2. THE ROOTS OF THE BANKING CRISIS IN THE NEW EU MEMBER STATES: A PANEL REGRESSION APPROACH

Mejra FESTIC[1]
Alenka KAVKLER[2]

Abstract

We contributed to the empirical evidence of the impact of macroeconomic environment on the non-performing loans (NPL) ratio dynamics by analyzing the panel model with fixed effects, the model with random effects and instrumental variable regressions to control for a potential endogeneity problem.

Economic and consumption growth proved to be positively correlated with the business cycle in the ten new EU member states (NMS-10), which raised the quality of the loan portfolio. Compliance with the Basel Core Principles was shown to improve the NPL ratio dynamics.

Keywords: cyclicality, systemic risk, overheating economies

JEL Classification: E32, E51, E66, F34, F43, G21, G28

1. Introduction

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. In theory, we would expect the systemic risk and the non-performing loans to total loans (NPL) ratio to be procyclical within the economic cycle, while the favourable macroeconomic conditions coincide with better capabilities in loan repayment.

We analysed the relationship between the non-performing loans ratio and the macroeconomic/banking sector 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 ten EU New Member States (NMS-10). As an empirical

---

[1] EPF - Faculty of Economics and Business, University of Maribor; EIPF - Economic Institute, Ljubljana. SLOVENIA. E-mail: mejra.festic@uni-mb.si; mejra.festic@eipf.si
[2] EPF - Faculty of Economics and Business, University of Maribor; EIPF - Economic Institute, Ljubljana. SLOVENIA. E-mail: alenka.kavkler@uni-mb.si

contribution, we tried to find evidence that compliance with the Basel Core Principles and higher financial sector depth would decelerate the NPL ratio growth, while higher banking sector concentration would contribute to a worsening of loan portfolio quality. We also tested the hypothesis if the amount of available finance might harm banking sector performance, and if a slowdown in economic activity is likely to deteriorate NPL dynamics.

The structure of the paper is as follows: in the second chapter, the theoretical background of the empirical analysis and empirical literature overview are presented. In the third chapter, we summarized the characteristics of the macroeconomic environment and the banking sector in the ten new EU member states (NMS-10). The fourth chapter explains the methodology and discusess the results of the empirical analysis. The implications of the empirical analysis are revisited in the conclusion.

2. The theoretical background of empirical analysis and the empirical literature overview

The quality of a loan portfolio in the banking sector is determined by the macroeconomic environment that influences the values of external indicators, such as economic convergence, gross domestic product, purchasing power parity, the liberalization of banking sector, financial deepening, credit relative to the GDP, the net open position in foreign currency to capital, foreign direct investment in the financial sector, the share of foreign-currency-denominated loans to total loans, etc.; as well as indicators of banking sector performance, such as the loans to assets ratio, the deposits to loans ratio, compliance with Basel core principles, banking market concentration, etc. (see Babihuga, 2007; Ferreira, 2008). Information on the legal framework needs to be taken into consideration and qualitative data on easing financial regulations that could provoke high-risk behaviour.

Both complementing banking sector data and overall macroeconomic data are required in order to assess the current state of the cycle. If economic expansion is associated with rapid credit growth, large increases in consumption, a high level of investment, export/employment growth (Collender and Shaffer, 2009), excessive capital accumulation and inflows, the level of credit risk is higher because risk is built up in a boom but materializes in a downturn. In the household sector, the macroeconomic consequences of a boom are declining unemployment and rising real wages (Swain, 2007), while in the corporate sector, the consequence of a boom is an increasing market for products. The corporate sector's credit demand rises in order to accommodate growing consumer demand. Banks are prepared for the possibility that some of their loans will be non-performing due to defaults by the private sector in a recession (D'Avack and Levasseur, 2007). Applying soft budget constraints for credits to enterprises may also lead to a higher NPL ratio due to considerable losses in the corporate sector, when investments turn out to be counterproductive. 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. For this reason, the impact of business cycle variables on the banks' credit risk positions turns out to be procyclical (Sirtaine and Skamnelos, 2007).

A sudden withdrawal of bank deposits, leaving domestic banks illiquid, might happen after a period of large inflows of foreign short-term capital, when depreciation is expected or when confidence in the economy wavers, when disruption on financial markets or balance of payments crises is expected and when there is a high share of loans denominated in a foreign currency (Calvo and Mendoza, 2000). Large deficits are typical for the emerging markets and do not pose a problem (for the NPL ratio) as long as they are caused by the import of capital goods, and future export growth is strong enough to reimburse debt. And, an unexpected depreciation of the domestic currency might increase the PD and NPL ratio, if banks borrow in a foreign currency and lend in domestic currency due to higher debt burdens in the private sector.

Limited growth prospects in export-oriented industries can ultimately lead to economic contraction with direct implications on loan performance, owing to the fact that bank lending surveys have shown that loans granted to enterprises are partly hedged by their export proceeds. Also, the higher demand of households could increase debt burdens, and if the indebtedness of households is higher (i.e., the lower compensation of employees to demand of households ratio as a proxy), the NPL could increase (Sirtaine and Skamnelos, 2007).

Heterogeneity across economies might prove a different relationship between banking sector asset quality and the business cycle (Babihuga, 2007). The higher the banking sector concentration, the more FDI in the financial sector comes from abroad and the higher the financial sector depth, the more possibilities the banks have for offering more credits and creating lower capital adequacy.

The choice for the explanatory variables in the model reflects the significant amount of empirical literature confirming that a deterioration in banking sector results and credit quality is transmitted from the macroeconomic environment. Arpa *et al*. (2001) have concluded that the share of risk provisions in the total loans of the banking sector varies indirectly with the real GDP growth. Gambera (2000) also revealed the link between macroeconomic dynamics and bank asset quality.

Gerlach, Peng and Shu (2005) found that the NPL ratio rises with an increasing number of bankruptcies, but decreases with economic growth and property price inflation. Quagliariello (2003) argues that decreasing real GDP growth and increasing unemployment have a significantly adverse effect on loan portfolio quality, while the real exchange rate fails to affect it significantly. According to the empirical study of Jakubík (2007), the default rate for the corporate sector is determined by an increase in the loan to GDP ratio; meanwhile, the default rate for households deteriorates via unemployment and compensation to employees. Hoggarth, Sorensen and Zicchino (2005) have found the dynamics of inflation and interest rates as important factors indirectly influencing financial stability and loan portfolio quality.

Ferreira (2008) comments that an increasing deposit to loan ratio might be an indicator of decreasing the NPL ratio. According to D'Avack and Levasseur (2007), the loan to asset ratio is positively correlated with banking problems, increasing the NPL ratio and (in)solvency as a result of long-term banking mismanagement.

Podpiera (2006) found a significant positive impact of higher compliance with the Basel Core Principles on banking sector performance as measured by decelerating NPL dynamics. Meanwhile, Babihuga (2007) argues that the relation between the

business cycle and capital adequacy is more ambiguous; and it appears to be countercyclical. According to Babihuga (2007), the higher the banking sector concentration and the more FDI in the financial sector comes from abroad, the more possibilities the banks have of offering more credits and creating lower capital adequacy. The author further discusses the negative relationship between the business cycle and capital adequacy ratio; and that the capital ratio is smaller in economies with stronger supervision.

3. The banking sector in the macro environment of the New Member States

3.1. The macroenvironment and overheating

Due to the fact that catching-up economies required investment levels that exceeded domestic savings, the NMS financed a part of their investment through foreign direct investment (FDI) and huge current account deficits have been financed by a steady increase in the net inflow of FDI, net portfolio investment and foreign currency loans. Bank credits have remained an important source of financing for both investment and consumption. Credit growth in the NMS-10 had been largely foreign-funded and loans to the private sector grew at a rapid pace over the period 2002-2007.

