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AUTHORS	Alenka Kavkler Mejra Festić

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Alenka Kavkler (Slovenia), Mejra Festić (Slovenia)

The banking sector in the Baltics

Abstract

In this paper, we analyze the determinants of the non-performing loans (NPL) ratio in Estonia, Latvia and Lithuania. Twelve financial and macroeconomic variables are employed in regression analysis as possible predictors for the NPL variable. A strong economic growth and decelerating non-performing loans ratio, as an indicator of the loan portfolio quality, in the context of procyclicality theory, could be interpreted as signals of economic potential overheating and therefore, as a potential threat to banking sector performance. The slowdown in economic activity (GDP, net export, investment and savings growth) is likely to deteriorate the loan portfolio quality in the Baltic States.

Keywords: economic growth, non-performing loans, cyclicality.
JEL Classification: F47, G15, G21.

Introduction

Changes in the macroeconomic environment resulted into changes in the quality of the loan portfolio of the banking sector. Common exposure to macroeconomic risk factors across banks is a source of systemic risk that influences the quality of a loan portfolio, which can be expressed as the non-performing loans to total gross loans ratio.

We contributed to the empirical evidence on the impact of the macroeconomic environment on non-performing loans (NPL) ratio dynamics. The amount of available finance in the banking sector and a slowdown in economic activity are associated with a deterioration in loan portfolio quality. This fact highlights the need for demand restraint in order to improve the saving dynamics in the EU New Member States (Brzoza and Brzezina, 2005). The economic literature often differentiates between demand factors (such as economic convergence, wealth accumulation, interest rates, inflation, gross domestic product, purchasing power parity, etc.) and supply factors (liberalization of banking sector, financial deepening, etc.) determining the sustainable credit growth (Sirtaine and Skamnelos, 2007). According to theory, we expected that the economic growth represented a major challenge to the loan portfolio quality, which was assumed to be procyclical within the economic cycle.

We analyzed the relationship between the non-performing loans ratio and the macroeconomic variables as a source of systemic risk in order to assess the banking sector's vulnerability to bad loan performance on a macroeconomic level in the Baltic States. Our empirical contribution tests the hypothesis that the growth of credit and amount of available finance might harm banking performance and deteriorate NPL dynamics, most probably due to the overheating of economies, and that a slowdown in economic activity is likely to accelerate the growth of the NPL ratio. In our estimates for the Baltic States, we also tried to find evidence for the hypothesis that gross fixed capital formation in the selected economies – by contributing to an increase in economic activity – is likely to lower NPL ratio(s).

1. Macro impulses for the non-performing loans ratio

Measuring of loan portfolio quality includes a wider range of indicators – micro and macro. First, information on investment patterns of institutional investors, the balance between sources of corporate debt finance in banking and bond markets may be used. Second, various financial prices may give valuable direct indicators of the degree of risk perceived by markets. Third, monetary data, inflation, nominal GDP projections and information on financial liberalization are needed. Fourth, information on legal framework is needed. Fifth, qualitative data on easing financial regulation that could provoke high-risk behavior are required. Finally, complementing financial data and overall macroeconomic data are required in order to assess the current state of cycle (Borio and Lowe, 2002). In the long-run macroeconomic, strategic and operational risk may affect the long-run performance of banks and loan portfolio quality, which can be perceived as stemming from the share of non-performing loans in total loans (NPL ratio).

Measuring of the range of possible outcomes can be thought of as having a number of common building blocks, which include: a system of rating loans, assumptions about the correlation of default probabilities across borrowers, assumptions about the loss incurred in the case of default and assumptions regarding the correlation between the default probabilities and loss given default.

Quagliariello (2003) presents a regression between the evolution of NPL as the dependent variable and a set of explanatory variables: real GDP growth rate, growth of real gross fixed investment and consumption, change in the unemployment rate, the CPI, the real exchange rate and the M2 growth rate. Babouček

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and Jančar (2005) investigate economic developments by unemployment, GDP growth, export, import, appreciation, CPI and credits growth as the indicators of the NPL ratio performance. Jakubík (2007) employs the regression method for NPL inflow estimation using real GDP, real effective exchange rates, the CPI, the loan to GDP ratio, unemployment, and the real interest rate as explanatory variables. The empirical findings presented in the literature (Table 1) are an important source of the hypothesis for responsiveness of the NPL ratio on macro factors.

