Last Decade Analysis over the Impact of Loans & Deposits on the Romanian Economy: from Hook to Anchor

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Abstract

Traditionally, banking consists in attracting deposits or other repayable funds from the population and in granting loans. This paper aims to analyze the attracted deposits and the loans granted in the Romanian banking system, as well as analyze the evolution of deposits and loans in terms of the interest rate for the whole banking system with the help of the VEC Model for the period 2007-2018. The importance of this work lies in its contribution to understand how the massification of credit facilities designed to finance both private consumption and investment by companies help in the economic recovery.

Keywords: *banking system; analyze; deposits; loans; VEC*

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1. Introduction

Analyzing the macroeconomic environment from the last decade, we observe that the banking performance of commercial and industrial loans highlights an independent and a permanent source of macroeconomic fluctuations. According to Simon Wolfe, Klaus Schaeck, and Martin Cihak, the bank's systems which are very competitive are less expose to a global crisis and possess a much higher sturdiness to a systemic crisis. In their research papers they have used the Panzar test and Rosse H-statistic for a 45 countries sample, due to competition reasons.

The relevant studies from the literature which best emphasize this topic are the papers written by Merton (1977, 1978), Bhattacharya et al. (2002), Dangl and Lehar (2004). These articles are focused on an exogenously deposit structure rather than on an endogenous deposit type which would measure the volume of deposits in the future. Beyond these aspects, commercial banks are subdued to regulations, and sometimes the regulation requires that the capital-asset ratio exceed a certain level.

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2. Literature review

From 2006 to 2009, the bank deposits growth decreased with more than 12 percentage points globally, and the most affected by the 2008 global financial crisis were the countries with higher average incomes which registered an average decrease of 15 percentage points.

According to (Diamond and Dybvig, 1983; Shin, 2009), during the periods of financial stress or financial crises, depositors are becoming anxious, and may decide to withdraw deposits from one or more banks at the same time, due to bank solvency concerns. Those with large deposits are usually the first ones to choose to withdraw their deposits as shown in the study by (Huang and Ratnovski, 2011). As stated by the large numbers law, the withdrawals of correlated deposits could be mitigated if the bank deposits were better diversified. This better diversification of deposits could be obtained by allowing a wider access to the use of bank deposits, involving a bigger part of the adult population in using of bank deposits (financial inclusion). Based on this premise, a wider financial inclusion in the bank deposits could notably increase the strength of banking sector financing and overall the financial stability, according to (Cull et al., 2012).

Some researchers have concluded that there is no relationship between bank deposits and economic growth, such as (Kumar and Chauhan, 2015) that conducted a study in India, using Granger cointegration and causation, and concluded that saving bank deposits trade does not cause India's GDP to increase. However, according to other researchers, it is a one-way relationship, from economic growth to the bank savings.

(Liang and Reichert, 2006) discovered some causal relationships between the development of the financial sector and the economic growth for the developing and advanced countries. They established that causality begins with the economic development, moving further to the financial sector development. Nevertheless, this causal relationship is strong for developing countries, comparing to the developed countries, as claimed by other researchers.

(Aurangzeb, 2012) decided that the banking sector has had a major contribution to Pakistan's economic growth according to the regression method and Granger causality test. The result of the regression indicates that deposits, investments, profitability and interest income have had an important and conclusive impact on Pakistan's economic growth. He has also discovered that causality has a two way relationship between deposits, advances and profitability with the economic growth, while the one way causality is based on investments and interest gained step by step with the Pakistan's economic growth.

(Korkmaz, 2015) conducted studies in 10 European countries and concluded that the internal credit granted by the banking sector has had an important effect on the economic growth. (Caporale et al., 2009) studied about ten EU countries, and for these studies they used the Granger causality test and established that there is a one-way causal relationship, starting from financial development to economic growth in these ten EU countries, using the dependent variable LOANS for the private sector and the interest rate margin for the economic growth, these variables as a proof for financial development.

According to (Obradovic and Grbic, 2015) the economic growth has an important impact for the process of financial deepening, reaching the conclusion that there is a one way causality starting from the loans of private enterprises to the GDP, the loans of population to the GDP, and both of them have contributed to the Serbia's economic growth. Furthermore, according to these researchers, there is also a two-way causal relationship between the share of non-financial private sector bank loans, the growth rate of the total domestic credit in the economy.

As stated by ARB (Romanian Association of Banks) together with Estonia, Malta, Poland and Slovakia, Romania is one of 5 countries in the European Union, which in the period between 2007 and 2016 did not need government intervention in the financial system. The correlation between the level of monthly consumption expenditures and the level of new consumer loans granted to households is 0.91, which shows that, through loans, banks directly stimulate the level of consumption in the economy. As well, the correlation between the number of existing homes and the level of real estate loans granted to the is 0.94, which shows us that through real estate loans the population directly stimulates the increasing number of houses.

By the end of January 2016, according to the National Bank of Romania, the volume of loans granted to non-bank customers is 216,112.2 million lei, equivalent to approximative. 40% of GDP, and almost half of the bank loans were denominated in foreign currency.

According to (Gonnet.L. et.al., 2018) the banking sector in Romania is weak and has decreased relative to the economy, and also both sides of the bank balance sheet reflect the low financial intermediation level. In September 2017 banking assets accounted for 52.7% of GDP, decreasing from a maximum of 72.5 % in 2010, as the evolution of banking assets after 2008 (CAGR - Compound Annual Growth Rate of 2.5 % between 2009 and 2016) decreased as a result of GDP (CAGR of 6.2 %). The relative size of the sector is one of the lowest in the region (average of countries: Bulgaria, Croatia, Hungary and Poland is 104.9% of GDP), and Romania drops behind in terms of deposit penetration market and credit market. Compared to the average of 71.4 %, the deposit base was 36.3 % of GDP in September 2017 and the bank loans reached 33.4 % of GDP compared to the average of the above countries, which is 68%. This gap can as well be seen in both crucial segments of the market: households and businesses.

3. Methodology and database

The purpose of our research is to identify if there are links (correlations) between a series of macroeconomic indicators underlying at the core of banking system.

For this analysis we will use a multiple linear regression of the type:

$$Yt = C + b_n X_j \quad (1)$$

$t = 1,2,3,.........n$ – sample observations;
Yt – t observation of the dependent variable;
X_j – independent variables;
C – constant;
b_n – the coefficients of the independent variables, n= 1,2,......k;

In order to be able to study the correlation between loans and deposits as efficiently as possible, we will use a series of indicators such as: loans, deposits, the consumer price index, the net average wage and the monetary policy interest rate, for the analysis between 2007 and 2018. Thus, in order to be able to estimate and study the correlation between these variables, we will use the following tools:

1) Checking the stationarity for the obtained data series;
2) Determining the optimal number of lags for each model;
3) We will use the Johansen cointegration test with (p) number of lags;
4) Use of VECM with (p-1) lags;
5) Checking the diagnostic tests.

