THE IMPACT OF HOUSEHOLD SECTOR RISKS TO THE SOUNDNESS OF THE ROMANIAN BANKING SYSTEM

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ABSTRACT: The paper focuses, primarily, on assessing if risks associated to household sector have a significant impact on Romanian banking system's soundness and stability, by establishing which household specific variables are the most important and have to be monitored. We have considered several representative prudential and performance banking system's indicators and we have performed a regression for each one, against a set of 12 explanatory variables, concerning households' balance sheet, their net earnings, the dynamics of unemployment rate, the degree of indebtedness, banking system's exposure to currency risk associated to households. Our empirical findings suggest that banking system profitability, expressed as return on equity, and liquidity indicator are the most influenced by households' financial behavior and the evolutions on the labor market.

Key words: banking system vulnerability, prudential indicators, households' financial position, logistic regression

JEL codes: G21, H31

Introduction

In this paper we intend to investigate the extent to which the Romanian banking system's robustness and stability is influenced by the weakening of the household sector's financial position. We believe that this issue is of extreme importance, keeping in mind the severe macroeconomic imbalances which characterize, at present, our economy, the real sector being the hardest hit.

Households' vulnerability to exogenous shocks (interest rate or currency shocks, asset prices boom, expected income shocks) is boosted by their past saving and borrowing behavior. At the core of this behavior lies the necessity of having access to financial resources in order to fulfill present and future consumption needs. Since 2004, the high positive dynamics of household consumption was supported by:

- the slowdown of the nominal interest rate, a trend imposed on by the progressive reduction of the monetary policy interest rate in the period November 2003 - September 2005;
- the increasing confidence in the ongoing improvement of economic framework and in the disinflationary process;
- higher asset prices increased the value of the collateral, meaning a higher amount of borrowed funds.
- the exchange rate appreciation trend;
- the high availability of credit, due to relaxed monetary policy and to the increasing competition between foreign-owned banks and domestic ones. The joint action of these two factors has increased the affordability of credit standards. Also, substantial capital inflows

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had been perceived as a source of additional liquidity, creating incentives for banks to expand lending.

- optimistic expectations relative to the increase of disposable income. In this respect, the process of EU integration has been perceived as a catalyst towards the raising of the convergence pace with the member states.

The effective change in consumption level was achieved in two ways: by using the financial resources already saved (until the end of 2007 household sector was net creditor for the banking system) or by increasing the degree of indebtedness.

Lending frenzy has seen a sharp adjustment with the collapse of the subprime mortgage market in the U.S. in the second half of 2007, which marked the beginning of a period characterized by profound financial turmoil in the financial markets and national economies. The first phase of the crisis consisted in a lack of liquidity and confidence in international financial markets. Considering that in the Romanian banking system lending activity was fueled increasingly by external liabilities, restricting the access to external financing and increasing costs incurred in attracting it caused a strong contraction of money supply. This situation led credit institutions to strengthen lending standards and more closely monitor the risks associated with the outstanding loan portfolio. On the demand side, the contraction in lending reflected the public's reluctance in requesting bank financing, hence contributing to a decline in private consumption and investment and causing a severe adjustment of economic growth and trade balance. Compression of economic activity directly affected the labor market, registering a rapidly rise of unemployment rate, especially in the private sector. Under these circumstances, a private sector characterized by high levels of indebtedness will face repayment difficulties, which will further damage the loan portfolio quality and solvency of financial institutions, increasing their reluctance to finance the real sector. In the absence of timely macroeconomic and monetary measures, we run the risk of entering a spiral in which declining economic activity and restricting access to bank financing is fueling each other.

In this context, monetary authority is concerned not only about the dynamics of the debt, but especially about its structure, as loans to households were granted preponderantly on longer terms, were denominated in currency, having as destination consumption purposes. It is known that the higher the indebtedness degree, the more sensitive are households to income, interest rates or currency shocks. Households' vulnerability in repaying its debt it's amplified by the actual context, characterized by: deep recession, rising unemployment rate, worsening of budget deficit, negative perceptions relative to workplace safety, level of income and standard of living. In addition, the Romanian consumer confidence indicator, computed by the European Commission in order to summarize households' perceptions over the next 12 months relative to their financial situation, the general economic situation, unemployment and savings expectations records a value lower than the average for the EU countries.