Table 1. Selected findings between the NPL ratio and macro impulses

Explanatory variable	Author	
Balance of payments	Calvo and Mendoza (2000)	Capital inflows could result in an expansion of domestic credits; and a sudden withdrawal of bank deposits leaving domestic banks illiquid might take place after a period of large inflows of foreign short-term capital when domestic interest rates fall, when depreciation is expected or when confidence in the economy wavers, when disruption on financial markets or balance of payments crises is expected.
Assets' prices	Borio and Lowe (2002)	The effect of falling asset prices/share prices ('wealth effects') in the presence of fixed nominal debt may cause wide-spread default among firms as well as banking distress. Second, if equity prices are overvalued, calculated probability defaults are likely to underestimate true probabilities of default, and perhaps suggest a relatively low level of credit risk.
Investment activity	Berglöf and Roland (1995)	Applying soft budget constraints prevalent in many transition countries for credits to enterprises may lead to considerable losses in the economy when investments turn out to be counterproductive.
GDP, (net)export, unemployment	Borio and Lowe (2002)	If the expansion is associated with rapid credit growth, large increases of asset prices, high level of investment, export/employment growth and excessive capital accumulation, the level of credit risk is higher because risk is built up in a boom but materializes in the downturn.
Public debt	Sirtaine and Skamnelos (2007)	According to the economic literature, public debt can also play a role in determining equilibrium credit growth through crowding-out effects.
Interest rate	Rajan (2005)	The financial liberalization increases the costs of funds and nurtures the culture of high-risk behavior and in order to mitigate risks, higher rates are charged to high-risk borrower further increasing banks' overall exposure.
Inflation	English (1996)	When inflation is drastically reduced, banks see one of their main sources of revenue disappear and stabilization from chronic inflation may lead to a reduction in the size of the banking system which adversely affects the economy.
Savings	Lardy (1999)	It can be argued that growth in the amount of available finance may precipitate financial crises and harm economic development due to soft budget constraints. On the other hand, low banks' capitalization often leads to the adoption of imprudent lending strategies with direct implications for banks' loans portfolios, which tend to be heavily skewed toward high risk projects.

The majority of studies have confirmed that GDP/export/gross fixed capital formation/investment activity is a major challenge to loan portfolio quality and the dynamics of the NPL have been proven to be procyclical with respect to economic growth. Periods of economic growth, investment and strong demand for a country's exports have a positive effect on the domestic, corporate and household sectors. On the other hand, large current account deficits are typical for emerging markets and do not pose a problem (also for PD and the NPL ratio) as long as they are caused by the importing of capital goods, and, if future export growth is strong enough to reimburse foreign debt (Borio et al., 2001; Borio and Lowe, 2002; Calvo and Mendoza, 2000). A worsening of banking sector mismatches and the NPL ratio can occur when borrowers borrow in a foreign currency (or their loans are denominated in a foreign currency) and pay back credit in a domestic currency – due to the shortage of foreign currency assets and domestic currency depreciation that threatens the NPL performance and increases the debt burden (Edwards, 2001).

Capital inflows (and FDI in financial intermediation and real estate) could result in an expansion of domestic credits; and the sudden withdrawal of bank deposits could leave domestic banks illiquid after a period of large inflows of foreign short-term capital when domestic interest rates fall, when depreciation is expected or when confidence in the economy wavers, or when a disruption on financial markets or balance of payments crises is expected. In this case a higher public debt burden increases (Calvo and Mendoza, 2000; Eichengreen et al.,1999).

The analysis indicated that the NPL ratio rises with increasing nominal interest rates, with higher CPI inflation, unemployment, public debt and (possible) savings (see Table 1), but decreases with economic growthnet export, investment, property prices and savings. Deflation squeezes out corporate profitability and adversely affects borrowers' ability to repay (Gerlach, Peng and Shu, 2005). The study showed that the appreciation of the real effective exchange rate does not deteriorate the NPL ratio; increasing unemployment

and inflation deteriorate the NPL ratio, while faster GDP growth decelerates the NPL ratio (Babouček and Jančar, 2005).

2. Banking sector in macro environment of the Baltic States

In the following chapter we described the macroeconomic environment in the Baltic States due to the fact that the quality of a loan portfolio in the banking sector is determined by the macroeconomic environment. Changes in the macroeconomic environment resulted into changes in the quality of the loan portfolio of the banking sector. Common exposure to macroeconomic risk factors across banks is a source of systemic risk that influences the quality of a loan portfolio, and the favorable macroeconomic conditions coincide with better capabilities in loan repayment.

