. The results of their analysis highlight, both for the European and the U.S. banks, a positive effect of competition on bank soundness, transmitted through the efficiency channel. Uhdea and Heimeshoff (2009) examine, for 25 EU Member States, the impact of banking market concentration on banks' financial soundness, measured by Z-score, using as control variables some macroeconomic, bank-specific, and regulatory and institutional factors. The authors found that the increase in banking market concentration has a negative impact on the financial soundness of banks. Liu *et al.* (2013) investigate the impact of bank competition and regional economic conditions on bank stability in 10 European countries for the period 2000-2008. The results of their empirical study show that a moderate level of bank competition can increase bank stability, and regional economic conditions significantly influence the stability of European banks.

## 2. Model and data

Our study evaluates the effects of selected macroeconomic variables on the financial soundness of the banking sector in 11 Central and Eastern European countries (namely Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia) and a timespan of 15 years, covering both pre- and post-crisis conditions (2000-2014).

In order to describe the relationship between macroeconomic environment and banking sector soundness in our sample countries, we used a multivariate linear regression model, where several macroeconomic indicators were introduced as explanatory variables, according to equation (1).

$$Y_{i,t} = \beta_0 + \beta_k X_{ki,t} + \gamma_n E_n + u_{i,t} \quad (1)$$

Where:

- $i$  refers to the country ( $i = \overline{1, 11}$ );
- $t$  refers to time ( $t = \overline{1, 15}$ );
- $Y$  is the dependent variable (a measure of banking sector soundness);
- $X_k$  is a vector of  $k$  independent variables, macroeconomic factors with possible impact on banking sector soundness;
- $E_n$  are  $N-1$  country dummies (binary variables), where  $N$  denotes the number of countries in our sample;
- $\beta_k$  and  $\gamma_n$  are the coefficients of the explanatory macroeconomic and binary variables, respectively;
- $\beta_0$  is the intercept;
- $u_{i,t}$  is the error term.

Given that our sample includes several countries, heterogeneity could be an issue, therefore

country dummies have been included into the model, allowing us to capture the effects of the individual characteristics of a country that do not change over time. Time fixed-effects have also been considered when deciding on the specification of our econometric model. However, all the coefficients of time dummies proved to be insignificant and, therefore, we decided to drop these from the model.

The literature on banking sector soundness suggests several alternative measures of the financial soundness of banks, among which the Z-score, the ratio of non-performing loans to total bank loans, the ratio of bank capital and reserves to total assets, etc. In our analysis, we decided to measure the financial soundness of banking sector using Z-score (see Table no. 1), a synthetic variable that compares the buffer of a country's banking sector (capitalization and returns) with the volatility of those returns, according to equation (2).

$$Z - score = \frac{\mu+k}{\sigma} \quad (2)$$

Where:  $\mu$  is the average return on bank assets (%);  $k$  is equity to total assets (%);  $\sigma$  is the standard deviation of average return on assets (a proxy for return volatility).

Therefore, Z-score reflects the extent to which banks have a cushion (of bank capital) to absorb losses. A large value of Z-score points to a low solvency risk and a high level of financial soundness.

Table no. 1. Variables and their expected effect

Symbol of the variable	Description of the variable	Expected effect*
Dependent variable		
Z-score	Bank Z-score, a measure of the probability of default of a country's banking sector	
Independent variables		
gdp	Real GDP per capita growth rate (annual %)	+/-
unemployment	Unemployment rate (% of active population)	-
inflation	Inflation, consumer prices (annual %)	+/-
exchange	Real effective exchange rate (index, 2005=100)	+/-
current_account	Current account balance (% of GDP)	+
budget	General government budget balance (% of GDP)	-
debt	General government debt (% of GDP)	-
bank_credit	Bank credit to the private sector (% of GDP)	+/-
stock_market	Stock market capitalization (% of GDP)	+/-

\*according to relevant empirical studies

Source: (the authors)

According to the literature (Demirgüç-Kunt and Huizinga, 2010; Köhler, 2015), the dynamics of the financial soundness of banks is affected by bank-specific characteristics, the macroeconomic and institutional environment, as well as the banking sector's structure and size. Since our study is only concerned with the macroeconomic environment, we considered as independent variables nine macroeconomic factors that could have an impact on banking sector soundness, namely the real economic growth rate (*gdp*), the unemployment (*unemployment*) and inflation (*inflation*) rates, exchange rate (*exchange*), current account balance (*current\_account*), two public finance variables (the government budget balance (*budget*) and public debt (*debt*)), as well as two measures of financial depth, namely the resources provided to the private sector by banks (*bank\_credit*) and stock market capitalization (*stock\_market*). Table no. 1 provides further details on the independent variables and their expected effect on the financial soundness of the banking sectors in CEE countries.

Data on Z-score are aggregated at the level of banking sector for each country and come from World Bank (Global Financial Development Database). Data on the independent variables come

from the databases of European Commission (Eurostat) and World Bank (World Development Indicators).