Significant amounts of FDI have been related to the banking sector and non-tradable sectors (such as the real estate business) which are closely tied to the availability of bank finance in the Baltics, which differentiates the Baltic States from Central Europe, where most capital inflows have taken the form of FDI in the tradable sector. Romania and Bulgaria have become some of the main beneficiaries of FDI in the tradable sector in the Central and Eastern European Region due to their EU accession, the relatively low wages of the highly educated labour force and the rapidly growing domestic market. In the Czech Republic, the inflow of foreign direct investment has influenced the structure of the Czech economy, resulting in a high degree of foreign ownership by corporations, which export a high share of their production. In Slovakia, Slovenia, Poland and Hungary, FDI represented a restructuring factor for the economy and also contributed to the growth in the available financing.

Economic growth has been high and widespread: domestic demand, boosted by a foreign-financed boom in bank lending, the positive impact of FDI and the import of capital goods, real wage growth on the back of productivity gains; and export growth have all contributed to GDP growth after the EU accession (Brandmeier, 2006). Already in the aftermath of the Russian crisis at the end of the '90s, Estonia and Latvia experienced very rapid loan growth between 2000 and 2002, while Lithuania lagged somewhat behind. In Bulgaria, the period after 2001 saw a great credit expansion after the crisis. In light of the credit boom, the banking sector's risk profile has deteriorated somewhat and the Bulgarian National Bank introduced measures to decrease the credit growth rate in the period from 2004 to 2006. In Romania, the cautious approach of banks to lending after the banking crisis in the late '90s (and their preference for doing low-risk business) led to a low share of private sector loans to GDP. The growth in private consumption - triggered by strong real wage growth -

led to a pick-up in lending in 2003 (Naraidoo *et al.*, 2008) and the National Bank of Romania started to implement measures to curb domestic credit growth after 2004.

In Poland, the rapid growth of the economy led to favourable conditions for an increase in the volume of credits; and after 2001, the negative effect of weakening of the zloty was counterbalanced by favourable business conditions and the increasing profitability of exporters (Brandmeier, 2006). The banking sector in Hungary was characterized by a dynamic build up of credit risk in the corporate and households sectors, due to an expansion of loans and a change in consumption. The short-term maturity of the bulk of domestic funds has shown itself to be the primary reason why the Hungarian banks have resorted to foreign funds. In the Czech Republic, households' rapidly rising real incomes and the fostering of dynamic growth in household consumption has had a favourable effect of growth. Starting in 2004, there was an uptick in export growth (in response to an easing of exchange rate) that resulted in improved banking loan portfolio quality. In Slovenia, favourable export dynamics and foreign direct investment contributed to the improved competitiveness of the Slovenian economy. Disposable savings with banks (due to the relatively higher real interest rate on tolar deposits) enabled excess liduidity in the banking sector and potential credit growth. In Slovakia, FDI contributed significantly to the growth in available finances and, consequently, in ample liquidity within the banking sector. The banking system was also indirectly vulnerable to exchange rate shocks - due the depreciation of the koruna, which made foreign debt servicing more expensive - and because of the significant foreign debt exposure of its corporate borrowers.

Structural dependence on external financing - which is in part a by-product of the effect of the low levels of internal saving - have led to large current account deficits and financial instability. Despite good FDI coverage and the recovery of export growth, the sustainability of the external imbalance is, in the medium term, an issue of concern. Broad-based contraction in economic activity, accompanied by a strong fall-off in exports, as well as in imports, was already noticeable at the end of 2007, and continued in 2008. The trend has continued in 2009.

3.2. The banking sector

Most of the NMS-10 banking sectors - having undergone similar structural changes over a relatively short period of time - share some common structural characteristics. Indeed, benefiting from favourable macroeconomic conditions, real and nominal convergence towards the EU-15 (Table 1), banks in the NMS-10 have generally improved their performance after 2001 (see Figure 1). An analysis of the financial health EBRD indicators confirms that, generally, capital adequacy in the banking sector of the analysed ten economies has been sufficient (Table 1).

Two of the defining characteristics in most NMS-10 banking sectors are a (considerable) foreign presence with a relatively high concentration. Foreign banks have significantly contributed to the transformation of the banking sector in the NMS-10. Although their presence in the banking sector is relatively widespread, competition in NMS banking markets is intense, owing partly to the increasing integration of the EU banking sectors. While this should have positive welfare implications, it may also put pressure on banks' margins and profitability, as well as on lending criteria.

While the Estonian and Lithuanian banking sectors became truly consolidated, Latvia has remained the exception, with a number of smaller niche banks oriented towards the Russian market. Estonia privatized its last remaining large state-owned banks into foreign hands. The Lithuanian banking sector is considerably smaller and its effectiveness has been lower than in Estonia or Latvia due to state ownership, which lasted longer in Lithuania, and due to the fact that the banks are too risk-averse. In Bulgaria and Romania, sustained economic recovery and foreign ownership of the banking sector have increased competition and boosted confidence. Banks have also enjoyed adequate profitability (profits were also supported by continued cost-containment) and banks have benefited from an enhancing of asset quality (which has allowed for reduced provisioning). Some of the most pertinent risk problems for the banking sector in Bulgaria and Romania have shown themselves to be the persisting lag in restructuring the real sector (particularly state-owned enterprises and loss-prone firms), a lack of financial discipline and partly untransparent insolvency procedures.

Due to the fact that many state owned banks in Hungary became insolvent in the middle of the transition period (triggering further recapitalization), the main objective of the restructuring programme was to make banks attractive for foreign investors at the moderate concentration of the Hungarian banking sector. In terms of funds channeled to financial intermediaries, the majority (80%) of savings are placed with banks and other credit institutions in Hungary. A major factor in the banking sector's evolution in Poland was the arrival of foreign entrants in the mid-'90s that have driven consolidation among the sector's largest Polish banks; and the banking system transformed into nine independent regional banks at the beginning of the transition period.

In the Czech Republic, the development of medium-sized banks, which are mainly foreign banks or branches of foreign banks, and a restructuring programme, have gradually eroded the dominance of the larger banks. In Slovenia, although market entry barriers were removed in the late 1990s, few foreign investors are present in comparison with other Central and Eastern European countries. The relatively high level of concentration of the banking sector is primarily due to mergers between domestic banks in order to achieve a critical mass and to remain competitive. In Slovakia, the quality of the credit portfolio worsened significantly until the restructuring of the banking sector in 1999 and 2000; this fact was also supported by ample liquidity in the banking sector and significant credit growth in the late '90s. Defaulted loans were replaced by government bonds in 1999/2000 and in 2001/2003. After an increase in default rates, the banks were more cautions when granting (corporate) loans (more in Festić *et al*., 2011).

