Post-Crisis Household Savings Behavior in Romania

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Abstract. *The recent linear growth trend recorded by net savings in Romania is very intriguing. We thus study household savings behavior using Vector Autoregression and Vector Error Correction models on a sample of post-2007 monthly data. Contrary to common economic theory, we find that real interest rates do not influence the loan and savings behavior of Romanian households in our sample, despite their significant volatility and, even, negative recorded values. The results indicate a change in attitude and in risk perception of Romanian households in the aftermath of the financial crisis in 2008, in the way that has significantly decreased their preference for present consumption in favor of savings. Despite the significant increase in net savings, we also find that they have not significantly contributed to economic growth.*

Keywords: Household Savings, Credit, Deposits, VECM, Romania

Introduction

Economic theory defines household saving as the difference between disposable income and consumption. Households typically defer consumption and make investments in order to generate reserves for future unpredictable situations and/or to increase future consumption. Savings are a source of well-being, but also a buffer in case of individual income shocks (Lidi et al., 2017). Saving can also be seen as a method of risk reduction, a situation arising from the imperfect ability to make forecasts. At the microeconomic level, savings become important because they can compensate for a financial shortage in case of unforeseen events in an individual's life. At the macroeconomic level, savings contribute to economic growth, being an important source of capital that helps finance firms, investments and, in general, economic activity.

Savings are associated with economic growth in neoclassical growth models and play an important role in a country's economic development process. Countries that have a high level of savings and, implicitly, investments, are well positioned to achieve a faster growth rate. Savings also play an important role in alleviating constraints on financing a country's economy, as well as granting householder loans. The household's preference for saving depends on macroeconomic factors, such as interest rate levels and/or interest rate spreads, as well as individual factors, such as income level, risk aversion, education, age, etc. For

example, in the case of the young population, the probability of contracting a loan and assuming a risk is higher than in the case of the adult population. In contrast, the adult and elderly population prefer deposits/saving at the expense of loans. Also, savings can also depend on national and/or cultural factors, on the political, institutional and fiscal environment, or on financial market regulations (Bover et al., 2013). The dynamics of country-wide savings can further be explained on the basis of representative indicators, such as wealth, government debt, the old-age dependency ratio, inflation rates, long-run interest rates and real disposable income (Hüfner and Koske, 2010). Given all of these possible influences, the total level of savings and, consequently, economic growth, can vary greatly from one country to another and from one period to another.

This study aims at analyzing the determinants of the savings and borrowing behavior of households in Romania after the financial crisis in 2008. Specifically, we are interested in investigating the dynamics of net savings and possible changes in household behavior following the economic recession that was experienced by the country in the aftermath of the crisis. Figure 1 shows how interest rates and net savings evolved in the post-crisis period. We observe that net savings bottomed out at the end of 2008 and then followed a consistent, fairly linear, uptrend, despite the substantial volatility in interest rates and even in the face of significant negative real interest rates recorded in 2017-2018. This evolution is very intriguing and we decide to investigate it in this paper. Using a Vector Autoregression (VAR) model and a Vector Error Correction model (VEC) based on macroeconomic data collected for Romania, we are interested in answering questions such as: Why did net savings continue to grow even in the context of real negative interest rates on deposits? How did this development affect the degree of economic growth (GDP) and, ultimately, the economic well-being of the population? What are the roles of savings and credit for economic development in the post-crisis environment?

Figure 1. Interest rates (long-term deposits-red; long-term loan-green) and net savings (black) in Romania

Source: Authors' own contribution

The study of household savings behavior is not new, both at the international level as

well as for Romania. For example, Ismail and Rashid (2013) find a significant interdependence between savings, consumption and income (wages, pension, and health insurance) in Pakistan, both in long-run equilibrium and in short-term dynamics. Kapounek et al. (2016) analyzes (Ir)rational households' saving behavior and finds a significant impact of the current account deficits on foreign savings and also an insignificant impact of interest rate or inflation differentials taking into account the Fisher Effect. In most cases, authors find that economic growth does not stimulate savings, while, among others, Niculescu-Aron and Mihăescu (2012, 2014) emphasize that interest and inflation rates are the main determinants of saving. The authors also show that demographic determinants contribute to predicting the trend of saving, although, from a policy perspective, they are exogenous and are very difficult (if not impossible) to control. Also, savings behavior is closely related to the lending activity, and has an influence on the dynamics of GDP.

