



Macroeconomic and bank-specific determinants of non-performing loans in Macedonian banking system - panel data analysis

Central Bank of the Republic
of Kosovo

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Main goals of the paper

- Examines the factors that influence NPLs, separately for corporate and household sector credit portfolio
- Broadens banking supervisors and regulators knowledge and might bring new ideas to bankers
- Facilitates the identification of financial system key vulnerabilities and it enables sound protection of the financial stability



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
- Lack of write-offs of non-recoverable claims by Macedonian banks → high level of persistence of NPLs
- Until the mid - 2000's (period of transition, accompanied with ownership restructuring and privatization in the real economy):
 - undeveloped credit market
 - modest credit supply
 - banks inherited high levels of NPLs causing ↓ risk appetite and implementation of conservative credit policies
- 2004 – 2008 (stable macroeconomic environment and large ownership changes in banking industry):
 - building of contemporary risk management systems, improving efficiency and strengthening financial position
 - increased credit supply to private sector (double digit credit growth rates, averaging above 30%)
 - NPLs registered downward trend, NPL ratio = 6.6% (2008Q3)
- 2008 – 2015 (global financial crisis, euro-zone sovereign debt crisis, etc., etc. ...):
 - weak credit growth
 - NPLs were increased by almost three times, NPL ratio = 12.3% (2013Q2) and = 10.8% (2015Q4)
- 2016 – 2017 (regulatory measures which oblige banks to regularly write-off NPLs that are fully provisioned for at least two years)
 - NPL ratio reduced to 6.8% (2017Q2)
 - credit growth is still below pre-2008 levels especially with the corporate sector



Panel estimation – data and methodology

- Data: unbalanced panel consisted of 17 commercial banks for the period 2004 – 2015 (annual frequency of data)
 - 15 banks currently operating in Macedonia
 - time period includes both a period of growth as well as downturns
- Method: Arellano-Bover (1995)/Blundell-Bond (1998) system two-step GMM estimator
 - GMM type of IVs for bank-specific variables
 - standard IVs for macroeconomic variables
 - safeguard measures to reduce the instrument count in panel GMM: 1) collapsing method designed by Roodman (2009) and 2) principal components analysis (PCA) on the GMM-style instruments
- Dependent variable: logit form of household and corporate sector NPL ratio
- Independent variables: commonly used in this kind of studies
 - macroeconomic (real sector variables, level of prices, household sector variables, external sector variables, variables on public finance management) and
 - bank-specific (size/market power of banks, level of capitalization, exposure to liquidity risk, credit growth rates, profitability and efficiency indicators, banking system structural features)



Panel estimation – results (1)

- General to specific approach is applied
 - We started from a more general forms of the models containing all the variables assumed to be potentially important determinants of banks NPL ratios
 - Ended with “refined” specification estimates, where a large part of the statistically non-significant variables have been removed from the models
- Robustness check:
 - p-values of AR(1) and AR(2)
 - p-value of Hansen test
 - KMO measure of sampling adequacy
 - in-sample analysis (2004 – 2008 vs. 2009 - 2015)



Panel estimation – results (2)

companies (left) and households (right)

Dynamic panel-data estimation, two-step system GMM

Number of obs	=	170		175
Number of groups	=	17		17
Number of instruments	=	16		16

NPL_r_comp.			NPL_r_hous.		
	Coef.	P> z		Coef.	P> z
NPL_r_comp.			NPL_r_hous.		
L1.	.6127301***	0.000	L1.	.7734168***	0.000
gdp_real_gr	-.1653872***	0.007	disp_income_gdp	.0367704	0.293
ppi	.013017	0.175	cpi	.0968014*	0.072
ext_debt_c_gdp	-.0519622*	0.081	emp_rate	-.0191438	0.130
size_loans_c	-.1387906	0.164	size_loans_h	-.0324732	0.375
liquid_ratio	.0099372***	0.000	liquid_ratio	.0047875***	0.000
capital_rat	-.0286241**	0.011	capital_rat	-.0240447***	0.006
cost_to_income	-.0010231	0.356	cost_to_income	.0044317**	0.038
y2008	.3760154	0.153	y2008	-.0853719	0.856
y2009	-.0879016	0.835	y2009	.7320954***	0.000
y2012	-.5027225**	0.012	y2012	-.3289435*	0.052
_cons	.0392442	0.835	_cons	-.0134139**	0.029

