MACROECONOMIC DETERMINANTS OF NON-PERFORMING LOANS IN MACEDONIAN BANKING SYSTEM- PANEL DATA ANALYSIS

Mihajlo Vaskov

Financial Stability and Banking Regulations Department

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Main Goals of the Paper

- To make the first empirical analysis of the macroeconomic determinants of non-performing loans in Macedonian banking system, based on panel estimation in a sample of 16 banks

- To draw conclusions regarding the necessary changes that could lead to lower NPL ratio

- To compare the results of this research with previous expert/qualitative analysis/opinions regarding the main macroeconomic factors that determine NPL ratio movements

Credit Risk Profile of the Macedonian Banking System

- Credit risk plays the most important role and has crucial importance for banks' performances

- Dominance of traditional banking as bank business-model, based on collecting deposits as main source of funding and their placement in form of loans to non-financial entities

- Until the mid - 2000's, loan supply in the Macedonian banking system was relatively modest and credit market could be described as undeveloped

- With the credit expansion and the ownership changes in the domestic banking industry, banks started to design contemporary risk management systems that have been consequently upgraded, they have improved their efficiency and allocation of resources, and have strengthened its financial position

- Lack of write-offs of non-recoverable claims by Macedonian banks and thus, a relatively high level of persistence of non-performing loans should be expected

Recent Developments of NPLs

- With the intensification of credit growth, the level of non-performing loans in the banking system registered downward trend
- However, with the transmission of the effects from the global financial crisis and worsening in the macroeconomic conditions, NPL ratio has recently deteriorated

NPL ratio dynamics

Annual growth rate of NPLs
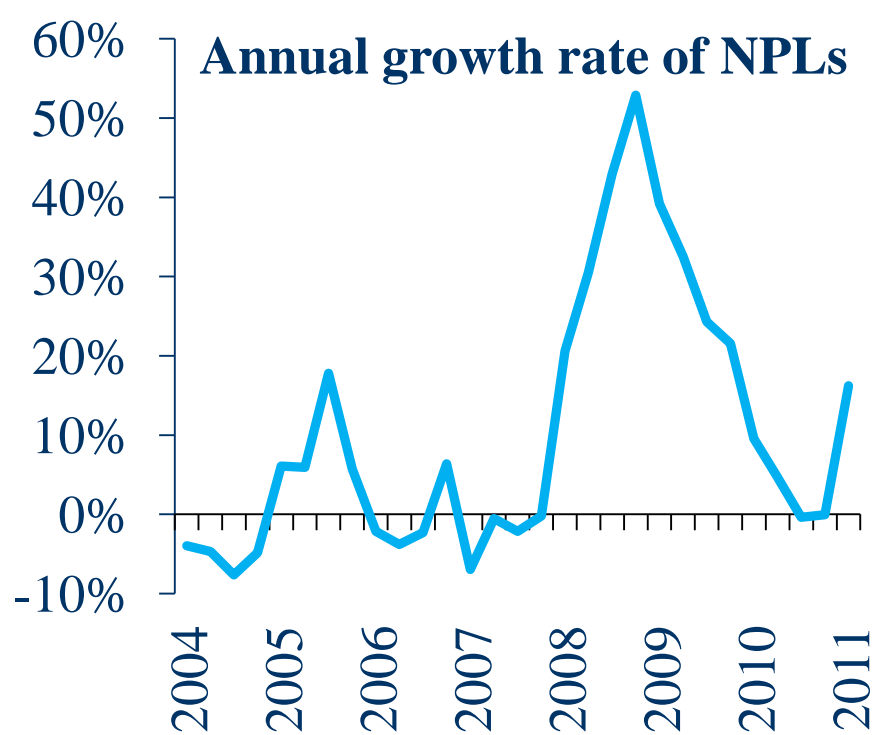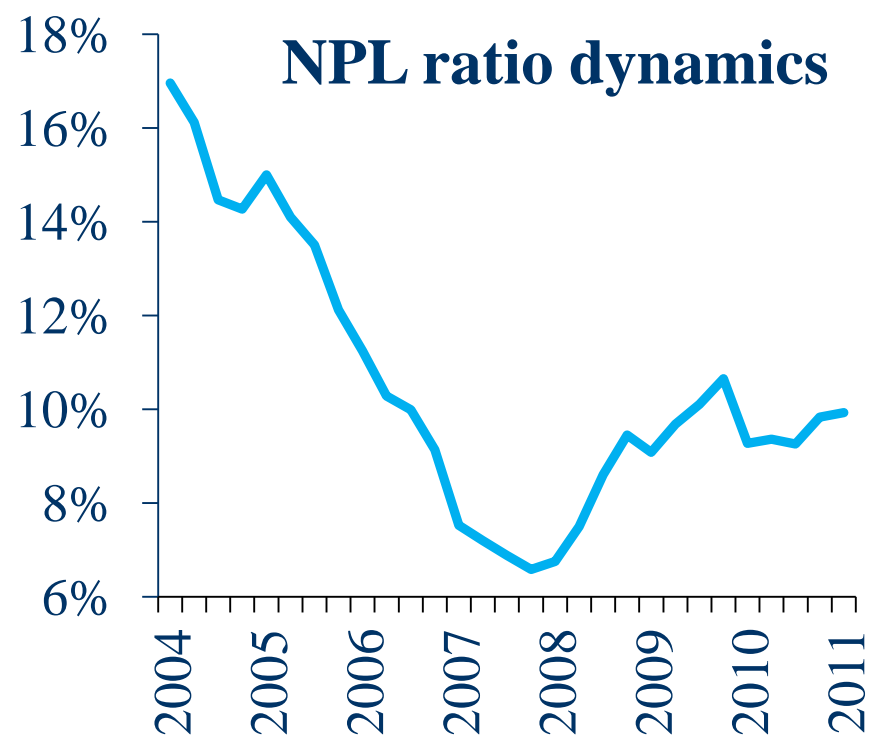
Panel Estimation - Data and Methodology