At first we need to check if the used data series are stationary, and at the same time cointegrated. At the formal level, stationarity can be observed if the time series contain a unit root. In this sense the most well-known test is Augmented Dikey-Fuller (ADF) - used for each of the variables from the model to check the stationarity:

$$\Delta Yt = \alpha + \beta t + \Upsilon y_{t-1} + \xi_t \quad (2)$$

Υ = represents the lags used to identify possible higher-order autocorrelations;
α = the constant term;
β = multiple regression coefficient;
ξ_t = the term of white noise error;
Yt = variable tested for stationarity;

The unit root statistical test is generated under the null hypothesis H0: $\Upsilon = 0$, against the alternative hypothesis H1: $\Upsilon = 1$. Thus, the more negative the value of the statistical test is, the stronger the rejection of the null hypothesis is.

For the Augmented Dikey-Fuller (ADF) test, if the absolute test statistic value is more than critical value (absolute), - 5% level value, than we can accept the alternative hypothesis. But if (t statistic) <5%, we will accept H0.

Null Hypothesis – Ho: Variable has unit root, meaning that the variable is not stationary;

Alternative Hypotheis – H1: Variable has not unit root, meaning that variable is stationary;

If the (P) associated for t-statistic is much smaller than 5%, we can accept H1. When P value >> 5%, we will accept this null hypothesis H0.

The main question of our study is whether the lending activity is influenced by the deposit activity in the Romanian banking system. In order to find the answer for our question we will follow the next two hypotheses:

Hypothesis 1 (I1): All variables used in the model (Loans to households, Deposits of households, Consumer price index, Net average wage, and Monetary policy interest rate) are stationary;

Hypothesis 2 (I2): The variables chosen for the analysis are not stationary and we perform VECM;

Hypothesis 3 (I3): Between lending and deposit activity there is not a two way relation, just a one way relationship, from deposits to loans.

Testing the hypothesis with a statistically significant long-term connection between time series can be done by applying the Johansen co-integration test (1991). The basic steps of the Johansen methodology are as follows:

1. Specifying and estimating a VAR (P) model for Yt,

$$Yt = A1\, Yt-1 + ... + Ap\, Yt-p + \xi_t \quad (3)$$

where Y^t is the vector of variables I(1), iar ξ_t is the vector of innovations.

2. Rewriting the VAR (P) model to determine the number of cointegrated vectors, of the form:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i Y_{t-1} + \varepsilon_t \quad ,$$
$$\Pi = \sum_{i=1}^{p} A_i - I;\ \Gamma = -\sum_{j=i+1}^{p} A_i . \quad (4)$$

3. Imposing normalization and identifying constraints on co-integration vectors resulting from considering a r<k rank for matrix coefficients Π;
4. Estimation of the resulting Vector Error Correction (VEC) cointegration model.

To estimate the VEC cointegration model, we will use two types of equations to quantify the variables impact on both the short and long term. The co-integrated equation and the long-run model is:

$$ECT_{t-1} = [Y_{t-1} - \eta_j X_{t-1} - \xi_m R_{t-1}] \quad (5)$$

where

Y_{t-1} is the dependent variable

X_{t-1} are all the endogenous variables

R_{t-1} is the constant of the equation

Taking into account the short-run coefficients, the equation is:

$$\Delta y_t = \sigma + \sum_{i=1}^{k-1} \gamma_i \Delta y_{t-1} + \sum_{j=1}^{k-1} \eta_j \Delta X_{t-j} + \sum_{m=1}^{k-1} \xi_m \Delta R_{t-m} + \lambda \, ECT_{t-1} + u_t \quad (6)$$

y_t is the dependent variable
ΔX, ΔR....are the independent variables
γ_i, η_j, ξ_m are the coefficients
σ is the adjustment coefficient

In the last part of the research we will use a series of specific tests, in order to verify the validity of the obtained results. Thus we will start with the residual autocorrelation test, then we will check the normality test for the residuals, and finally we will check if the residues have heteroschedasticity.

a) To test the residual autocorrelation, we will use the LM serial correlation test, meaning we will follow the probabilities associated with the values of the F-Statistic R-squared statistical tests. If these probabilities exceed the 5% limit, it means that we will accept the null hypothesis which tells us that we have no serial correlation between the residuals for this model, and if the associated probabilities are below the 5% limit, thus becoming H1 which shows us that we have serial correlation between residues.
The testing is also done by using the largest number of lags that is plausible, or allowed by the sample studied.

b) To check whether or not the residuals are normally distributed, we will perform the Choleschy normality test where we will be interested in the probability of the Jarque Bera test, and if its probability is less than 5% we will reject the null hypothesis H0 that says the residues are normally distributed and we shall accept H1 - that the residues are not normally distributed. If the probability is P-value> 5% we choose H0, which tells us that the residuals are normally distributed.

c) The heroschedasticity test shows us if the residues have homoschedasticity or heteroschedasticity and thus if the probability associated with this test P-value > 5% we select H0 that says that the residues have homoschedasticity, and if the probability P-value <5%, we choose H1 that shows that the residuals have heteroschedasticity.

4. Results and discussions

The aim of our research is to identify the relationship and the impact of some of the macroeconomic indicators on the core business of the banking system.

In order to find out the correlation for loans-deposits, we choose some of the most relevant indicators, such as: Household Loans, Household Deposits, Consumer price index, Net average wage, and Monetary policy interest rate.

Our research employs the pooled sample data of the Romanian banking system during the 2007–2018 periods, extracted from the website of National Institute of Statistics, and National Bank of Romanian database.

The data was collected and analyzed in order to ascertain the relationship between the independent variables (Household deposits, Consumer price index, Net average wage, and Monetary policy interest rate) and the dependent variable (Household Loans).

Given the high record values for Loans and Deposits, they were divided by 1 million and then, except of MPIR, all the other variables (Loans, Deposits, CPI and WAGE) were logarithmic.

The interdependence between WAGE, DEPOSIT, and LOAN is higher and highlight the endogeneity problem which must be solved applying VECM model. We follow 5 steps in order to estimate the correlation between our variables:

1. Test the stationarity of the series
2. Determine optimal lag length (p) for the model
3. Perform Johansen cointegration test with (p) lags
4. Specify the Vector Error Correction Model, with (p-1) lags
5. Performed some diagnostics tests

First of all, we performed the UNIT ROOT TEST to ensure the stationary nature of the data series used in the analysis. We used monthly data, because we think that it is more relevant for our empirical analysis, and because of that we chose 12 lags for our model.

For the unit root we setup the following hypothesis:

Null Hypothesis H0: the variable is not stationary, or has unit test

Alternative H1: the variable is stationary

After perform the Augmented Dickey-Fuller test we saw that our variable is not stationary, meaning that we cannot reject the null hypothesis. To correct this, we apply the 1st difference and the series become stationary.