AR(1) in first differences:	0.080	0.047
AR(2) in first differences:	0.791	0.252

Hansen test:	0.767	0.679
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Portion of variance explained		
by the components =	0.765	0.784
Kaiser-Meyer-Olkin measure		
of sampling adequacy =	0.828	0.855

Note: Arellano-Bover (1995)/Blundell-Bond (1998) system two-step GMM estimator (with Windmeijer, 2005 corrected standard errors) is employed. Additionally, we reduce the size of the instrument matrix by implementing the collapsing method (Roodman, 2009) and we also apply principal components analysis (PCA) on the GMM-style instruments (Kapetanios and Marcellino 2010; Bai and Ng 2010; Mehrhoff 2009). ***, **, * denote significance at 1%, 5% and 10%, respectively.



Main findings (1)

- We have confirmed the already expected high level of persistence of NPLs - autoregressive coefficient up to 0.8
 - absence of efficient management and resolution of NPLs within Macedonian banks
- NPL ratios of corporate loans are found to be negatively determined by changes in GDP real growth and in companies' external-debt-to-GDP ratio
 - in recession phase corporate NPLs soar and vice versa
 - increased external funding sources in the period under review is found to improve companies' growth prospects and reputation which boost their creditworthiness
 - stylized fact: recent higher growth of external funding sources of Macedonian companies is mainly due to higher foreign investments and increased approval of trade loans by foreign partners (facilitated foreign trade flows)
- Among macroeconomic variables, only the inflation rate is found to have statistically significant positive effect over household NPL ratio



Main findings (2)

- Cost-to-income ratios with individual banks are found to have positive and statistically significant effects on household NPL ratios
 - evidence in favor of the “bad management” hypothesis with the household credit portfolio
 - cost-inefficient managers are also poor loan portfolio managers and vice versa – banks with higher levels of cost efficiency experience lower levels of household NPL ratio
- Capitalization rate is found to have negative impact on both NPL ratios (of corporate and household loans)
 - support for the “moral hazard” hypothesis
 - alternative explanation: possible overlap between undertaken recapitalizations or retention of profit in individual banks and simultaneously intensified credit activity of banks (which ↓ NPL ratio), possibly followed by certain write-offs of non-performing loans
- Positive interrelation between banks liquidity ratios and NPL ratios (of corporate and household loans)
 - in this case, “moral hazard” hypothesis does not hold
 - banks having higher liquidity are usually less active and consequently less profitable, which is pushing them towards making some bad credit decisions
- Market power indicators, indicators on banking system concentration, credit growth variables and public debt-to-GDP ratio do not have enough explanatory power over NPL ratios



Policy recommendations (1)

- Regulatory (and other incentives) are needed to push banks management towards faster and more efficient resolution of NPLs
 - NBRM has already undertaken regulatory measures which oblige banks to regularly write-off NPLs that are fully provisioned for at least two years
 - strategy for NPLs management and resolution has been also prepared
- Macroeconomic policies that aim at ↑ economic growth and creating attractive environment for ↑ foreign investments and greater involvement of companies in international trade flows are required to improve corporate sector outlook and its ability to repay debt to domestic banks
 - Domestic banks should further improve its capacity to provide attractive financial services to big foreign companies recently established in Macedonia that are currently financed externally, mainly via their parent entities
- Maintaining price stability (the primary monetary policy objective) is an important precondition for a favorable household sector creditworthiness and low levels of NPLs to households



Policy recommendations (2)

- Cost-to-income ratios (and perhaps, other similar inefficiency measures) may serve as one of the indicators of future NPLs
- Banking supervisors should monitor capital ratios carefully and require banks actions to raise the ratios quickly when they become low
- Banks swimming in liquidity are more prone to bad credit decisions and should be closely monitored by banking supervisors



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