Although households' behavior in terms of their ability to pay back debts may vary considerably depending on their indebtedness degree and their income levels, at an aggregate level the repayment difficulties will be transferred to lenders balance sheet, impairing their credit portfolio quality and worsening, ultimately, the prudential and profitability indicators.

Therefore, the focus of our study is on analyzing which household related variables have the most significant influence on the evolution of some key banking system indicators. The paper was structured as follows: second part presents a brief literature review; the third part illustrates the methodology applied, the variables considered and the empirical results, while the last part concludes.

Literature review

In the past few years the analysis of households' borrowing behavior has become a main concern of both policymakers and academics, which examined the determinants of households'

indebtedness, their vulnerability to economic shocks and the possible implications of debt high dynamics for individual credit institutions' balance sheet and for financial stability purposes.

According to some recent studies driven by Fuenzalida M., Ruiz-Tagle J. (2008), Dey S., Djoudad R., Terajima Y. (2008), Persson M. (2009) and others, the policymakers' ability to monitor and assess the vulnerabilities in the financial system arising from developments in household sector depends critically on having access to timely, high frequency micro-level data. The advantage of micro data upon aggregate data consists in capturing the heterogeneity of individual households' financial position, in terms of distribution of income, interest expenditures, indebtedness, financial assets and liabilities. However, for most countries, this information is scarce, is not readily available at a high frequency and covers only a small sample of the population, making difficult to perform a granular analysis.

Dynan K.E., Kohn D.L. (2007) pointed out that the greater availability of credit is susceptible to lessen the sensitivity of household spending to downturns in income, stimulating hence both consumption and indebtedness. Also, the wealth growth made households less vulnerable to economic shocks. Hull (2003) notes that the ability of indebted households to withstand economic downturns depends on the level of leverage, on the degree of balance sheet impairment and on unemployment rate.

Although households' balance sheet is exposed to risks both on the assets (associated to changes in the structure of financial investments, generated by the risk-return tradeoff) and on the liabilities side (determined mainly by debt increases), from a financial stability viewpoint the latter are more important. In the years preceding the financial crisis, national and international financial institutions reported a decline of lending to the corporate segment, while the rapid expansion of credit for the retail sector. Accordingly, the question that aroused was to what extent the maintenance of this trend will have negative repercussions on risk exposure of the banking system. Boss (2002) found out that, for estimating credit risk in the Austrian financial sector, from the household sector-specific variables considered in his study, the major determinants were disposable income and unemployment rate.

Turner (2006) argues that for long-term loans at variable interest rates and denominated in foreign currency, debtors will be directly affected by higher interest rates or currency depreciation, since there is a transfer of risk from the credit institutions to the public. Mendoza, Terrones (2008), Kiss (2006), Hilbers, Otker-Robe, Pazarbasioglu, Johnsen (2005), Cottarelli, Dell'Ariccia, Vladkova-Hollar (2003) have attempted to answer the question if the rapid pace of credit growth witnessed by most European countries in the last few years is part of a convergence process or, rather, it is an excessive lending. Nevertheless, all of them agreed that, in practice, it is difficult to determine a normal rate of non-government credit growth, which do not affect macroeconomic stability. In turn, supervisors faced the same dilemma on the timely intervention and appropriate tools that will help to mitigate growth rate of non-government credit.

Research methodology and empirical results

As stated above, our purpose consists, strictly, in depicting which household sector-specific variables influence banking system's soundness, and is not intended to analyze other underlying financial and economic determinants of banking activity, although they would be, without doubt, important. However, we decided to include two exogenous variables, namely the exchange rate RON/EUR and the interest rate, as they are indirect determinants of households' financial behavior.

The analysis was based on aggregate data for the household sector, for the period January 2000 – May 2009, the time series considered having a monthly frequency. The econometric method employed was the classical linear regression model, the coefficients' values being determined with the OLS estimation method. The selection of independent variables to be included in the model was made according to the economic theory. The main indicators of the banking system's resilience and soundness, included in the model as dependent variables, are classified into: prudential indicators

(solvency ratio, liquidity indicator, general risk ratio, past due and doubtful credits/total credits) and profitability indicators (return on equity).

In table 1 we have summarized all the variables used to develop the regression equations.