Catching-up economies required *investment* levels that have exceeded domestical *savings.* They have financed a part of their investment through foreign direct investment (FDI) and the huge current account deficits have been financed by a steady increase of net-inflow of FDI, net portfolio investment and foreign currency loans. The positive impact of FDI and import of capital goods on *economic growth* is visible in the diversification of foreign trade structure, the increase of labor productivity and the improvement of competitiveness of the *export* industries (Brandmeier, 2006), improvement in the market structure and high growth rates. The productivity increases in the tradeable sector induced significant effects to the overall *inflation differences* between the Baltic countries and their main Western trading partners due to Balassa-Samuelson effect that caused the Baltics' currencies to appreciate in real terms (Breuss, 2003).

High economic growth, prudent budget assumptions and continuing improvements in tax collections have likely contributed to positive impact on tax receipts. In the Baltic countries they adopted a tight fiscal stance to support fixed exchange rate regimes. This effect produced good results as contributed to a significant progress with disinflation (see Table 2).

Table 2. Some indicators for Estonia, Latvia and Lithuania (2007)

	GDP % growth	Credits/GDP (2006)	Inflation (ann. in %)	Budget balance (% of GDP)	Public debt (% of GDP)	FDI inflow (% of GDP)	NPL (2005/06)*	Exchange rate regime
Estonia	7.0	82	6.6	3.6	2.8	3.9	0.2/0.2	ERM II since June 2004
Latvia	10.7	82	10.1	0.7	10.2	8.0	0.7/0.5	ERM II since May 2005
Lithuania	8.8	50	5.7	-0.5	17.7	4.3	2.5/1.1	ERM II since June 2004

Notes: * Portfolio quality and loan classification categories: Estonia – standard, watch, doubtful, uncertain, loss; Latvia and Lithuania – standard, watch, substandard, doubtful, loss. Substandard loans are 91 to 180 days past due (and require provisioning between 15 and 40), doubtfull loans are 181 to 365 days past due (and require provisioning between 40 and 99) and losses are not repayed (requiring 100% provisioning). In Estonia, loans overdue for 150 plus days have to be written off in Estonia. In Latvia, although the substandard classification covers loans 31-90 days overdue and provisioning levels are 10/30/60/100 percent, respectively.
Source: IMF (2008) and ECB (2006).

Economic growth has been high and broad based: *domestic demand*, boosted by a financed boom of bank lending, falling unemployment and real wage growth on the back of productivity gains, and *export growth*. The recovery of EU economies and positive externalities of accession to the EU contributed to export growth in the Baltic States. In *Lithuania*, trade and transportation showed large gains within the expanding service sector. In *Estonia*, tourism and banking have been among the fastest expanding sectors. In *Latvia*, economic growth has been driven by the service sector, mainly by transport and communications. Growth was consistent in *Estonia* and *Lithuania*, whereas it came to a brief halt in *Latvia*. The impact of the Russian crisis on these economies brought back into focus the differing pace of structural adjustment but did not reverse the trend.

Credit growth to the corporate sector has lagged behind loans to households, which can be partly explained by the fact that an important share of investment by the non-financial corporate sector has been financed by retained earnings, inter-company loans and foreign capital, including credits from banks in other countries and foreign direct investment. Credit growth has been largely foreign funded and loans to private sector have been growing at high pace.

While *Estonian* and *Lithuanian* banking sector became truly consolidated, *Latvia* remained the exception, with a number of smaller niche banks oriented towards the Russian market, attracting particular non-resident deposits. *Estonia's* sound, prudently regulated banking sector is considered to be the strongest and the most developed in the Baltic States. The EBRD indicators show that the capacity for effective *prudential*

regulation and supervision have been developed, despite lending has been growing rapidly recently banks maintained adequate *solvency* buffers and they surveyed identified consolidation, adaptation of the organizational structure and regulatory incentives as significant drivers of change (Ådahl, 2006).

In *Estonia*, the new owners have introduced a lot of new technologies and the efficiency of the *Estonian* banking sector has improved. In *Latvia*, the high number of banks is partly explained by the fact that ten of the banks deal primarily with nonresident transactions, meaning investing Russian money in Western Europe. In 1998, *Latvian* banks suffered relatively large losses due to the Russian crises. The Lithuanian banking sector is considerably smaller and the effectiveness has been lower than in *Estonia* and in *Latvia*. One reason for that is state ownership, which lasted longer in *Lithuania* (Koivu, 2002). Already in the aftermath of the *Russian crisis* at the end of 90s, *Estonia* and *Latvia* experienced very rapid asset and deposit growth, while Lithuania has lagged somewhat behind. Banking crises in 1995 and 1998 led to the liquidation and consolidation of a number of *Latvia's banks*. *Lithuania's banking system* has recovered from its collapse in 1995 and emerged relatively unscathed from the Russian financial crisis in 1998 (Ådahl, 2006).

