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THE BANKING SECTOR AND MACROECONOMIC INDICATORS: SOME EVIDENCE FOR HUNGARY AND POLAND

Bančni sektor in makroekonomski indikatorji: nekaj evidence za Madžarsko in Poljsko

Abstract

UDK: 336.71(439:438)
Exposure to macroeconomic risk factors across banks is a source of systemic risk that influences the performance of the banking sector. In this paper, we present some evidence of macroeconomic indicators affecting the NPL ratio in Hungary and Poland. We have shown that the improvement of economic conditions, measured by real GDP growth, positively influenced the banking sector performance of both economies. In addition, increasing depreciation of nominal exchange rates accelerated the NPL ratio in Hungary as well in Poland.
Key words: systemic risk, non-performing loans, economic growth.

Izvleček

UDC: 336.71(439:438)
Izpostavljenost makroekonomskim dejavnikom je razlog za sistemsko tveganje, ki vpliva na rezultate bančnega poslovanja. V tem prispevku predstavljamo nekaj makroekonomskih indikatorjev, ki vplivajo na dinamiko slabih posojil na Madžarskem in Poljskem. Pokazali smo, da boljši ekonomski pogoji – merjeni z rastjo realnega BDP – pozitivno vplivajo na bančni sektor obeh gospodarstev. Potrdili smo tudi, da depreciacija nominalnega deviznega tečaja pospešuje rast slabih posojil tako na Madžarskem kot na Poljskem.
Ključne besede: sistemsko tveganje, slaba posojila, gospodarska rast.

JEL: F47, G15, G21.

I. Introduction

Bank credits represent an important source of financing investment and consumption. Because credit expansion is likely to put upward pressure on the banking sector's performance, it is necessary to perceive this effect as stemming from both higher revenues and a lower share of non-performing loans (NPL) in total gross loans. Studies suggest that the fulfilment of convergence criteria and obtaining a stable macro environment diminish credit risk. Accordingly, credit expansion and decelerating share of the NPL ratio have yielded better results in banking sectors in a favourable macroeconomic environment. As has been established (see, for example, Borio et al., 2001), GDP growth represents a major challenge to loan portfolio quality, and risk for credit expansion is assumed to be procyclical within GDP growth. It is expected that a rise in unemployment, interest rate and inflation accelerate growth of the NPL ratio; savings and a higher value of equity are expected to decelerate the NPL ratio; while investment activity is expected to deteriorate the NPL ratio if investment turns out to be counterproductive. Depending on the exchange rate regime, appreciation of foreign currency deteriorates the NPL ratio, especially if there is a high share of loans nominated in foreign currency.

Common exposure to macroeconomic risk factors across banks is a source of systemic risk that influences the performance of the banking sector expressed as NPL to total gross loans. An increasing ratio may be a signal of deterioration in banking sector performance and deterioration in the quality of the loan portfolio. In this paper we are testing the significance of macroeconomic variables affecting the NPL ratio in Hungary and Poland.

II. Overview of the literature on the macro environment influencing the NPL ratio

Over the last few decades, the global financial system has been subject to a variety of disruptive incidents reflecting the increasing complexity of modern financial systems. The liberalization, developments, consolidation and growth of the global financial system supported by technological progress has been remarkable. These changes have also implied a marked increase in the variety of credit sources, reductions in the costs of financial services and the intermediation costs of credit, and stimulated an increase of incentives to engage in risky behaviour.

According to risks associated with banking activities (country risk, credit risk, liquidity risk, equity risk and market risk, which consists of interest rate risk, currency risk, equity and commodity risk), several recent studies complement broad-based risk estimations by macroeconomic indicators. First, information on investment patterns of institutional investors, and the balance between

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Table 1: *Literature on macro determinants of NPL ratio*

