5th Research Conference "Economic and Financial Cycle Spillovers: Reconsidering Domestic and Cross Border Channels and Policy Responses"

Ownership, Bank-Specific and Macroeconomic Determinants of Non-Performing Loans in Central and Eastern Europe

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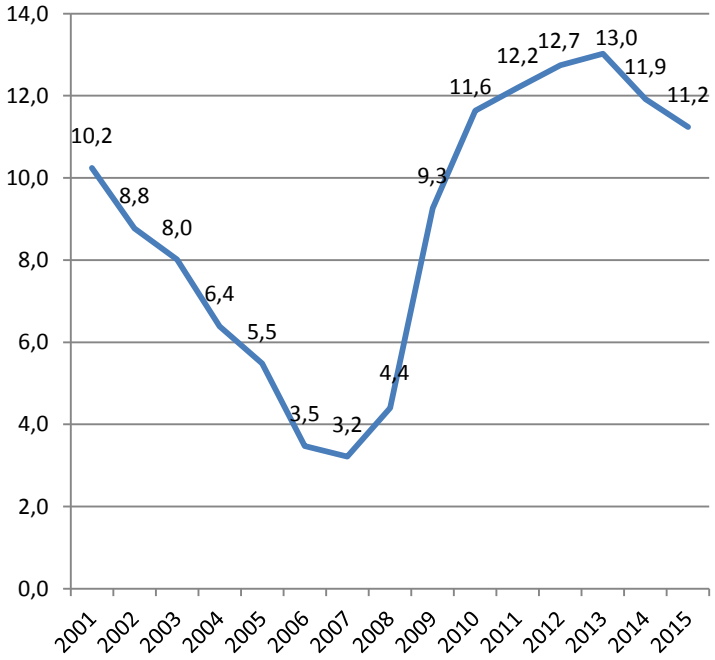
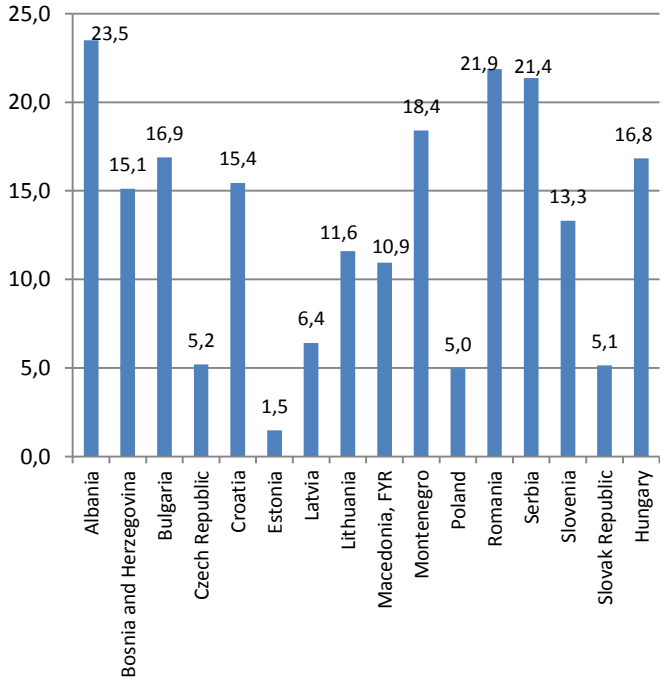
Introduction

- High rates of non-performing loans ratios (NPLs) have been a source of concern for financial stability in a number of Central and Eastern European Countries.

Figure 1a) NPLs on aggregate level



1b) NPLs by CEE countries in 2013



Source: World Development Indicators

Objectives and data

- **The objective: to develop a bank level model to estimate the determinants that have a significant influence on the incidence of NPLs in CEE countries.**
- Based on the existing literature, both bank-specific and macroeconomic factors are included as independent variables in the estimation, but a novel feature of the analysis presented is the attention paid to bank ownership and past lending behaviour.
- The analysis uses panel data of:
  - ✓ individual banks' balance sheets and ownership data from Bankscope, and
  - ✓ macroeconomic indicators from the World Economic Outlook (WEO) datasets.
- Data is based on annual frequency for 1999–2011 and covers the 334 commercial banks in 16 countries of CEE. The countries considered are: Albania, Bosnia and Herzegovina, Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Montenegro, FYR of Macedonia, Poland, Romania, Serbia, Slovenia and Slovakia.