In the Baltic States, non-performing loans, dating back to the early 90s government intervention in state-owned banks and companies (Tang et al., 2000), have been fully written off in recent years. *Estonia* and *Latvia* injected capital into the banks they considered viable and suitable for further privatization, while leaving it to the banks themselves to deal with their bad loans. *Lithuania* set up a central agency to clean up the bad loans of selected banks and the government issued special bonds and transferred cash from the budget. The banking sectors in the Baltic States, supported by very favorable macroeconomic conditions, recorded the lowest share of non-performing loans (see Table 2).

3. Empirical analysis: methodology and empirical results

3.1. Methodology. Following studies on the determinants of NPL ratio (see Section 1) we constructed a data set of explanatory variables that are usually employed in models. The NPL variable is specified as the share of all nominal loans that are at least 90 days past due in total nominal loans that are awarded to the corporate and household sectors in an individual country. It is important to note, however, that cross-country variation in asset quality indicators can also be explained by differences in loan classification rules (see notes, Table 2). Country practices differ on whether ex-post (evidence from past behavior, such as 90-day nonpayment of interest/principal) or ex-ante information (assess future losses by considering forward-looking information) should be used to assess loan classification (IMF, 2008). The usual definition is that NPL are defined as loans past due more than 90 days, as used in our case.

In order to arrive at appropriate specifications in the spirit of the theoretical suggestions we have to investigate the time series properties of the data. Quarterly data for the period from the first quarter of 1997 till the third quarter of 2007 were obtained[1]. Twelve variables were employed in our empirical analysis as possible predictors for the dependent variable non-performing loans as share of total loans (NPL), namely real effective exchange rate (REFFEXCHR), gross investment as % of GDP (INVEST), harmonized consumer price index (HCPI), short-run real interest rate (INTR), gross domestic product (GDP), unemployment rate (UNEMPLOY), stock exchange index (SHARES), gross savings (with banks) as % of GDP (SAVINGS), net export (NETEXP) and public debt as % of GDP (PDEBT). To reduce the heteroskedasticity, the variables were transformed into one-period % changes, but the same notation was used. Descriptive statistics for all variables are given in the Appendix.

Using unit root tests we found that several variables are non-stationary (see Table 10 in the Appendix). It is well-known that regressing a variable on independent unit root processes can lead to spurious regression, because of the bias towards falsely rejecting the null hypothesis of no relationship. Several possibilities to deal with spurious regression can be found in the literature. The bootstrap procedure for simulating the confidence intervals of the regression coefficients can be applied. Examples of such empirical investigations are given in Paya and Peel (2006), Hansen et al. (2005) and Sarno (2003).

The results of the ordinary least squares estimator can be found in Tables 3 to 5. Bootstrapped 95% confidence intervals based on 2000 replications and the bootstrapped standard errors are stated in the last two columns, while original OLS coefficients are given in the second column. To avoid the multicolinearity problem, the independent variables for each of the countries were chosen so that the correlation coefficient for any variable pair is not higher than 0.9.

Simulation-based bootstrap methods aim at approximating the finite-sample distributions of the test statistics under the null hypothesis they test. To achieve this goal, the deviation between the true data-generating process (DGP) and the DGP used

[1] The EIPF (The Economic Institute of the Law School) internal data base and BACA (Bank Austria Creditanstalt Unicredit Group) internal data base.

for drawing bootstrap samples should be negligent. If heteroskedasticity of unknown form is allowed under the null hypothesis, the bootstrap data-generating process cannot capture the characteristics of the observed data. To solve this problem, Liu (1988) proposed the so-called "wild bootstrap". Mammen (1993) proved that under some regularity conditions the asymptotic distributions of various test statistics are the same as the distributions of the analogous wild bootstrap statistics. In other words, the wild bootstrap is asymptotically justified.