Table no.1

Description of variables

Variable	Explanation	Comments
	Dependent variables	
IS	Solvency ratio	Represents the share of own funds in the weighted value of assets and off-balance sheet items.
IL	Liquidity indicator	It is the actual liquidity/required liquidity ratio.
RGR	General risk ratio	It is the ratio between the weighted value of assets and off-balance sheet items and total assets and off-balance sheet items. The weighting is made according to the degree of credit risk.
DDL	Past due and doubtful credits/total credits	A measure for credit portfolio quality, computed for the aggregated banking system.
ROE	Return on equity	Computed as the share of net earnings in own capital.
	Explanatory variables	
adobe	The average interest rate for households' outstanding assets expressed in EURO.	The ratio between the actual active interest and the monthly average of households' total actual assets expressed in EURO.
adobr	The average interest rate for households' outstanding assets expressed in RON.	The ratio between the actual active interest and the monthly average of households' total actual assets expressed in RON.
pdobe	The average interest rate for households' outstanding liabilities expressed in EURO.	The ratio between the actual interest for households' liabilities and the monthly average of households' total actual liabilities expressed in EURO.
pdobr	The average interest rate for households' outstanding liabilities expressed in RON.	The ratio between the actual interest for households' liabilities and the monthly average of households' total actual liabilities expressed in RON.
currisk	Currency loans as a percentage of total loans	A measure for the banking system exposure to currency risk.
creditchg	The percentage change of credits granted to households	Indicates the households' credit growth.
l_curs	Exchange rate	Natural log of the RON/EUR exchange rate.
ldep	Households' deposits	Natural log of the deposits' volume, computed as being the sum of households' overnight and term deposits.
wealth	Households' net wealth	It indicates the level of households' net financial assets. It was computed as the difference between financial assets (overnight and term deposit accounts) and financial liabilities (credits).
indebt	Degree of households' indebtedness	We have used a proxy variable, namely the households' deposits/total credit ratio.

		If the ratio falls below 1, households became net debtors, as they borrow more than save, signaling indebtedness growth.
rincome	Real income	It was computed as the ratio between the monthly net average earnings and consumer price index (as against December previous year).
unempl	Unemployment rate	A rise of unemployment or stagnation/contraction of real income is a matter of concern as they directly affect household solvency, exposing banking system to household default risk.

Source: authors

Before running the regressions, we proceeded to a preliminary analysis of their statistical features. The positive skewness recorded for *adobr, pdobe, pdobr, currisk, ddl, indebt, rincome, roe* and *unempl* suggests that, in the considered time period, these variables followed a trend of growth, meanwhile the remaining variables recorded a negative asymmetry. We noticed a trend towards platikurtosis for *adobe, currisk, il, is, indebt, rgr, rincome* and *unempl*, while the other variables indicate a leptokurtosis trend, which means that the probability of recording an extreme event is high. There is no evidence of multicollinearity between variables included in the regression equations. Also, the time series are not affected by seasonality.

We checked for nonstationarity of the distributions by means of Augmented Dickey-Fuller test. Variables *roe, unempl* and *creditchg* proved to be stationary in level, *indebt* is second difference stationary and the remaining ones are first difference stationary, the null hypothesis of having a unit root being rejected at 5% level.

In the following, for each dependent variable we have estimated an OLS regression equation, the results being illustrated in table 2.

Table no.2

Estimation results

Dependent variable: D_IL			
Explanatory variables	Coefficient	p-value	R-squared
D_LDEPOZIT(-9)	-0.696054	0.0205	0.679266
D_INDEBT(-12)	-0.449686	0.0501	
D_WEALTH (-18)	6.58E-08	0.0044	
CREDITCHG(-14)	1.082243	0.0017	
D_ADOBR(-1)	0.146169	0.0000	
Dependent variable: D_IS			
D_INDEBT	3.436304	0.0129	0.229674
D_INDEBT(-1)	4.617996	0.0006	
D_ADOBR(-2)	0.162601	0.0043	
UNEMPL(-11)	0.031269	0.0436	
CREDITCHG(-9)	-6.278575	0.0196	
Dependent variable: D_RGR			
D_INDEBT	2.708622	0.0173	0.278044
D_CURRISK(-6)	-31.73010	0.0006	
D_ WEALTH(-6)	2.67E-07	0.0027	
D_ADOBR(-12)	-0.124622	0.0048	
Dependent variable: ROE			
UNEMPL	-2.435741	0.0000	0.461780
D_WEALTH	-8.47E-07	0.0336	
D_LCURS(-2)	-50.66416	0.0076	
D_PDOBR(-6)	1.744464	0.0004	
CREDITCHG(-1)	39.87060	0.0004	
Dependent variable: D_DDL			
D_ADOBE(-7)	0.082463	0.0200	0.371364