On the other hand, Dobrescu (2013) builds a model of the Romanian economy that incorporates households' consumption and savings as a function of income, interest rate, and the share of rural population, foreign trade, and prices. The author uses several control variables, including indicators of global output, foreign trade and prices, but the conclusions do not especially focus on savings behavior. This paper contributes to the literature by specifically investigating this behavior, which has possibly changed and has experienced an atypical evolution in the aftermath of the financial crisis. We are also interested in possible causes of these dynamics and their implications for economic development. Evidence show that the financial crisis had a significant impact on subsequent economic activity and behavior in Romania (Scutaru et al., 2015). Also, imbalances caused by the effects of the financial crisis have diminished consumer confidence in the banking sector (Duican and Pop, 2015). However, the behavior of net savings in Romania, as shown in Figure 1, is contrary to the expected effect of the previous findings in the literature. This paper investigates the causes behind this phenomena.

The rest of the paper is structured as follows. Section 2 defines the data and the methodology used to investigate savings behavior in Romania. Section 3 presents the main results and some robustness checks. The paper ends with a discussion and conclusions in Section 4.

Methodology and Data

We developed and estimate two simultaneous-equation models that study the interaction between changes in total income (GDP), the total value of long-term deposits (DEPOSITS) of the population to banks and the total amount of loans (CREDITS) obtained by the population from banks. In order to correctly specify these interactions in a model, we incorporate other relevant exogenous macroeconomic variables. We use the interest rates net of inflation (real interest rates) for three relevant categories of financial assets/liabilities. In addition, we incorporate control variables relevant to fiscal policy and social security policy. Table 1 summarizes the variables used in the model and provides a short description for each.

First, we are interested in modeling short-term interactions between variables, namely to investigate how the changes (shocks) in one determines changes in the others. We use a VAR model, for which the equations can be written as:

$$Y_t = \alpha + \beta X_t + \varepsilon_t \quad (1)$$

In equation (1), Y represents a column vector of dependent variables (in our case, this vector has 3 lines, one for each endogenous variable in the model), X represents a matrix

containing the independent variables and endogenous variable lags, β represents the sensitivity matrix of the endogenous variables to each factor in the model, while α and ε represent two column vectors, the first containing the intercepts and the second containing the estimation errors.

Table 1. Model variables: summary and description

Variable	Symbol	Description	Type
Total income	GDP or "PIB"	Real GDP per capita.	endogenous
Total deposits	DEPOSITS or "DEPOZITE"	Total deposits made by households at banks, adjusted for price levels.	endogenous
Total loans	CREDITS or "CREDITE_BANCI"	Total loans received by householders from banks, adjusted for price levels.	endogenous
Interest on deposits	R_DEPOSITS	Real interest rate on household deposits with a maturity of more than one year.	exogenous
Interest on real estate credits	R_RE_CREDITS	Real interest rate on loans for real estate property.	exogenous
Interest on consumer credit	R_CONS_CREDITS	Real interest rate on loans for consumption.	exogenous
VAT rate	VAT	Value Added Tax Level	exogenous
ECS rate	ECS	Level of Employee Contribution to the Social Insurance (Public Pensions) Fund.	exogenous
Pillar II quota	P2	Contribution to Pensions - Pillar II (Mandatory Private Pension System).	exogenous

Source: Authors' own contribution

Table 2. Result of cointegration tests of endogenous variables

Panel A: Trace test				
No cointegration relationships	Eigenvalue	Trace Statistics	Critical Value	Prob*.
None	0.1608	40.00	29.79	0.0023
At most 1	0.0944	15.11	15.49	0.0570
At most 2	0.0071	1.02	3.84	0.3113

Panel B: Max-Eigenvalue test				
No cointegration relationships	Eigenvalue	Trace Statistic	Critical Value	Prob.*
None	0.1608	24.89	21.13	0.0141
At most 1	0.0944	14.08	14.26	0.0533
At most 2	0.0071	1.02	3.84	0.3114

