Non-performing loans – dimension of the non-quality of bank lending/loans and their specific connections

Bogdan Florin FILIP
"Alexandru Ioan Cuza" University of Iaşi, Romania
bogdan.filip@feaa.uaic.ro

Abstract. *This paper deepens the study of non-performing loans (NPLs), conceived by the author as an expression of non-quality of part of bank lending / loans, which is considered in turn, as being reflected directly by the proportions held by these loans in the total volume of loans (granted by banks). In this respect, it starts from conceptual delimitations required to perform the research, including a redefinition of NPLs (compared to the documentary sources in this area). A large part of paper is assigned, however, to the analyzes focused on econometric modelling, based on the determining relationships regarding the volume of NPLs, the author outlining appropriate regression models, taking into consideration the volume of these loans, both as dependent variable and as determinant variable within relationships with some macro indicators (the total volume of bank loans, GDP, etc.), included in these regression models, either as determinant or dependent variables. Testing them, by processing the corresponding data in Romania's case, led to relevant results and conclusions, being also validated the models used.*

Keywords: bank loan, loan categories, causal linkages, feedback, econometric models.

JEL Classification: C22, E43, E51, G21.
REL Classification: 11B.

Introduction

Bank lending is performed as a complex process, centered on the fundamental principles of credit, assuming, firstly and objectively, the obligation of repaying the borrowed money amounts and paying the related interest by the borrower in favour of the creditor banks. Applying these principles appears to be defining in assessing the quality of lending and implicitly of the bank loans by fulfilling some conditions of economic and financial performance, both in activity of banks and in that of the debtor customers. On the contrary, disrespecting those principles assumes usually nonperformance or poor performance in the activities of participants in the credit relationships, associated with the presence of non-performing loans (NPLs).

From the same perspective, it appears to us significantly also the way of manifestation of the general credit risk, materialized, mainly, by not being reimbursed the borrowed amounts (at maturity) and not being paid the corresponding interest, even if in the phases of approval and granting of the loans there were favourable conditions to obtain performance in the activities of the contracting parties and, concurrently, to assure the quality necessary for these loans.

The eventual non-quality of bank lending is reflected synthetically in those loans granted by bank for which borrowers do not make the due payments related to them, they being generally called nonperforming. Such a financial phenomenon arises in the context of current running credit processes under the incidence of certain objective and subjective factors, which usually manifest themselves in the financial and economic activity of debtors, but sometimes, also in the lending activity performed by banks itself. On a broader plan, however, as determinants of non-quality of lending and, implicitly, of bank loans, respectively of recording of NPLs by creditor banks, should be considered the very lack of quality or performance in the activities of the credit contract parties.

On the other hand, the transfer of some current loans by creditor banks in a separate category, of NPLs, may produce multiple feedback effects. Such effects have an impact on the flows and financial results achieved, firstly, by the participants in these credit relationships. But, in a broader plan, the NPLs' feedback manifests itself on macroeconomic level, based on some connections and correlations, certified also by the dynamics of these loans, in relation to that of some typical indicators, including gross domestic product (GDP), which appears particularly relevant.

A relatively long period, the quality of bank lending and the existence of non-performing loans have not captured the attention of researchers in this field. However, on the background of amplifying the proportions of this financial

phenomenon and of the observation of its effects, they started to be tracked and quantified in many other states, and in Romania only after 2000.

At the same time, it has to be admitted that the smaller sizes of NPLs and the effects generated by them till the current economic and financial crisis, could explain also the existence of relatively few studies published before 2000 on the quality of bank loans respectively on NPLs. Moreover, the latter become, not only in a direct way, an expression of non-quality of a part of bank lending and loans, but also, indirectly, a true measure of the quality of the overall lending activity and of the entire volume of bank loans. However, especially in the financial crisis context, the declining quality of bank loans, which is reflected in a concrete way by higher and higher dimensions of the NPLs, justifies the extension of research on identifying the factors that determine the existence of this category of loans and the effects induced by their presence on the economic and financial situation, including on the development of the whole society.

Therefore, we consider that it is still necessary to study more in-depth the quality of lending and bank loans, including from the perspective of their non-quality, especially considering the volume of NPLs registered by banks, in order to improve the management of the activities for preventing or decreasing the proportions of this category of bank loans and thus to increase the level of lending quality. In the same framework, we consider that for the relevance of the approaches and conclusions resulted from the analysis regarding the quality or non-quality of lending and bank loans it is necessary also to define the concept of non-performing bank loan, in terms of its financial and economic essence.

Conceptual approaches

There is no doubt that the presence of non-performing loans affects the quality level of the lending activity performed by banks and, implicitly, of the bank loans, considered globally. But under the latter aspect, one can see that the concept of quality of bank loans itself is too little outlined, including in the scientific literature. Only some connotations of this phrase can be identified in a classification of loans granted by credit institutions, which is consistent with the scheme developed by the Institute of International Finance (IIF), quoted in the literature. This classification distinguishes, in a descending order of their quality level, five classes of loans, namely standard, watch, substandard, doubtful, loss (Krueger, 2002: p. 20). The classification of the bank loans in a class or another is based mainly on the criterion of the delay of the due payments on loans received (with a certain number of days) by the debtors of the banks, last class including the loans with total lack of quality.

