

**THE IMPACT OF NON-PERFORMING LOANS RATE AND OF INFLATION RATE
ON THE INTEREST RATE IN ROMANIA****Lecturer PhD. Gheorghe MOROȘAN***Stefan cel Mare University of Suceava, 720229, Romania
morosang59@gmail.com***Lecturer PhD. Iulian CONDRATOV***Stefan cel Mare University of Suceava, 720229, Romania***Liliana FILIPCIUC***Stefan cel Mare University of Suceava, 720229, Romania***Abstract**

The aim of this study was to demonstrate the influence of non-performing loans rate and of the inflation rate on the interest rate growth on newly granted loans in Romania. The study was conducted on the basis of data gathered from the National Bank of Romania and the National Institute of Statistics during the period 2010-2018. The method used to study this relationship is the multiple linear regression. Based on the results obtained, we have been able to detect the link among the three selected variables, namely: the non-performing loan rate, the inflation rate, the interest rate on credits; building 4 models of functions according to the types of credits selected for analysis. The present study is structured as follows: in the first section we presented the literature review, in the second section we described notions and theoretical concepts regarding the non-performing loans and interest, the third section provides the database, the results and the conclusions of the study.

Key words: *non-performing loans; interest rate; inflation rate.*

JEL Classification: *E43; E44; E5.*

I. INTRODUCTION

Currently, in Romania, one of the most important form of financing of both, population and economic agents, is the one provided by the credit institutions, especially by the banks. Lending activity is the core business of credit institutions for which they collect interest and commissions. However, as the practice shows, this activity brings both, profit and loss (caused either by internal factors, such as: bad management, abusive lending, etc. or by external factors such as: rates given default, inflation, interest rate fluctuation, etc).

The purpose of the paper is to identify the impact of non-performing loans and of the inflation rate on the interest rate applied by banks in Romania, as well as its quantification using the multiple statistical regression method, having as reasoning the following assertions: First of all, among the most important categories of banking risks, the credit risk occupies the highest weight (approximately 60%), followed by the liquidity risk (about 30%), while the market, operational, systemic risks, cumulative, have a proportion of less than 10% (Pop, Chicu & Răduțu, 2018). Secondly, the increase in the volume of non-performing loans affects not only the banking system but also the economy of the country, and in order to solve this problem, is needed a coordinated and centralized response from the state, as this problem, once it has arisen, cannot be overcome by the banking system with its own powers.

Analyzing the assets of the main banks in Romania, around 50% of the total assets are loans granted. That's why, the bank is very vulnerable to the increase in the volume of non-performing loans, since about half of its resources are placed in the form of credits, and their non-reimbursement would mean depriving banks of their assets - which do not belong to them and which are also interest-bearing. Losses from non-performing loans can be covered by the bank only on the basis of interest rates, adjusted to the inflation rate - the impact of which has been long demonstrated by specialists.

Therefore, the hypothesis proposed in this paper is: the increase of non-performing loans rate and of the inflation rate implies interest rate growth to newly granted loans.

II. RESEARCH STRATEGY

From a methodological point of view, this study was carried out on two approaches inherent interdependent. The *theoretical plan*, which is a conceptual and content analysis of the specific terminology used in the field of the article, as well as a brief analysis of some of the most recent papers published on the given subject. The *empirical plan*, represented by the applied research itself, was based on the support of building and analyzing a database. Thus, regarding the applicative study, as mentioned in the introduction, we are assuming that the dynamics of non-performing loans rate and of inflation rate (referred further as independent variables) have an impact on the the interest rate on newly granted loans (referred further as dependent variable), and to show the relationship between those variables using a linear regression method.

III. LITERATURE REVIEW

In the literature, this subject is not addressed directly by the authors, but most of the articles and studies have links to the selected topic. We present, below, some aspects of the specialized papers, which indirectly confirm the proposed hypothesis.

Pop and the coauthors in their study analyzed the determinants factors of non-performing loans for the 5 largest banks in Romania, grouping them as specific factors of the banking system (total assets, ROE (return on equity) loans granted/deposits attracted) and macroeconomic factors (unemployment rate, budget deficit, inflation), concluding that total assets and inflation rate have an impact on non-performing loans (Pop et al., 2018).

