FORECASTING CREDIT GROWTH RATE IN ROMANIA: FROM CREDIT BOOM TO CREDIT CRUNCH?

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Abstract

The specialists paid a special attention to credit growth in the transitions countries due to its sharp increase during the last years. However, once the financial crisis started in 2008, the credit activity evolution reversed. Consequently, forecasting the credit trend has become a subject of interest in the context of the present financial and economic conditions, because the credit market blockage has a negative impact on economic activity revival and leads to the amplification of the uncertainty on financial markets. The main objective of this paper is to highlight the recent credit developments in Romania and to predict their future evolution. Based on the credit growth rate endogenous factors and using a stochastic simulation econometric model, we demonstrate that this economy experiences a passage from a credit boom to a severe credit crunch. The forecasting exercise results show a credit activity contraction up to the end of 2009, demolishing the expectations related to a near economic recovery in Romania.

Keywords: *credit growth rate, forecasts, stochastic simulation, credit crunch*

JEL Classification: C15, C53, E51

1. Introduction

There is a general agreement among economists that the strong credit growth has been one of the most pervasive development in Central and Eastern European Countries (CEECs) in the recent years [Enoch, (2007)]. Consequently, many studies approach the determinant factors of this phenomenon and try to identify a credit growth equilibrium level in these countries [see Kiss et al. (2006), Égert et al. (2006), Backé et al. (2007)]. Their results show that there is a large amount of uncertainty when establishing the equilibrium level of private credit. Some findings indicate that a number of countries was very close or even above the estimated equilibrium levels, whereas other were still well below the equilibrium level before the economic and financial crisis appearance.

The main question was whether these dynamics represented an equilibrium convergence process or rather a threat at financial system's stability. The estimations of the authors mentioned above have showed that a large part of the credit growth in new member states can be explained by the catching-up process, but there is also the possibility to energise a credit "overshooting" phenomenon [Égert et al., (2006)], or a

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procyclical behaviour of credit activity [see Borio et al. (2001) for an exhaustive presentation of the procyclicity impact on financial stability].

Indeed, credit growth is a particularly difficult subject to deal with mostly because there is no possible way to quantify a universally accepted threshold value beyond which its increase can be considered as "excessive" [Zdzienicka, (2009)]. The sharp credit growth rate can be attributed to a number of exogenous factors, including comprehensive reforms and privatization in the financial sector, introduction of market institutions and legal reforms, current account liberalisation and increase competition in CEE banking systems [Clarke et al. (2003), Lensink and Hermes (2004), De Haas and Lelyveld (2006), Aydin (2008)]. Another category of factors are related to a macro-stabilisation process and it represents the endogenous determinants of credit growth rate.

Based on this last category of factors, we perform a forecasting exercise in order to assess the Romanian credit growth rate in the context of the economic crisis. Like other countries in the region, Romania knew during last years an abrupt increase of the domestic credit, especially of the credit denominated in foreign currency. Once the economic crisis installed, the credit growth rate registered a rapid contraction due to market uncertainty and to liquidity contraction. The macroeconomic developments show that credit activity will contract furthermore, reality which demolishes the expectations related to an economic recovery in Romania in the near future.

The paper is structured as follows. Section 2 reviews some stylized facts regarding credit growth in Romania. Section 3 is dedicated to the empirical analysis. Section 4 presents the estimation technique and the forecasting exercise results. Finally, Section 5 draws some concluding remarks.

2. Macroeconomic Context and Credit Growth in Romania: Stylized Facts

The bank credit is the main source of external financing in the transition countries, including Romania. The Romanian banking sector has undergone a comprehensive transformation in the past 10 years, after the 1998 banking crisis. According to the National Bank of Romania (NBR), credit growth has accelerated since 2001 with the share of the financial sector's total assets in the GDP increased from 36,3% in 2003 to 74,1% in 2007 [NBR (2008)].