Table 1

Macroeconomic and banking sector indicators for the NMS-10

Macro economic environment (2007/2008/2009^t)						
	GDP % growth (yoy %, real)	Gross foreign debt (% GDP)	Inflation (ann. av. in %) (CPI) ***	Budget balance (% of GDP)	Public debt (% of GDP) 2007/2008	Current account (% of GDP)	FDI inflow (% of GDP)
The Czech Republic	6.0/3.2/-1.8	38.2/39.9/42.9	2.8/6.3/1.7	-1.0/-1.2/-4.6	28.9/29.8	-3.2/-3.1/-2.4	5.1/4.1/2.8
Slovakia	10.4/6.4/-0.5	59.0/55.0/57.0	2.8/4.6/1.9	-1.9/-2.2/-4.9	29.4/27.6	-5.3/-6.5/-6.7	4.4/2.5/1.1
Slovenia	6.8/3.5/-2.1	100.7/105.1/113.6	3.6/5.7/1.1	-0.1/-0.2/-3.8	23.4/22.8	-4.2/-5.9/-3.7	-0.8/0.7/0.7
Hungary	1.1/0.5/-6.2	99.3/109.2/152.5	8.0/6.2/3.9	-4.9/-3.3/-3.5	65.8/73.0	-6.5/-8.4/-4.0	0.8/3.4/1.8
Poland	6.7/4.8/-0.8	48.2/56.6/60.8	4.2/2.6/3.3	-2.0/-3.9/-5.2	44.9/47.1	-4.7/-5.5/-4.0	5.4/3.0/2.4
Estonia	6.3/-3.5/-10.1	112.4/122.9/137.4	6.6/10.4/1.4	2.7/-2.2/-2.7	3.5/4.8	-18.1/-9.2/-3.8	5.3/3.7/2.0
Latvia	8.9/3.1/-9.2	72.0/77.2/83.0	5.7/11.0/5.5	-1.2/-1.9/-3.7	17.0/15.6	-14.6/-13.0/-3.7	3.6/2.4/1.1
Lithuania	10.0/-4.6/-14.5	135.1/127.0/137.6	10.1/15.5/4.7	0.1/-3.3/-6.8	9.0/19.5	-23.8/-13.2/-3.9	6.8/4.2/2.8
Bulgaria	6.2/6.0/-3.0	100.2/107.7/102.9	8.4/12.4/3.5	3.5/3.0/-0.4	18.2/.14.1	-25.1/-25.3/-9.8	29.4/18.1/7.7
Romania	6.2/7.1/-4.0	31.1/37.0/50.0	4.8/7.9/6.1	-2.3/-4.8/-5.0	12.7/13.6	-13.5/-12.3/-8.7	5.8/6.6/3.6

Banking sector indicators (for commercial banks, 2007/2008/2009^q)									
	asset share of foreign banks (in % of total banking sector assets)	Solvency ratio/ Tier 1 ratio (2008)	Loans to GDP/ Deposits to GDP (in %)	ROE/ROA (2008)	C/I (% of total income) (2008)	Loan to deposit ratio/ FL to TL** (2008)	NPL (2007/ 2008/2009)	Rating Moody's/ S&P 2008	EBRD index of banking sector reform*
1	2	3	4	5	6	7	8	9	10
The Czech Republic	97.0	11.58/10.56	53/70	14.57/1.56	-54.53	0.7/14	2.7/3.1/4.3	A1stable A stable	4.0
Slovakia	96.0	11.30/10.10	47/60	10.26/1.59	-55.19	0.8/26	2.5/2.9/4.2	A1 stable A+ stable	3.3
Slovenia	37.0	11.67/8.83	85/55	5.23/1.24	-59.66	1.6/51	1.8/1.6/2.5	Aa2 positive AA stable	3.3
Hungary	89.0	12.90/10.86	69/49	15.06/1.81	-58.59	1.4/43	2.5/2.9/6.5	BAA1 negative BBB-negative	3.7

1	2	3	4	5	6	7	8	9	10
Poland	67.0	11.43/10.24	51/47	14.77/2.12	-55.83	1.1/32	5.2/4.4/6.0	A2 stable A- stable	3.3
Estonia	97.0	10.53/8.21	100/50	15.98/2.17	-40.50	2.1/85.3	0.4/1.6/3.6	A1 negative A negative	3.7
Latvia	61.0	10.94/9.57	91/37	2.68/1.89	-54.03	2.8/89.3	0.4/2.2/6.0	Baa3 negative BB+ negative	3.7
Lithuania	88.0	10.72/8.38	64/32	11.39/1.61	-48.40	2.0/64.0	1.0/1.1/2.9	A3 negative BBB negative	3.0
Bulgaria	84.0	14.93/11.20	74/60	17.32/2.66	-50.24	1.3/66.9	2.1/2.4/4.4	Baa3 negative BB negative	3.7
Romania	88.0	12.88/10.54	41/32	29.49/4.06	-45.16	1.3/55.5	9.7/9.8/11.3	Baa3 stable BB+ negative	3.0

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), doubtful loans are 181 to 365 days past due (and require provisioning between 40 and 99) and losses are not repaid (requiring 100% provisioning). In Estonia, loans overdue for 150 plus days have to be written off. In Latvia, although the substandard classification covers loans 31–90 days overdue and provisioning levels are 10/30/60/100 percent, respectively. Poland and Hungary - NPL (substandard, doubtful and loss) are loans in default or close to being in default that are usually defined as loans to customers and banks that are 90 days or more overdue. Slovakia - there was a methodological change in 2006: the NPL are defined as loans past due more than 90 days and for which the present value of the future cash-flow was below 50% of the outstanding amount of the loan. According to the methodology of the Czech National Bank, "watch" credits are included in the category of classified credits. In Slovenia, NPL are defined as loans to customers and banks that are 180 days or more overdue (i.e. doubtful and loss).

* The ERBD indicators of banking sector reform are measured on a scale of 1 to 4+ (for 1997 and 2003): score 2: established internal currency convertibility, significant liberalised interest rates and credit allocation; score 3: achieved substantial progress in establishing prudential regulation and supervision framework; score 4: level of reform approximates the BIS institutional standards.

** FL to TL: foreign currency loans as % of total loans.

*** Inflation differentials have been larger and more persistent in the European Monetary Union (Fendel and Frenkel 2009).

[q]: The second quarter of 2009.

[f]: Forecast for 2009.

Source: BACA (2009), EIPF (2009).

3.2. Non-performing loans

The transition economies share a common problem: their banking sectors in the early 1990s were characterized by a relatively small number of large, state-owned institutions that had become burdened by large volumes of non-performing loans. We can point to two reasons for this: first, these countries had to deal with the issue of a large amount of inherited NPLs from the past and, second, the new NPLs mounted up in the balance sheets of commercial banks due to a lack of experience, government intervention, inappropriate incentives for bank management and poorly designed privatization methods.

The NMS-10 used different strategies for privatization. While Hungary went for a quick sale of its banks to foreign investors, Poland combined public offerings with management buyouts and some placements with foreign strategic investors. In Hungary, the government sold part of the bad loans to the Hungarian Development Bank. The state cleaned their debts from bank portfolios through an exchange for government bonds. In Poland, rather than transferring NPLs from their balance sheets to a state asset-management agency, the state presented the banks with treasury bonds in return for which they were to actively pursue the work-out of NPLs with debtor enterprises, typically resulting in debt-equity swaps or bad debt write-offs.

The balance sheet of all of the larger state owned banks in Slovakia were cleaned in 1999-2001 by provisioning NPLs or removing them to the Konsolidacna Banka and the Slovak Consolidation Agency and replacing them with government bonds. Meanwhile, Slovenia initiated banking sector reforms by placing three of its largest banks under the control of the Bank Rehabilitation Agency, and then pursuing a 'good bank-bad bank approach' in which good banks shed their sister banks, re-emerged and cleaned-up their balance sheet. In the Czech Republic, the partial privatization of commercial banks began in the decade through the voucher privatization program. Because of lax regulations in the financial sector, the result of the voucher privatization process was detrimental to corporate governance. In 2000, the Czech National Bank was forced to take over its administration.