In our opinion, yet, such an approach of the quality of bank loans, although provides a significant image, it is not relevant enough, given both the approximated, variable and questionable nature of the choice of the number of days of late payments and the diversity of the causes that generate not making the due repayments and interest payments.

At the same time, it has to be recognized that, in principle, the quality level of lending and bank loans depends, on the one hand, by the very quality of specific activities performed by banks, starting from the phase of credit policy development, including their exigencies in assuming the risk of default for the granted loans. But on the other hand, is entitled the appreciation of the quality, respectively of the non-quality of the loans granted by banks, by reporting to the existence of the delays from the borrowers in making due repayments and interest payments, which is usually caused by the lack of performance in the activities financed by the loans in question. It is highlighted thus the determining role of the quality of financial and economic activities conducted by the beneficiaries of bank loans, respectively the direct impact of the levels of performance obtained by them on the formation and the dimensions of NPLs and, implicitly, on the non-quality proportions of bank lending. However, precisely from this perspective, achieving higher performance within the activities of the parties involved in credit relations becomes a vital precondition for the optimal progress and completion of lending processes, inclusively for the prevention of non-quality or ensuring the necessary quality for bank loans. Moreover, it is highlighted, thus, also an objective connection of the quality of each (banking) loan with the performance levels achieved by the debtors and the creditor banks in their activities, being admitted that these levels are reflected in the results obtained by each participant to the credit relationships, which prints each credit either a performing character or an underperforming one. Therefore, to ensure a superior quality of bank loans would require, primarily, that the borrowers to run activities with positive results, at a performance level as high as possible. Under such circumstances, it is ensured obtaining of at least enough income to make the due payments on the received loans, avoiding the delays or default of borrowers and thus the formation of NPLs. It remains, still, in the foreground, the creditor banks' concern to obtain performance also in their lending activities, which is corroborated with the performance achieved by borrowers, allowing full and on time recovery of the receivables from the granted loans and the prevention or limitation of their transformation into NPLs.

Nevertheless, it is possible for the debtor to use inefficiently the bank loan and, under the conditions of a nonperforming activity, not to ensure the necessary income for making the due repayments and interest payments, which makes the bank to encounter difficulties in its lending activity, inclusively overdue

receivables out of the current loans that became temporarily or permanently unrecoverable. Such situations appear to be typical for the manifestation of non-quality of lending or bank loans involved in the formation of these claims and for their reflection into the nonperforming category.

On the other hand, the concept of "non-performing bank loans" appears to us insufficiently defined, as specific financial phenomenon. In this respect, reference sources show a diversity of meanings attributed to the phrase "nonperforming bank loans." At its basis, it is placed, most often, the differentiation those loans from the current ones on the grounds of the delay of the due payments (consisting of instalments and corresponding interest amounts) by the debtors on a variable interval of time, and frequently, it is invoked a delay of such payment of at least 90 days. Thus, according to one of the most important sources (IMF, 2006: p. 46), NPL means the "principal (the loan amount – o.n.) or interest unpaid for 90 days or longer." Likewise, by other authors (Louzis, Vouldis and Metaxas, 2011: p. 5), non-performing loans are coming from the current loans for which occurred delays in payments to creditor banks over 90 days from their maturities. Also, sometimes the expression "non-performing loan" means that loan being in the position of either "lost" or to become "lost" (Saba, Kouser and Azeem, 2012: p. 127), or for which there are manifesting obvious weaknesses either of the loan itself or of the borrower (Barisitz, 2011: p. 29).

In a manner applied also in banking practice, NPLs are separated by the other ongoing loans, within the loan portfolios of banks, in relation to the classes stated by the same IIF scheme previously invoked. Thus, in principle, are included in NPLs' category all bank loans falling within the classes "loss" doubtful "and" substandard "(IMF, 2005: p. 396). This presumes, therefore, incorporating three levels of nonperformance and non-quality of bank lending, corresponding to the NPLs which are differentiated on the three mentioned classes, which may make questionable the relevance of the analyzes, particularly of those of comparative types and of the conclusions that would be based only on the values regarding the total amount of NPLs.

However, it must be admitted that, on macro level, the quality of the global volume of loans granted by banks can be assessed from the reverse perspective of its of non-quality, depending on the proportions of the accumulated NPLs, which are, in fact, the direct expression of the non-quality of part of the bank lending processes. By default, it results that the quality of bank lending can be characterized through the dimensions represented, especially as share of the amount of NPLs in the total bank loans in progress. This percentage becomes a synthetic indicator of the quality of bank lending, respectively of the quality of loan portfolios of commercial banks, but also of their assets (De Bock and Demianets, 2012: p. 12), being relevant and useful for the analyzes and the bank management decisions at any level of approach.