*MacKinnon-Haug-Michelis (1999) p-values

Source: Authors' own contribution

On the other hand, we are interested in the long-run relationship between the variables, namely, we want to test the way in which the values and/or the trend of some determines changes in the values and/or the trend of the others. For testing this type of interactions, we used a VEC modeling strategy that was developed by Engle and Granger (1987). The fundamental condition that allows the use of a VEC model is that the variables considered are cointegrated. To test this, we used the Johansen (1991) cointegration test, assuming the

hypothesis that the variables (GDP, DEPOSITS, CREDITS) follow a deterministic linear trend. The results of this test are presented in Table 2 and confirm the existence of two cointegration relationships, which implies that GDP, CREDITS and DEPOSITS are cointegrated and that the VEC model is well-specified.

We estimate our two models using monthly data for all variables, collected from public available sources, such as the National Institute of Statistics (<http://www.insse.ro/cms/en>) and the National Bank of Romania (<http://www.bnr.ro/Home.aspx>). Each data series starts in 2007M1 and ends in 2018M12, having 144 observations. At the end of the sample, some data points are missing; in this case, we either fill in the missing data with estimates obtained from the National Bank of Romania (such as is the case for GDP and interest rates), or we perform linear extrapolation using the last 12 observations available in the sample.

Table 3. Selection of the number of autoregressive terms (lags) for endogenous variables

Lag	LogL	LR	FPE	AIC	SIC	HQIC
1	1283.515	56.19548	9.81e-13	-19.1376	-18.47919*	-18.87008*
2	1288.418	8.833629	1.05e-12	-19.0751	-18.2191	-18.7273
3	1310.779	39.25955	8.54e-13	-19.2791	-18.2256	-18.8510
4	1322.272	19.65188	8.24e-13*	-19.3171	-18.0661	-18.8088
5	1324.457	3.635916	9.18e-13	-19.2131	-17.7645	-18.6245
6	1334.368	16.04019	9.09e-13	-19.2270	-17.5809	-18.5581
7	1339.709	8.398855	9.67e-13	-19.1711	-17.3275	-18.4220
8	1348.292	13.10279	9.80e-13	-19.1648	-17.1236	-18.3353
9	1358.873	15.67022	9.66e-13	-19.1889	-16.9502	-18.2792
10	1367.755	12.74708	9.78e-13	-19.1871	-16.7509	-18.1972
11	1383.000	21.17894	9.01e-13	-19.2824	-16.6487	-18.2122
12	1396.129	17.63879*	8.59e-13	-19.34547*	-16.5142	-18.1950

NOTES: * the optimal number of lags selected by each criterion; LogL - Log Likelihood; LR - LR statistical test; FPE - the final prediction error; AIC - Akaike information criterion; SIC - Schwarz information criterion; HQIC - Hannan-Quinn information criterion.

Source: Authors' own contribution

We next consider specifying the number of autoregressive terms (lags) for the endogenous variables. For this selection, we use standard information criteria and we test from 1 to 12 possible terms. Table 3 summarizes the test results. The Schwartz and Hannan-Quinn criteria favors a single lag model, while the Akaike and the Log Likelihood criteria favors a 12-lag model. We decide on a single-lag specification for the primary models, while we also estimate the VAR and VEC models using 12 lags, to determine the robustness of the results to changes in the number of selected lags. The lag-length test results enable us to specify the main VAR model as:

$$\begin{aligned}
 gdp_t &= \beta_1 gdp_{t-1} + \beta_2 deposits_{t-1} + \beta_3 credits_{t-1} + \alpha + \beta_4 R_DEPOSITS_t \\
 &\quad + \beta_5 R_RE_CREDITS_t + \beta_6 R_CONS_CREDITS_t + \beta_7 VAT_t + \beta_8 ECS_t + \beta_9 P2_t \\
 &\quad + \epsilon_t \\
 deposits_t &= \beta_1 gdp_{t-1} + \beta_2 deposits_{t-1} + \beta_3 credit_{t-1} + \alpha + \beta_4 R_DEPOSITS_t \\
 &\quad + \beta_5 R_RE_CREDITS_t + \beta_6 R_CONS_CREDITS_t + \beta_7 VAT_t + \beta_8 ECS_t + \beta_9 P2_t \\
 &\quad + \epsilon_t
 \end{aligned} \tag{2}$$

$$\begin{aligned} credits_t = & \beta_1 gdp_{t-1} + \beta_2 deposits_{t-1} + \beta_3 credits_{t-1} + \alpha + \beta_4 R_DEPOSITS_t \\ & + \beta_5 R_RE_CREDITS_t + \beta_6 R_CONS_CREDITS_t + \beta_7 VAT_t + \beta_8 ECS + \beta_9 P2_t \\ & + \epsilon_t \end{aligned}$$