Another study confirming the influence of inflation, along with other macroeconomic variables, on the increase in the level of non-performing loans is that carried out by Maşcu and Pescu (2016).

By analyzing a sample of 25 countries, Radivojevic has demonstrated a direct link between the level of non-performing loans and the inflation rate. Therefore, the effect of a higher interest rate, driven by a higher inflation rate and a declining economy, outweighs the positive effect of inflation on the borrower's ability to pay (Radivojevic, 2017).

The same conclusion was reached by the authors of the following two studies, namely Mileris (2012) and Nkusu (2011). They also showed a positive but less significant relationship between the inflation rate and the non-performing loans rate.

Through his research, Jolevski (2017) analyzed how the non-performing loans affect the return on equity. It has shown that there is a negative relationship between these two variables and concluded that the increase in the volume of non-performing loans results in impairment losses and reducing the bank liquidity and solvency. Since return on equity is determined as the ratio between net profit and equity, the results of the study explain the decrease in net profit (due to the expenses increase or revenues decrease) on the basis of non-performing loans. Therefore, in order to achieve a desired level of profit the bank seeks to raise the interest rate in order to reduce the damage caused and keep its financial indicators at the desired level.

A similar study made on the Eurozone by Makri (2014) demonstrated the negative influence of the level of non-performing loans on ROE and bank capital.

The study led by Cocris and Nucu (2013) has shown that interest rate is a central instrument for controlling the level of lending in the country, and that the change in a bank's loan portfolio and total assets evolves in line with the short-term interest rate. As mentioned above, Pop et al. (2018), demonstrated the influence of the interest rate on total assets, which means that a larger amount of assets is inevitably correlated with an increase in the associated risk level of these assets, and in the case of lending, this risk represents the rate default reached at its maturity, the consequence of this risk meaning the increase of non-performing loans level.

Another study carried by Bredl (2017) highlights the link between non-performing loans and the cost of borrowed capital. This influence is determined by the value of the capital premium, a component of the interest demanded by investors (the level of it being directly proportional to investor confidence in that bank, or, in other words, the higher the level of non-performing loans, the higher the risk premium is). The outline of this study is as follows: a higher level of non-performing loans indicates a higher interest rate on loans.

IV. NOTIONS AND CONCEPTS

IV.1. DEFINING THE CONCEPT OF NON-PERFORMING LOANS

At EU level there is no unanimously accepted definition of this concept.

From the definition of the IMF, it appears that a non-performing loan is classified in this category if (criteria accepted also in Romania) [1]:

- the principal payment and/or the interest on it has exceeded the maturity of 90 days (and over) or
- the decision is based on objective reasons (for example the bankruptcy of the client), which do not question the debtor's inability to repay the debt.

Once the credit has been classified as a non-performing loan, it remains in this category until the debt has been extinguished.

Non-performing loans are considered to be wickered for the following reasons:

- causes the profit diminishing, based on the revenues decrease from the lending activity;
- there is an increase in the cost of borrowed capital due to the decrease of investor confidence which in turn requires a higher cost (the cost being proportional to the associated risk);
- a sign of a potential economic crisis, as was the 2007 financial crisis;
- diminishing the lending capacity, caused by the bank's liquidity erosion;
- affecting economic growth.

IV.2. DEFINING THE CONCEPT OF INTEREST

Interest is the amount of money earned by the owner of the capital in return for its disposing to third parties. The interest rate is the share of the capital that the borrower is contractually obliged to give to the lender in return for the use of foreign capital.

The interest rate at which the bank accepts lending its borrowers must cover all expenses incurred by the bank as well as to ensure a profit. That is why interest plays the decisive role for the bank, because it is its source of existence. Therefore, the rise in the level of non-performing loans is an existential danger for the bank and the instrument that can ensure its stability is the interest.

V. DATABASE - ANALYSIS, RESULTS AND DISCUSSIONS

The data used in the present study were collected from the NBR [2] interactive database as well as the data taken from the NIS website, statistical databases [3], published during the period 2010-2018, data published monthly and quarterly (Annex 1) [4]. In selecting data, two aspects were considered: the volume of the data to be large (for a more accurate determination of the relationship) and the data to not be affected in different proportions over the selected period of time by various factors such as the financial crisis triggered in 2007 (on a global scale, in Romania its appearance was felt starting with 2008, the climax being reached in 2009). Starting with 2010, the banking sector had to be more cautious in selecting the financial portfolio, minimizing credit risk.