The probability is very significant, even below 1%, and also the absolute value is clearly higher than the 5% level, meaning that we have a stationary series, as we can see in the below equations.

In the first table we have the stationary series for LOANS, our dependent variable. The absolute value of t-Statistics for the loans series is higher than the critical value – 5% level showed in the equation, meaning the rejection of H0, and acceptance of H1, the significance being that our dependent variable has not unit root at I(0), meaning the variable is stationary.

Also for the probability associated with t-statistic we can observe that P – value 0.01%<<5%, meaning the rejection of H0 and acceptance of H1 hypothesis, which says the variable LOANS is stationary. The coefficient for LOANS lag 1 –> LOANS (-1) has a negative value, the interpretation being that Augmented Dickey-Fuller model is viable.

Table 1. Loans Stationarity

Null Hypothesis: LOANS has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.815599	0.0001
Test critical values:	1% level	-3.479281	
	5% level	-2.882910	
	10% level	-2.578244	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOANS)
Method: Least Squares
Date: 03/02/19 Time: 16:40
Sample (adjusted): 2007M05 2018M07
Included observations: 135 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOANS(-1)	-0.038388	0.007972	-4.815599	0.0000
D(LOANS(-1))	0.242271	0.081712	2.964923	0.0036
D(LOANS(-2))	0.070123	0.083621	0.838578	0.4032
D(LOANS(-3))	0.202279	0.078116	2.589449	0.0107
C	0.180307	0.037241	4.841594	0.0000

R-squared	0.620314	Mean dependent var	0.007848
Adjusted R-squared	0.608631	S.D. dependent var	0.018097
S.E. of regression	0.011322	Akaike info criterion	-6.087891
Sum squared resid	0.016663	Schwarz criterion	-5.980288
Log likelihood	415.9326	Hannan-Quinn criter.	-6.044164
F-statistic	53.09699	Durbin-Watson stat	2.040519
Prob(F-statistic)	0.000000		

Source: Own Calculations

The second table shows the stationary series for Deposits, which is also stationary at I(0). As we can see in the equation, the Dickey-Fuller t-Statistics absolute value is 3.890183, clearly higher than the critical values even at 10% level, meaning the rejection of H0 and selection of H1, being good because this variable is stationary. The (P) – value is 0.27 %<< 5%, and the coefficient for DEPOSITS (-1) is also negative, meaning that the variable is stationary and the model is viable.

Table 2. Deposits Stationarity

Null Hypothesis: DEPOSITS has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.890183	0.0027
Test critical values:	1% level	-3.478547	
	5% level	-2.882590	
	10% level	-2.578074	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DEPOSITS)
Method: Least Squares
Date: 03/02/19 Time: 16:41
Sample (adjusted): 2007M03 2018M07
Included observations: 137 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEPOSITS(-1)	-0.013021	0.003347	-3.890183	0.0002
D(DEPOSITS(-1))	0.289789	0.080732	3.589499	0.0005
C	0.068620	0.016258	4.220749	0.0000

R-squared	0.272255	Mean dependent var	0.009881
Adjusted R-squared	0.261393	S.D. dependent var	0.012910
S.E. of regression	0.011095	Akaike info criterion	-6.142954
Sum squared resid	0.016496	Schwarz criterion	-6.079013
Log likelihood	423.7923	Hannan-Quinn criter.	-6.116970
F-statistic	25.06519	Durbin-Watson stat	2.012989
Prob(F-statistic)	0.000000		

Source: Own Calculations

In addition to variables DEPOSITS and LOANS, we will also control and check the stationarity of the consumer price index (CPI), the net average wage (NAW), and the monetary policy interest rate (MPIR).

The results of the Dickey Fuller statistic tests at first difference for the consumer price index (CPI) series shows that this variable also has not unit root at first difference I(1). For this variable, t-Statistics 5.853760>>5%, the P-value 0% <<5% and the D(CPI(-1)) is negative says the acceptance of H1 hypothesis, showing that the D(CPI) – first difference of variable CPI is stationary.

Table 3. CPI Stationarity

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.853760	0.0000
Test critical values:	1% level	-3.478911	
	5% level	-2.882748	
	10% level	-2.578158	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI,2)
Method: Least Squares
Date: 03/02/19 Time: 16:43
Sample (adjusted): 2007M04 2018M07
Included observations: 136 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI(-1))	-0.608727	0.103989	-5.853760	0.0000
D(CPI(-1),2)	-0.158191	0.086198	-1.835217	0.0687
C	-0.001704	0.000528	-3.230780	0.0016

R-squared	0.374278	Mean dependent var	3.99E-05
Adjusted R-squared	0.364869	S.D. dependent var	0.006370
S.E. of regression	0.005076	Akaike info criterion	-7.706681
Sum squared resid	0.003427	Schwarz criterion	-7.642431
Log likelihood	527.0543	Hannan-Quinn criter.	-7.680571
F-statistic	39.77730	Durbin-Watson stat	1.993736
Prob(F-statistic)	0.000000		

Source: Own Calculations

The Dickey-Fuller test for the Net Average Wage (NAW) generated absolute value-Statistics of 8.215729. Since this is bigger than the critical value -5% level value and (P) –value is 0%, less than 5%, the series is stationary and we can also argue that it is appropriately identified as one of the endogenous variables, because it influences both loans and deposits. This variable becomes stationary at second difference, due to the seasonality of this series and the model is viable due to negative coefficient for the variable D(WAGE(-1),2).

Table 4. WAGE Stationarity

Null Hypothesis: D(WAGE,2) has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.215729	0.0000
Test critical values:	1% level	-3.483751	
	5% level	-2.884856	
	10% level	-2.579282	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(WAGE,3)
Method: Least Squares
Date: 03/02/19 Time: 16:45
Sample (adjusted): 2008M04 2018M07
Included observations: 124 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(WAGE(-1),2)	-14.35470	1.747222	-8.215729	0.0000
D(WAGE(-1),3)	12.05697	1.689112	7.138052	0.0000
D(WAGE(-2),3)	10.60789	1.574290	6.738206	0.0000
D(WAGE(-3),3)	9.278035	1.444920	6.421141	0.0000
D(WAGE(-4),3)	8.041886	1.302805	6.172747	0.0000
D(WAGE(-5),3)	6.911718	1.149799	6.011240	0.0000
D(WAGE(-6),3)	5.842049	0.988863	5.907847	0.0000
D(WAGE(-7),3)	4.782684	0.825532	5.793455	0.0000
D(WAGE(-8),3)	3.742835	0.661355	5.659346	0.0000
D(WAGE(-9),3)	2.688410	0.500417	5.372342	0.0000
D(WAGE(-10),3)	1.579404	0.347366	4.546798	0.0000
D(WAGE(-11),3)	0.456567	0.203925	2.238904	0.0272
D(WAGE(-12),3)	0.114661	0.083511	1.372997	0.1725
C	-0.000451	0.001734	-0.259902	0.7954