In equation (2), we use lower-case letters to denote variables that are log-differentiated for stationarity. The resulting model is estimated using MLE and the results are presented and discussed in the next section.

Results

Table 4 summarizes the results from the VAR model specified in Equation (2). In terms of economic theory, the results show that credit is positively and statistically significant influenced by the increase in deposits, while economic growth positively influences both the savings and credit. Also, real interest rates on deposits have a positive and statistically significant effect on deposits, while real interest rates on loans have a negative and statistically significant effect on credit. These results are expected and confirm the general validity of our model.

Table 4. VAR model estimation results

	D(LOG(PIB))	D(LOG(DEPOZITE))	D(LOG(CREDITE))
D(LOG(GDP(-1)))	0.542512 (0.07959) [6.81597]***	0.041215 (0.10255) [0.40188]	0.215482 (0.10821) [1.99131]**
D(LOG(DEPOSITS(-1)))	-0.18271 (0.0836) [-2.18541]***	0.156747 (0.10772) [1.45513]	-0.25135 (0.11366) [-2.21137]**
D(LOG(CREDITS(-1)))	-0.03713 (0.08329) [-0.44575]	-0.10438 (0.10732) [-0.97259]	0.206365 (0.11324) [1.82238]*
C	0.026136 (0.016) [1.63352]	0.056796 (0.02062) [2.75504]***	0.085691 (0.02175) [3.93939]***
R_DEPOSITS	0.000852 (0.0006) [1.42888]	0.001789 (0.00077) [2.32833]**	0.003203 (0.00081) [3.94967]***
R_RE_CREDITS	-0.00042 (0.00086) [-0.48540]	-0.00187 (0.00111) [-1.68331]*	-0.0019 (0.00117) [-1.62363]
R_CONS_CREDITS	-0.00148 (0.00084) [-1.75976]*	-0.00088 (0.00108) [-0.80784]	-0.00322 (0.00114) [-2.81086]***
VAT	0.000568 (0.00054) [1.04457]	0.000445 (0.00070) [0.63612]	0.000289 (0.00074) [0.39093]
ECS	-0.00033 (0.0006) [-0.55524]	-0.00101 (0.00077) [-1.30742]	-0.0007 (0.00081) [-0.85979]
PILLAR II	-0.00226 (0.00108) [-2.08956]**	-0.00438 (0.00139) [-3.13929]***	-0.00744 (0.00147) [-5.05779]***
R-squared	0.414905	0.215472	0.548006
Adj. R-squared	0.375012	0.161981	0.517188
Sum sq. resids	0.011521	0.019126	0.021294

	D(LOG(PIB))	D(LOG(DEPOZITE))	D(LOG(CREDITE))
F-statistic	10.40048	4.028221	17.78212
Log likelihood	467.2905	431.3004	423.6758
Mean dependent	0.003671	0.006942	0.005446
S.D. dependent	0.011817	0.013149	0.018279

NOTE: Values in round parenthesis represent standard errors. Values in square brackets represent t-statistics. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Source: Authors' own contribution

However, the analysis also reveals some surprising results, which apparently contradict classical economic theory. First, of the control variables incorporated in the model, only the contribution rate to Pension Pillar II influences the endogenous variables. Furthermore, its influence is significantly negative on all endogenous variables. This result is difficult to explain. One possibility is that it is caused by the existence of hidden correlated variables, but searching for those and incorporating them into the model would greatly inflate it, causing a significant drop in statistical power due to the limited amount of data. However, we appreciate the existence of such variables as fairly unlikely. As the result implies that the development of the private pension system has a negative influence on economic development, a thorough investigation of this finding would be required due to the importance of Pillar II for the safety and sustainability of the Romanian economy. We defer this to subsequent research.