Table 1: Description of the Variables

Dependent variable		*Ratio of Non-performing loans in total loans (NPLs)*	
	Symbol	***Explanation***	***Sign***
Ownership variables	***FOREIGN***	those banks with foreign ownership exceeding 51% in year *t*	(+) (-)
	Dummy_EU12	If the origin (home country) of the parent bank is from EU12	(+) (-)
	Dummy_SouthEnlargement	If the origin (home country) of the parent bank is from Greece, Spain or Portugal	(+) (-)
	Dummy_CEE	If the origin (home country) of the parent bank is from CEE	(+) (-)
	Dummy_USAandCH	If the origin (home country) of the parent bank is from USA and CH	(+) (-)
	Dummy_RU	If the origin (home country) of the parent bank is from RU	(+) (-)
	Dummy_TR	If the origin (home country) of the parent bank is from TR	(+) (-)
Bank specific variables	***CGR***	Credit growth rate	(+)
	CAP	Capital adequacy ratio	(+)(-)
	LtD	Loans to deposit ratio	(+)
	CiR	Cost to income ratio	(+)
	ROA	Return on assets	(-)
	ROE	Return on equity	(-)
Macroeconomic variables	**GDP**	GDP growth rate	(-)
	INF	Inflation rate	(+)(-)
	INTR	Interest rate	(+)
	EXCR	Exchange rate	(+)
	UNEMP	Unemployment rate	(+)
	DEBT	Public debt (% of GDP)	(+)

Methodology

- **Following the literature discussion, we base our empirical analysis on the following equation:**

$$
\begin{aligned}
NPL_{i,t} = {} & \beta_{0i} + \hat{\beta}_1 GDP_{i,t} + \hat{\beta}_2 INF_{i,t} + \hat{\beta}_3 UNEMP_{i,t} + \hat{\beta}_4 DEBT_{i,t} + \hat{\beta}_5 EXCR_{i,t} + \hat{\beta}_6 INTR_{i,t} + \hat{\beta}_7 ROA_{i,t} \\
& + \hat{\beta}_8 ROE_{i,t} + \hat{\beta}_9 CR_{i,t} + \hat{\beta}_{10} CAP_{i,t} + \hat{\beta}_{11} LtD_{i,t} + \hat{\beta}_{12} CIR_{i,t} + \hat{\beta}_{13} Marketshare_{i,t} \\
& + \hat{\beta}_{14}\, Interactioncreditgr2009 + \hat{\beta}_{15} Dummy\ 2009 + \hat{\beta}_{16} Foreign_{i,t} + \hat{\beta}_{17} Dummy\_EU12_{i,t} \\
& + \hat{\beta}_{18} Dummy\_SouthEnlarg_{i,t} + \hat{\beta}_{19} Dummy\_CEE_{i,t} + \hat{\beta}_{20} Dummy\_USAandCH_{i,t} \\
& + \hat{\beta}_{21} Dummy\_RU_{i,t} + \hat{\beta}_{22} Dummy\_TR_{i,t} + \lambda_t + C_i + \eta_i + \varepsilon_{it} \qquad (1)
\end{aligned}
$$

- We are interested in the effect of past rapid loans growth on the evolution of NPLs might become evident. Thus, the growth of credit during the period of past fast credit growth is interacted with an indicator variable for the period after the peak of credit growth.

- After some experimentation it was concluded that the effect of past peak loan growth on the incidence of NPLs became most evident in the second year after the peak of loans growth.

Modelling procedure

- The static model is misspecified due to the omitted dynamics that would result in biased and inconsistent estimates, thus we use dynamic model specification.