Authors	Explanatory variables
Gambera (2000)	By bivariate VAR models (using variables of unemployment, income, number of bankruptcies, car sales, agricultural, commercial, industrial and real estate loans), the author investigates the impact of economic development on loan portfolio quality.
Arpa et al. (2001)	The authors conclude that the share of risk provisions in the total loans of the banking sector varies with real GDP growth, real interest rates, CPI inflation and real estate price inflation.
Blaschke and Jones (2001)	They propose applying the VAR methodology to investigate the transmission from GDP, inflation, money interest rate and the terms of trade to the NPL ratio.
Shu (2002)	The author examines the regression analysis that indicates that the NPL ratio rises with increasing nominal interest rates, but decreases with higher CPI inflation, economic growth and property price inflation, exchange rate, the terms of trade and share prices.
Quagliariello (2003)	The author 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 and Jančar (2005)	The authors investigate economic developments by unemployment, GDP growth, export, import, appreciation, CPI and credit growth as the indicators of the NPL ratio performance.
Hoggarth, Logan and Zicchino (2005)	They apply the VAR approach to investigate the link between loan write-offs and output gap, retail prices, real estate prices, the nominal short-term interest rate and the real exchange rate.
Zeman and Jurča (2008)	The authors apply the multivariate regression method using GDP, output gap, export, industrial production, oil prices, inflation, M1, interest rate and exchange rate as explanatory variables for the NPL dynamics.

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 liberalisation are needed. Fourth, information on the legal framework is also important. Fifth, qualitative data on easing financial regulation that could provoke high-risk behaviour are required. Finally, complementing financial data and overall macroeconomic data are required in order to assess the current state of the cycle (Borio and Lowe, 2002). In addition, macro prudential analysis involves bank-by-bank stress testing, sectoral analysis and integrated analysis using the value at risk (VaR) framework and other concepts (Gordy, 2000). 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 in the case of default. In the long run, macroeconomic, strategic and operational risk may affect the long-run performance of banks, which can be perceived as stemming from the NPL ratio.

The selection of relevant studies in Table 1 shows a remarkable variety of macroeconomic variables that are tested by researchers in order to elucidate the behaviour of the NPL ratio. Thus, the list of frequently investigated macro variables usually includes some indicators of domestic economic activity (GDP growth, investment expenditures), indicators of the external economic environment (exports, imports), various price indicators (consumer price index, real estate prices, terms of trade, exchange rates) and a set of monetary variables (monetary aggregates, interest rates, loans to the business sector and households).

An in-depth explanation of the possible relationship between individual macroeconomic variables and the NPL ratio is given in Table 2.

III. Macro environment and the banking sector in Hungary and Poland

Catching-up economies have required investment levels that have exceeded domestic 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 (Table 3). The positive impact of FDI is visible in the diversification of foreign trade structure, and in the improvement of competitiveness showing the Balassa-Samuelson-effect (Brandmeier, 2006, 396-400; Havlik, 2003).[1] Exports have become dynamic, but the contribution of net export to growth has turned negative due to accelerating imports. Domestic demand, boosted by a foreign financed boom of bank lending and real wage growth on the back of productivity gains, has been an important factor of growth.

In Hungary, the bad loans problem required the restructuring programme of the 90s. Bad loans were swapped for long-term government bonds. Removing unrecoverable loans from bank balance sheets and government financed bank recapitalization were the means of getting banks in shape (Várhegyi, 2002). Since many state owned banks became insolvent, triggering further recapitalization, the main objective of the restructuring programme was to make banks attractive for foreign investors. Foreign

[1] The Balassa-Samuelson effect has been weak in recent years. Breuss (2003, 25) sees the appreciation of the real exchange rate as the result of productivity gains in the tradable sector of catching-up countries that does not erode competitiveness.

owned banks account for a high share of total assets in Hungarian banking sector (Table 3). The profitability of the banking sector has been satisfactory since the completion of bank restructuring and privatization. The quality of the portfolio of the Hungarian banking sector improved greatly in the second half of the 90s, and by 2000 the share of problematic assets (bad, doubtful and below-average loans) had fallen to less than 3%. The quality of the assets has improved despite the soaring volume of client loans in Hungary.