Second, and more importantly, we observe that the increase in credit does not significantly influence the real GDP growth rate, and the sign of the coefficient (albeit insignificant) is negative. This implies that, in Romania, the bank lending to the general population does not bring any benefit to the real economy, despite the fact that the credit structure has recently changed from consumer credit to real estate loans. This result is also difficult to explain and requires further investigation in a later study.

Last but not least, and more importantly for our research question, we observe a positive and statistically significant intercept in the deposit rate equation at the 1% confidence level. This result shows a strong autonomous component of household saving behavior, which has most likely started in 2009. Also, all of the other variable do not tend to have an influence on deposits, this implying that the behavior of the Romanian households has changed following the financial crisis in 2008. Most notably, the increase in net savings cannot be explained by increases in the level of total income (GDP). One possible explanation is that an increase in the population's risk aversion has occurred as a result of a change in perception induced by the effects the crisis. In Romania, these were particularly drastic, a relevant example being the decrease in the salaries of employees working for the government by 25% in 2009. This change could have led to a consistent increase in the preference for future consumption at the expense of current consumption, which has favored a growth in net savings, regardless of the changes incurred by real interest rates or the other economic variables. Thus, the model results show a significant change in post-crisis household savings behavior in Romania.

Figure 2 shows the variance decomposition of the endogenous variables and their impulse response functions, both for a forecast period of 12 months. The results show that all three endogenous variables have a strong positive autocorrelation component. Specifically, we observe that over 90% of the variability of the real GDP growth rates and the real growth rates of deposits, as well as about 50% of the variability in real credit growth

rates, are explained by autoregressive shocks. Instead, only a small part of the variance is explained by shocks in other variables, the largest influence having the deposits growth rate on the credit growth rate (approximately 37%).

Table 5. VEC model estimation results

Cointegration equation:	CointEq1		
GDP(-1)	1.00000		
DEPOSITS(-1)	-0.89428 (0.13107) [-6.82291]***		
BANK_CREDITS(-1)	0.178811 (0.12982) [1.37734]		
C	-79.8215		
Error Correction:	D(PIB)	D(DEPOZITE)	D(CREDITE_BANCI)
CointEq1	-0.1326 (0.02917) [-4.54536]***	0.013673 (0.02882) [0.47437]	-0.02043 (0.02744) [-0.74443]
D(GDP(-1))	0.651525 (0.0777) [8.38551]***	-0.00668 (0.07676) [-0.08706]	0.185529 (0.07309) [2.53851]**
D(DEPOSITS(-1))	-0.36841 (0.11521) [-3.19771]***	0.122899 (0.11383) [1.07969]	-0.23955 (0.10837) [-2.21034]**
D(BANK_CREDITS(-1))	-0.00991 (0.1209) [-0.08194]	-0.11833 (0.11945) [-0.99069]	0.089071 (0.11372) [0.78323]
C	20.50537 (4.20946) [4.87126]***	5.752098 (4.15892) [1.38308]	12.44341 (3.95967) [3.14254]***
R_DEPOSITS	0.510499 (0.12392) [4.11963]***	0.164461 (0.12243) [1.34330]	0.47187 (0.11657) [4.04812]***
R_RE_CREDITS	-0.15331 (0.14165) [-1.08227]	-0.17178 (0.13995) [-1.22745]	-0.11903 (0.13325) [-0.89328]
R_CONS_CREDITS	-0.42433 (0.1419) [-2.99043]***	-0.09321 (0.14019) [-0.66487]	-0.48278 (0.13348) [-3.61698]***
C_VAT	-0.37728 (0.13207) [-2.85670]***	0.060145 (0.13048) [0.46095]	-0.12543 (0.12423) [-1.00968]
C_ECS	-0.16068 (0.0996) [-1.61320]	-0.12162 (0.09841) [-1.23588]	-0.04664 (0.09369) [-0.49783]
C_PILLAR 2	-0.67793 (0.17978) [-3.77083]***	-0.3101 (0.17762) [-1.74584]*	-0.7138 (0.16911) [-4.22081]***
R-squared	0.495558	0.132692	0.464357
Adj. R-squared	0.457051	0.066485	0.423469
Sum sq. resids	303.3524	296.1119	268.4191
F-statistic	12.86927	2.004202	11.35661
Log likelihood	-255.383	-253.668	-246.697