The data were selected from the "Monetary and financial statistics" section and the indicators taken from this section are (hereafter referred to as):

- Y_1 - Interest rate on newly granted loans to households; for housing; with the variable interest rate or with the initial fixed interest rate period of less than or equal to 1 year;
- Y_2 - Average effective annual interest rate on newly granted loans to households; for consumption;
- Y_3 - Variable interest rate or interest rate with the initial fixed period of less than or equal to 1 year on newly granted loans to non-financial corporations; up to and including 1 million euro equivalent;
- Y_4 - Variable interest rate or interest rate with the initial fixed period of less than or equal to 1 year on newly granted loans to non-financial corporations; with a value of more than 1 million euro equivalent;
- X_2 - Non-performing loans rate;
- X_1 - Inflation rate.

Selected data were analyzed using the multiple linear regression method. In this study was analyzed the influence of the inflation rate and of non-performing loans rate (independent variables) on the interest rate of four types of credits (dependent variables), obtaining a function that shows the relationship between these variables according to the model:

$$Y_i = a_i + b_i * X_1 + c_i * X_2 \tag{1}$$

Results

Using the multiple linear regression method, the following results were obtained, centralized in the table below:

Table 1. Summary table of calculated indicators

		Y1	Y2	Y3	Y4	Variation interval
Correlation coefficient		0,79	0,74	0,76	0,78	[0;1]
Determination coefficient		0,62	0,55	0,58	0,62	[0;1]
Significance F		4,7*E(-23)	5,8*E(-19)	1,16*E(-20)	6,74*E(-23)	<5%
P-value	Constant	1,72*E(-10)	2,49*E(-25)	2,62*E(-7)	3,33*E(-7)	<5%
	Inflation rate	5,1*E(-24)	7,3*E(-20)	3,12*E(-21)	1,77*E(-23)	<5%
	Non-performing loans rate	0,02	0,00097	6,83*E(-6)	1,64*E(-6)	<5%
Coefficients	Constant	3,38	9,13	3,23	2,58	
	Inflation rate	0,68	0,81	0,76	0,67	
	Non-performing loans rate	0,06	0,13	0,16	0,14	

Source: prepared by the authors based on the calculations

The equation models obtained for each of the dependent variables are:

$$Y_1 = 3.38 + 0.68 * X_1 + 0.06 * X_2 \tag{2}$$

According the analysis of the Y1 dependent variable, the following results were obtained:

- the correlation coefficient of 0.79 indicates strong interdependence, approaching the limit of 1;
- the determination coefficient [5] of 0.62 expresses the fact that 62% of the interest rate variation noted Y1 is statistically explained by the influence of the inflation rate and the non-performing loans rate;
- it was verified that the significance values of tests F and T to be below the 5% limit, so that the regression model used could be considered correctly constructed and could be used in the study of the link between the introduced variables;
- according to the results, significance F with the value of 4.7 * E (-23) and P-value with the values of 1.72 * E (-10), 5.1 * E (-24) and 0.02, both fulfilling this condition.

The obtained coefficients help us determine the mathematical expression of the relationship between the studied variables (2). The value of 3.38 is the value of constant and indicates that if the inflation rate and the non-performing loan rate were 0, meaning that it had no influence on the dependent variable, the interest rate Y1 would be 3.38. The second coefficient intervenes when an increase in the inflation rate is recorded by one unit and shows a Y1 interest rate increase of 0.68 units. The third coefficient indicates that an increase in the non-performing loans rate would lead to an increase of 0.06 units in the Y1-type interest rate.

The following three equations (3), (4) and (5) have similar results to the first equation with the indicators: correlation coefficient, determination coefficient, Significance F and T-value and all the values show a strong correlation from a statistical point of view.