In relation to the invoked sources, we find, so, that the approaches regarding the concept of "non-performing loans" focus primarily on the differentiation of the ongoing loans, having as main landmark the delay or failure of due payments, related to some of these, usually with a minimum number of 90 days, which represents, however, only a technical side of the bank lending process and not the essence of this financial phenomenon. However, in our view, in defining the concept of non-performing (bank) loan should be invoked its essence, of altered or damaged, unwanted, negative credit relationship, which contradicts the fundamental principles of credit. Such damage occurs under the conditions of nonperformance in the specific activities of the borrower and of the creditor bank. Simultaneously, it is worthy to note that a non-performing loan manifests itself either as (actual or potential) losses of banks or as unacceptable blockages of lending resources in nonperforming activities of the debtor clients, leading to failure in reimbursing the borrowed amounts and paying of due interest by them.

Therefore we consider that a non-performing loan could be defined, essentially, as a credit relationship that is deteriorating amid non-performance of the involved activities, becoming generator of losses or temporary blockage of credit resources, for the creditor banks.

In the same context, it must be recognized that the presence of NPLs expresses also a manifestation of the credit risk assumed by banks, but the large sizes of these loans affect significantly not only the financial status of creditor banks, up to their bankruptcy (Barr and Siems, 1994: p. 3). The very pronounced tendency of growth of NPLs can be considered as an indication of the onset of a crisis in a country (Kaminsky and Reinhart, 1999: p. 476). But firstly, such a development regarding the proportions of these category of loans indicates a possible banking crisis (Reinhart and Rogoff, 2010: p. 8), which was confirmed also in the case of the manifestation of the current economic and financial crisis.

The presence and the dimensions of the NPLs and, implicitly, of non-quality of bank lending evolve under the incidence of a variety of determining factors. Some of these factors are acting from outside the banks expressing themselves most often through macro-level indicators, such as those depicting developments in GDP, (total) volume of bank loans, inflation, unemployment, etc. Other factors are considered, however, to be specific for the internal activities of banks, and between them might be observed, entitled, the size of the capital, excessive lending (Salas and Saurina, 2002: p. 203), low return on capital (Berger and DeYoung: 1997 p. 28). But, more generally, there are detaching the managerial performance, respectively the credit policy pursued by each bank, including the selection of the criteria for granting, setting interest rates on loans to be granted etc.

From the perspective of quality/non-quality of bank lending it is outlined, thus, a wide range of causal linkages, characteristic for the manifestation of NPLs, which should be taken into account into specific determination relationships between them and various economic and financial variables. Among these relationships keeps attention, especially, the relationship between the dimensions of NPLs, on the one hand, and GDP, on the other hand, which is addressed, usually, through the relation of determination which implies a reduction in the volume of the first one, on the account of the increase of the latter (Louzis, Vouldis and Metaxas, 2011; Khemraj and Pasha, 2009, Jimenez and Saurina, 2006, Rajan and Dahl, 2003; Salas and Saurina, 2002). However, it appears to us to be more direct the reverse conditioning relation, because the reduction of NPLs makes available financial resources usable to finance through loans the increase of production and thus of GDP (Filip, 2013: p. 130).

The volume of outstanding loans granted by banks represents, in turn, objectively, a determining factor for the occurrence and changes registered by NPL balance (Saba, Kouser and Azeem, 2012; Khemraj and Pasha, 2009; Sinkey and Grenwalt, 1991). Moreover, we believe that this factor is fundamental for the existence of NPLs and the increase of the volume of granted bank loans itself creates preconditions for the increase of the volume of NPLs because, naturally, there is a probability that part of the total loans to fall into this category. Also, a possible rapid increase in the volume of bank loans amid an eventual easing of the conditions imposed by banks to borrowers may amplify the conversion of the current loans into NPLs.

Also, the interest rate charged on bank loans can be considered as another factor of influence on the occurrence and evolution of NPLs (Berge and Boye, 2007; Nkusu, 2011; Beck, Jakubik and Piloiu, 2013). Thus, it has to be accepted that, in principle, the increase of the interest rate on the loans granted by banks involves a greater burden for borrowers and reduces their ability to make payments on the current outstanding loans and a possible increase in NPLs. On the contrary, a decrease of the interest rate may have the opposite effect, of reducing the amount of the due payments on current loans, favouring making these payments and diminishing the amount of previously accumulated NPLs. We appreciate, however, that it must not be ignored the presence of a potential effect of changes in interest rates on bank loans, which may manifest itself in reverse directions to those exposed above. Thus, its increase reduces the access to credit of the clients with doubtful solvency, helping to prevent the accumulation of NPLs. In contrast, lower interest rates may favour granting loans to customers with poor repayment capacity, on the background of the reduction of the bank's exigencies in selecting the loan applicants, and eventually the classification of these loans in NPL category.

Normally, also inflation rate interacts the dimensions of NPLs, its impact highlighting, in principle, mutations in the same sense, respectively a positive determination relationship (Khemraj and Pasha, 2009; Fofack, 2005), most often generating a erosion of the debtors' ability to pay. Yet, we subscribe to the idea that, in this case, is not to be neglected either the potential reduction in the real value of NPLs under the increase of inflation, making more advantageous the repayment of due amounts by the borrowers (Nkusu, 2011: p. 8; Klein, 2013: p. 6), given that the creditor banks are not updating their claims with the inflation rate.