Table no. 2. Descriptive statistics of the variables

Variable	Mean	Std. dev.	Min	Max
Z-score	5.32	3.23	-12.61	16.15
gdp	3.72	4.57	-14.6	12.9
unemployment	10.64	4.16	4.30	20.00
inflation	4.52	5.25	-1.42	45.67
exchange	105.35	12.07	76.71	133.61
current_account	-4.51	5.22	-25.54	8.21
budget	-3.25	2.91	-15.00	2.90
debt	35.17	19.81	3.70	86.60
bank_credit	46.20	19.69	6.38	103.53
stock_market	24.99	27.95	0.73	210.38

Source: (authors' calculations)

The descriptive statistics of the variables included into our analysis are presented in Table no. 2. Over the period of our analysis, Z-score registered a mean value of 5.32%, while the minimum and maximum values were -12.61% (Bulgaria, in 2014) and 16.15% (the Slovak Republic, in 2012), respectively. This indicates a large variability in the financial soundness of the banking sectors of CEE countries, due to large differences in banks' profitability (return on bank assets) and capitalization. Also, there can be noticed significant differences between countries with regard to all nine macroeconomic variables.

### 3. Results and discussions

The results of our estimation on the impact of selected macroeconomic factors on banking sector soundness in our sample of 11 CEE countries are shown in Table no. 3. The coefficients of country dummies have not been reported for the reason of lack of space.

The findings highlight that *real GDP per capita growth rate* (gdp) has a positive impact on the financial soundness of banks, in agreement with our expectations and in line with the results of Uhdea and Heimeshoff (2009), Nguyen *et al.* (2012), Schaeck and Čihák (2014), and Köhler (2015). An increase in the GDP per capita could lead to an increase in borrowers' incomes and, thus, the increase of their solvency, with positive impact on the quality of bank loans and hence on banks' soundness. However, the coefficient of this macroeconomic variable is not statistically significant, in line with the results of Hesse and Čihák (2007), and Mirzaei *et al.* (2013). Thus, it would seem that the real GDP per capita growth rate doesn't have a significant effect on the soundness of the banking sector in our sample countries.

*Unemployment rate* (unemployment) has a significant negative impact on banks' soundness, in line with expectations and in accordance to the results of Liu *et al.* (2013), and Schaeck and Čihák (2014). A rising unemployment rate could lead to lower incomes and lower ability of borrowers to honor their debts, so that banks could be exposed to a higher insolvency risk.

The impact of *inflation rate* (inflation) depends on whether inflation is anticipated by banks or not. If inflation is anticipated, revenues will grow faster than bank costs and thus the profitability and financial soundness of banks will improve. Our results indicate that inflation is positively and significantly associated with banking sector soundness, in line with our expectations and the findings of Hesse and Čihák (2007), Mirzaei *et al.* (2013), Maechler *et al.* (2010).

With regard to *exchange rate* (exchange), our results highlight a positive and significant association with banking sector soundness, in line with our expectations. An increase in the exchange rate (which expresses an appreciation of national currency) positively affects borrowers who borrowed in foreign currency (Nkusu, 2011), which leads to the decrease of non-performing loans ratio and thus improves the financial soundness of banks.

*Current account balance* (current\_account) is also positively and significantly associated with

banks' soundness. Thus, an improvement in current account balance may increase the financial soundness of banks.

Table no. 3. Results of regression analysis

Dependent variable Z-score	Coefficients	Robust standard errors
gdp	0.0536468	0.0408054
unemployment	-0.1375672	0.0546381**
inflation	0.0654021	0.0141133***
exchange	0.038221	0.0142944***
current_account	0.0817878	0.0274972***
budget	0.1170449	0.0757336
debt	0.0323701	0.0114436***
bank_credit	-0.0300152	0.0088482***
stock_market	-0.0194486	0.00525***
_cons	3.292043	1.617801**
<i>N</i>	146	
<i>R-squared</i>	0.8522	

Notes: OLS estimates; \* denotes significance at the 10% level, \*\* at the 5% level, \*\*\* at the 1% level

Source: (authors' calculations)

*Bank credit to the private sector* (bank\_credit) is found to have a negative and highly significant impact on the soundness of banks in CEE countries, in agreement with our expectations and the results of Mirzaei *et al.* (2013). A significant and rapid increase in the value of this variable can signify excessive risk-taking by banks and thus the deterioration of their' financial soundness. *Stock market capitalization* (stock\_market) is also negatively and significantly correlated with banking sector soundness. The increase in stock market capitalization could indicate an expansion of financial disintermediation, so that banks could react by reducing interest rate margins, which would lead to the decrease of their profitability and, therefore, their financial soundness.