Table 2: *Relation between the NPL ratio and macro impulses: selected findings*

Explanatory variables	Authors	Relation between the NPL ratio and macro impulses
Capital inflows and balance of payments	Calvo and Mendoza (2000), Edwards (2001)	Capital inflows could result in an expansion of domestic credits. 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, when confidence in the economy wavers, or when disruption on financial markets or balance of payments crises are expected.
Exchange rate	Kaminsky and Reinhart (1999)	The worsening of banking sector results occurs when banks borrow in foreign currency and lend in domestic currency due to an unexpected depreciation of the domestic currency that threatens bank profitability and the NPL performance. Appreciation of the real exchange rate could contribute to the build-up of a crisis through shifts in international competitiveness coupled with terms of trade deterioration. Limited growth prospects in export-oriented industries could ultimately lead to economic contraction with direct implications for loans performance. Bank lending surveys show that loans granted to enterprises are partly hedged by their export proceeds.
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, export, unemployment	Borio et al. (2001)	If expansion is associated with rapid credit growth, large increases in asset prices, a high level of investment, export growth and excessive capital accumulation, the level of credit risk is higher because risk is built up in a boom but materialises in the downturn. The impact of GDP growth and the business cycle on credit risk is usually represented as pro-cyclical. Expected unemployment growth rationally decreases demand for loans and in this case rising unemployment improves loan portfolio quality.
Interest rate	Rajan (2005)	First, liberalization increases the costs of funds and nurtures the culture of high-risk behaviour. In order to mitigate risks, higher rates are charged to high-risk borrowers further increasing banks' overall exposure. Second, an increase in short term interest rates (paid on liabilities) forces banks to increase the interest rate paid to depositors, but because the asset side of bank balance sheets usually consists of loans of longer maturity at fixed interest rates, banks cannot increase their lending rates quickly enough and they must bear losses because of maturity transformation.
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	Jappelli and Pagano (1994), Eichengreen et al. (1999), Lardy (1999)	First, the saving surplus allows moving toward capital account convertibility, thereby further reducing the risk of a potential bank crisis. Second, it can be argued that growth in the amount of available financing may precipitate financial crises and harm economic development due to soft budget constraints. Third, low bank 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.

Table 3: *Selected economic indicators for Hungary and Poland*

	Exchange rate regime	Export/GDP,[a] Current account/ GDP (2006)	FDI/GDP[b] (2005/2006)	EBRD index of banking sector reform[c] (2005)	Capital adequacy[d] (2005/2006)	Foreign banks[e] (2005)	**Loans in foreign currency to total loans in % (2005)**
Hungary	Target zone (EUR)	76.9, -6.6	6.9/5.4	3.7	15/11.5	81	39
Poland	Float	40.4, -3.2	3.1/4.1	3.3	14.6/13.2	75	27

[a]Export of goods and services (in %); [b]Inflow of FDI in GDP (in %); [c]The EBRD indicators of banking sector reform are measured on a scale from 1 to 4: score 1: underdeveloped financial sector; 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; [d]Solvency ratio; [e]Asset share of foreign banks/total assets (in %).

Source: Baca (2008), ECB (2007), European Commission (2007), IMF (2006).

The banking sector in Hungary is relatively small compared to the size of the economy, but in terms of funds channelled to financial intermediaries, the majority (80%) of savings is placed with banks and other credit institutions. The short term maturity of the bulk of domestic funds has been the main reason that Hungarian banks have resorted to foreign funds. Loans of resident banks to the private sector as a % of GDP are equivalent to merely 1/3 of the EU average. Half of the Hungarian enterprises operate without financing from banks, which is partially due to the poor creditworthiness of these enterprises, and one third of loans to enterprises are denominated in foreign currency. Loans in foreign currency have been attractive for companies that have been able to manage exchange rate risk at lower interest rates (Szapáry, 2002). Banks have stepped up their lending to households (consumer loans have recently begun to grow rapidly), reflecting rising incomes and property prices as well as enhanced creditor rights since household indebtedness relative to income is much lower than the EU average.

The situation in the banking sector in Poland was determined by macroeconomic conditions and specific systemic characteristics in the first stage of transition. The Polish banking system transformed into nine independent regional banks at the beginning of transition. Another major factor in the banking sector's evolution was the arrival of foreign entrants in the mid-90s that have driven consolidation among the sector's largest banks. Currently around 75% of the sector's net assets are controlled by foreign banking institutions (Table 3). The period of optimism and large capital expansion was followed by a period of poor banking sector performance due to non-transparent owner structure and asset stripping. Domestic banks suffered losses, large state banks and small banks had to be bailed out because managers were not subject to efficient shareholder control, they were not tempted to maximize the value of banks, the moral hazard problem occurred and the level of non-performing loans was high. The Polish experience proved that it is important to introduce bank supervision in the early transition since failing to do so creates room for risky management of banks. Only the banks under foreign control remained profitable (Balcerowicz and Bratkowsky, 2001).

In the period from 1997-2000 the strengthening of the effectiveness of the banking sector supervisory institutions, changes in prudential norms and increasing the level of guaranties for bank deposits were introduced. In January 1998 the New Banking Act and the New Act of the National Bank of Poland came into force and introduced a new model of banking supervision. The regulatory framework conforms to prudential guidelines rendered by the Basel committee. The Act on Capital Requirements required capital to increase by the end of 1999. Banks below the capital requirements started to seek for foreign investors, and in January 1999 Poland removed restrictions applied to foreign banks concerning the purchase of bigger stock blocks.