D_PDOBE(-3)	0.195952	0.0001	
D_ WEALTH (-3)	1.10E-08	0.0501	
D_LCURS(-1)	0.734638	0.0134	
CREDITCHG	-0.346620	0.0109	

Source: *own calculations, Eviews software*

For each estimated regression we have illustrated the estimated coefficients, their p-value and R squared. At the 5 percent level each coefficient is significantly different from zero. This means that, with a probability of 95%, the independent variables have explanatory power for the variability of the dependent variable. To measure how well each regression model fits the data, or, in other words, to assess if a model composed by a set of independent variables actually explain variations in the dependent variable, we have used the R-squared value as a goodness-of-fit statistics.

In the first regression equation the evolution of the *dependent variable IL (the liquidity indicator)* appears to be determined by households' deposit volume, indebtedness, net wealth, the relative credit change and the active interest rate for RON. The R-squared value indicates that changes in this households' specific variables explain 67, 92% from the variation of the IL variable. As it is known that the closer to one is the R-squared value, the better specified is the model, this result implies there is room for further improvement of model specification, by including several macroeconomic or bank-related variables.

Watching the signs of the coefficients' estimates, one can note that deposits have a negative sign, suggesting that an increase in households' deposits volume 9 months ago will have the opposite effect on liquidity indicator. This situation is reasonable if we analyze the structure of deposits and credits according to their maturity. Most term deposits have low maturities, up to three months, while credits are granted preponderantly at long maturities, increasing therefore the maturity gap and hence the liquidity risk. In other words, deposits stability influences banking liquidity level. The households' credit growth 14 months ago has a positive effect on IL, as it increases the numerator, computed as the sum of assets on different maturities.

A growth in the indebtedness degree may take 12 months to produce a decrease of the liquidity indicator level. The increase of debt indicates a drop in households' disposable income, and therefore a contraction of their saving incentives, translated as a reduction of banking liquidity sources. The growth of net wealth 18 months ago will produce an increase in the actual level of liquidity indicator. The active interest rate for RON positively influences IL value with a delay of one month. In order to economically interpret this finding, it is necessary to have more detailed information relative to the % change in interest rate level, and the way this change affected the number and value of credits granted.

In the second OLS regression equation the evolution of the *dependent variable IS* (*the solvency ratio*) appears to be determined by households' indebtedness, the relative credit change, the active interest rate for RON and unemployment rate. The R-squared value indicates that changes in this households' specific variables explain only 22, 96% from the variation of the IS variable, being the effect of omitting some important macroeconomic variables. The actual and the lagged indebtedness variable have a positive impact on solvency ratio value. An increase of household sector's indebtedness, on the background of macroeconomic turbulences and imbalances, boosts banking system exposure to credit risk, raising the need for supplementary capital in order to withstand potential losses. A growth in the unemployment rate may take 11 months to produce an increase of the solvency ratio. As unemployment is the main reason for households to default, and therefore to fail in fulfilling their obligations relative to debt payment, banks have to raise their own funds, which will be translated into an increase of solvency ratio. A sustained growth of the active interest rate two months ago will reduce households' borrowing incentives, decreasing the volume of loans, with direct influence on the denominator of solvency ratio. The rise of % credit change, with a lag of 9 months, has a negative influence on IS value, as it increases the denominator.

The household sector variables that best explain the variation of *dependent variable RGR* (*general risk ratio*) proved to be indebtedness, net wealth, active interest rate for RON and the share of currency loans to total credit granted to households. Nevertheless, R-squared value indicates that the model composed only by household sector data doesn't fit very well the dependent variable. An increase in net wealth will register a positive response from RGR with a delay of six months. An increase of the actual indebtedness will determine RGR to evolve in the same direction. The decrease of active interest rate level 12 months ago stimulates lending activity and causes RGR to rise. A decrease in the share of currency loans to total credit may take 6 months to produce an increase of the RGR value, meaning that RGR is not sensitive to currency risk, but to credit risk.