Also, the unemployment rate is invoked, in principle, as factor that causes changes in the size of NPLs (Nkusu 2011; Berge and Boye, 2007; Rinaldi and Sanchis-Arellano, 2006), in the same direction with its own variations. In this respect, we admit that an increase in unemployment rate is likely to adversely affect the income of the borrowers, especially those of individuals, deepening their difficulties to make repayments and interest payments, which may lead to the transformation of current loans into NPLs. Moreover, the income reduction of the population, generated by unemployment's increase, leads to lower demand of goods and services for consume, with the consequence of the reduction in the production and sales of companies, which determines in turn, the reduction of revenues and of the repayment capacity of the debtors (Louzis, Vouldis and Metaxas, 2011: p. 10), favouring also the increase of NPLs.

In contrast, any reduction in the unemployment rate causes creating jobs and employment and, implicitly, the increase of the income and of the capacity of borrowers to make due repayments and pay interest on the current loans, including the possibility of making payments for overdue amounts, which may lead to reducing of previously accumulated NPLs.

In their turn, but on a larger scale, the feedback type effects generated by changes in NPLs (considered as a determining factor) can manifest themselves in many ways, including through the impact on the functionality of the economy (Hou, 2007: p. 2), respectively in terms of balanced development and economic growth.

The approaches regarding the feedback of NPLs aim, in the foreground, the effects reflected in the financial condition of banks and, implicitly, on the economy of a country, starting often from the connection of these loans with the total supply of bank loans. It is assumed, therefore, firstly, that an increase of NPLs level in banks can create uncertainty about their financial stability, which would generate a limitation of their access to other resources on financial markets (Diwan and Rodrik, 1992). As result, may result reactions from banks to limit customers access to lending, inclusively by raising the interest rate on loans to be granted. The latter reaction may affect both the volume of bank loans and the maintenance, within acceptable limits, of profitability and efficiency of creditor

banks. But, from the same perspective, in our view, becomes relevant finding that, in fact, NPLs are blocked or even lost financial resources for the banks, they reducing so their potential for granting new loans. However, the reduction of NPLs involves also the adequate release of resources for lending, out of which banks may grant other loans, reducing simultaneously the costs of managing NPLs, including the provisions. Under such circumstances, there are created favourable conditions to obtain much easy by the commercial banks, other credit resources, cheaper, including from the central banks, which lead to increasing the supply of bank loans at a lower rate interest. In the same context, we believe that it must be taken into account the feedback of changes in the dimensions of NPLs either towards reducing them, with return to the business of the corresponding monetary resources, supporting, thus, economic growth (GDP) especially if new credit is granted for the development of productive activities, or backwards, with negative impact on GDP growth.

Methodology and data sources

Our research is based on the documenting focused on the consultation of scientific literature, useful also conceptually, and of other sources of information on the approached area, including banking practice. It also includes making of analyzes on the quality of bank lending, through the prism of the existence of NPLs. Such analyzes start from the objective nature of the connections of these loans with the action of some factors often represented by variations of certain macroeconomic indicators, perceived as determinant variables, and continue with the feedback on these loans, reflected, in principle, by variations of those indicators who become determined variables. The quantitative analyzes of econometric type are developed based on data for Romania, adapting for this purpose certain econometric models, according to our own choices on the variables included.

Therefore, by taking into account the specific correlations between the determining factors / variables and highlighting the determining relationships between the volume of NPLs at the end of the current period, on the one hand, and the levels of certain macroeconomic indicators, on the other hand, we have outlined an econometric model. It includes, as variables that determine the evolution of NPLs, the corresponding values of the following indicators: GDP, total bank loans, the change in the inflation rate, the change in the unemployment rate, the change in interest rate on bank loans.

In determining of the causal linkages between the dependant variable and the determinant variables, we used as research method the OLS regression (Ordinary Least Squares) and also Pearson correlation analysis of the considered variables.

For purposes of adequate processing of the information about NPLs regarding Romania, which are relatively few, we opted to take into account of quarterly values corresponding to these variables, considering that they ensure the formation of a satisfactory sample of available values for the period 2001-2012. In this regard we extracted and processed the necessary information from data series published by the National Bank of Romania and National Institute of Statistics of Romania.

Also, in our case study we used the following notation on the variables included in the calculations: NPL – the volume of NPLs at the end of the current period (in billions RON); NPL (–1) – the volume of NPLs at the end of the previous period (in billions RON); GDP – the GDP realized in the current period (in billions RON), TL – total bank loans volume at the end of the current period (in billions RON); ΔINFLR – quarterly change in inflation rate (%); ΔUNEM - quarterly change in unemployment rate (%) ΔLIR – quarterly change in the interest rate on bank loans (%).