Cointegration equation:	CointEq1		
Mean dependent	0.695242	0.865517	0.509761
S.D. dependent	2.065182	1.556079	1.885209

NOTE: Values in round parenthesis represent standard errors. Values in square brackets represent t-statistics. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Source: Authors' own contribution

Panel A. Variance decomposition of endogenous variables

Panel B. Impulse response functions of endogenous variables

Figure 2. VAR model estimation results

Source: Authors' own contribution

Panel A. Variance decomposition of endogenous variables

Panel B. Impulse response functions of endogenous variables

Figure 3. VEC model estimation results

Source: Authors' own contribution

Table 5 summarizes the results obtained by estimating a VEC model equivalent to the previous VAR specification, the difference being that the endogenous variables have not been stationarized and were now introduced in level. Figure 3 shows the variance decomposition of endogenous variables and their impulse response functions for a corresponding forecast period of 12 months. We note that the VEC model results largely confirm the results previously obtained using the VAR model. Specifically, we also find that:

- (1) All endogenous variables (GDP, DEPOSITS, CREDITS) have a strong positive autocorrelation component;
- (2) The GDP level positively influences both the level of deposits and credits;
- (3) Changes in credit do not have an impact on the economic growth trend;
- (4) The contribution rate to the Pension Pillar II also has a negative and statistically significant influence on all endogenous variables.

However, unlike the VAR model, the results of the VEC model differ in several important aspects. First, we note that a shock in the level of deposits has a positive influence on the long-term economic growth path, which occurs after a period of about 6 months after the shock. As the increase in household credit does not affect GDP, the most likely explanation for this phenomenon is that deposits are directly used in the economy to finance investments, either by increasing the credit to private companies (which is not captured by our model) or by direct investing in the capital market. On the other hand, the results indicate that the VAT level has a negative influence on economic growth, consistent with the expected negative effect of restrictive fiscal policies on equilibrium income.

Last but not least, interest rate levels do not seem to have a significant influence on endogenous variables. More precisely, even though the coefficients are statistically significant, the values estimated for interest rates on deposits are almost identical, but opposite, to those recorded for interest rates on loans. Because credit spreads tend to be rather stable, the influence of the two cancel out. This result shows that real interest rates had a limited influence on economic growth, and also on loan and savings behavior of the Romanian households, at least in the post-crisis sample that we analyze. In other words, the recent trends in household saving behavior appear to be influenced by a change in the risk perception of households, this result being consistent with a behavioral hypothesis in the context of changing attitudes of the population since the economic and financial crisis in 2008. A very striking consequence of this was the sustained and almost constant linear growth of net savings since 2009, recorded despite the variability of real interest rates and their unusual low values, these even becoming negative for a significant period in the analyzed sample.

We check the robustness of the results using an alternative model specification, as indicated by the Akaike information criterion and by the LR test in Table 3. We estimate the previously specified models incorporating up to 12 lags for all endogenous variables. The results of this exercise are summarized in Table 6 (estimation results) and Figure 4 (variance decomposition and impulse response functions for a forecast period of 12 observations) for the 12-lag VAR model, and in Table 7 (estimation results) and Figure 5 (variance decomposition and impulse response functions for a forecast period of 12 observations) for the 12-lag VEC model. For brevity, Tables 6 and 7 only show the coefficients for the first autoregressive term (complete results can be provided by the corresponding author at request). First, we find that these alternatives significantly increase the explanation power of the endogenous variables compared to the original models. The R^2 and adjusted- R^2 are higher

in all cases, with differences reaching up to 35 percentage points. However, when analyzing the signs of the estimated coefficients, their statistical significance and the response of endogenous variables to shocks, we find that the original conclusions do not materially change when extending the models by adding lags.