The essential difference between these three functions is the way it is composed, caused by different coefficients, namely for the variable Y2 we obtain the formula:

$$Y_2 = 9.13 + 0.81 * X_1 + 0.13 * X_2 \tag{3}$$

Explanation: If the inflation rate is 0 and the non-performing loan rate is equal to 0, the Y2-type interest rate would be 9.13. If the inflation rate would increase by one unit, the Y2-type interest rate would increase by

0.81 units. If the rate of non-performing loans would increase by one unit, the Y2-type interest rate would increase by 0.13 units.

For the Y3 variable, the formula is as follows:

$$Y_3 = 3.23 + 0.76 * X_1 + 0.16 * X_2 \quad (4)$$

Explanation: If the inflation rate is 0 and the non-performing loan rate is equal to 0, the Y3-type interest rate would be 3.23. If the inflation rate would increase by one unit, the Y3-type interest rate would increase by 0.76 units. If the rate of non-performing loans would increase by one unit, the Y3-type interest rate would increase by 0.16 units.

For the Y4 variable, the formula is as follows:

$$Y_4 = 2.58 + 0.67 * X_1 + 0.14 * X_2 \quad (5)$$

Explanation: If the inflation rate is 0 and the non-performing loan rate is equal to 0, the Y4-type interest rate would be 2.58. If the inflation rate would increase by one unit, the Y4-type interest rate would increase by 0.67 units. If the rate of non-performing loans would increase by one unit, the Y4-type interest rate would increase by 0.14 units.

VI. CONCLUSIONS

This research aimed to demonstrate the link between the non-performing loans rate, the inflation rate and the interest rate, using the data collected from the NBR's interactive database and the NIS database during the years 2010-2018.

The results of this research confirmed the hypothesis proposed at the beginning of the paper, namely that the inflation rate and the rate of non-performing loans influence the interest rate on the loans granted.

Using the multiple linear regression method, four functions have been obtained that describe and quantify how this influence takes place. Thus, on average, the increase in the inflation rate with one unit has an impact of 0.73 units on the change of the interest rate, and the one unit increase of the non-performing loans rate has an impact of - 0.12 units on the interest rate.

Although the rate of non-performing loans has a much lower impact than the inflation rate, this factor has the advantage that it is controllable by the bank's management and depends, largely, on its lending policy, while the inflation rate is a macroeconomic variable that cannot be controlled, but only anticipated by the banking system.

To conclude, the paper shows that in the Romanian banking system it was found the same trend as was found in other banking systems, namely: the rate of non-performing loans increases the cost of newly granted loan, implicitly the interest rate, attracting banks' attention to act in the direction of reducing non-performing loans rate.

Other notes:

[1] *In Romanian legislation this definition is given by Order no. 6/2014, Art. 1. The methodological norms regarding the preparation of FINREP financial statements at individual level, in compliance with the International Financial Reporting Standards, applicable to credit institutions for prudential supervision purposes published in the Official Gazette no. 699 of 24/09/2014.*

[2] *The database can be accessed here: <https://www.bnr.ro/Baza-de-date-interactiva-604.aspx>.*

[3] *The database can be accessed here: <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table>.*

[4] *For the data quarterly collected, we assume that the quarterly monthly values record the same values as the quarterly value.*

[5] *Represents the square of the correlation coefficient.*

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ANNEX 1. Indicators collected for study