With regard to *general government budget balance* (budget) and *public debt* (debt), the results of our study point to a positive (and significant in the case of the latter) impact on the financial soundness of banks, which invalidates the findings of other empirical studies. A higher budget balance (meaning a higher budget surplus or, more often, a lower budget deficit), possibly as a result a fiscal consolidation measures, increases macroeconomic stability and thus banking sector soundness. With regard to general government debt, it is acknowledged in the literature that its negative effects on the economy generally occur only after a certain debt threshold is breached. From this point of view, the debt of Central and Eastern European countries, quite low (with the exception of Hungary) by the standards of Western European countries, could allow for a positive impact of public debt (possibly resulting from higher public investment expenditure) on banking sector soundness.

#### 4. Conclusions

In the CEE countries, the financing of the real economy is mainly performed by banks, so their soundness is of major importance for ensuring sustainable economic growth, but also for overall economic and financial stability.

The extremely negative impact of the crisis on banks and the real economy underlined the importance of banking sector soundness for macroeconomic stability and revived the interest of researchers for investigating the determinants banks' financial soundness. In line with this concern, our study examined the effects of the changes in macroeconomic conditions on the financial soundness of banks in 11 countries from Central and Eastern Europe, over the period 2000-2014.

The results of our empirical investigation indicated that the financial soundness of the banking sector in CEE countries is heavily influenced by unemployment and inflation rates, exchange rate, current account balance, public debt, as well as financial depth. Also, our analysis revealed that

economic activity (proxied by real GDP per capita growth rate) positively affects the soundness of banks, but the impact is not significant.

Overall, our study underlined the great importance of ensuring a healthy and sound macroeconomic environment for the financial soundness of banks. Also, our research highlighted that out of all selected macroeconomic factors, the dynamics of bank credit to the private sector is the main risk factor for the soundness of the banking sector in CEE countries and one of the warning signals for the financial frailty of banks, which calls for its rigorous monitoring.

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## 5. References

1. Beck, T., De Jonghe, O. and Schepens, G., 2013. Bank competition and stability: cross-country heterogeneity. *Journal of financial Intermediation*, 22(2), pp. 218-244.
2. Demirgüç-Kunt, A. and Huizinga, H., 2010. Bank activity and funding strategies: The impact on risk and returns. *Journal of Financial Economics*, 98(3), pp. 626-650.
3. Ghita-Mitrescu, S. and Duhnea, C., 2015. An overview on the Romanian banking system stability. *Revista Economica (Economic Review)*, 67(1), pp. 55-67.
4. Hesse, H. and Čihák, M., 2007. Cooperative Banks and Financial Stability. *IMF Working Paper* No. 07/02.
5. Klingen, C., Mucci, F., Deuber, G., Kavan, S. and Ross, M., 2013. Banking in Central and Eastern Europe and Turkey: Challenges and opportunities. *Regional Studies and Roundtables*, European Investment Bank (EIB).
6. Köhler, M., 2015. Which banks are more risky? The impact of business models on bank stability. *Journal of Financial Stability*, 16, pp. 195-212.
7. Liu, H., Molyneux, P. and Wilson, J. O. (2013). Competition and stability in European banking: a regional analysis. *The Manchester School*, 81(2), pp. 176-201.
8. Maechler, A. M., Mitra, S. and Worrell, D., 2010. Decomposing financial risks and vulnerabilities in emerging Europe. *IMF Staff Papers*, 57(1), pp. 25-60.
9. Mirzaei, A., Moore, T. and Liu, G., 2013. Does market structure matter on banks' profitability and stability? Emerging vs. advanced economies. *Journal of Banking & Finance*, 37(8), pp. 2920-2937.
10. Nguyen, M., Skully, M. and Perera, S., 2012. Market power, revenue diversification and bank stability: Evidence from selected South Asian countries. *Journal of International Financial Markets, Institutions and Money*, 22(4), pp. 897-912.
11. Nkusu, M., 2011. Nonperforming loans and macrofinancial vulnerabilities in advanced economies. *IMF Working Paper*, 161.
12. Schaeck, K. and Čihák, M., 2014. Competition, efficiency, and stability in banking. *Financial Management*, 43(1), pp. 215-241.
13. Schaeck, K., Čihák, M., 2008. How does competition affect efficiency and soundness in banking? New empirical evidence. *Working Paper*, 932, European Central Bank.
14. Sorsa, P., Bakker, B. B., Duenwald, C. K., Maechler, A. M. and Tiffin, A., 2007. Vulnerabilities in emerging Southeastern Europe-How much cause for concern?. *IMF Working Papers*, 236.
15. Uhde, A. and Heimeshoff, U., 2009. Consolidation in banking and financial stability in Europe: Empirical evidence. *Journal of Banking & Finance*, 33(7), pp. 1299-1311.
16. Vallascas, F. and Keasey, K., 2012. Bank resilience to systemic shocks and the stability of banking systems: Small is beautiful. *Journal of International Money and Finance*, 31(6), pp. 1745-1776.