In the Baltic States, non-performing loans dating back to government intervention in state-owned banks and companies in the early '90s were fully written-off by the end of the decade. Estonia and Latvia relied on a decentralized model, injecting capital into banks they considered viable and suitable for further privatization, while leaving it to the banks themselves to deal with their bad loans. Lithuania chose a centralized approach and set up a central agency to clean up the bad loans of selected banks and provide banks with government assets for recapitalization. To this effect, the government issued special bonds and transferred cash from the budget.

In Bulgaria and Romania, the structure of NPLs improved by the end of 2004. The removal of non-performing loans from balance sheets (predominantly affecting loans to the corporate sector) during the bank restructuring process and improved management skills have improved bank loan portfolios in both economies. These changes in the asset structure display a similarity to the developments in the New Member States over the last decade (see Figure 1, Table 1).

Emerging Europe's long-term real convergence story ran headfirst into the global slowdown of the last quarter of 2008, with the region's economic sentiment indicators deteriorating at a faster pace in the last quarter of 2008. Against the backdrop of a sharp deterioration in global and regional indicators, consensus forecasts for 2009 global, EMU and CEE GDP growth were cut significantly in the second half of 2008. Due to the fact that the denominator of the NPL ratio was growing quickly during the boom and considering the gloomy outlook for the rest of 2009, NPLs are probably set to increase even more (Figure 1).

Figure 1

The NPL ratio dynamics in the 10 EU New Member States
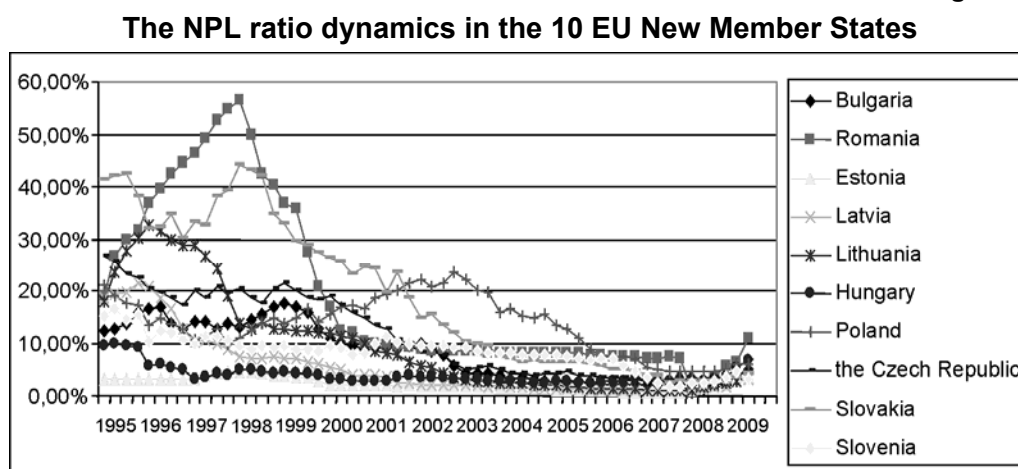
Source: BACA (2009) and EIPF (2009).

4. Empirical analysis: Data specification, methodology, empirical results and discussion

We analyzed the relationship between the NPL ratio and macroeconomic/banking sector variables as a source of systemic risk in order to assess the banking sector's vulnerability to bad-loan performance on a macroeconomic level by panel regression method for the NMS-10.

4.1. Data specification

Based on the studies of the determinants of the NPL ratio, we constructed a data set of explanatory variables that are usually employed in models.[1] The usual definition is that NPLs are defined as loans that are more than 90 days past due, as was used in our case.

The NPL ratio could be problematic to use when outflow is given by one-off NPL write-offs. This ratio can be driven by purely administrative measures. For example, in the New EU Member States, a significant portion of defaulted loans were removed from

---

[1] *It is important to note, however, that cross-country variations in asset quality indicators can also be explained by differences in loan classification rules (see notes, Table 1).*

banks and substituted with government bonds. Since we could not provide the NPL inflow time series, we had to rely on the use of an NPL series as nominal loans that are at least 90 days past due. The NPL (in billion of domestic currency and deflated by the consumer price index) as the share of total loans to the private sector (in billion of domestic currency and deflated by the consumer price index) was used for the dependent variable in our analysis.

Originally, the following time series for economic activity were considered: the (real) export of goods and services (in billion of domestic currency in real terms, the deflator is export prices), the real GDP (in billion of domestic currency deflated by a GDP deflator), gross (real) fixed capital formation in the non-financial sector (in billion of domestic currency deflated by gross fixed capital formation deflator), foreign direct investment in financial intermediation and real estate (in billion of domestic currency, in real terms), disposable income and compensation for employees (deflated by consumer price index) to the (domestic) demand of households (in billion of domestic currency deflated by the consumer price index). The net foreign assets (of the banking sector) as a share of net (banking) assets were used as an indicator of the net open foreign currency position. The banks' loans to the private sector (i.e., loans to households and corporations, as obtained from banks in the country, in billion of domestic currency deflated by the consumer price index) as a share in the total banking assets (in billion of domestic currency deflated by the consumer price index) was considered as a proxy of risk taken by banks.

In order to explain the institutional conditions within the NMS-10, the following variables were employed: financial sector depth (proxied by the deposits of the banking sector relative to GDP, expressed in billion of domestic currency, in real terms), market concentration (proxied by the assets of four big banks relative to total banking sector assets, expressed in billion of domestic currency, in real terms)[2] and compliance with the Basel Core Principles (measured by an index of compliance with the Basel Core Principles) as a rough measure for the quality of regulation and supervision[3] (Babihuga, 2007).

All the nominal variables expressed in national currencies were corrected by an individual country's appropriate deflator(s) (using the second quarter of 2009 as the base) and transformed into EUR by using the exchange rate of the second quarter of 2009.

We relied on the internal database of the BACA (2009), EIPF (2009) and the databases of central banks in individual countries. A quarterly time series was used for the period from the first quarter of 1995 to the second quarter of 2009, in order to explain the NPL dynamics in the Baltic States, Bulgaria, Romania, Slovenia, Slovakia, Poland, Hungary and the Czech Republic.

In order to control for a potential endogeneity problem, several instrumental variables were employed (Kaufmann *et al.*, 2006, Babihuga, 2007): the EBRD index of banking

---

[2] Financial sector depth and market concentration were expressed as dummy variables and divided intro three categories: low, middle and high (see Babihuga, 2007).

3 The capital adequacy and compliance with Basel Core Principles are therefore estimated for the years 1995, 1996 and 1997 (EIPF, 2009).

sector development, capital adequacy (by dividing aggregated data on regulatory capital by aggregate risk-weighted assets for commercial banks as a rough measure of the quality of regulation and supervision), the income level of national economy (measured as the average real GPD/per capita), the index of government effectiveness and the index of the rule of law, the loan to deposit ratio (as a proxy for the degree to which funding comes from abroad, expressed in real terms), and the ratio between the time deposits of clients and loans offered to the same clients (as a proxy for loan insurance, expressed in real terms).

4.2. Methodology

According to the relatively short time series and similarities between the analyzed economies, we decided to use panel regression (Hsiao, 2003), and obtain more information on the analyzed parameters. This method allows one to control for omitted variables that are persistent over time and, by including lags of regressors, may alleviate measurement errors and endogeneity bias. The advantage of the applied method is that it lowers co-linearity between explanatory variables (Davidson and MacKinnon, 1993) as well as dismisses heterogenous effects. We contributed to the existing empirical evidence on the impact of the macroeconomic environment on NPL ratio dynamics by analyzing the model with fixed effects (which controls the impact of neglected and changing variables among observed countries that are constant within a time period), the model with random effects and instrumental variable regressions (Arellano and Bond, 1991; Babihuga, 2007).