According to Flachaire (2005), appropriate bootstrap methods in regression models for inference robust to heteroskedasticity of unknown form are the wild bootstrap and the pairs bootstrap. Monte Carlo experiments were applied to investigate the finite sample performance of a heteroskedastic-robust test. The simulation results suggest that the wild bootstrap outperforms the pairs bootstrap. Detailed descriptions of both bootstrap methods can be found in Flachaire (2005) and in Davidson and Flachaire (2000). Thus, the wild bootstrap was applied in our case to simulate the 95% confidence intervals of the regression coefficients in Tables 3 to 5.

The variables that were not significant at the 5% level were eliminated. Lagged dependent variables were included to remove the autocorrelation effects. Thus, the dynamics was introduced into the specified models. The models passed the diagnostic checking satisfactorily. The Breusch-Godfrey Lagrange multiplier test does not reject the null hypothesis of no error autocorrelation up to order p (with p = 1, 2, 4) for any of the countries. The heteroskedasticity problems were solved by using the wild bootstrap method, as already mentioned.

3.2. Empirical results. If the GDP growth rate in *Estonia* rises by 1% point, while other predictors are held constant, then the NPL ratio growth rate decelerates by 3.81% point. The variable net export growth with the regression coefficient of -4.27 has a similar effect. Net export and GDP growth have improved the NPL ratio growth in *Estonia* from 1997 to 2007 probably due to strong productivity growth and increasingly diversified export and import structures that have reduced the vulnerability to terms of trade deterioration. The impact of savings on the NPL ratio deterioration in *Estonia* is significant, which could be explained by domestic savings that had not kept up with the expansion of lending activity. After 2004 domestic savings started to augment in *Estonia*, which is explainable by substantially increased income of households and enterprises. Unemployment rate slightly deteriorated the NPL ratio in *Estonia* because of the fact that unemployment rate dropped significantly after 2004.

Table 3. OLS results for Estonia

Dependent variable: NPL			
Variable	Coefficient	Std. error	95% confidence interval
1	-0.173137	0.052057	(-0.2549, -0.0585)
GDP	-3.814574	1.132236	(-5.928, -1.489)
NETEXP	-4.272584	1.281942	(-6.455, -1.584)
PDEBT	0.767607	0.239925	(0.2639, 1.1903)
SAVINGS	2.030377	0.610631	(0.686, 2.966)
UNEMPLOY	0.334714	0.115854	(0.1138, 0.5760)
NPL(-1)	0.995517	0.320044	(0.6295, 1.7496)
NPL(-2)	-0.450459	0.194083	(-0.8835, -0.2191)

Note: R^2 = 0.9972, *S.E.* = 0.0272, *SSR* = 0.0467, *AIC* = -4.2637 $LM_{AR(1)}$ = 1.1345 (0.2868), $LM_{AR(2)}$ = 1.7927 (0.4081), $LM_{AR(4)}$ = = 1.9609 (0.7429). The Breusch-Godfrey Lagrange multiplier test statistics for the null hypothesis of no error autocorrelation up to order p (with p = 1, 2, 4) are given above. The p-values are stated in brackets.

In *Latvia*, the variables that improve (i.e. decelerate) the NPL ratio growth are investment and savings growth. As a part of the process of real convergence, the investment to GDP ratio might have risen further to maintain strong economic growth. A rapid credit growth appeared to have been contained by high domestic savings (and deposit accumulation) in *Latvia* after 2000. The regression coefficients of inflation and interest rate are close to 0 (0.03 and 0.04, respectively), thus indicating a negligent influence on the growth of NPL ratio. Given that inflation has been decreasing throughout the region in line with monetary convergence with the EU and volatility of inflation that is accompanied by more uncertainty about future price development, higher inflation in *Latvia* than in the Euro area has weakly deteriorated the NPL ratio. Net export deteriorated the NPL ratio probably due to import growth that mainly exceeded export growth in the period between 2000 and 2006.

Table 4. OLS results for Latvia

Dependent variable: NPL			
Variable	Coefficient	Std. error	95% confidence interval
1	5.098462	1.934527	(0.144, 6.269)
GDP	68.81079	26.108831	(1.97, 84.59)
HCPI	0.030427	0.012880	(0.0014, 0.0483)
INTR	0.035300	0.013202	(0.0038, 0.0532)
INVEST	-86.05183	32.627841	(-105.92, -2.45)
NETEXP	31.34042	11.884213	(0.88, 38.53)
SAVINGS	-40.18518	15.249784	(-49.44, -1.13)
UNEMPLOY	1.928819	0.736782	(0.059, 2.403)
NPL(-1)	0.497715	0.574932	(0.1563, 1.9725)
NPL(-2)	-0.251499	0.303833	(-1.0108, -0.0701)
NPL(-4)	0.096245	0.061037	(0.0054, 0.3433)