R-squared	0.967369	Mean dependent var	-0.000948
Adjusted R-squared	0.963512	S.D. dependent var	0.100818
S.E. of regression	0.019258	Akaike info criterion	-4.955785
Sum squared resid	0.040795	Schwarz criterion	-4.637366
Log likelihood	321.2587	Hannan-Quinn criter.	-4.826436
F-statistic	250.8469	Durbin-Watson stat	1.856572
Prob(F-statistic)	0.000000		

Source: Own Calculations

Also the last chosen variable, the Monetary Policy Interest Rate (MPIR), has a unit root, and it becomes stationary at second difference I(2), as we can see in the below equation:

Table 5. MPIR Stationarity

Null Hypothesis: D(MPIR,2) has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on AIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.580561	0.0000
Test critical values:	1% level	-3.480425	
	5% level	-2.883408	
	10% level	-2.578510	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MPIR,3)
Method: Least Squares
Date: 03/02/19 Time: 16:46
Sample (adjusted): 2007M08 2018M07
Included observations: 132 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MPIR(-1),2)	-2.382620	0.314307	-7.580561	0.0000
D(MPIR(-1),3)	0.857808	0.277688	3.089101	0.0025
D(MPIR(-2),3)	0.466655	0.222933	2.093254	0.0383
D(MPIR(-3),3)	0.303207	0.152346	1.990257	0.0487
D(MPIR(-4),3)	0.202999	0.084018	2.416144	0.0171
C	0.004393	0.014961	0.293625	0.7695

R-squared	0.738841	Mean dependent var	-0.001894
Adjusted R-squared	0.728477	S.D. dependent var	0.329086
S.E. of regression	0.171480	Akaike info criterion	-0.644313
Sum squared resid	3.705072	Schwarz criterion	-0.513277
Log likelihood	48.52467	Hannan-Quinn criter.	-0.591066
F-statistic	71.29288	Durbin-Watson stat	1.995778
Prob(F-statistic)	0.000000		

Source: Own Calculations

According to our first hypothesis all stationarity tests ended up with t-Statistics higher than critical level, thus we can reject the null hypothesis that those variables are exogenous.

For the second hypothesis we suppose that all variables are not stationary and we can argue that our VECM is justified, its results being consistent and unbiased. So that the next step for our analysis is to select the optimal lags for our model. Started from the variables evolution, in the last decade, we can see in the below graphs that three of our variables (LOANS, DEPOSITS and WAGE) have had a positive trend and the other two (CPI and MPIR) show a negative trend.

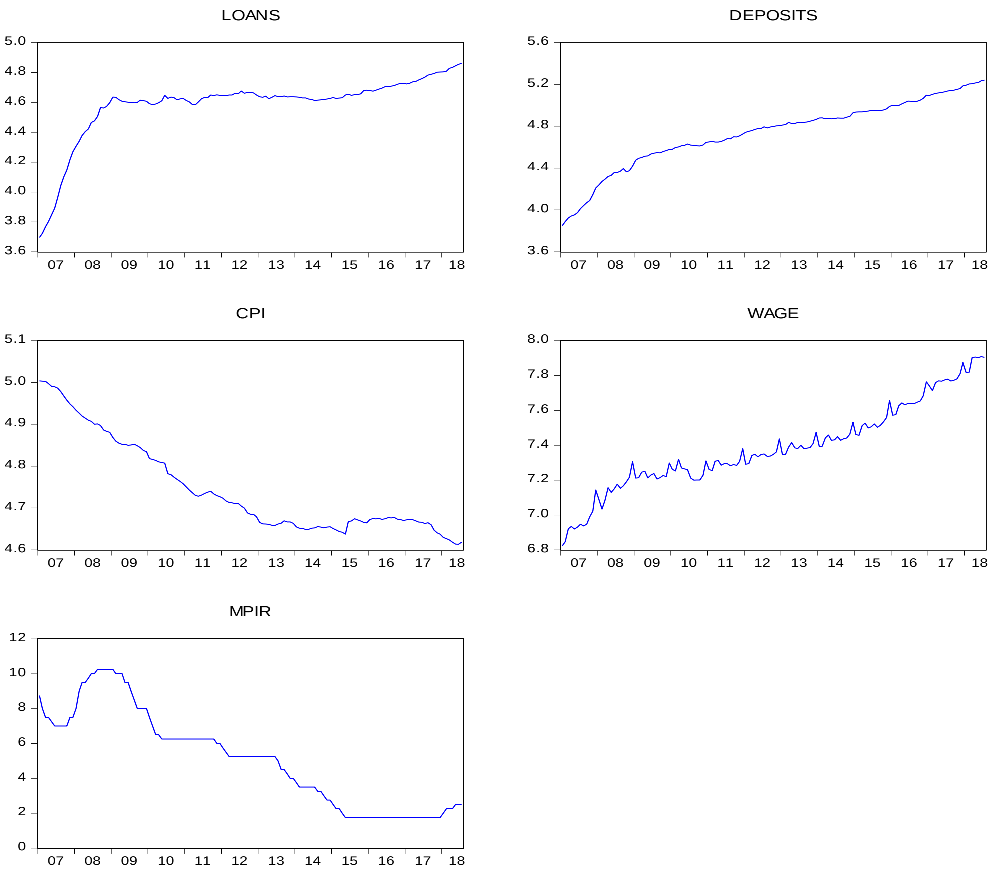

Figure 1. Variables used in the models

Source: Own Calculations

Most of the criteria from the unrestricted VAR suggest that the optimum lags is three, and we should use this three lags in our Vector Error Correction Model. Accordingly we can use any of the following criteria: Sequential modified LR test, (FPE), (AIC), but we decided to use AIC and we shall keep these three lags in our analysis.

Table 6. Number of Lags Selection

VAR Lag Order Selection Criteria
Endogenous variables: LOANS DEPOSITS CPI
WAGE MPIR
Exogenous variables: C
Date: 03/02/19 Time: 17:48
Sample: 2007M01 2018M07
Included observations: 135

Lag	LogL	LR	FPE	AIC	SC	HQ
0	493.1470	NA	4.98e-10	-7.231807	-7.124204	-7.188080
1	1714.610	2334.351	9.98e-18	-24.95718	-24.31156*	-24.69482
2	1766.526	95.37199	6.71e-18	-25.35594	-24.17231	-24.87494*
3	1803.089	64.45884*	5.67e-18*	-25.52724*	-23.80559	-24.82761
4	1823.360	34.23681	6.13e-18	-25.45719	-23.19753	-24.53893

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: Own Calculations

According to Akaike Criterion (AIC), we chosen 4 lags and performed the Johansen Cointegration test, which shows that we shall reject the null hypothesis. The cointegration test also indicates that we have four cointegration equations, meaning that our variables are serial correlated. That means that our data has a trend, and there is a long run connection between our variables.