Lütkepohl and Xu (2009) have demonstrated that logarithmic approximation is only accurate in some special cases. Since the dynamics of the NPL ratio is sometimes large, this approximation would produce a significant downward bias in the estimation. Therefore, the original time series were transformed into differences and expressed as percentage changes. The Fisher-ADF panel unit root test indicates the stationarity of all the transformed time series even at the 1% significance level. By using the differences of the variables expressed as percentage changes, the problem of spurious regression was avoided. Namely, the original variables are integrated of different orders. Some of the variables are already stationary in the level form, whereas the majority are integrated of order 1. The cointegration analysis for all of the variables could not be performed due to different levels of integration, but we found three cointegrating equations among the set of I(1) variables. Variables were seasonally adjusted by the X-12 ARIMA seasonal adjustment method on the basis of quarter-on-quarter data. The lag length selection in the specified model was based on Schwarz, Akaike and Hannan-Quinn information criterion. According to a recent simulation study by Asghar and Abid (2007), the Schwarz criterion performs better than other information criteria in large samples, in the presence of a structural break. We included the breakpoint in the middle of 2000[4], when the so-called dot-com bubble burst and a recession started (and, thereafter, significant credit growth slowed down) (see Figure 1). The two regimes are thus determined by a dummy variable with the value of 0 until the second quarter of 2000 and with a value of 1 from then on.

---

[4] *The Chow forecast test was performed to check for the existence of a structural break in the middle of 2000.*

The following variables: loan to asset ratio (LAR), foreign direct investment in the financial sector and real estate (FDI$_f$), financial sector depth (FSD), market concentration (MC) and compliance with the Basel Core Principles index (BCP) may suffer from endogeneity. In this case, bias in the estimation could arise from the correlation between the vector of explanatory variables and the error term. To control for this problem, we used the instrumental variable approach. Instrumental variables should be correlated with the endogenous explanatory variables and uncorrelated with the error term. We decided to choose the following set of instrumental variables: the EBRD index of banking sector development, capital adequacy (measured as capital to risk-weighted assets), the income level of the national economy (measured as the average real GPD/per capita), the index of government effectiveness and index of rule of law,[5] the ratio between time deposits of clients and loans offered to them (as a proxy for loan insurance), and the loan to deposit ratio as a proxy for the degree to which funding comes from abroad (Kaufmann *et al.* 2006; Babihuga, 2007)[6].

The fixed effects model assumes that intercepts vary across the countries and can thus account for possible unobserved time invariant heterogeneity. A random effects model, on the other hand, assumes that the individual country intercepts are random variables drawn from a common distribution. Given the high p-values of the Hausman test in our case (Table 2), the null hypothesis could not be rejected; therefore, both fixed effects and random effects produced consistent estimators. Instrumental variable regressions also serve as a robustness check, since the regression coefficients in our models do not differ substantially.

An analysis of the residuals shows that the results of the panel estimation are unbiased and suggests that the model(s) have been correctly specified. We accepted the hypothesis of no autocorrelation of residuals - with high probabilities and low Q-statistics. The Chow Forecast test (performed by STATA programme) proved the stability of the model(s). All the calculations TSLS were performed by Eviews 6.0 and STATA.

4.3. Results and discussion

Although the banking sectors of these countries faced different circumstances during their EU integration period, the performance of their banking sectors have all demonstrated a similar impact on the NPL ratio.

The obtained results confirmed the influence of the chosen explanatory variables on the dynamics of the NPL ratio. As expected, we found evidence of a positive influence by the loan/asset ratio on NPL rate dynamics. Foreign direct investment in financial intermediation and real estate business increased the available finance and contributed to the worsening of NPL ratio growth. Rapid credit growth was supported by significant capital inflows, resulting in a substantial increase in bank credit risk

---

[5] *The compliance with the Basel Core Principles index is highly correlated with an index of government effectiveness and an index of measuring the rule of law (Kaufmann* et al.*, 2006).*

[6] *Cragg-Donald statistic tests the null hypothesis that the estimation is weakly identified; and rejection of the hypothesis ($g_{min} > g_{critical}$) has confirmed the absence of weak instruments problem. Rejection of the null hypothesis of the Kleibergen-Paap test has suggested that the chosen instruments are not weak (Kleinbergen and Paap, 2006).*

exposure. Excessive credit lending and the amout of available banking finance are associated with decreasing capital ratios, financial soundness and deterioration of loan portfolio quality.

Table 2

The panel regression results for the EU New Member States-10

Variable	PLS pooled	PLS Fixed effects	PLS Random effects	TSLS pooled	TSLS fixed effects	TSLS random effects
Dependent Variable: d(NPL), Cross-sections included: 10 (the first quarter of 1995 - the second quarter of 2009), n=570						
C	-13.61290 (-5.798105) (0.0001)***	-13.54872 (-7.55671) (0.0000)***	-13.65146 (-5.932135) (0.0000)***	-15.87439 (-4.464736) (0.0000)***	-15.70348 (-7.142654) (0.0000)***	-16.28527 (-4.053436) (0.0001)**
d(FDI$_f$)$_{(-2)}$	0.570110 (5.658745) (0.0000)***	0.565145 (5.328168) (0.0000)***	0.571272 (5.869021) (0.0000)***	0.740354 (7.277187) (0.0000)***	0.730074 (7.132209) (0.0000)***	0.729742 (8.056974) (0.0000)***
d(LAR)$_{(-5)}$	0.194062 (8.844872) (0.0000)***	0.212189 (10.70662) (0.0000)***	0.203445 (7.10894) (0.0000)***	0.227856 (2.509083) (0.0140)**	0.261330 (2.587405) (0.0114)**	0.252324 (2.517556) (0.0137)**
d(NFA)$_{(-4)}$	-0.112872 (-7.82630) (0.0000)***	-0.126336 (-7.59114) (0.0000)***	-0.108652 (-6.1000) (0.0000)***	-0.106203 (-7.995928) (0.0000)***	-0.127047 (-9.462667) (0.0000)***	-0.097987 (-7.888457) (0.0003)***
d(EXPORT)$_{(-3)}$	-0.272047 (-3.270304) (0.0015)***	-0.278639 (-3.449810) (0.0008)***	-0.258804 (-2.748684) (0.0073)***	-0.321977 (-2.423394) (0.0175)**	-0.329206 (-2.383591) (0.0194)**	-0.294864 (-2.083690) (0.0402)**
d(GFCFGDPR)$_{(-3)}$	-0.129277 (-7.465946) (0.0000)***	-0.132889 (-7.673911) (0.0000)***	-0.141499 (-7.448885) (0.0000)***	-0.193408 (-5.367894) (0.0000)***	-0.197997 (-5.345679) (0.0000)***	-0.216067 (-6.652846) (0.0000)***
d(CFEDDR)$_{(-4)}$	-0.693556 (-6.888263) (0.0000)***	-0.726869 (-6.53240) (0.0000)***	-0.669494 (-7.696579) (0.0000)***	-0.808168 (-4.509785) (0.0000)***	-0.861870 (-4.416395) (0.0000)***	-0.778047 (-4.293905) (0.0000)***
d(BCP)$_{(-5)}$	-2.815972 (-6.53156) (0.0000)***	-2.962190 (-7.11484) (0.0000)***	-2.931767 (-6.86042) (0.0000)***	-3.930805 (-3.784915) (0.0003)***	-4.071085 (-3.497099) (0.0008)***	-4.333600 (-4.073731) (0.0001)***
d(FSD)$_{(-3)}$	-0.795654 (-5.353997) (0.0000)***	-0.810267 (-5.345659) (0.0000)***	-0.819149 (-5.876242) (0.0000)***	-0.846676 (-7.006325) (0.0000)***	-0.859363 (-6.821332) (0.0000)***	-0.862560 (-6.496294) (0.0000)***
d(MC)$_{(-2)}$	0.183308 (4.660171) (0.0000)***	0.183815 (4.712252) (0.0000)***	0.182838 (3.286153) (0.0015)***	0.203953 (3.903781) (0.0002)***	0.207822 (4.004142) (0.0001)***	0.208269 (3.048719) (0.0031)***
d(FDI$_f$)$_{(-2)}$*dum	-0.509265 (-3.775022) (0.0003)***	-0.507538 (-3.649956) (0.0005)***	-0.499278 (-3.696482) (0.0004)***	-0.714774 (-5.399746) (0.0000)***	-0.708232 (-5.382645) (0.0000)***	-0.695122 (-5.770523) (0.0000)***
d(LAR)$_{(-5)}$*dum	0.215664 (7.247325) (0.0000)	0.233987 (8.234926) (0.0000)***	0.223349 (8.683951) (0.0000)***	0.227568 (3.627945) (0.0005)***	0.261837 (3.698834) (0.0004)***	0.247173 (3.060887) (0.0029)***
d(NFA)$_{(-4)}$*dum	0.097818 (5.55343) (0.0000)***	0.111713 (6.19797) (0.0000)***	0.091241 (4.42386) (0.0001)***	0.091957 (6.352080) (0.0000)***	0.114271 (7.026049) (0.0000)***	0.081312 (5.597958) (0.0000)***
d(EXPORT)$_{(-3)}$*dum	-0.297466 (-3.777383) (0.0003)***	-0.297584 (-3.796790) (0.0003)***	-0.280791 (-3.568559) (0.0006)***	-0.530545 (-6.013281) (0.0000)***	-0.531347 (-6.226321) (0.0000)***	-0.538036 (-8.159448) (0.0000)***