The fourth regression equation illustrates that the explanatory variables: unemployment, net wealth, exchange rate, credit change and the passive interest rate for RON explain 46, 17 % from *ROE (return on equity)* variation. A growth of the unemployment rate restricts households' ability to borrow or to repay debt, curtailing banking interest incomes and hence net profit. The estimated coefficient of net wealth is negative, meaning that when households' financial liabilities exceed financial assets, banking profitability improves. The nominal exchange rate with a two months lag influences negatively the dependent variable. The exchange rate appreciation implies an increase of ROE, as population has an incentive to borrow currency funds, raising interest incomes. Credit change with one month lag and the passive interest rate for RON with a six months lag have both a positive sign, their increase having a positive impact on banking profitability.

In the last regression equation the evolution of the *dependent variable DDL (due and doubtful loans)* appears to be determined, in proportion of 37,13%, by the active interest rate for EURO, the passive interest rate for EURO, net wealth, exchange rate and credit change.

An increase of the active interest rate for EURO and of the passive interest rate for EURO will produce a raise in the level of DDL with a delay of seven months and, respectively, three months. This growth of EURO interest rates may suggest that monetary authority is concerned about the high dynamics of currency credits and tries to moderate it. On the households' balance sheet side, interest rates increase and a currency shock can seriously affect their debt service, increasing the share of due and doubtful loans in total credit and impairing banking portfolio quality. A diminution of credit growth could be the result of lower credit availability, as credit institutions have to monitor and minimize the impairment of credit portfolio quality.

Conclusions

The main findings of our study suggest that changes in households' net wealth and credit percentage change appear to affect almost all the dependent variables considered in the study. The degree of indebtedness and the active interest rate for RON are best related to liquidity indicator, solvency ratio and general risk ratio. The exchange rate exerts an influence on banking profitability (ROE) and quality of credit portfolio (DDL), meanwhile unemployment rate determines the solvency ratio (IS) and return on equity (ROE) values. According to R-squared value, the variations recorded by dependent variables liquidity indicator and return on equity are the more influenced by household sector specific variables.

All told, however, the results suggest that household sector specific variables explain part, but not all of the dynamics in banking system's prudential and profitability indicators over time.

From a banking system stability perspective, monitoring households' financial behavior, especially the characteristics of borrowed funds, plays a significant role in any banking system, being important not only at a micro level, for purposes of maintaining the capital adequacy and soundness of each credit institution, but also at the aggregate level, in order to strengthen the resilience to exogenous shocks of the banking system as a whole. The characteristics of household sector indebtedness, overlapped on the current constraints affecting the labor force market and the wage policy, increase the sensitivity of household ability of repaying debt to monetary policy decisions. Therefore, the central bank's attitude relative to the appreciation/depreciation of the

exchange rate and the level of key interest rate may become critical for over indebted individuals.

References

1. Boss M. (2002) "A macroeconomic credit risk model for stress testing the Austrian credit portfolio", Financial stability report no.4, Oesterreichische Nationalbank
2. Cottarelli C., Dell'Ariccia G., Vladkova-Hollar I. (2003) "Early birds, late risers and sleeping beauties: bank credit growth to the private sector in central and eastern Europe and the Balkans", IMF Working Paper no. WP/03/213.
3. Dey S., Djoudad R., Terajima Y. (2008) "A Tool for Assessing Financial Vulnerabilities in the Household Sector", Bank of Canada Review, summer 2008.
4. Dynan K.E., Kohn D.L. (2007)"The Rise in U.S. Household Indebtedness: Causes and Consequences", The Reserve Bank of Australia Conference 2007, "The Structure and Resilience of the Financial System," on August 20-21, 2007.
5. Fuenzalida M., Ruiz-Tagle J.(2008) "Households financial vulnerability", Conferencia Banco Central de Chile November 2008.
6. Hilbers P., Otker-Robe I., Pazarbasioglu C., Johnsen G. (2005) "Assessing and managing rapid credit growth and the role of supervisory and prudential policies" IMF Working Paper WP/05/151
7. Hull L. (2003) "Financial deregulation and household indebtedness" Discussion Paper Series DP2003/01, Reserve Bank of New Zealand.
8. Kiss G. (2006) "Fast credit growth: equilibrium convergence or risky indebtedness?" MNB BULLETIN june 2006.
9. Mendoza E.G., Terrones M.E. (2008) "An Anatomy of Credit Booms: Evidence From Macro Aggregates and Micro Data", IMF working papers WP/08/226.
10. Persson M. (2009) "Household indebtedness in Sweden and implications for financial stability – the use of household-level data", BIS Papers no.46
11. Turner P. (2006) "The banking system in emerging economies: how much progress has been made ?", BIS papers no.28, part 1, august 2006.