IV. Empirical analysis

In this section, in order to assess the banking sector's vulnerability to bad loan performance on a macroeconomic level, relations between the NPL ratio and macroeconomic variables were analysed. In the first subsection, we present the methodology, while in the second subsection, the empirical results are discussed.

A. Methodology

The monthly time series expressed as growth rates were used for the period from January 1995 to December 2006 for the explanation of the NPL ratio in Hungary and Poland.[2] The NPL variable was specified for both countries 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. On the basis of the covariance matrix and the contribution of eigenvalues to the explained variance, we have initially chosen 18 time series, that have maximum explanatory value for the NPL ratio and that explain the residual factors of endogenous variable movements. All real variables were corrected by the consumer price index. After excluding the strongly correlated variables, we decided to use the time series of long run (lending) 5-year real interest rate, real gross domestic product, real saving of private sector with banks, nominal exchange rate (national currency per $), number of insolvent companies and real wages for Hungary, whereas for Poland the time series of short run (lending) 6-month real interest rate, nominal exchange rate (national currency per $), real gross domestic product, real saving of private sector with banks, real wages and real foreign direct investment in the non-financial sector were utilised.

Stationarity of the used time series (Table 4) has been obtained by the first order difference and accepted at the 1 % significance level (Dickey and Fuller, 1979). The Breusch-Godfrey LM test and the ARCH model were employed to check the autocorrelation in the residuals and in the error variance. In our work we relied on the ordinary least squares and impulse response methodology. The lag length selection in the models specified was based on the Akaike information criterion and the Schwarz information criterion. The ARMA technique incorporates the residual from the past observation into the regression model for the current observation. If the correlogram has shown that a serial correlation dies off after a small number of lags/increasing number of lags, the series obey a low order moving average process/autoregressive process (MA/AR). According to the Chow forecast test used for proving the stability of estimated OLS functions, we have accepted the hypothesis of structural stability (Thursby, 1982).

[2] The program Eviews 4.1 was used, employing the EIPF (Economic Institute of the Law School, Ljubljana), BACA (Bank Austria Creditanstalt Unicredit Group) and central banks internal data bases. We used the constant interpolation method for real GDP and unemployment rate (constant with average matched to the source data) for quarterly data into monthly data.

Table 4: *Results of the ADF unit root test for Hungary and Poland*

Variable	Hungary		Poland	
	Level	First diff.	Level	First diff.
EXCHR	-1.893262	-10.87428	-2.001553	-8.767320
GDP	-0.760176	-6.466121	-1.849178	-12.33254
INTRs	-0.730516	-10.14889	-1.046091	-9.790598
INTRl	-0.731529	-12.70244	-1.835953	-14.02666
FDIn	-0.215479	-5.987458	-0.376211	-6.094767
SAVINGS	-3.329950	-4.566833	-1.498237	-12.36745
INSOLCn	-4.461951	-10.65589	-3.185487	-9.843658
REWAG	-2.154688	-3.993644	-2.265309	-10.69251
NPL	-2.434492	-4.736619	-2.446175	-12.30748

Critical values the at 1%, 5% and 10% level of significance -3.473096, -2.880211 and -2.576805.

Symbols: EXCHR: nominal exchange rate, GDP: real gross domestic product, INTRs: short run real interest rate, INTRl: long run real interest rate, FDIn: real foreign direct investment in the non-financial sector, SAVINGS: real saving of private sector with banks, INSOLCn: number of insolvent companies per year, REWAG: real wages, NPL: non-performing loans as share of total loans.