Table 6. VAR model estimate with 12 lags

	D(LOG(PIB))	D(LOG(DEPOZITE))	D(LOG(CREDITE_BANCI))
D(LOG(GDP(-1)))	0.426649 (0.11573) [3.68672]***	0.278347 (0.16111) [1.72764]*	0.228122 (0.16782) [1.35935]
D(LOG(DEPOSITS(-1)))	-0.165976 (0.10838) [-1.53148]	0.111581 (0.15088) [0.73953]	0.040051 (0.15716) [0.25484]
D(LOG(BANK_CREDITS(-1)))	0.014026 (0.10262) [0.13668]	-0.155326 (0.14287) [-1.08718]	-0.135818 (0.14881) [-0.91267]
C	-0.030222 (0.02034) [-1.48603]	0.040999 (0.02831) [1.44801]	0.068204 (0.02949) [2.31265]**
R_DEPOSITS	-0.001416 (0.00112) [-1.26246]	0.000483 (0.00156) [0.30928]	-1.55E-05 (0.00163) [-0.00956]
R_RE_CREDITS	0.001455 (0.00104) [1.40260]	-0.00282 (0.00144) [-1.95202]*	0.000749 (0.00150) [0.49775]
R_CONS_CREDITS	-0.000787 (0.00117) [-0.67504]	0.001925 (0.00162) [1.18626]	-0.000543 (0.00169) [-0.32137]
C_VAT	0.0012 (0.00070) [1.71093]*	-3.25E-05 (0.00098) [-0.03325]	-0.000103 (0.00102) [-0.10158]
C_ECS	-7.28E-06 (0.00069) [-0.01056]	-0.00113 (0.00096) [-1.17736]	-0.001321 (0.00100) [-1.32084]
C_PILLAR 2	0.003459 (0.00186) [1.85549]*	-0.003224 (0.00260) [-1.24195]	-0.007488 (0.00270) [-2.76949]***
R-squared	0.706120	0.401494	0.535819
Adj. R-squared	0.565859	0.115843	0.314279
Sum sq. resids	0.005441	0.010546	0.011442
F-statistic	5.034327	1.405542	2.418604
Log likelihood	474.9464	431.5999	426.2605
Mean dependent	0.002885	0.005378	0.001984
S.D. dependent	0.011934	0.011642	0.013770

NOTE: Values in round parenthesis represent standard errors. Values in square brackets represent t-statistics. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Source: Authors' own contribution

Panel A. Variance decomposition of endogenous variables

Panel B. Impulse response functions of endogenous variables

Figure 4. VAR model estimate with 12 lags

Source: Authors' own contribution

Table 7. VEC model estimate with 12 lags

Cointegrating Eq.:	CointEq1		
GDP(-1)	1.00000		
DEPOSITS(-1)	-1.337214 (0.48180) [-2.77547]***		
BANK_CREDITS(-1)	-3.406602 (1.01537) [-3.35505]***		
C	409.6846		
Error Correction:	D(PIB)	D(DEPOZITE)	D(CREDITE_BANCI)
CointEq1	0.028534 (0.00870) [3.28041]***	0.035263 (0.00854) [4.13018]***	0.034147 (0.00818) [4.17496]***
D(GDP(-1))	0.352196 (0.11523) [3.05652]***	0.071035 (0.11310) [0.62805]	0.087207 (0.10835) [0.80485]
D(DEPOSITS(-1))	-0.233618 (0.13719) [-1.70289]*	-0.036369 (0.13466) [-0.27008]	-0.030183 (0.12900) [-0.23398]
D(BANK_CREDITS(-1))	0.022974 (0.13976) [0.16438]	-0.007356 (0.13718) [-0.05362]	-0.104414 (0.13142) [-0.79452]
C	3.918464 (4.28746) [0.91394]	16.5067 (4.20840) [3.92232]***	17.43597 (4.03157) [4.32486]***
R_DEPOSITS	-0.30651 (0.20156) [-1.52070]	0.088531 (0.19784) [0.44749]	0.070817 (0.18953) [0.37365]
R_RE_CREDITS	0.098247 (0.21797) [0.45074]	-0.774887 (0.21395) [-3.62183]***	-0.343528 (0.20496) [-1.67608]*
R_CONS_CREDITS	-0.166014 (0.19541) [-0.84955]	0.329021 (0.19181) [1.71535]*	0.078549 (0.18375) [0.42748]
C_VAT	0.03989 (0.12827) [0.31099]	-0.201557 (0.12590) [-1.60088]	-0.183746 (0.12061) [-1.52343]
C_ECS	-0.127046 (0.12337) [-1.02978]	-0.342173 (0.12110) [-2.82562]***	-0.314078 (0.11601) [-2.70738]***
C_PILLAR 2	0.704214 (0.34251) [2.05601]**	-0.132235 (0.33620) [-0.39332]	-0.915632 (0.32207) [-2.84295]***
R-squared	0.722313	0.485081	0.601436
Adj. R-squared	0.585066	0.23058	0.404445
Sum sq. resids	160.2558	154.3998	141.697
F-statistic	5.262849	1.906011	3.053112
Log likelihood	-199.084	-196.6457	-191.0223
Mean dependent	0.583857	0.756794	0.234781
S.D. dependent	2.106966	1.518735	1.653712