Processing of the statistical data included in our assessment as the first step of the analysis led to the following general characterization results, for the period 2001-2012, shown in Table 1:

Table 1. *Summary statistics*

	Mean	Median	Maximum	Minimum	Std. Dev.
NPL	9.10	1.64	38.37	0.14	12.49
NPL(-1)	8.31	1.59	37.16	0.14	11.79
GDP	92.67	93.40	172.1.	20.69	44.73
TL	110.45	93.35	219.45	7.98	82.39
ΔINFLR	2.47	2.11	9.10	-0.93	2.08
ΔUNEM	0.01	0.00	3.80	-2.00	0.97
ΔLIR	-0.79	-0.47	2.25	-4.10	1.42

According to the data of Table 1 it results the existence of relatively large variations of the variables such as GDP and the total bank loans volume followed by those of NPLs and of changes in inflation rate and, in a smaller proportion, by the changes in interest rate on bank loans, respectively by the changes in unemployment rate, over the period 2001-2012. Still, we find that if the terms of the inflation rate and the interest rate on bank loans, large variations are found at the beginning of the period under review, for GDP and total bank loans volume are recorded major changes in the boom economic years 2005-2008, and NPLs recorded a sharp increase between 2008-2012, on the background of the financial crisis manifestation.

The analysis of the linking relations between the dependent variable and the determining variables reveals through the correlation matrix, the following results, shown in Table 2.

Table 2. *The correlation matrix*

	NPL	NPL(-1)	GDP	TL	ΔINFLR	ΔUNEM	ΔLIR
NPL	1.000000						
NPL(-1)	0.997328***	1.000000					
GDP	0.737660***	0.725578***	1.000000				
TL	0.805975***	0.784279***	0.917163***	1.000000			
ΔINFLR	-0.411711***	-0.394545***	-0.624133***	-0.610464***	1.000000		
ΔUNEM	-0.015079	-0.013507	-0.037471	-0.004405	0.098637	1.000000	
ΔLIR	0.250359*	0.246428*	0.516333***	0.503199***	-0.367517**	0.273756*	1.000000

*, **, *** - denote significance at 1, 5, and 10 percent, respectively.

Thus, from Table 2, there result the direction and intensity of causal linkages that occur between the volume of NPLs at the end of the current period and the other variables. According to the coefficients highlighted matrix appear to be significant the positive correlations between the volume of NPLs at the end of the current period and the volume of NPLs at the end of the previous period (0.9973), and, also, the GDP realized in the current period (0.7377). These values also certify, significant positive correlations of the NPLs at the end of the current period with the total bank loans at the end of the same period (0.8059) and with the quarterly changes in interest rate on bank loans (0.2504). At the same time, are highlighted the negative correlations of the NPLs at the end of the current period with quarterly change in inflation rate (–0.4117) and in unemployment rate (–0.015), the latter having, however, an insignificant level. The same data confirm the positive and significant correlation between the total volume of bank loans and GDP size, for each quarter. It also confirms the reverse causality linkage between GDP and the change in unemployment rate, the development of the latter variable influencing negatively the former one and vice versa, and also the natural reverse correlation between the change in unemployment rate and the evolution of the total volume of bank loans.

Econometric modelling and results

Overall, the results (according to Table 2) and the previous observations allow a positive assessment on the possibility of establishing of the influences transmitted over NPLs at the end of the current period, considered as a dependent variable by the determinant variables taken into calculations, according to the levels of the corresponding indicators in the years 2001-2012, in Romania's case. The evaluation

of these influences may be accomplished by using the OLS (Ordinary Least Squares) regression method, having as base a model of regression equation, adjusted by us, keeping the previous notations, in the following form:

$$NPL = \beta_0 NPL(-1) + \beta_1 GDP + \beta_2 TL + \beta_3 \Delta INFLR + $$
$$+ \beta_4 \Delta UNEM + \beta_5 \Delta LIR + \varepsilon \qquad (1)$$

Therefore, in relation to the proposed regression equation (1), the determination of NPLs at the end of the current period, by processing of data for the period 2001-2012, in Romania's case, led to the results shown in Table 3:

Table 3. *Regression results for the applied research model on Romania's case*

Dependent Variable: NPL				
Method: Least Squares				
Date: 09/28/13 Time: 18:34				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL(-1)	1.000554	0.014923	67.04968	0.0000
GDP	-0.012007	0.004882	-2.459239	0.0181
TL	0.016824	0.003883	4.332971	0.0001
ΔINFLR	-0.033228	0.053035	-0.626539	0.5344
ΔUNEM	0.027394	0.121503	0.225462	0.8227
ΔLIR	-0.162290	0.091188	-1.779729	0.0824
R-squared	0.996715	Mean dependent var		9.100083
Adjusted R-squared	0.996324	S.D. dependent var		12.49426
S.E. of regression	0.757558	Akaike info criterion		2.399035
Sum squared resid	24.10355	Schwarz criterion		2.632935
Log likelihood	-51.57684	Hannan-Quinn criter.		2.487426
Durbin-Watson stat	1.580219			

The values determined and reflected in this table, for the proposed regression equation, indicate that the volume of NPLs at the end of the current period is determined in a very high proportion (R-squared of 0.9967, adjusted R-squared of 0.9963) by the variables included in the applied econometric model, which confirms its relevance.