Note: R^2 = 0.9998, *S.E.* = 0.0079, *SSR* = 0.0030, *AIC* = -6.6883 $LM_{AR(1)}$ = 1.0483 (0.3059), $LM_{AR(2)}$ = 5.2717 (0.0717), $LM_{AR(4)}$ = = 7.8522 (0.0971). The Breusch-Godfrey Lagrange multiplier test statistics for the null hypothesis of no error autocorrelation up to order p (with p = 1, 2, 4) are given above. The p-values are stated in brackets.

In *Lithuania*, economic growth has been stimulated by expanding internal market after the accession to the EU and favorable export conditions that contributed to the GDP growth. The responsiveness of NPL ratio growth on net export is relatively weak. Import has been growing more rapidly than export and net export has slightly accelerated the NPL ratio. And the widening of current account deficit has reflected a decrease in savings of private sector (it has been expected that the decrease of personal income tax would affect private savings positively in *Lithuania* from 2006 on). The variables savings, unemployment rate and interest rate with the regression coefficients of 0.21, 0.17 and 0.009, respectively, had a weak influence on the NPL ratio. The effort to fight stubborn inflation has often led in high real interest rates that have weakly deteriorated the NPL ratio in *Lithuania*. A more rapid reduction of unemployment was hindered by a lack of qualified specialist, a large number of unskilled unemployed individuals and rigid employment policy.

Table 5. OLS results for Lithuania

Dependent variable: NPL			
Variable	Coefficient	Std. error	95% confidence interval
GDP	-2.309935	0.631938	(-3.317, -0.879)
INTR	0.008759	0.003515	(0.0026, 0.0172)
NETEXP	1.559439	0.478884	(0.599, 2.515)
SAVINGS	0.210561	0.065744	(0.0757, 0.3278)
SHARES	-0.037049	0.011632	(-0.0597, -0.0145)
UNEMPLOY	0.168831	0.048284	(0.0688, 0.2567)
NPL(-1)	0.965732	0.297695	(0.5543, 1.6654)
NPL(-2)	-0.185116	0.107859	(-0.3580, -0.0955)*

Note: R^2 = 0.9984, *S.E.* = 0.0205, *SSR* = 0.0249, *AIC* = -4.8213 $LM_{AR(1)}$ = 2.5149 (0.1128), $LM_{AR(2)}$ = 3.1826 (0.2037), $LM_{AR(4)}$ = = 8.9575 (0.0622). * 90% confidence interval is given in case of the variable NPL(-2), since the variable is not significant at the 5% level, but it was left in the model in order to remove the autocorrelation.

Table 6. The tested hypotheses of procyclicality

Hypothesis	Supported hypothesis EE	L	LT
Faster GDP growth decelerates NPL ratio growth	yes	-	yes
Increase in investment activity growth decelerates NPL ratio growth	-	yes	-
Net export growth decelerates NPL ratio growth	yes	-	-
Higher growth of equity's prices decelerates NPL ratio growth	-	-	yes
Higher savings growth decelerates NPL ratio growth	-	yes	-

Notes: EE – Estonia, L – Latvia, LT – Lithuania.

The slowdown in economic activity (GDP, net export, investment and savings growth) is likely to accelerate the NPL ratio growth in the Baltic States (see Kiss, Nagy and Vonnák, 2005). The long-term interest rate growth and real exchange rate growth have proved to be insignificant for the NPL ratio growth in the Baltic States, even in the period of the *Russian crisis*. The appreciations of the real exchange rates could be seen as the result of productivity gains in the tradable sector and as a "natural phenomena in catching-up countries" and did not erode competitiveness because higher investment activity lead to a rise in external competitiveness and higher export and GDP growth (Brandmeier, 2006), expanding the capability of a country to service foreign debt. Consequently, national savings to GDP ratio could be expected to increase and to become large enough to reduce the needs for foreign financing, considerably.

Conclusion

The Baltic States recorded the lowest share of non-performing loans in the EU New Member States and the outlook for banking sector results is possibly reflecting a favorable assessment of the economic growth. Increasing indebtedness of private sector could become causes of concern if the macroeconomic environment should develop less favorably. We tested a significance of macroeconomic variables conditioning the NPL ratio performance and the hypothesis of procyclicality between the economic growth and improving banking sector results in the Baltic States.