Table 5: *OLS results for Hungary for the period from January 1995 to December 2006*

Dependent variable: DNPL			
Explanatory variable	Coefficient	Std. error	t-statistic (prob.)
$DGDP_{(-7)}$	-0.196422	0.069791	-2.814434 (0.0055)
$DEXCHR_{(-4)}$	1.077541	0.110789	9.726069 (0.0000)
$DINTRl_{(-3)}$	1.252065	0.112907	11.08933 (0.0000)
$DSAVINGS_{(-5)}$	-0.131899	0.044078	-2.992410 (0.0032)
$DINSOLCn_{(-3)}$	1.180233	0.099592	11.8506 (0.0000)
$DREWAG_{(-2)}$	-0.242270	0.032199	-7.524250 (0.0000)
MA(1)	0.673250	0.063230	10.64761 (0.0000)

$R^2 = 0.9088$, S.E. = 0.1355, SSR = 2.7373, AIC = -1.1152, DW = 1.7605

$LM_{(2)} = 2.1345$ (0.3762), $LM_{(4)} = 3.7927$ (0.4081), $LM_{(8)} = 0.9549$ (0.6977)

Chow forecast test (1998:01-2006:10) = 0.8975 (0.7925)

Symbols: NPL: non-performing loans as share of total loans; GDP: real gross domestic product; EXCHR: nominal exchange rate; INTRl: long run real interest rate; SAVINGS: real saving of private sector with banks; INSOLCn: number of insolvent companies per year; REWAG: real wages. The letter D before the variable denotes the change measured in percentage points. The time lag of individual coefficients is given in subscripts.

Table 6: *OLS results for Poland for the period from January 1995 to December 2006*

Dependent variable: DNPL			
Explanatory variable	Coefficient	Std. error	t-statistic (prob.)
$DGDP_{(-6)}$	-1.000069	0.141140	-7.085633 (0.0000)
$DEXCHR_{(-3)}$	0.040189	0.031174	12.890442 (0.0199)
$DINTRs_{(-1)}$	-0.017000	0.008668	-1.961130 (0.0519)
$DSAVINGS_{(-7)}$	0.182522	0.056219	3.254240 (0.0014)
$DFDIn_{(-8)}$	-0.040051	0.020598	-19.447892 (0.0053)
$DREWAG_{(-4)}$	-0.053425	0.029120	-18.345253 (0.0068)
AR(1)	0.912555	0.030808	29.620714 (0.0000)

$R^2 = 0.8824$, S.E. = 0.0806, SSR = 0.8976, AIC = -2.1503, DW = 1.9503

$ARCH_{(1)} = 0.043678$ (0.834754), $ARCH_{(2)} = 0.052024$ (0.939424), $ARCH_{(4)} = 0.43603$ (0.996365)

Chow forecast test (1996:01-2006:01) = 0.7038 (0.8754)

Symbols: NPL: non-performing loans as share of total loans; GDP: real gross domestic product; EXCHR: nominal exchange rate; INTRs: short run real interest rate; SAVINGS: real saving of private sector with banks; FDIn: real foreign direct investment in the non-financial sector; REWAG: real wages. The letter D before the variable denotes the change measured in percentage points. The time lag of individual coefficients is given in subscripts.

The VAR models include a considerable number of variables and it is necessary to test each of them for exogeneity. The testing for exogeneity follows the methodology proposed by Greene (2003). Greene (2003, 582) clarifies that the tests for exogeneity can be based on the concept of Granger causality applied to individual equations and examined by the Wald test in order to test the significance of a particular explanatory variable. The reaction of a variable to an impulse generated by another variable is assumed to reveal the causal relationship between them (Engle and Granger, 1978) and the relative importance of each random innovation in affecting the variables in the selected model.

Macroeconomic shocks affecting growth in the NPL ratio are analysed by impulse responses (Sims and Zha, 1999). Analysing the residuals' covariance matrix facilitates the assessment of the robustness of the impulse analysis to the re-ordering of variables. Since there are correlations between some residuals, it is necessary to examine the sensitivity of the responses to re-ordering of the variables and recursive identification is used, which separates the residuals into orthogonal shocks using Cholesky factorisation of the covariance matrix of residuals (Canova, 2003). Recursive identification attributes all the contemporaneous correlations of the residuals and all of the effect of any common component to the variable that is ordered first in the VAR system. Each impulse or shock equals one standard deviation of the time series of the respective variable and causes other time series to respond (Pesaran and Shin, 1998).

B. Empirical results

If the GDP growth rate in Hungary rises by 1 % point, while other predictors are held constant, then growth in the NPL ratio has decreased by 0.20 % point. The variable exchange rate growth with the regression coefficient of 1.08 has had an accelerating effect on growth in the NPL ratio. An increase in the savings growth rate by 1 % point has decelerated the NPL ratio growth by 0.13 % point. The responses of the dependent variable on long run (lending) interest rate growth and the increasing number of insolvent companies have been accelerating with regression coefficients of 1.25 and 1.18, respectively. An increase in growth in real wages has decelerated growth in the NPL ratio by 0.24 % point (Table 5).