At the same time, the results in the table highlight the dependence, in the same direction, of the volume of NPLs at the end of the current period on the volume of NPLs at the end of the previous period and on the total volume of bank loans at the end of the current period. Also, we note that both the values of the determinant variables present P-values below a level of significance of 1%, which leads to the rejection of the null hypothesis value of their coefficients and confirm the certain dependency of the dependent variable on the action of these factors.

Similarly, but at slightly lower significance levels (5% and 10% respectively), we find the existence of some reverse dependencies of the dependent variable on the GDP volume, respectively on the change in the interest rate on bank loans.

For the other variables, considered as determinant (the change in inflation rate and the change in unemployment rate), the P-values lead to the conclusion that they are less significant in influencing the dependent variable. However, through the prism of the resulted coefficient, we find that the dynamics of the unemployment rate causes a similar trend of the dependent variable, while the inflation rate has an impact in the opposite direction on the same dependent variable.

Regarding the quantitative assessment of the feedback effects generated by NPLs, considered as determinant variables, taking into account the same data on Romania, during 2001-2012, we admitted the hypothesis of some reverse determining relationships between them and GDP, the total volume of bank loans, the change in inflation rate, the change in unemployment rate and the change in interest rate on bank loans. The latter become thus dependent variables, and in this framework we shaped equations, respectively econometric models adaptable to them.

Such an econometric model implies reflecting cumulatively of the feedback effects generated by all the determinant variables on the evolution of each variable considered to be dependent, and the results established so are useful for understanding of the positive or negative nature and of the intensity of these determination relationships. In this respect, based on testing an appropriate model it can be appreciated the impact on the volume of NPLs on GDP, in Romania's case, in the period 2001-2012, using OLS (Ordinary Least Squares) regression method, according with an equation, of the following form:

$$GDP = \alpha_0 NPL + \alpha_1 NPL(-1) + \alpha_2 TL + \alpha_3 \Delta INFLR +$$
$$+ \alpha_4 \Delta UNEM + \alpha_5 \Delta LIR + \varepsilon \qquad (2)$$

in which the variables keep the names and symbols used in the regression equation (1).

Testing the equation (2), using the data set corresponding to Romania's conditions, during the mentioned period, led to the results summarized in Table 4:

Table 4. *Regression results for the determinants of quarterly GDP*

Dependent Variable: GDP				
Method: Least Squares				
Date: 09/28/13 Time: 19:19				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL	-10.48323	4.262792	-2.459239	0.0181
NPL(-1)	9.999754	4.315627	2.317104	0.0254
TL	0.807807	0.059240	13.63608	0.0000
ΔINFLR	3.687609	1.467974	2.512039	0.0159
ΔUNEM	-0.993781	3.589101	-0.276889	0.7832
ΔLIR	-3.945303	2.727073	-1.446717	0.1554
R-squared	0.776157	Mean dependent var		92.66908
Adjusted R-squared	0.749509	S.D. dependent var		44.72502
S.E. of regression	22.38448	Akaike info criterion		9.171081
Sum squared resid	21044.73	Schwarz criterion		9.404982
Log likelihood	-214.1060	Hannan-Quinn criter.		9.259473
Durbin-Watson stat	1.336392			

The results shown in Table 4, outline, firstly, a high viability of the proposed regression equation (R-squared = 0.7762; Adjusted R-squared = 0.7495), which means that quarterly GDP volume could be determined sure enough by the quarterly volume of NPLs in conjunction with the other determinant variables included and taken into consideration in equation (2). From the same table results, also, logically, that there is a high probability that both the current level (P-value = 0.0181) and the previous level (P-value = 0.0254) of the quarterly volume of NPLs to influence the evolution of the quarterly volume of GDP. Thus, according to the sign of the coefficients, it results that the evolution of the quarterly volume of NPLs cause a contrary trend of the quarterly GDP volume, as the current size of the quarterly volume of NPLs has a negative impact on GDP volume, partially compensated by a possible positive effect of volume NPL previous quarter.

In the same framework, we notice the existence of a positive determination on GDP, of the total volume of bank loans and of the change in inflation rate and also the determination, in reverse, at a lower significance level, induced by the changes in the interest rate on loans and of the change in the unemployment rate over the dependent variable, and these findings are corresponding with the theoretical anticipations made earlier in the paper.

Similarly, to determine the "feedback" of NPLs on the total quarterly volume of bank loans in Romania, for the years 2001-2012, we have outlined a new regression equation of the form:

$$TL = \gamma_0 NPL + \gamma_1 NPL(-1) + \gamma_2 GDP + \gamma_3 \Delta INFLR + \gamma_4 \Delta UNEM + {} + \gamma_5 \Delta LIR + \varepsilon \tag{3}$$

in which the variables keep the names and symbols used in the previous regression equations.