The causality showed us a major impact which deposits have on loans whereas the impact of loans on deposits is negative and insignificant. So on a system level, loans are returning into the banks as deposits and their value depends both on the net average wage of the population, consumer price index, and the monetary policy interest rate set by the national bank.

Table 7. Variables cointegration equations

Date: 03/02/19 Time: 17:52
Sample (adjusted): 2007M05
2018M07
Included observations: 135 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: LOANS DEPOSITS CPI
WAGE MPIR
Lags interval (in first differences): 1 to 3

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.395732	156.2434	88.80380	0.0000
At most 1 *	0.241826	88.23883	63.87610	0.0001
At most 2 *	0.167249	50.86515	42.91525	0.0067
At most 3 *	0.128497	26.15740	25.87211	0.0461
At most 4	0.054671	7.589970	12.51798	0.2870

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.395732	68.00462	38.33101	0.0000
At most 1 *	0.241826	37.37368	32.11832	0.0104
At most 2	0.167249	24.70775	25.82321	0.0696
At most 3	0.128497	18.56743	19.38704	0.0655
At most 4	0.054671	7.589970	12.51798	0.2870

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOANS	DEPOSITS	CPI	WAGE	MPIR	@TREND (07M02)
25.82833	-17.44998	6.516203	-23.78581	-0.059740	0.220444
-15.41488	23.04124	-33.17636	36.66079	-1.125168	-0.476896
37.98136	-87.84638	-49.59541	39.35026	-1.766069	0.044970
4.586460	3.647061	6.520037	-6.388058	0.588438	0.032535
0.692998	19.28427	40.12804	-9.240615	-0.993987	-0.073664

Unrestricted Adjustment Coefficients (alpha):

D(LOANS)	-0.005493	-0.001334	0.001577	-0.001733	0.000505
D(DEPOSITS)	-0.001101	-0.002777	0.003156	-0.000143	3.50E-05
D(CPI)	5.51E-05	-5.01E-05	0.000182	-0.001045	-0.000866

D(WAGE)	0.007377	-0.012587	-0.001459	-0.003533	0.000670
D(MPIR)	0.039680	0.029019	0.025014	-0.029876	0.015406

1 Cointegrating Equation(s):		Log likelihood	1800.482

Normalized cointegrating coefficients (standard error in parentheses)

LOANS	DEPOSITS	CPI	WAGE	MPIR	@TREND (07M02)
1.000000	-0.675614	0.252289	-0.920920	-0.002313	0.008535
	(0.18691)	(0.30436)	(0.26639)	(0.00960)	(0.00193)

Adjustment coefficients (standard error in parentheses)

D(LOANS)	-0.141883
	(0.02334)
D(DEPOSITS)	-0.028426
	(0.02299)
D(CPI)	0.001424
	(0.01126)
D(WAGE)	0.190528
	(0.06958)
D(MPIR)	1.024872
	(0.34386)

2 Cointegrating Equation(s):		Log likelihood	1819.169

Normalized cointegrating coefficients (standard error in parentheses)

LOANS	DEPOSITS	CPI	WAGE	MPIR	@TREND (07M02)
1.000000	0.000000	-1.314779	0.281103	-0.064425	-0.009942
		(0.51801)	(0.47300)	(0.02469)	(0.00494)
0.000000	1.000000	-2.319473	1.779157	-0.091934	-0.027349
		(0.61079)	(0.55771)	(0.02911)	(0.00582)

Adjustment coefficients (standard error in parentheses)

D(LOANS)	-0.121325	0.065129
	(0.02693)	(0.02587)
D(DEPOSITS)	0.014380	-0.044778
	(0.02564)	(0.02464)
D(CPI)	0.002197	-0.002117
	(0.01312)	(0.01260)
D(WAGE)	0.384554	-0.418742
	(0.07315)	(0.07029)

D(MPIR)	0.577552	-0.023791
	(0.39230)	(0.37697)

3 Cointegrating Equation(s):	Log likelihood	1831.523

Normalized cointegrating coefficients (standard error in parentheses)

LOANS	DEPOSITS	CPI	WAGE	MPIR	@TREND (07M02)
1.000000	0.000000	0.000000	-0.914427	-0.016626	0.002855
			(0.24828)	(0.01542)	(0.00243)
0.000000	1.000000	0.000000	-0.329943	-0.007609	-0.004773
			(0.17645)	(0.01096)	(0.00173)
0.000000	0.000000	1.000000	-0.909301	0.036355	0.009733
			(0.13035)	(0.00809)	(0.00128)

Adjustment coefficients (standard error in parentheses)

D(LOANS)	-0.061423	-0.073418	-0.069768
	(0.04280)	(0.08169)	(0.05302)
D(DEPOSITS)	0.134232	-0.321983	-0.071546
	(0.03883)	(0.07411)	(0.04810)
D(CPI)	0.009105	-0.018095	-0.006998
	(0.02111)	(0.04030)	(0.02616)
D(WAGE)	0.329121	-0.290532	0.538042
	(0.11765)	(0.22456)	(0.14575)
D(MPIR)	1.527617	-2.221178	-1.944748
	(0.62197)	(1.18722)	(0.77056)

4 Cointegrating Equation(s):	Log likelihood	1840.807

Normalized cointegrating coefficients (standard error in parentheses)

LOANS	DEPOSITS	CPI	WAGE	MPIR	@TREND (07M02)
1.000000	0.000000	0.000000	0.000000	0.067709	-0.002074
				(0.05296)	(0.00404)
0.000000	1.000000	0.000000	0.000000	0.022820	-0.006551
				(0.01954)	(0.00149)
0.000000	0.000000	1.000000	0.000000	0.120217	0.004833
				(0.05374)	(0.00410)
0.000000	0.000000	0.000000	1.000000	0.092227	-0.005390
				(0.05871)	(0.00448)

Adjustment coefficients (standard error in parentheses)

D(LOANS)	-0.069369	-0.079737	-0.081064	0.154898
	(0.04228)	(0.08041)	(0.05246)	(0.05139)
D(DEPOSITS)	0.133578	-0.322504	-0.072476	0.049459
	(0.03900)	(0.07416)	(0.04838)	(0.04740)
D(CPI)	0.004311	-0.021908	-0.013814	0.010686
	(0.02068)	(0.03934)	(0.02566)	(0.02514)
D(WAGE)	0.312916	-0.303418	0.515005	-0.671770
	(0.11711)	(0.22271)	(0.14529)	(0.14234)
D(MPIR)	1.390594	-2.330136	-2.139538	1.295176
	(0.61025)	(1.16055)	(0.75710)	(0.74175)

Source: Own Calculations

In the long-run connection, the deposits, the net average wage and the monetary policy interest rate have a positive impact on loans, while the consumer price index has a negative impact on the loans, on average, caeteris paribus. The coefficients are statistically significant at the 1% level.