In Poland, an increase in GDP growth by 1 % point has decelerated the NPL ratio growth rate by 1 % point. An increase in the savings growth by 1 % point (ceteris paribus) has accelerated the NPL ratio growth by 0.18 % point. The regression coefficients of interest rate growth, exchange rate growth, real wage growth and foreign direct investment (in the non-financial sector) growth are low and close to 0 (-0.02, 0.04, -0.05 and -0.04, respectively), thus indicating a weak influence on the NPL ratio growth. Note that in our empirical investigation for Poland, the only variable that has improved (i.e., decreased) the NPL growth rate significantly is GDP growth (Table 6).

In Hungary and Poland, GDP growth has decelerated the NPL ratio in the time period of 12 and 36-month interval. The NPL responses to exchange rate growth have been accelerating in Hungary and Poland (Table 7). Further, results for Hungary show that interest rate impulses accelerate growth in the NPL ratio, whereas for Poland interest rate impulses slightly decelerate the NPL ratio. The Central Bank of Hungary has a history of responding to currency moves with changes in interest rates (Pawłowski, 2006, 9). In addition, government securities have attracted a substantial part of banking funds thereby crowding out lending to the enterprise sector and resulting in real interest rate growth in Hungary (Szapáry, 2002). Savings have accelerated the NPL ratio in Poland and slightly decelerated in Hungary. In Hungary, a large proportion of savings is placed with banks and the degree of financial intermediation in Poland is below the Central and Eastern Europe average (ECB, 2006). The NPL responses to growth in real wages have been slightly decelerating in both economies. An increasing number of insolvent enterprises in Hungary has accelerated the NPL ratio in the

Table 7: *Impulse response analysis for Hungary and Poland (January 1995-December 2006)*

Hungary

Period	DNPL	DGDP	DEXCHR	DINTRl	DSAVINGS	DINSOLCn	DREWAG
12	0.003011	-0.010593	0.045115	0.210170	-0.003505	0.221375	-0.041008
24	0.008312	-0.022301	0.065824	0.334031	-0.010874	0.358551	-0.073297
36	0.001589	-0.040111	0.092477	0.508315	-0.020891	0.545378	-0.120074

Poland

Period	DNPL	DGDP	DEXCHR	DINTRs	DSAVINGS	DFDIn	DREWAG
12	0.006248	-0.265592	0.025523	-0.002518	0.072091	-0.006750	-0.065756
24	0.007697	-0.386251	0.040861	-0.002813	0.109279	-0.022847	-0.070277
36	0.006888	-0.413876	0.069037	-0.001598	0.145444	-0.067250	-0.078806

Symbols: NPL: non-performing loans as share of total loans; GDP: real gross domestic product; EXCHR: nominal exchange rate; INTRs: short run real interest rate; INTRl: long run real interest rate; SAVINGS: real saving of private sector with banks; INSOLCn: number of insolvent companies per year; FDIn: real foreign direct investment in the non-financial sector; REWAG: real wages. The letter D before the variable denotes the change measured in percentage points.

time period of 36-month, due to insufficient protection of creditor rights before 2001. An increasing value of foreign direct investment (in the non-financial sector) has a decelerating effect on the NPL ratio in case of Poland.

V. Conclusion

Macroeconomic stabilization, restructuring and privatization of the banking sector provided an environment that has been conducive to banking sector activity in transition countries. The banking sector crisis gave a strong incentive to strengthening the legal framework and to the introduction of regulation to deal with the area of risk exposures. Thus, the macroeconomic stability reduced the systemic risk and played a role in influencing the NPL ratio.

In this paper, we have analysed the procyclicality of the GDP growth and banking sector performance in the sense of decelerating growth in the NPL ratio for Hungary and Poland in the period from 1995 to 2006. The improvement of economic conditions positively influenced the banking sector performance of both economies. Further, depreciation of the Hungarian Forint and Polish Zloty could contribute to the build-up in the banking crisis through a high share of loans nominated in foreign currency. In Hungary, a large proportion of savings is placed with banks, and savings have decelerated the NPL ratio. On the contrary, in Poland, savings have accelerated growth in the NPL ratio. An increasing number of insolvent enterprises in Hungary has accelerated the NPL ratio. Huge bank losses in Hungary were the result of inadequate creditor protection and difficulties in the domestic enterprise sector.

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