Applying the equation (3) for the same set of data, the Romania, has led to the results in Table 5:

Table 5. *Regression results for the determinants of the quarterly total volume of bank loans*

Dependent Variable: TL				
Method: Least Squares				
Date: 09/28/13 Time: 19:20				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL	18.36220	4.237786	4.332971	0.0001
NPL(-1)	-17.00938	4.401134	-3.864772	0.0004
GDP	1.009824	0.074055	13.63608	0.0000
ΔINFLR	-1.664580	1.741444	-0.955862	0.3446
ΔUNEM	0.013393	4.016527	0.003334	0.9974
ΔLIR	6.208106	2.973620	2.087727	0.0429
R-squared	0.917545	Mean dependent var		110.4452
Adjusted R-squared	0.907729	S.D. dependent var		82.39174
S.E. of regression	25.02741	Akaike info criterion		9.394289
Sum squared resid	26307.60	Schwarz criterion		9.628189
Log likelihood	-219.4629	Hannan-Quinn criter.		9.482681
Durbin-Watson stat	1.292730			

Results in Table 5 reveal, in the foreground, a very high viability of the proposed regression equation (R-squared = 0.9175; Adjusted R-squared = 0.9077), which expresses that the total quarterly volume of bank loans evolves in close dependence on the volume of NPLs at the end of the current period, respectively on the NPLs at the end of the previous period, and on the other variables considered as determinants, included in equation (3).

The same results also highlight the fact that the volume of NPLs influences significantly the evolution of the total volume of bank loans, as confirmed by the very high probability corresponding both to the current (P-value = 0.0001) and previous level (P-value = 0.0004) of NPLs. In this context, based on the recorded values of the coefficients, it results that the evolution of the quarterly volume of NPLs causes a similar trend of the total quarterly volume of bank loans, since the current size of the quarterly volume of NPLs has a positive impact on the latter, more higher than the negative effect of NPLs in the previous quarter.

Moreover, there are highlighted the significant relationships of positive determination on total quarterly volume of bank loans, of the quarterly GDP and of the changes in interest rate on bank loans and also the negative determination, at a lower significance level, corresponding to changes in inflation rate, while the

changes in unemployment rate appear to have a positive, but insignificant, influence on the dependent variable.

On the other hand, the assessment of NPLs feedback on the changes in interest rate on bank loans can be achieved also by applying a regression model similar to the previous ones, starting from the same data on Romania for the period 2001-2012, drawing another regression equation of the following form:

$$\Delta \text{LIR} = \gamma_0 \text{NPL} + \gamma_1 \text{NPL}(-1) + \gamma_2 \text{GDP} + \gamma_3 \text{TL} + \gamma_4 \Delta \text{INFLR} + {}$$
$$+ \gamma_5 \Delta \text{UNEM} + \varepsilon \qquad\qquad (4)$$

in which the variables keep the names and symbols used in the previous regression equations.

Testing the equation (4), by processing the same set of data, for Romania's case, led to the results listed in Table 6:

Table 6. *Regression results for the determinants of changes in interest rate on bank loans*

Dependent Variable: ΔLIR				
Method: Least Squares				
Date: 09/28/13 Time: 19:22				
Sample (adjusted): 2001Q1 2012Q4				
Included observations: 48 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	P-value
NPL	-0.432106	0.242793	-1.779729	0.0824
NPL(-1)	0.410096	0.245057	1.673468	0.1017
GDP	-0.012031	0.008316	-1.446717	0.1554
TL	0.015145	0.007254	2.087727	0.0429
ΔINFLR	-0.285156	0.074986	-3.802773	0.0005
ΔUNEM	0.426354	0.187155	2.278079	0.0279
R-squared	0.320955	Mean dependent var		-0.787083
Adjusted R-squared	0.240116	S.D. dependent var		1.418051
S.E. of regression	1.236134	Akaike info criterion		3.378323
Sum squared resid	64.17710	Schwarz criterion		3.612223
Log likelihood	-75.07974	Hannan-Quinn criter		3.466714
Durbin-Watson stat	1.218626			

The results in Table 6 attest, firstly, an acceptable level of viability of the proposed regression equation (R-squared = 0.321; Adjusted R-squared = 0.2401), which confirms that the changes in interest rate on bank loans are relatively dependent on the volume of NPLs at the end of periods (current and previous) and on the other variables included in the equation.

From the same table, it results also that there is a good probability that both the current (P-value = 0.0824) and the previous period (P-value = 0.1017) level of the NPLs to influence the evolution of the interest rate of bank loans. Under the conditions to which are reported the data processed by us, the corresponding

coefficients indicate that, overall, the evolution of the volume of NPLs determines a contrary trend of the interest rates on bank loans, since the negative impact of the volume of NPLs at the end of the current period is partially compensated by a possible positive effect of the volume of NPLs at the end of the previous period.

At the same time, it can be observed that other determinant variables, consisting of the changes in the unemployment rate and the total volume of bank loans have significant positive influences on the changes in the interest rate on bank loans, while the change in inflation rate and the volume of GDP have negative impact on the same dependent variable.

Similarly, by conceiving appropriate regression models to assess the feedback of NPLs (along with other variables that become determinant within the corresponding equation) there can be processed the data, by applying the same OLS method, also in the cases of the changes on inflation rate, respectively of the changes in unemployment rate, considering the latter ones, separately, as dependent variables.