Variable	PLS pooled	PLS Fixed effects	PLS Random effects	TSLS pooled	TSLS fixed effects	TSLS random effects
d(GFCFGDPR)$_{(-3)}$ *dum	0.086660 (6.31639) (0.0000)***	0.091858 (8.37043) (0.0000)***	0.087455 (7.10847) (0.0000)***	0.088448 (9.53164) (0.0000)***	0.094236 (10.68410) (0.0000)***	0.090919 (10.71561) (0.0000)***
d(CFEDDR)$_{(-4)}$ *dum	0.521439 (5.78351) (0.0000)***	0.551395 (5.75303) (0.0000)***	0.508328 (6.86127) (0.0000)***	0.573257 (4.499449) (0.0000)***	0.622671 (4.448148) (0.0000)***	0.559625 (4.800609) (0.0000)***
d(BCP)$_{(-5)}$*dum	-0.072649 (-6.011565) (0.0000)***	-0.201058 (-5.664476) (0.0000)***	-0.450704 (-5.437108) (0.0000)***	-1.650869 (-3.789148) (0.0003)***	-1.755631 (-3.657318) (0.0004)***	-2.339981 (-4.525422) (0.0000)***
d(FSD)$_{(-3)}$*dum	0.466288 (5.703170) (0.0000)***	0.470234 (5.545320) (0.0000)***	0.426347 (5.258141) (0.0000)***	0.840488 (4.725908) (0.0000)***	0.836429 (4.654227) (0.0000)***	0.788385 (5.365247) (0.0000)***
d(MC)$_{(-2)}$ *dum	-0.056295 (-1.998044) (0.0489)**	-0.055761 (-1.831843) (0.0677)*	-0.050513 (-1.806471) (0.07013)*	-0.120218 (-1.791491) (0.0762)*	-0.124414 (-1.766664) (0.0804)*	-0.129757 (-1.733795) (0.0845)*
The 1st and the 2nd period: Till the end of the second quarter of 2000 and from the second quarter of 2000 on						
d(FDI$_f$)$_($ The 1^s period	0.570110	0.565145	0.571272	0.740354	0.730074	0.729742
The 2nd period	0.060845	0.057607	0.071994	0.025580	0.021842	0.034620
d(LAR) The 1^s period	0.194062	0.212189	0.203445	0.227856	0.261330	0.252324
The 2nd period	0.409726	0.446176	0.426794	0.455424	0.523167	0.499497
d(NFA) The 1^s period	-0.112872	-0.126336	-0.108652	-0.106203	-0.127047	-0.097987
The 2nd period	-0.015054	-0.014623	-0.017411	-0.014246	-0.012776	-0.016675
d(EXPORT) The 1^s period	-0.272047	-0.278639	-0.258804	-0.321977	-0.329206	-0.294864
The 2nd period	-0.569513	-0.576223	-0.539595	-0.852522	-0.860553	-0.832900
d(GFCFGDPR) The 1^s period	-0.129277	-0.132889	-0.141499	-0.193408	-0.197997	-0.216067
The 2nd period	-0.042617	-0.041031	-0.054044	-0.104960	-0.103761	-0.125148
d(CFEDDR) The 1^s period	-0.693556	-0.726869	-0.669494	-0.808168	-0.861870	-0.778047
The 2nd period	-0.172117	-0.175474	-0.161166	-0.234911	-0.239199	-0.218422
d(BCP) The 1^s period	-2.815972	-2.962190	-2.931767	-3.930805	-4.071085	-4.333600
The 2nd period	-2.888621	-3.163248	-3.382471	-5.581674	-5.826716	-6.673581
d(FSD) The 1^s period	-0.795654	-0.810267	-0.819149	-0.846676	-0.859363	-0.862560
The 2nd period	-0.329367	-0.340033	-0.392802	-0.006188	-0.022934	-0.074175
d(MC) The 1^s period	0.183308	0.183815	0.182838	0.203953	0.207822	0.208269
The 2nd period	0.127013	0.128054	0.132325	0.083735	0.083408	0.078512
Weighted Statistics						
R-squared	0.530768	0.551782	0.522720	0.475897	0.498832	0.457937
Adjusted R-squared	0.416188	0.429055	0.406175	0.347918	0.361608	0.325572
S.E. of regression	5.093387	5.096738	4.753647	5.383204	5.389383	5.093922
F-statistic	4.632296	4.496032	4.485132	6.918344	6.717400	6.804716
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum squared resid	2231.063	2182.046	1943.356	2492.184	2439.818	2231.531
Durbin-Watson stat	2.062937	2.101329	2.061542	2.061898	2.093413	2.076747

Random and Fixed Effects Tests (Prob.)						
Hausman Random Effects Test	-	-	(0.95278)	-	-	(0.96993)
Redundant Fixed Effects Test	-	(0.0000)	-	-	-	-
Stability Test (Chow Forecast Test):						
1995:01-2000:02	1.5486 (0. 6454)	1.8623 (0.5974)	3.0678 (0.4678)	-	-	-
2000:03-2009:02	2.6673 (0.5748)	2.9761 (0.5216)	3.7927 (0.4278)	-	-	-

Symbols: d(x), denotes the difference of the variables, NPL: the share of non-performing loans (as loans more than 90 days past due) to total bank loans, FDI$_f$: foreign direct investment (in financial sector and real estate), LAR: loan to asset ratio as the ratio between bank loans to private sector to banking sector assets, NFI: net foreign assets (of the banking sector) to net assets ratio, EXPORT: the export of goods and services, GFCFGDPR: gross fixed capital formation relative to GDP, CFEDDR: compensation of employees relative to domestic demand of households; BCP: the Basel Core Principles (measured as index of compliance with Basel Core Principles).