Date	Inflation rate	Non-performing loans rate	Interest rate on newly granted loans to households; for housing; the variable interest rate or the initial fixed interest rate period of one year or less	Average effective annual interest rate on newly granted loans to households; for consumption	Variable interest rate or interest rate with the initial fixed period of less than or equal to 1 year on newly granted loans to non-financial corporations; up to and including 1 million euro equivalent	Variable interest rate or interest rate with the initial fixed period of less than or equal to 1 year on newly granted loans to non-financial corporations; with a value of more than 1 million euro equivalent
	X1	X2	Y1	Y2	Y3	Y4
Dec. 2018	3,27	4,95	5,67	10,57	6,12	5,32
Nov. 2018	3,43	5,56	5,75	10,65	6,30	5,68
Oct. 2018	4,25	5,56	5,72	10,78	6,13	5,96
Sept. 2018	5,03	5,56	5,66	10,79	6,05	5,42
Aug. 2018	5,06	5,71	5,74	10,92	5,98	6,05
Jul. 2018	4,56	5,71	5,55	10,95	5,96	5,64
Jun. 2018	5,40	5,71	5,00	10,98	5,69	5,46
May. 2018	5,41	6,16	4,81	11,00	5,52	5,22
Apr. 2018	5,22	6,16	4,65	10,98	5,27	4,38
Mar. 2018	4,95	6,16	4,79	10,84	5,25	4,55
Feb. 2018	4,72	6,41	4,63	10,74	5,18	4,31
Jan. 2018	4,32	6,41	4,51	10,48	4,98	4,60
Dec. 2017	3,32	6,41	4,47	9,98	5,10	4,88
Nov. 2017	3,23	7,96	4,25	10,22	5,00	4,18
Oct. 2017	2,63	7,96	3,99	10,24	4,71	4,22
Sept. 2017	1,77	7,96	3,56	10,03	4,19	3,23
Aug. 2017	1,15	8,32	3,40	10,23	3,96	3,34
Jul. 2017	1,42	8,32	3,33	10,37	4,02	3,39
Jun. 2017	0,85	8,32	3,29	10,23	4,27	3,38
Mai. 2017	0,64	9,36	3,49	10,24	4,22	3,44
Apr. 2017	0,61	9,36	3,49	10,31	4,15	3,30
Mar. 2017	0,18	9,36	3,62	10,43	4,36	3,80
Feb. 2017	0,20	9,62	3,54	10,38	4,19	3,84
Jan. 2017	0,05	9,62	3,46	10,36	4,15	3,18

Dec. 2016	-0,54	9,62	3,42	9,94	4,05	3,40
Nov. 2016	-0,67	10,00	3,31	10,09	4,04	3,12
Oct. 2016	-0,43	10,00	3,48	9,99	4,20	3,48
Sept. 2016	-0,57	10,00	3,51	10,25	3,96	2,89
Aug. 2016	-0,20	11,30	3,38	10,57	4,12	3,06
Jul. 2016	-0,78	11,30	3,29	10,61	4,16	3,50
Jun. 2016	-0,70	11,30	3,24	10,31	4,27	3,85
Mai. 2016	-3,46	13,52	3,19	10,19	4,24	3,31
Apr. 2016	-3,25	13,52	3,16	10,06	4,35	3,25
Mar. 2016	-2,98	13,52	3,39	9,69	4,60	3,97
Feb. 2016	-2,68	13,51	3,56	9,67	4,63	3,56
Jan. 2016	-2,13	13,51	3,59	10,61	4,75	3,58
Dec. 2015	-0,93	13,51	3,69	10,28	4,65	4,04
Nov. 2015	-1,14	15,73	3,74	10,73	5,01	3,30
Oct. 2015	-1,64	15,73	3,88	10,72	5,10	4,00
Sept. 2015	-1,73	15,73	3,81	10,93	5,04	4,34
Aug. 2015	-1,87	16,20	3,77	10,15	5,03	3,76
Jul. 2015	-1,67	16,20	3,86	9,41	5,02	4,09
Jun. 2015	-1,55	16,20	3,89	8,96	5,37	4,34
Mai. 2015	1,16	20,20	3,95	9,43	5,41	4,08
Apr. 2015	0,65	20,20	3,89	10,81	5,46	4,07
Mar. 2015	0,79	20,20	3,90	10,97	5,67	4,43
Feb. 2015	0,40	20,71	4,10	11,34	5,71	4,11
Jan. 2015	0,41	20,71	4,04	11,24	5,47	4,92
Dec. 2014	0,83	20,71	4,48	11,24	6,09	5,48
Nov. 2014	1,26	21,47	4,86	11,52	6,08	4,72
Oct. 2014	1,44	21,47	5,23	11,70	6,84	5,59
Sept. 2014	1,54	21,47	4,97	11,72	6,79	5,78
Aug. 2014	0,84	22,26	4,68	11,61	6,36	5,33
Jul. 2014	0,95	22,26	4,77	11,64	6,65	5,91
Jun. 2014	0,66	22,26	5,16	11,57	6,72	5,52
Mai. 2014	0,94	22,26	5,35	11,66	7,26	6,94
Apr. 2014	1,21	22,26	5,26	11,73	7,07	6,38
Mar. 2014	1,04	22,26	5,12	11,90	7,37	6,66
Feb. 2014	1,05	21,87	5,16	12,31	7,72	7,04
Jan. 2014	1,06	21,87	4,73	12,46	7,06	6,20
Dec. 2013	1,55	21,87	5,14	12,27	7,73	5,85
Nov. 2013	1,83	21,56	5,30	13,30	7,79	6,85
Oct. 2013	1,88	21,56	5,58	13,90	8,32	6,94