- Balanced panel consisted of 16 commercial banks for the period 2003Q1 - 2011Q4 - total of maximum 576 observations

- Time span determined by data availability for particular variables

- Banks included in the sample have been functioning throughout the entire sample period

- We use system GMM and first-difference GMM (one-step and two-step) - but prefer the one-step system GMM, according to the suggestions of the literature in this area

- We investigate broader list of macroeconomic and financial variables (10) combined into several (4) equations

- The variables are the ones commonly used in this kind of studies: real GDP growth, real interest rate, REER, employment rate, policy rate, inflation rate, net-wages growth, loan-to-GDP ratio, export growth, unit labor costs

- p-values show all variables are significant across various options, and the results from the diagnostic tests suggest that the equations might be considered as suitable statistical generating mechanisms (AR(2) test, Hansen test, difference-in-Hansen test)

Main results (one-step system GMM)

Explanatory variables	Equation 1 LNPL	Equation 2 LNPL	Equation 3 LNPL	Equation 4 LNPL
LNPL $_{t-1}$	0.751*** (0.000)	0.749*** (0.000)	0.571*** (0.000)	0.910*** (0.000)
GDP_GR $_t$	-1.819* (0.065)			
GDP_GR $_{t-1}$		-1.071* (0.097)		
GDP_GR $_{t-2}$				-1.419* (0.064)
ULC_GR $_{t-2}$		0.781** (0.018)		
REINT $_{t-1}$	0.940* (0.065)			
REER $_{t-1}$	1.608* (0.091)	2.652*** (0.007)		1.159* (0.078)
EMP_GR $_{t-1}$	-0.988** (0.050)			
PR_MA				1.545* (0.084)
INF $_{t-1}$		2.498* (0.095)		2.990*** (0.006)
NET_WAG_GR $_{t-1}$			-1.909* (0.094)	
LLOAN_GDP			0.440* (0.082)	
EXP_GR $_{t-2}$			-0.192** (0.022)	
Constant	-0.555*** (0.007)	-0.642** (0.014)	-0.431* (0.059)	-0.328* (0.057)

Main results (2)

- Results in the specifications are mostly in accordance with the theory and with our previous expectations

- We found relatively high level of persistence of non-performing loans

- Variables with highest explanatory power are the inflation rate and the REER, with both having positive signs in the equations explaining the movement of the NPL ratio

    - ↑ domestic inflation rate → ↑ domestic companies' costs and ↓ their competitiveness, which usually appreciates REER/Additionally, ↑ domestic inflation → ↓ household sector real income and ↓ their debt servicing capacity

    - export growth rate was found to have the smallest magnitude (with "+" sign) → REER influences NPLs movements mainly through the import channel

    - REER depreciation→ ↓ NPLs, not mainly because of ↑ export, but as a consequence of ↓ import which stimulates the domestic production to be a larger contributor in domestic demand fulfillment/ export is consisted of products with low value added and has low sensitivity to real exchange rate changes

Main results (3)

- Negative relation was found between GDP growth and the dependent variable/ GDP growth is significant only at 10% level

- Interest rates are positively associated with NPLs/estimated coefficients do not demonstrate very large magnitude and they prove to be significant only at 10% level

- Positive relation between level of non-financial entities debt burden and NPL ratio is detected, but the significance of this variable is achieved at only 10% level, and the estimated coefficient is relatively small

- Household sector variables have negative effect on NPL ratio movements, with stronger relationship between the employment rate and NPLs (at 5% significance level), but larger magnitude of the impact of net-wages

- Modest magnitude (with "+" sign) is observed for the impact of the change in unit labor cost variable/nevertheless this variable demonstrates relatively high level of significance

Important Caveats!!!

- Our sample does not include a complete business cycle

- NPL ratio as a proxy of banks' credit portfolio quality is an ex post indicator that does not measure the current credit risk management practices and does not capture the changes in credit policies and banks' risks awareness

- Individual cross sections are rather heterogeneous, and thus, the inclusion of some bank-related variables (example: cost efficiency ratio, market share measure etc.) could notably change the estimation output

- GMM might not be appropriate, because T>n

Future Work

- Explanation of NPLs movements could be enriched by adding bank-specific variables

- Analyses of non-performing loans could be further improved by developing separate equations for different segments of the credit portfolio

- Additional estimation techniques could be employed

- Second-round effects should be explored by applying panel VAR in order to consider any possible effects from the NPL movement on macroeconomic variables

- With appropriate fine tuning, the model might be used for stress-testing purposes, specifically for investigation of banking system resistance to different macroeconomic shocks

WORKING PAPER: "Macroeconomic Determinants of Non-performing Loans in Macedonian Banking System-Panel Data Analysis"

AUTHORS:

Maja Ilievska (IlievskaM@nbrm.mk)**, Mihajlo Vaskov** (VaskovM@nbrm.mk) **and Petar Debnikov** (DebnikovP@nbrm.mk)

Thank You for Your Attention!!!