Our conclusion is that the null hypothesis of no cointegration is rejected against the alternative of a cointegrating relationship in the model.

Table 8. Coefficients of Cointegration

1 Cointegrating Equation(s): Log likelihood 1800.482

Normalized cointegrating coefficients (standard error in parentheses)

LOANS	DEPOSITS	CPI	WAGE	MPIR	@TREND(07M0)
1.000000	-0.675614	0.252289	-0.920920	-0.002313	0.008535
	(0.18691)	(0.30436)	(0.26639)	(0.00960)	(0.00193)

Source: Own Calculations

According to the trace statistics all variables are cointegrated. Both tests show same results, and that means that we can run the Vector Error Correction Model.

The cointegrated equation and the long-run model is:

$$ECT_{t-1} = [Y_{t-1} - \eta_j X_{t-1} - \xi_m R_{t-1}] \quad (7)$$

where

Y_{t-1} is the dependent variable

X_{t-1} are all the endogenous variables

R_{t-1} is the constant of the equation

Our results generated the following equation, signifying long-run relationship among the variables:

$$ECT_{t-1} = [1000 loans_{t-1} - 0.563 deposits_{t-1} + 0.083 cpi_{t-1} - 0.895 \text{wage}_{t-1} + 0.005 \text{mpir}_{t-1} + 0.007 \text{TREND(07M01)}_{t-1} + 3.730] \quad (8)$$

After we performed Vector Error Correction Model, we obtained the results presented in the following table:

Tabel 9. Vector Error Correction Model

Vector Error Correction Estimates
Date: 03/02/19 Time: 18:19
Sample (adjusted): 2007M04 2018M07
Included observations: 136 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1				
LOANS(-1)	1.000000				
DEPOSITS(-1)	-0.563883				
	(0.23404)				
	[-2.40939]				
CPI(-1)	0.083324				
	(0.39538)				
	[0.21074]				
WAGE(-1)	-0.895442				
	(0.33028)				
	[-2.71113]				
MPIR(-1)	0.005625				
	(0.01276)				
	[0.44091]				
@TREND(07M01)	0.007699				
	(0.00247)				
	[3.12227]				
C	3.730952				
Error Correction:	**D(LOANS)**	**D(DEPOSITS)**	**D(CPI)**	**D(WAGE)**	**D(MPIR)**
CointEq1	-0.114909	-0.017506	-0.003847	0.045416	0.340838
	(0.01736)	(0.01748)	(0.00795)	(0.05171)	(0.26265)
	[-6.61907]	[-1.00121]	[-0.48367]	[0.87832]	[1.29771]
D(LOANS(-1))	0.270624	0.065087	-0.049665	0.551993	2.534591
	(0.10385)	(0.10460)	(0.04758)	(0.30932)	(1.57117)
	[2.60588]	[0.62227]	[-1.04386]	[1.78453]	[1.61318]
D(LOANS(-2))	0.304534	0.142545	0.008526	0.062081	1.421106
	(0.09923)	(0.09994)	(0.04546)	(0.29556)	(1.50125)

Vector Error Correction Estimates
Date: 03/02/19 Time: 18:19
Sample (adjusted): 2007M04 2018M07
Included observations: 136 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	[3.06898]	[1.42628]	[0.18755]	[0.21005]	[0.94661]
D(DEPOSITS(-1))	-0.183962	0.145180	-0.016858	-0.179841	-3.135088
	(0.11466)	(0.11548)	(0.05253)	(0.34152)	(1.73472)
	[-1.60440]	[1.25714]	[-0.32092]	[-0.52659]	[-1.80725]
D(DEPOSITS(-2))	-0.345574	-0.091609	-0.043409	-0.390637	3.025821
	(0.11516)	(0.11599)	(0.05276)	(0.34302)	(1.74233)
	[-3.00070]	[-0.78979]	[-0.82274]	[-1.13882]	[1.73665]
D(CPI(-1))	-0.005988	-0.168511	0.237814	-0.333077	1.400335
	(0.19869)	(0.20011)	(0.09103)	(0.59179)	(3.00596)
	[-0.03014]	[-0.84208]	[2.61257]	[-0.56283]	[0.46585]
D(CPI(-2))	-0.071475	-0.453956	0.114973	-1.247310	-4.215714
	(0.19275)	(0.19414)	(0.08831)	(0.57411)	(2.91616)
	[-0.37081]	[-2.33834]	[1.30196]	[-2.17258]	[-1.44564]
D(WAGE(-1))	-0.077713	0.029939	-0.023772	-0.308901	0.634401
	(0.02945)	(0.02966)	(0.01349)	(0.08772)	(0.44556)
	[-2.63875]	[1.00935]	[-1.76188]	[-3.52149]	[1.42383]
D(WAGE(-2))	-0.009145	0.039630	-0.000743	-0.388011	0.661068
	(0.02771)	(0.02791)	(0.01269)	(0.08253)	(0.41918)
	[-0.33005]	[1.42012]	[-0.05855]	[-4.70170]	[1.57704]
D(MPIR(-1))	0.007546	0.005484	-0.003852	0.000214	0.338090
	(0.00569)	(0.00573)	(0.00261)	(0.01695)	(0.08609)
	[1.32612]	[0.95689]	[-1.47769]	[0.01261]	[3.92723]
D(MPIR(-2))	0.003435	-0.004803	0.003158	0.005804	0.074542
	(0.00558)	(0.00562)	(0.00256)	(0.01661)	(0.08438)
	[0.61591]	[-0.85494]	[1.23608]	[0.34937]	[0.88340]
C	0.009438	0.005103	-0.000689	0.009064	-0.070443
	(0.00178)	(0.00179)	(0.00081)	(0.00529)	(0.02688)
	[5.31259]	[2.85191]	[-0.84646]	[1.71304]	[-2.62101]
R-squared	0.671339	0.325679	0.190626	0.330003	0.353965
Adj. R-squared	0.642183	0.265860	0.118827	0.270568	0.296656
Sum sq. resids	0.014652	0.014863	0.003075	0.129985	3.353679
S.E. equation	0.010870	0.010948	0.004980	0.032377	0.164456
F-statistic	23.02619	5.444417	2.654990	5.552316	6.176382
Log likelihood	428.2612	427.2884	534.4202	279.8277	58.80094