Dummies: FSD: financial sector depth (proxied by the deposits of commercial banks relative to GDP), and MC: market concentration (proxied by the assets of four big banks relative to total banking sector assets) divided into three categories (low, middle and high).

Instrumental variables: CA: capital adequacy (measured as regulatory capital to risk weighted assets), EBRD: index of banking sector development, IL: income level of national economy (measured as the average GPD/per capita); expressed as low, middle and high, GE: the index of government effectiveness and RL: index of rule of law; LGC_DC: the ratio between time deposits of clients and loans offered to the same client; LDR: the loan to deposit ratio as the proxy for degree to which funding comes from abroad.

*** significant at 1%; ** significant at 5%; * significant at 10%.

The time lag of an individual coefficient is given in subscripts; (t-Statistics) are in brackets and (probabilities)*** are in brackets below (t-Statistics).

Domestic credits in the NMS-10 have primarily been financed by domestic deposits and external sources. The acceleration in domestic lending - in particular to households - has been fuelled by strongly increasing foreign liabilities (see Sopanha, 2006). Much of the financing for the lending boom has come from the foreign parent companies of the major foreign banks. The banks' ability to fund loan expansion has been boosted by strong capital inflows through the banking system, amid high global liquidity. Also, the NMS-10 had stimulated savings in domestic currency (as the part of an anti-inflationary approach) by offering relatively higher real interest rates on deposits, which also stimulated savings with domestic banks. Domestic savings with banks started to augment by the end of the 90s, which can be explained by the substantially increased income of households and enterprises due to increased productivity.

Further, the credit-fuelled domestic demand boom has translated into GDP growth. After *EU* accession, the NMS-10 faced the recovery of the EU economies and the positive externalities of accession to the EU contributed to significant export growth between 2002 and 2007. A higher capacity to absorb EU investment grants and strong external demand have caused relatively high GDP growth rates in the NMS-10. The increased economic activity improved the loan portfolio quality of the banking sector.

The theory of procyclicality between exports and the NPL ratio (as well as procyclicality between gross fixed capital formation relative to GDP and the NPL ratio) was confirmed. The growth of compensation of employees to the demand of household ratio by one percentage point decreased the NPL ratio growth by 0.67 and 0.86 percentage points. Progress in the implementation of reforms has been an important driver for the EU NMS-10 in achieving macroeconomic stability and productivity improvements. EU membership has been expected to allow further economic expansion due to the fact that consumption and investment have come to the forefront after 2003. The GDP growth, investment opportunities and increased productivity should be positively correlated with the business cycle and increasing economic performance, which raises the quality of a loan portfolio. After the second quarter of 2000, only the intensity of the explanatory variables' impact on the NPL ratio changed. The impact of gross fixed capital formation to GDP and compensation to employees to the demand of households ratio became less intensive in lowering NPL ratio dynamics. Meanwhile, the impact of exports has become more influential in improving the NPL ratio dynamics (Table 2). The credit-led domestic demand growth was accompanied by sizeable productivity increases and moderate wage growth, which contributed to external competitiveness. Export growth improved economic conditions in the NMS-10, most likely due to strong productivity growth and increasingly diversified export and import structures that reduced vulnerability in terms of trade deterioration, which encouraged the modernization of production and introduction of new technologies.

The net foreign assets to net assets ratio became less influential in improving the dynamics of NPL growth after the break point. The worsening of banking sector mismatches and the NPL ratio could occur due to a shortage of foreign currency assets that threaten NPL performance and increase debt burdens. With the opening of a capital account, households have started shifting from domestic to foreign-currency denominated loans. With foreign borrowing becoming important, the net foreign asset position of the banking system deteriorated in the period from 2003 to 2007 (Naraidoo *et al.*, 2008). As domestic savings have not kept up with the expansion of lending activity after 2003, the banks have not met the growing demand for loans and have started decreasing their net foreign asset balances, providing them as credit lines and credits.

The impact of foreign direct investment - as the amount of available finance – has become less intensive, presumably because FDI and cross-border financing have started showing signs of weakness and the impact of the loan asset ratio became more influential in worsening the dynamics of the NPL ratio.

Compliance with the Basel Core Principles improved the loan portfolio quality more intensively in the second period than before the middle of 2000 and contributed to a lowering of the NPL ratio dynamics. In compliance with EU directives and regulations, banks have been forced to introduce a number of regulations to ensure adequate risk diversification. Barth *et al.* (2001) argue that banking systems with greater regulations and supervison may be more stable. According to Uhde and Heimeshoff (2009) higher capital stringency is associated with higher capital buffers and more prudent banking

behavior. We would expect commercial banks to hold excess reserves in the future due to the fragility of the current banking system (Ogawa, 2007).[7]

The financial sector depth improved the NPL ratio dynamics, while market concentration deteriorated the NPL ratio dynamics less significantly in the second period. Higher banking concentration has had a negative impact on the European banks` financial soundness (Uhde and Heimeshoff, 2009). According to Beck and Laeven (2006) the increasing size of the banks may be associated with lower transparency and worse loan portfolio quality. Increased risk profiles for the largest banks might coincide with a higher level of systemic risk potential for a more concentrated banking system (De Nicoloó *et al.*, 2004)[8].

The credit-led domestic demand growth was accompanied by macroeconomic imbalances, such as overleveraged households and external imbalances. The significantly greater increase in domestic demand over overall growth implies the mounting negative growth contribution from net exports mirrored in a ballooning current account deficit. Buoyant growth rode on the back of robust consumption spending, together with accelerating investments - as a result of reconstruction activities and a large number of programmes co-financed by the EU. Strong domestic demand (only partially financed by FDI and the net portfolio investment) and productivity adjusted wage growth relative to trading partners have highlighted the need for demand restraints to improve the saving-investment balance and slow down the debt accumulation of the private sector[9].

The inflow of foreign capital has contributed to a significant growth in liquidity and created an additional supply of loans. On the other hand, higher net foreign direct investment inflows in the tradable sector, gross fixed capital formation, favourable export growth and the net foreign assets of the banking sector expanded the capability of a country to service foreign debt. Despite good foreign direct investment coverage and the recovery of export growth, the sustainability of the external imbalance is, in the medium term, an issue of concern for the banking sector. Excess credit growth, which has financed increasing consumption and caused a deterioration in external accounts, could threaten the stability of the banking sector due to the fact that credit-boom-driven deficits are often financed through short-term external debt creation. A slowdown in economic activity is also likely to deteriorate NPL ratio growth in the NMS-10, with negative repercussions on debt repayment.

---

[7] *Commercial banks do not demand excess reserves for precautionary purpose but rather because of the maintained constraint (Khemraj, 2009).*

[8] *According to Schaeck, Čihak and Wolfe (2009), the banks tend to hold higher capital buffers when operating in a more competitive environment. Additionally, Boyd* et al. *(2006) found evidence emphasizing the stabilizing effects of competitiveness in the banking sector.*

[9] In the EU NMS-10 the signals of economic overheating with a medium-term risk of a hard landing were evident in 2007. The deceleration of economic growth in the second half of 2008 was mostly due to a supply side shock and the unwinding of the boom in the EU economies in 2008.

Conclusion

The EU NMS-10 grew strongly on the back of strong household spending, accelerating investment growth and FDI.