Net export and GDP growth has improved the NPL ratio growth in *Estonia* from 1997 to 2007 probably due to strong productivity growth and increasingly diversified export and import structures. Savings and investment activity has significantly improved the NPL ratio in *Latvia*. Since 2000 *Latvia* has experienced rapid growth in investment, encouraging modernization of production and introduction of new technologies. In *Lithuania*, faster GDP growth and equity value growth slow down the dynamics of NPL ratio. In *Lithuania*, economic growth has been stimulated by expanding internal market after the accession to the EU and favorable export conditions.

We can say that a strong economic growth and decelerating non-performing loans ratio, in the context of procyclicality theory, could be interpreted as signals of economic potential overheating and therefore, as a potential threat to banking sector perform-

ance. The slowdown in economic activity could be likely expected to accelerate the NPL ratio growth in the Baltic States.

We can also state that strong economic growth and a decelerating non-performing-loan ratio, can be interpreted as a signal for economic overheating and therefore as a potential threat to banking sector performance. This fact highlights the need for demand restraint in order to improve the saving dynamics in these national economies.

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Appendix.

In the Appendix, we describe all the variables employed in our empirical analysis in more details and present descriptive statistics for the growth rate variables. Additionally, results of the unit root tests are also given.
Variable description:
GDP: real gross domestic product;
HCPI: harmonized consumer price index;
INTR: short-run real interest rate (money market interest rate);
INVEST: gross investment (gross fixed capital formation on companies side) as % of GDP;
NETEXP: net export;
NPL: non-performing loans as share of all nominal loans that are at least 90 days past due in total nominal loans that are awarded to the corporate and household sectors in an individual country;
PDEBT: public debt as % of GDP;
REFFEXCHR: real effective exchange rate (deflator consumer price index);
SAVINGS: gross savings with banks as % of GDP;
SHARES: stock exchange index;
UNEMPLOY: unemployment rate (labor force survey).

Table 7. Descriptive statistics for Estonia

	GDP	HCPI	INTR	INVEST	NETEXP	NPL
Mean	0.021089	0.012177	0.009875	-0.004665	-0.644088	-0.030067
Median	0.039813	0.012704	-0.015094	-0.013309	-0.097345	-0.034091
Maximum	0.147707	0.040816	0.733524	0.155174	2.692308	0.215625
Minimum	-0.081991	-0.007057	-0.459906	-0.059064	-22.50000	-0.263158
Std. dev.	0.067634	0.010588	0.189479	0.043978	3.693953	0.074465
Skewness	0.089245	0.525465	1.062231	1.936703	-5.110390	0.175474
Kurtosis	1.516691	3.267741	7.234086	6.773680	30.22435	6.041053
Sum	0.906846	0.523610	0.424606	-0.340543	-27.69578	-1.292889
Sum sq. dev.	0.192122	0.004709	1.507902	0.139250	573.1023	0.232893

	PDEBT	REFEXCHR	SAVING	SHARES	UNEMPLOY
Mean	-0.014421	0.006947	0.045425	0.046571	-0.018062
Median	-0.020833	0.005057	0.049724	0.021627	-0.023810
Maximum	0.212766	0.030439	0.890756	0.551282	0.241758
Minimum	-0.219512	-0.008993	-0.456522	-0.321333	-0.160714
Std. dev.	0.068550	0.009752	0.273212	0.174838	0.090917
Skewness	0.580317	0.663534	0.418971	0.454148	0.614277
Kurtosis	7.485973	3.000082	3.609223	3.939625	3.251010
Sum	-0.447041	0.298729	1.953256	2.002564	-0.776654
Sum sq. dev.	0.140974	0.003994	3.135084	1.283874	0.347171

Table 8. Descriptive statistics for Latvia

	GDP	HCPI	INTR	INVEST	NETEXP	NPL
Mean	0.020152	0.012326	0.042454	0.047304	-0.004847	-0.049969
Median	0.016268	0.011864	0.000000	0.048276	-0.002684	-0.042105
Maximum	0.085915	0.039983	0.747610	0.207547	0.024559	0.074731
Minimum	-0.028089	-0.012300	-0.384780	-0.131274	-0.043535	-0.321429
Std. dev.	0.030745	0.011933	0.223071	0.059965	0.014931	0.073469
Skewness	0.554550	-0.055861	1.218300	-0.077793	-0.443000	-1.367412
Kurtosis	2.292553	2.930980	4.999675	4.229002	3.266840	5.926860
Sum	0.866533	0.530019	1.740623	2.034067	-0.305387	-2.148687
Sum sq. dev.	0.039701	0.005981	1.990418	0.151023	0.013822	0.226705