Several factors have contributed to credit expansion. The domestic conditions specific for the transition period (the demand of houses, of durable goods) represented one of the main driving forces of this phenomenon. This was completed by the favourable macroeconomic conditions (the reduction of the inflation and of the interest rate, as well as the economic growth increase), but also by the competition among commercial banks for gaining more consistent market shares (see Table 1 for a structural analysis of the Romanian banking system).

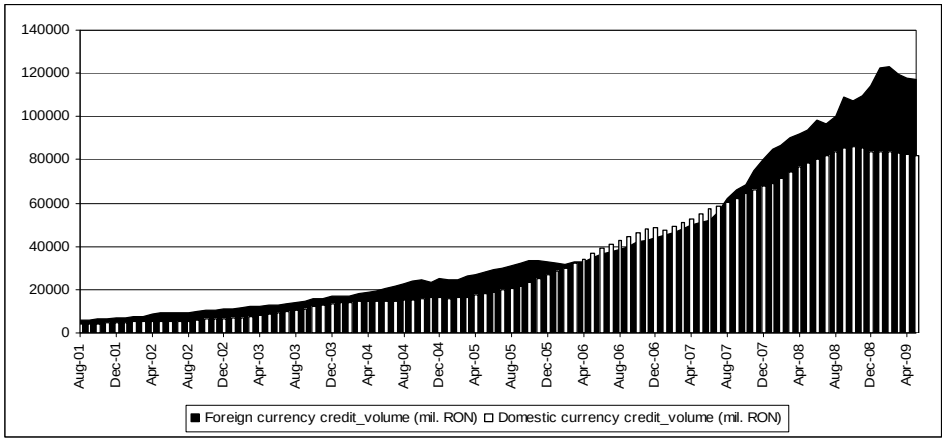
Table 1. The structure of the Romanian banking sector

	2001	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009t1*
No. of credit institutions	41	39	39	40	40	39	42	43	43
No. of banks with private majority capital	38	36	36	38	38	37	40	41	41
No. of banks with foreign majority capital	32	32	29	30	30	33	36	37	37
No. of banks at 100.000 inhabitants	0.18	0.18	0.18	0.18	0.19	0.18	0.19	0.2	0.2
Banks with foreign private capital (% in total assets)	58.2	59.6	62.5	93.1	94.0	94.5	94.7	94.7	93.6
Banks with foreign majority capital (% in total assets)	55.2	56.4	58.2	62.1	62.2	88.6	88.0	88.3	86.7
Herfindahl-Hirsehmann Index	1.427	1.381	1.264	1.120	1.124	1.171	1.046	926	906

Source: NBR (2009)

The privatisation process and the foreign banks access to the Romanian banking market have improved the credit activity. Only a small part of total credit was allocated to the public sector in the analysed period. Figure 1 describes the non-governmental credit expansion in Romania, during 2001-2009, on two main components: domestic currency credits and foreign currency credits. If before 2006 the foreign currency component slightly exceeded the domestic currency credits, the measures taken by the NBR to limit the expansion of foreign currency credits balanced the two components in 2005-2007.

Figure 1. The volume of domestic and foreign currency non-governmental credit (mil. RON)

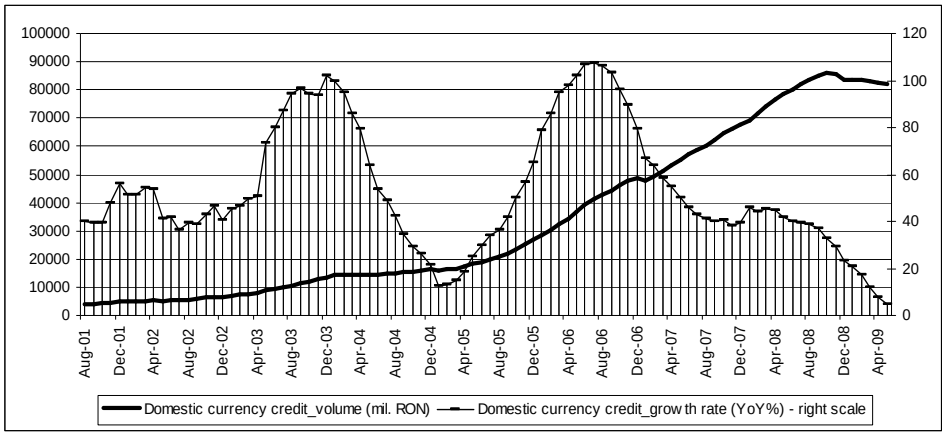


Source: NBR Monthly Bulletins

After the burst out of the subprime crisis in 2007 and after the interest rate increase, the domestic currency credit volume knew a smoother increase. Beginning with 2009, the credit activity contracted.