Conclusions

Our research has conducted, firstly, to highlighting the specific framework, with objective character, of the interpenetration of NPLs existence phenomenon, on the one hand, with those of non-quality or low (partial) quality of bank lending/ loans, respectively with the levels performance achieved in the activities of the parties involved in bank credit relationships, on the other hand. This allowed us to more precisely shape the concepts of quality/non-quality of lending/bank loans and, in particular, of the NPL. Furthermore, we consider the latter as a direct expression of non-quality of part of bank lending, reflecting simultaneously nonperformance of the activities of the users of bank loans, primarily of those funded by bank loans.

The considerations made within this context sustain that the development of the research on bank lending non-quality can focus on analyzes carried out on NPLs, deepening the study of the connections and correlations specific to the manifestation of this category of loans, with factors that are influencing their proportions, respectively the quality level of bank lending, out of which some become variables included in econometric models adapted our approach.

The documentation taken, showed that the notion of non-quality of bank lending/ loans is not distinctively found in the theoretical and practical approaches, it being assumed to have a reverse acception to that of their quality. Moreover, the concept of quality of NPLs itself and, particularly, that of NPLs are used in theory and especially in practice, with different meanings, they being not explicitly defined,

which can sometimes generate questionable interpretations. Consequently, we have outlined the concepts of non-quality, respectively of quality of bank lending /loans, concluding that NPLs manifests themselves as synthesising, direct expression of non-quality and indirectly characterize, the quality of bank lending/ loans, and these loans allow Knowing and evaluating the impact of factors that determine the evolution of their volume and, implicitly, the quality level of the total volume of loans granted by banks.

Therefore, because the sources in this area are using the notion of NPLs, most often referring to those loans for which there occur delays of the payments regarding the outstanding loans for over 90 days, we appreciated that such a technical criterion is not essential and the number of days taken into consideration can have a subjective, debatable character. As a result, in our opinion, this concept must be defined in terms of its financial and economic essence of NPLs, which consists in being a damaged, unwanted, negative, credit relationship, expressing directly, the partial non-quality of bank lending and, from a reverse perspective, the quality level, higher or lower, of the loans granted by banks. Such credit relations involve blocking, temporary or permanently, of credit resources, which can become losses for the creditor banks, and means, also, both non-performance in the activities carried on by the contracting parties and the non-quality of part of the bank lending/ongoing loans. Accordingly, we conclude that the volume of NPLs as an absolute amount, but more importantly, as a share of total bank loans reflects directly the proportions of lending's non-quality, and indirectly the obtained quality level of the totality of bank loans (in%), which is reduced, as compared to the maximum (100%), with the size of the respective share. The high percentage of NPLs in total bank loans, with strong rising trend, especially in recent years, expresses the amplification of the deterioration of bank lending quality, corresponding to the increase of the non-quality part of total bank loans.

The analysis the existence of NPLs and implicitly of the bank lending non-quality, through the causal linkages with other economic and financial phenomena, led, first, to highlighting of characteristic connections with influential specific factors, respectively of the relationships of determination regarding the size of these loans, within some logical correlations under economic and financial aspect. Further development of this analysis, targeting directly the expression of those correlations, under the real conditions of Romania, for the period 2000-2012, can be materialized as econometric approach, outlining, in this respect, a first regression model and using Pearson correlation, respectively OLS method. Thus, in this model, we considered as determinants, the variables the volume of NPLs at the end of the previous period, the GDP volume, the total bank loans volume, the change in inflation rate, the change in unemployment rate, the change in interest rate on bank loans and as the volume of NPLs at the end of the current period, as

dependent variable. The results obtained by testing this model showed a very high level of viability for the regression equation, and have revealed that the volume of NPLs at the end of the previous period, the total volume of bank loans, the volume of GDP and the change in interest rate on bank loans are particularly relevant in the determination of NPLs from current period. In the same context, it results that changes in inflation rate and changes in the unemployment rate appear to be less relevant in influencing the dependent variable and, implicitly, on the non-quality of bank lending.

In turn, the analysis of NPLs feedback was based on designing and testing of other regression models (equations), considering that the volume of these loans is a determinant variable for the progress of several macroeconomic indicators included in the corresponding equations, in which they were considered as dependent variables. In this regard, taking as dependent variable the GDP volume, it resulted a significant reverse feedback effect, transmitted over it by volume of NPLs, which confirmed also the validity of the regression model used. In the same context, it resulted also that the total volume of bank loans and changes in the inflation rate are positively influencing the GDP volume, while changes in the unemployment rate and changes in the interest rate on bank loans are generating opposite effects.

At the same time, the distinctive analyzes regarding the NPLs impact, based on models separately developed for each of the other macroeconomic indicators, conceived as dependent variables, showed different but significant effects generated by the volume of NPLs, as determinant variable. Thus, by testing the regression models on the data for Romania, during 2001-2012, is resulted that NPLs have a positive effect on the total volume of bank loans and a negative effect on the change in interest rate on bank loans.

Although, through the prism of the changes in the volume of NPLs, this variable can manifest itself also in a positive sense towards other dependent variables, we consider that, in principle, the presence of NPLs registered by banks remains a negative phenomenon, with undesirable effects, justifying intense concerns for limiting them to the lowest possible level.

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