NOTE: Values in round parenthesis represent standard errors. Values in square brackets represent t-statistics. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Source: Authors' own contribution

Panel A. Variance decomposition of endogenous variables

Panel B. Impulse response functions of endogenous variables

Figure 5. VEC model estimate with 12 lags

Source: Authors' own contribution

More precisely, some differences exist in the sign, magnitude and statistical significance of the estimated coefficients, but the responses of the endogenous variables

largely follow the ones previously obtained for the 1-leg VAR and VEC models. Thus, we conclude that the models and our inference remains robust to changes in the number of autoregressive terms that are incorporated in the VAR and VEC models.

Conclusions

This paper aims at investigating the behavior of household savings in relation to the financial system in Romania, as well as its analysis in terms of evolution and its role in encouraging economic development and/or improving the well-being of households.

We estimate VAR and VEC models that both show that a change occurred in the saving behavior of the Romanian households since 2009. More precisely, we find that bank deposits have a significant autonomous component and are not influenced by changes in real interest rates on deposits, which decreased during the analyzed period (becoming even negative in 2017-2018). Also, despite these low interest rates, total loans granted to households increased at a slower pace and even declined when analyzed as a percentage of GDP. Thus, net savings registered a positive, almost linear, trend during the analyzed period.

An overview of the important events of the period shows that the causes that can be related with these changes can be divided into two categories. First, the legislative and monetary policy changes following the financial crisis had the role of enforcing a prudent attitude for banks and restricting their lending activity. In our view, the most important measures taken by the National Bank of Romania and the Romanian Government, which have probably contributed to this effect, include: (i) the implementation of the Basel III set of rules that increased capital requirements to improve systemic risk control, (ii) the promotion of legislation to protect borrowers from foreign currency loans, which led to foreign currency risks being shared between borrowers and lenders, and also (iii) the decision to discourage foreign currency credit by increasing minimum reserve requirement, despite the fact that this type of credit is cheaper compared to the one in local currency, in the period that we analyze. Second, the analysis highlights a significant behavioral change of the general population, which has increased its preference for future consumption to the detriment of current consumption. In the context of falling real interest rates and based on standard intertemporal consumption models as an analysis framework, we can note that this result implies a significant increase in household risk aversion as a result of the events that followed the 2008 financial crisis. A relevant example of such an event that potentially triggered this change was the general decrease of salaries for employees working in the public sector by 25% in 2009.

From a policy perspective, our results reveal some interesting aspects that can serve as recommendations for decision makers at the macroeconomic level. First, we observe that the increase in net savings is not currently being transferred to increases in economic growth. This implies the need to implement policies that could increase the efficiency of resource allocation in the economy. For example, policies that would improve and develop the capital market would have a significant potential to encourage sustainable economic growth and improve welfare through a more efficient allocation of resources. Alternatively, one might implement policies aimed at increasing the technological development of the financial system, this potentially speeding up the transfer of previously accumulated net savings into productivity-increasing loans. Second, given the significant amount of local capital accumulated by banks in the form of net deposits and the fact that the risks and costs of using it are lower compared to foreign capital, the government can consider developing budgetary

policies oriented at encouraging investments in the economy, especially in the country's infrastructure that currently lags behind other countries in the region.

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