- “System GMM” developed by Arellano and Bover (1995) and Blundell and Bond (1998) where the lagged bank level variables were modelled as potentially endogenous, (thus instrumented GMM-style in the same way as the lagged dependent variable) while the country-level variables were treated as strictly exogenous (instrumented by itself as “IV style” instrument, Roodman (2009)).

- A model with one or more lags of the dependent variable together with several endogenous variables will generate a large number of instruments.

- According Roodman (2012) there are three ways to limit the instruments count while minimizing loss of identifying information.

1. Restrict the lag ranges.
2. Use “collapse” command available in >xtabond2<
3. Principal Components Analysis (PCA) to the "GMM"-style instruments

Table 2: Results

Dependent variable		Non-performing loans (%)		
	Variables name		**Coefficient**	**p-values**
	Lag dependent variable	**NPL**	**0.639*** **	**0.000**
Macro variable	**GDP growth rate**	**GDP**	**-0.307***	**0.059**
	Inflation rate	INF	0.006	0.215
	Interest rate	INTR	-0.051	0.746
	Exchange rate	EXCR	-0.113	0.312
	Unemployment rate	UNEMP	-0.272	0.975
	Public debt (% of GDP)	**DEBT**	**0.236***	**0.077**
Bank-specific variables	Return on assets	ROA	-1.167	0.137
	Return on equity	ROE	0.034	0.637
	Credit growth rate	**CR**	**-0.132 ****	**0.035**
	Capital adequacy ratio	CAP	-0.122	0.377
	Loans to deposit ratio	LtD	0.007	0.874
	Cost to income ratio	CIR	0.008	0.680
	Market share	Mshare	-0.037	0.442
	Interactioncreditgr2009	**Int 2009**	**0.179 ***	**0.066**
Ownership variables	**Foreign bank**	**Foreign**	**-2.166****	**0.045**
	Dummy_CEE	**CEE**	**3.954****	**0.027**
	Dummy_USAandCH	USandCH	1.232	0.287
	Dummy_SouthEnlargement	SouthEnl	0.497	0.765
	Dummy_RU	RU	4.214	0.623
	Dummy_TR	TR	-2.594	0.165
Time dummies [a)]	Included in the model	**Yes**		
Country dummies [b)]	Included in the model	**Yes**		
	Number of observations			1052
	Number of groups			226
	Number of instruments			64
	Hansen test p value			**0.495**
	A-B AR(1) or m1 test p-values			**0.008**
	A-B AR(2) or m2 test p-values			**0.751**

Significance level: *significant at 1%; ** significant at 5%; ***significant at 10%.

Results - Long run coefficients

Long run coefficients for the bank specific and macro variables are considerably larger than the estimated short-run effects

Table 3 Long-run coefficients for the variables

Variables	Coefficient	p-value
Credit growth rate	-0.366**	0.012
Interaction 2009	0.495*	0.069
Public debt (% of GDP)	0.655*	0.091

Significance level: *significant at 1%; ** significant at 5%; ***significant at 10%.

These results suggest that past credit growth can account for a substantial part of non-performing loans, especially in the aftermath of the global financial crisis.

Conclusion remarks

- ✓ The findings of paper highlight the need for a particular policy approach in order to prevent the escalation of credit risks generated in the banking sector and their transformation into systemic risk, given that the credit risk is prevalent in CEE banking sectors.

- ✓ The findings supplement the literature on banking sector stability and provide important insights into banks' lending behaviour in countries of Central and Eastern Europe.

- ✓ Appropriate lending policy designed with relevant economic and bank-specific factors can make a significant impact on reducing banks` non-performing loans.

- ✓ Banks should pay more attention to the future performance of the economy when approving loans, given that our results suggest that the loan delinquencies are likely to be higher during the period of economic slowdown.

- ✓ Furthermore, excessive lending during the boom phase tends to initially lower the NPL ratio, but to increase it later on, with a delayed effect of two years after the peak.

- ✓ Lastly, our results underscore the importance of integrated financial supervision.

  - ✓ That home country regulators should cooperate closely with host country (the country in which the foreign bank operates) regulators

Thank you!