	PDEBT	REFEXCHR	SAVING	SHARES	UNEMPLOY
Mean	-0.009113	0.005961	0.072044	0.000192	-0.022952
Median	-0.008000	0.005554	0.000000	0.000000	-0.007874
Maximum	0.102362	0.038551	2.285714	0.324544	0.131148
Minimum	-0.092593	-0.037396	-0.378238	-0.415113	-0.181818
Std. dev.	0.044318	0.019171	0.400949	0.130648	0.065612
Skewness	0.260739	-0.171602	3.995264	-0.644486	-0.171835
Kurtosis	2.842688	2.185544	22.85147	6.323485	3.383807
Sum	-0.282506	0.256325	3.097884	0.008254	-0.895138
Sum sq. dev.	0.058922	0.015436	6.751925	0.716892	0.163589

Table 9. Descriptive statistics for Lithuania

	GDP	HCPI	INTR	INVEST	NETEXP	NPL
Mean	0.023808	0.006565	-0.000376	-0.004847	0.815405	-0.073103
Median	0.056877	0.007205	-0.003717	-0.002684	0.075269	-0.066667
Maximum	0.188005	0.030251	0.783691	0.024559	24.66667	0.086854
Minimum	-0.134149	-0.018150	-0.463908	-0.043535	-0.967391	-0.275862
Std. dev.	0.086576	0.009699	0.191398	0.014931	3.900442	0.067093
Skewness	-0.151596	0.008227	1.544386	-0.443000	5.558200	-0.749177
Kurtosis	1.673798	3.373175	9.949779	3.266840	34.18332	4.361067
Sum	1.023755	0.282311	-0.013157	-0.305387	35.06240	-3.143408
Sum sq. dev.	0.314808	0.003951	1.245530	0.013822	638.9649	0.189063

	PDEBT	REFEXCHR	SAVING	SHARES	UNEMPLOY
Mean	-0.010578	0.008414	0.046073	0.005250	-0.028787
Median	-0.020661	0.001977	0.000000	0.000000	-0.037037
Maximum	0.094170	0.057892	0.705263	0.381818	0.175000
Minimum	-0.102459	-0.047660	-0.522843	-0.212161	-0.181159
Std. dev.	0.051459	0.022816	0.289780	0.098571	0.094203
Skewness	0.604251	0.294654	0.170351	1.072769	0.102789
Kurtosis	2.550863	3.233776	2.105653	7.216455	2.238969
Sum	-0.327918	0.361793	1.981151	0.225743	-1.122711
Sum sq. dev.	0.079442	0.021863	3.526843	0.408079	0.337221

Table 10. Results of the augmented Dickey-Fuller unit root test

Variable	Estonia		Latvia		Lithuania	
	Level	First diff.	Level	First diff.	Level	First diff.
EXCHR	0.0243_4		0.3795_4	0.1238_3	0.1890_4	0.0000_3
GDP	0.9961_4	0.3763_4	0.0172_1		0.0372_1	
HCPI	0.2907_4	0.0037_3	0.4257_0	0.0000_0	0.1870_0	0.0178_3
INTR	0.0811_3	0.0000_1	0.0069_3		0.1247_4	0.0007_3
INVEST	0.5402_4	0.1410_4	0.8535_1	0.1298_0	0.0000_4	
NETEXP	0.0188_1		0.0002_1		0.0046_1	
NPL	0.0065_1		0.3418_1	0.0480_0	0.0420_1	
PDEBT	0.1967_1	0.1544_0	0.0003_1		0.0331_1	

Table 10 (cont.). Results of the augmented Dickey-Fuller unit root test

Variable	Estonia		Latvia		Lithuania	
	Level	First diff.	Level		Level	First diff.
REFFEXCHR	0.0567_4	0.0018_3	0.61244	0.0649_3	0.3881_4	0.0001_3
SAVINGS	0.0077_1		0.1617_1	0.0000_0	0.0242_1	
SHARES	0.0703_4	0.0009_4	0.2464_4	0.0011_4	0.0958_1	0.0000_0
UNEMPLOY	0.0861_1	0.2454_0	0.0205_1		0.0036_1	
INTRlr	0.0146_4		0.0039_3		0.1842_0	0.0062_3