Vector Error Correction Estimates					
Date: 03/02/19 Time: 18:19					
Sample (adjusted): 2007M04 2018M07					
Included observations: 136 after adjustments					
Standard errors in ( ) & t-statistics in [ ]					
Akaike AIC	-6.121489	-6.107182	-7.682650	-3.938643	-0.688249
Schwarz SC	-5.864490	-5.850183	-7.425651	-3.681644	-0.431250
Mean dependent	0.008043	0.009698	-0.002826	0.007230	-0.036765
S.D. dependent	0.018172	0.012778	0.005305	0.037909	0.196095
Determinant resid covariance (dof adj.)		4.64E-18			
Determinant resid covariance		2.92E-18			
Log likelihood		1780.575			
Akaike information criterion		-25.21433			
Schwarz criterion		-23.80084			

Source: Own Calculations

Taking into account the short-run coefficients, the equations is:

$$\Delta y_t = \sigma + \sum_{i=1}^{k-1} \gamma_i \Delta y_{t-1} + \sum_{j=1}^{k-1} \eta_j \Delta X_{t-j} + \sum_{m=1}^{k-1} \xi_m \Delta R_{t-m} + \lambda\, ECT_{t-1} + u_t \qquad (9)$$

y_t is the dependent variable
ΔX, ΔR....are the independent variables
γ_i, η_j, ξ_m are the coefficients
σ is the adjustment coefficient

As loans were set as the target variable, after running the VECM, we obtained the equation below:

$$\Delta loans_t = -0.114 ECT_{t-1} + 0.270 \Delta loans_{t-1} - 0.183 \Delta deposits_{t-1} - 0.005 \Delta cpi_{t-1} - 0.077 \Delta wage_{t-1} + 0.007 \Delta mpir_{t-1} + 0.009 \qquad (10)$$

The deviations from long-run equilibrium from previous periods is corrected with adjustment speed of 11,4% in the current period.

The percentage change in DEPOSITS, CPI, and WAGE is associated with a decrease in LOANS (of 0.183%, of 0.005%, respectively of 0.077%), while the percentage change in MPIR is associated with a 0.007% increase in LOANS on average caeteris paribus in the short-run.

Analyzing these results, our theory support VECM for taking into account the loans-deposits connection and for outcomes which show us the performance of banking system in Romania, supported also by a good use of funds.

Apart of CPI that has a negative influence on loans, the rest of independent variables have a positive influence, the WAGE having the most significant impact on loans. So this WAGE factor supports Romanian banks in delivering a much higher number of loans for the banking system.

As we can see in the graph, the deposits have a negative influence on loans in the first six months, and after that the loan rate begins to increase. Thus, this major growth can be interpreted as an improvement in the level of financial education of Romanian investors. After a saving period, the investors find a good opportunity to invest, and the evolution of loans shows that many investors have chosen to take advantage of this opportunity.

Regarding the evolution of loans at a CPI impact, in the first half of the year the CPI hardly influences the loan rate. After that we notice a negative relationship between the Consumer price index and the loan rate. This is based on the fact that an increase in market prices affects the bank liquidity, and has a negative influence on the loan (asset) portfolio of commercial banks.

As shown in the chart below, there is a positive relationship between Net average wage and Household Loans, which is in line with the monetary policy. By increasing the WAGE, commercial banks will be able to grant higher loans.

The monetary policy interest rate does not influence the evolution of loans in the first 3 months, between 3 and 6 months has little influence, and after the sixth month it starts to have a powerful impact on the loans. This can be explained by the fact that interest rates on loans are variable depending on ROBOR 3M, or ROBOR 6M.

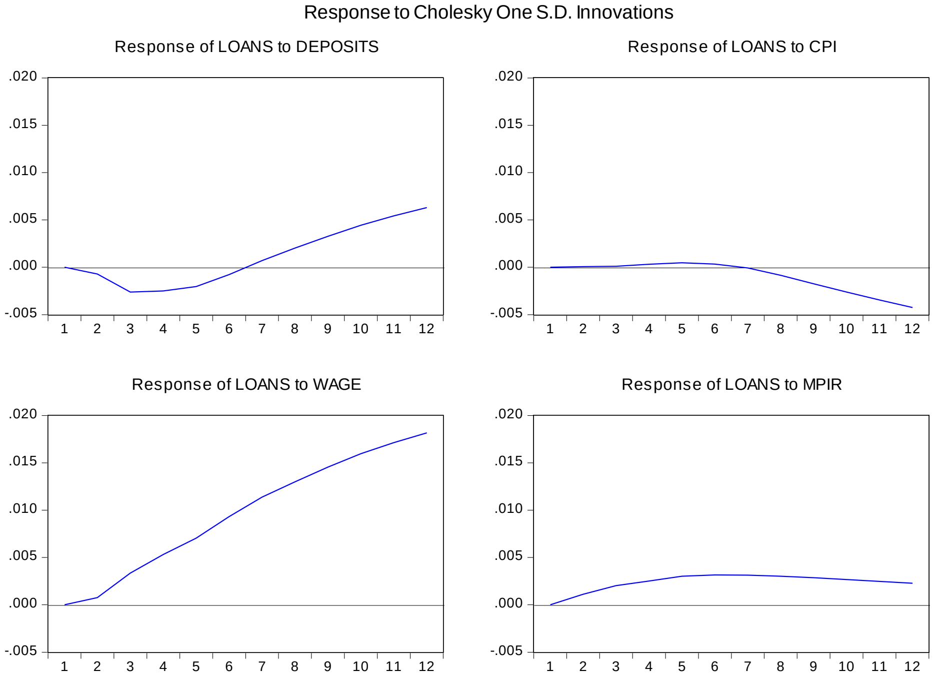

Figure 2. Cholesky Test
Source: Own Calculations

The picture of operational efficiency of Romanian banks is clearer, when examined over time. For this reason, we decided to analyze the loans and the deposits evolutions together over the last years.

Though the number of deposits from banks shown us a considerable increase for the study, the number of loans granted increased until 2008, stagnated during the 2009-2016 period, and from 2017 the loan rate began to slightly increase.

The graph below show us the average efficiency of loans from Romanian banks for the selected period of time, which had a linear trend between 2009 and 2017, when it began to increase slowly (blue lineage for Figure 2); while the average efficiency measured annually for deposit operations increased during the same period (the red trend line in Figure 2). Whilst the former show a problem for Romanian banks, the latter shows a good signal.