It is also interesting to observe the credit dynamics. In Figure 2 and Figure 3, the dynamics of domestic currency credits, and respectively of foreign currency credits, are presented. The credit growth rate was obtained on a YoY% basis.

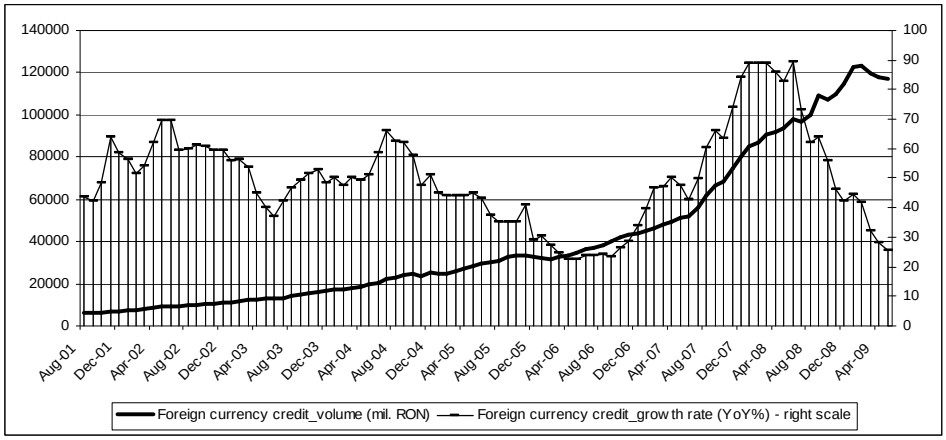
Figure 2. Domestic currency credit volume and growth rate



Source: NBR Monthly Bulletins

A considerable fluctuation in credit dynamics can be observed in Figure 2. The explanations for this evolution of the credit growth rate differ depending on the analysed period. For example, in 2005, the slowing down of the growth rate was influenced by the measures applied by the NBR for credit moderation, measures which had a more significant impact upon domestic currency credits, contrary to the authorities' expectations. As we observe from the evolution of domestic currency credits' volume, these measures had only a temporary effect on tempering the credit expansion. The second period characterised by the slowing down of the credit dynamics was the period preceding the subprime crisis, when the appreciation of the national currency generated the migration from domestic currency credits to foreign currency credits (Figure 3).

Figure 3. Foreign currency credits volume and of foreign currency credit growth rate



Source: NBR Monthly Bulletins

Figure 3 shows that the dynamics of foreign currency credit growth rate reversed starting with the second half of 2008. This was due, on the one hand, to the fact that the liquidity of global financial markets was decreasing and the domestic banks no longer succeeded in getting borrowings from their parent banks in order to finance their credit activity and, on the other hand, to the depreciation of the domestic currency and to the foreign exchange risk increase.

However, the credit growth rate decrease was more accentuated for the domestic currency denominated credit. We can observe a cyclical evolution of the growth rate for both categories of credits. The delineation between domestic and foreign currency credit is important in the analysis, because their determinant factors can be different. In the next section, using monthly data, we perform an econometric exercise to identify the factors which influence the two categories of credit growth rate.

3. Empirical analysis

3.1. Data description

The factors influencing credit trend are of a different nature. In the previous section we have seen that these factors can be grouped into exogenous factors, that characterise the integration process, and endogenous factors, related to the macroeconomic conditions. We carry out our analysis based on the second group of determinants.