Sept. 2013	1,88	21,56	6,10	14,47	8,59	7,23
Aug. 2013	3,67	20,30	6,94	15,20	9,10	8,01
Jul. 2013	4,41	20,30	6,95	14,83	9,40	7,42
Jun. 2013	5,37	20,30	6,82	15,07	9,45	8,60
Mai. 2013	5,32	19,08	7,00	15,20	9,59	8,95
Apr. 2013	5,29	19,08	7,43	15,57	9,97	8,64
Mar. 2013	5,25	19,08	8,29	15,79	10,21	8,30
Feb. 2013	5,65	18,24	8,25	16,00	10,42	8,37
Jan. 2013	5,97	18,24	8,35	15,86	10,59	9,20
Dec. 2012	4,95	18,24	8,30	15,24	10,51	8,79
Nov. 2012	4,56	17,34	8,15	15,60	10,51	9,24
Oct. 2012	4,96	17,34	7,72	15,58	9,76	9,07
Sept. 2012	5,33	17,34	7,81	15,64	10,17	9,79
Aug. 2012	3,88	16,76	7,58	15,16	10,16	8,95
Jul. 2012	3,00	16,76	7,31	14,96	9,95	8,81
Jun. 2012	2,04	16,76	7,12	14,84	9,95	8,80
Mai. 2012	1,79	15,88	6,67	15,07	9,47	8,88
Apr. 2012	1,80	15,88	6,67	15,19	9,42	7,54
Mar. 2012	2,40	15,88	7,51	15,29	9,61	8,00
Feb. 2012	2,59	14,33	7,58	15,21	10,31	8,31
Jan. 2012	2,72	14,33	7,47	15,78	10,52	8,85
Dec. 2011	3,14	14,33	7,75	16,79	10,77	8,77
Nov. 2011	3,44	14,18	8,35	16,96	10,79	9,37
Oct. 2011	3,55	14,18	8,97	16,86	10,72	9,00
Sept. 2011	3,45	14,18	9,00	16,87	10,63	8,77
Aug. 2011	4,25	13,35	8,66	16,53	10,16	8,19
Jul. 2011	4,85	13,35	8,71	16,38	9,52	7,94
Jun. 2011	7,93	13,35	8,55	15,83	9,94	8,37
Mai. 2011	8,41	12,71	7,53	15,13	10,59	8,31
Apr. 2011	8,34	12,71	8,48	15,59	10,16	8,10
Mar. 2011	8,01	12,71	9,33	17,04	10,71	8,11
Feb. 2011	7,60	11,85	10,22	17,83	11,27	10,98
Jan. 2011	6,99	11,85	10,05	17,47	9,89	8,16
Dec. 2010	7,96	11,85	10,32	17,51	10,59	8,66
Nov. 2010	7,73	11,67	10,92	18,14	11,06	10,24
Oct. 2010	7,88	11,67	10,25	18,28	11,54	8,11
Sept. 2010	7,77	11,67	10,32	19,24	11,68	9,62
Aug. 2010	7,58	10,20	9,97	19,27	11,74	10,00
Jul. 2010	7,14	10,20	10,46	18,77	12,46	11,66

Jun. 2010	4,38	10,20	10,17	17,77	12,43	9,68
Mai. 2010	4,42	9,11	10,66	17,20	13,00	10,13
Apr. 2010	4,28	9,11	10,30	17,46	12,05	9,20
Mar. 2010	4,20	9,11	12,16	20,27	13,24	10,73
Feb. 2010	4,49	7,89	11,81	20,97	14,45	11,08
Jan. 2010	5,20	7,89	12,40	21,78	15,41	12,53

Source: Processing based on the NBR interactive database and the NIS database