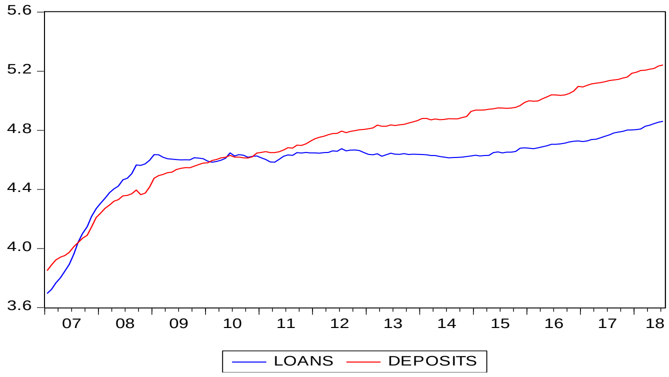

Figure 3. Loans and deposits evolution
Source: Own Calculations

As our analyses results show, deposits have a positive and more powerful impact on loans, than the impact of loans on deposits which is not significant. The loan rate decreased because of the loan interest rates, but the deposit rate has increased even if the interest rate on deposits has dropped over the past few years.

In other words, while the contribution of the bank's loan-creating activities is not so clear, the decrease of deposit activities will affect the banks' lending and that will have a negative influence on the entire system of banks.

Thus we recommend for Romanian banks maintaining an affirmative tendency on deposit activities, and also focus more on loan-creating activities.

In the last part of our research, we performed some diagnostics tests to see if our results are valid or not. We started with the residual test of autocorrelation, then we checked the normality of the residuals and finally we checked whether the residuals have heteroskedasticity.

a. For the Autocorrelation Test, we used two lags and found out that the probability values are higher than 5% level, meaning we have no serial correlation.

Tabel 10. Serial Correlation LM Test

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 01/19/19 Time: 15:40
Sample: 2007M01 2018M07
Included observations: 131

Lags	LM-Stat	Prob
1	44.12428	0.1658
2	33.71534	0.5777

Probs from chi-square with 36 df.

Source: Own Calculation

b. The second diagnostics test that we performed is the Normality Test.

In the equation we have the results for Skewness, Kurtosis, and Jarque-Bera. We are mostly interested in the Jarque-Bera test, where we have five components, and each component represents our variables in the system.

As we can see in the table below for all components of our model the residuals are not normally distributed, meaning that Jarque Bera Joint probability is less than 5%.

Tabel 11. Cholesky Normality Test

VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 03/02/19 Time: 19:01
Sample: 2007M01 2018M07
Included observations: 136

Component	Skewness	Chi-sq	df	Prob.
1	0.229446	1.193299	1	0.2747
2	0.190582	0.823285	1	0.3642
3	1.826546	75.62211	1	0.0000
4	0.062416	0.088304	1	0.7663
5	-0.076726	0.133435	1	0.7149
Joint		77.86043	5	0.0000

Component	Kurtosis	Chi-sq	df	Prob.
1	5.038040	23.53711	1	0.0000
2	4.144784	7.426340	1	0.0064
3	20.01289	1640.151	1	0.0000
4	3.915331	4.747712	1	0.0293
5	4.491489	12.60572	1	0.0004
Joint		1688.468	5	0.0000

Component	Jarque-Bera	df	Prob.
1	24.73041	2	0.0000
2	8.249624	2	0.0162
3	1715.774	2	0.0000
4	4.836016	2	0.0891
5	12.73916	2	0.0017
Joint	1766.329	10	0.0000

Source: Own Calculations

c. The Heteroskedasticity Test shows that the probability value is 1,31%, so we will reject the null hypothesis, meaning that our model is heteroskedastic, P – value << 5% and residuals have heteroschedasticity.

Table 12. Residuals Heteroskedasticity Test

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 03/02/19 Time: 19:07
Sample: 2007M01 2018M07
Included observations: 136

Joint test:

Chi-sq	df	Prob.
389.7546	330	0.0131

Individual components:

Dependent	R-squared	F(22,113)	Prob.	Chi-sq(22)	Prob.
res1*res1	0.256084	1.768129	0.0284	34.82740	0.0404
res2*res2	0.284400	2.041342	0.0082	38.67844	0.0154
res3*res3	0.112668	0.652182	0.8759	15.32280	0.8480
res4*res4	0.354984	2.826795	0.0002	48.27784	0.0010
res5*res5	0.368395	2.995870	0.0001	50.10165	0.0006
res2*res1	0.267847	1.879058	0.0173	36.42715	0.0273
res3*res1	0.090329	0.510033	0.9647	12.28474	0.9512
res3*res2	0.191819	1.219097	0.2465	26.08735	0.2480
res4*res1	0.143033	0.857290	0.6490	19.45249	0.6172
res4*res2	0.280868	2.006084	0.0097	38.19804	0.0174
res4*res3	0.135299	0.803683	0.7155	18.40068	0.6820
res5*res1	0.206961	1.340448	0.1616	28.14671	0.1709
res5*res2	0.306448	2.269517	0.0028	41.67692	0.0068
res5*res3	0.107552	0.619002	0.9027	14.62710	0.8777
res5*res4	0.306882	2.274154	0.0027	41.73595	0.0067

Source: Own Calculations

Taking into account these results, we can make an overall view on operational efficiency of the Romanian banking system using stocks for the period between 2007 and 2018. According to our findings, banking system in Romania is much competitive for deposit operations compared with lending operations, because in the last twelve years the deposit rate has increased more than the loan rate.

5. Conclusions

The economic theory and the studies carried out point to a series of variables as possible determinants of the bank loans, but in this paper we selected some of the variables that we think most influence the evolution of the bank lending activity, such as: Deposits, Net Average Wage, Consumer Price Index and Monetary Policy Interest Rate.

We know that traditional banking studies show a strong loan-deposit connection, but it can't be analyzed from causality or effectiveness perspective. Therefore, in our research, we investigated the efficiency of loan activities and deposit activities in a simultaneous framework to determine the causality connection among operational effectiveness and the structure deposits-loans from banks. This manner provides an overall view on the efficiency of the loans and deposits, these two being the essential operations for the banking system in Romania.

Taking into account that our study uses information gathered from the yearly reports of the National Bank of Romania, over a twelve-year period, from 2007 to 2018, we examine a range of the possible explanatory variables, analyzing the causal connection of the deposit-loan structure for the Romanian banks.

The deposits-loans connection is relevant in one single direction, because only the deposits influence loans, while the loans do not affect the deposits value. This is showing us, speaking about limited sources of financing in the case of loans for Romania, that bank's deposits are very important. On the other hand, the effect of loans on deposits is not significant, and this might be happened due to decisions taken by the clients for creating deposits in Romanian banks because of safety or beliefs reasons, and not because of bank's efficiency. Thus, further studies with different variables or with a larger dataset are required to validate these findings.

From a different perspective, a rapid loan growth or a slow deposit growth in the banking system could presage funding tensions, because household deposits are the main source of loans for Romanian commercial banks. Thus, commercial banks must be concentrated on reducing of deposits attracted, or increasing the number of loans offered, or on both variants.

Using the Vector Error Correction Model (VECM) for our empirical analysis, we identified that banking system in Romania had a moderate performance of lending and deposit operations, but we think the Romanian commercial banks still have a room to improve these activities.

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