In this study, our estimates for the NMS-10 support the hypothesis that the growth of credit might harm banking performance in overheating economies. In our estimates for the NMS-10 we found evidence that the gross fixed capital formation, the compensation of employees to demand of households ratio and exports in the selected economies - by contributing to an increase in economic activity and GDP growth - lower NPL ratios. Since we confirmed that the boost in the exports of these economies improved the NPL ratio, the weakening of growth in export-oriented industries has lead to an economic contraction with a direct impact on the sustainability of banking-sector results in these countries. The shortage of net foreign assets might increase the debt burdens due to a high share of loans denominated in a foreign currency.

We confirmed the positive and significant effect of the Basel Core Principles on asset quality due to the fact that higher capital stringency is associated with more prudent banking behavior and a more stable banking system.

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.

References

Arellano, M. and Bond, S.R. 1991. Some tests of specification for panel data: Monte Carlo Evidence and an application to employment equations. *Review of Economic Studies,* 58(2), pp. 227-297.

Arpa, M. Giulini, I. Ittner, A. and Pauer, F., 2001. The influence of macroeconomic developments on Austrian banks: implications for banking super-vision. Basel: Bank for International Settlements, *BIS Paper*, No. 1.

Asghar, Z. and Abid, I., 2007. Performance of lag length selection criteria in three different situations. *Interstat*. Available at : <interstat.statjournals.net/YEAR/2007/articles/0704001.pdf>, [Accessed on 28.9.2009].

Babihuga, R., 2007. Macroeconomic and Financial Soundness Indicators: An Empirical Investigation. Washington: IMF, *Working Paper*, No. 07/115.

BACA. Bank Austria Creditanstalt - Uni Credit Group, Internal data base.

Barth, J.R. Caprio, G. and Levine, R., 2001. The regulation and supervision of banks around the world: A new database. Washington: World Bank, *World Bank Policy Research Working Paper*, No. 2588.

Beck, T., Laeven, L., 2006. Resolution of failed banks by deposit insurers: cross-country evidence. Washington: World Bank, *World Bank Policy Research Working Paper*, No. 3920.

Boyd, J.H. De Nicoló, G. and Jalal, A.M., 2006. Bank Risk Taking and Competition Revisited: New Theory and New Evidence. Washington: IMF, *IMF Working Paper*, No. 06/297.

Brandmeier, M., 2006. Reasons for real appreciation in Central Europe. Gottingen: Centre for European, Governance and Economic Development Research, *Discussion Paper*, No. 55. Available: <http://www.cege.wiso.uni-goettingen.de/Dokumente/55_Brandmeier.pdf>, [3.10.2009].

Calvo, A.G. Mendoza, E., 2000. Contagion, globalization and the volatility of capital flows. In *Capital flows and the emerging economies,* S. Edwards (ed.), pp. 12-43. Chicago: University of Chicago Press.

Collender, R.N. Shaffer, S., 2009. Banking structure and employment growth. *Applied Economics,* 41(19), pp. 2403-2417.

D'Avack, F. Levasseur, S., 2007. The Determinants of Capital Buffers in CEECs. Paris: OFCE Centre de recherche en économie, *Working Paper*, No. 28. Available: <www.ofce.sciences-po.fr/pdf/dtravail/WP2007-28.pdf>, [Accessed 3.10.2009].

Davidson, R. MacKinnon, J.G., 1993. *Estimation and inference in econometrics.* Oxford: Oxford University Press.

De Nicoló, G. Bartholomew, P. Zaman, J. and Zephirin, M., 2004. Bank consolidation, internalization and conglomerization: trends and implications for financial risk. *Financial Markets, Institutions and Instruments,* 13(4), pp.173-217.

EIPF – Economic Institute of the Law School. (2009). Internal data base.

Fendel, R. Frenkel, M., 2009. Inflation differentials in the Euro area: did the ECB care? *Applied Economics,* 41(10), pp.1293-1302.

Festić, M., Kavkler A., Repina, S. (2011). The Macroeconomic Sources of Systemic Risk in the Banking Sectors of Five New EU Member States. *Journal of Banking&Finance*. 2011, vol. 35, issue 2, str. [310]-322, doi: 10.1016/j.jbankfin.2010.08.007.

Ferreira, C., 2008. The banking sector, economic growth and European integration. *Journal of Economic Studies,* 35(6), pp. 512-527.

Gambera, M., 2000. Simple forecasts of bank loan quality in the business cycle. Chicago: Federal Reserve Bank of Chicago, *Emerging issue series*, No. 3.

Gerlach, S. Peng, W. Shu, C., 2005. Macroeconomic conditions and banking performance in Hong Kong: a panel data study. Basel: Bank for International Settlements, *BIS Papers*, No. 22.

Hoggarth, G. Sorensen, S. and Zicchino, L., 2005. Stress Tests of UK Banks Using a VAR Approach. *Bank of England Quarterly Bulletin,* 45(4), pp. 478-478.

Hsiao, C., 2003. *Analysis of panel data.* Kindle edition. Oxford University Press.

Jakubík, P., 2007. Macroeconomic environment and credit risk. *Czech Journal of Economics and Finance,* 10(1), pp.166-133.

Kaufmann, D. Kraay, A. and Mastruzzi, M., 2006. *Governance matters IV: Governance indicators for 1996-2005.* Washington: World Bank.

Khemraj, T., 2009. Excess liquidity and the foreign currency constraint: the case of monetary management in Guyana. *Applied Economics,* 41(16), pp. 2073 – 2084.

Kleibergen, F. Paap, R., 2006. Generalized reduced rank tests using the singular value decomposition. *Journal of Econometrics*, 133(1), pp. 97-126.

Lütkepohl, H. Xu, F., 2009. The role of log transformation in forecasting economic variables. München: Center for Economic Studies, *CESifo Working Paper*, No. 2591.

Naraidoo, R. Paez-Farrell, J. Sofat, P. Meenagh, D. Toma, S. Gherman, A. Phuong Mai Le, V., 2008. *Romanian macroeconomic insight*, Vol. 1, No. 1. Bucharest: MacroAnalitica. Available: <macroanalitica.com/docs/MMI_May_2008_v4.pdf>, [5.10.2009].

Ogawa, K., 2007. Why Commercial Banks Held Excess Reserves: The Japanese Experience of the Late 1990s. *Journal of Money, Credit and Banking,* 39(1), pp. 241-257.

Podpiera, R., 2006. Does compliance with Basel Core Principles bring any measurable benefits? Washington: IMF, *IMF Staff Papers,* 53(2), pp. 306-325.

Quagliariello, M., 2003. Macroeconomics indicators useful in predicting bank loan quality? Evidence from Italy. Rome: Bank of Italy.

Schaeck, K. Čihák, M. Wolfe, S., 2009. Are competitive banking systems more stable? *Journal of Money, Credit and Banking,* 41(4), pp. 711-734.

Sirtaine, S. Skamnelos, I., 2007. Credit growth in emerging Europe: A cause for stability concerns? Washington: World Bank. *Policy Research Working Paper Series*, No. 4281.

Sopanha, S., 2006. Capital markets and credit boom in emerging market economies. Paris: Banque de France. *Financial Stability Review*, No. 9.

Swain, R.B., 2007. The demand and supply of credit for households. *Applied Economics,* 39(21), pp. 2681-2692.

Uhde, A. Heimeshoff, U., 2009. Consolidation in banking and financial stability in Europe: empirical evidence. *Journal of Banking and Finance,* 33(2), pp. 1299-1311.