In order to forecast the credit growth rate, Park (1993), Hofmann (2001), Pabón and Gordo (2006), Braddick and Montalti (2006) and Andersson and Lauvsnes

(2007) used in their papers variables such as: interest rate, economic activity evolution, real estate prices, consumption, customers' confidence, household debt service ratio, income distribution or the ratio credits to deposits.

In the macroeconomic conditions we include both factors influencing the banks' capacity to grant credits, as well as factors influencing the companies and the population's capacity to obtain financing. Thus, within the determinants for the domestic currency credits trend, we included the interest rate on the inter-banking market[1], the industrial production[2], the net wages growth rate, the growth rate of the deposits in "lei" and the unemployment rate.

The interest rate simultaneously determines the demand and supply of loans [Calza et al. (2003)]. The indicator is also important for the explanation of credit related costs. The rise of the interest rate causes, on the one hand, the increase of the refinancing costs and, on the other hand, it makes the access of final users to credits more difficult. We have used the interest rate at three months because it represents the basis for many forecasts and econometric calculations. We expect a negative correlation between credit growth rate and interest rate.

There are very robust arguments in favour of a positive relationship between credit demand, supply and economic growth, another determinant retained into analysis. The economic reasoning starts with the effect of economic growth on expected income and profit, improving the financial conditions of the private sector, and allowing for higher levels of indebtedness. A similar argument assumes that firms want to maintain the ratio between internal and external capital as the economy grows [Kiss et al. (2006)]. This would require an increasing credit demand, as with economic growth the capital intensity of production increases. In respect of the supply, economic growth is also expected to correlate positively with credit as the banks are more/less willing to lend in an economic upturn/downturn.

The industrial production growth rate represents a *proxy* for the economic growth rate, the latter being available only on a quarterly basis. The credits amount increases when the industrial production growth rate accentuates. Consequently, we expect a positive sign for the industrial production growth rate coefficient.

Another exogenous variable - the net wages growth rate - indicates the population capacity to attract credits, but also the saturation. It is difficult to say if this variable influences positively or negatively the credits growth. On the one hand, an increase in wages gives individuals the possibility to obtain mortgage loans, and on the other hand the income rise reduces the need to obtain consumption credits.

The deposits growth rate influences the credit rate because the financing is made mainly based on the available resources. That is why the deposits' positive dynamics involves a credits evolution in the same direction.

The last variable we have used is the unemployment rate. A higher unemployment rate reflects a less favourable economic situation, fact which is

[1] ROBID at 3 months (*Romanian Interbank Bid Rate*).
[2] As *proxy* for the economic growth rate.

translated into a slowing down of the credit granting process. The unemployed people have a reduced possibility to obtain credits. That is why we expect a negative relation between the unemployment evolution and the credits trend.

In order to establish the determinants of the growth rate for the foreign currency credits, we have used the growth rate of foreign currency deposits and the interest on the inter-banking market was considered EURIBOR at 3 months. We expect a negative correlation between the interest rate and credit growth rate.

The last variable used for the foreign currency loans growth rate explanation is the growth rate of credits to deposits ratio. It is mainly considered that if the growth rate of the indicator credits/deposits amplifies, the growth rate of the credit decreases, because the available financing resources diminish. In Romania, this rate is important for the foreign currency credit because the reserve requirements for the foreign currency-denominated holdings are high.

3.2. Econometric tests

We will further on present the econometric results of the equations tested by means of the OLS method. Two different models were tested, one for the domestic currency credit growth rate and another one for the foreign currency credit growth rate. The equation tested for the credits in "lei" is the following:

$$dccgr_t = c + a_*ip_t + \beta_*nw_t + \gamma_*dcd_t + \delta_*robid3_t + \lambda_*unp_t + \varepsilon_t \quad (1)$$

where: c is an intercept term; the *dccgr*, *ip*, *nw*, *dcd*, *robid3* and *unp* represent the growth rate of the non-governmental credit in "lei", the industrial production, the net wages growth rate, the deposits in "lei" growth rate, the ROBID at 3 months and the unemployment rate; ε represents the errors of the estimation.

For the foreign currency credits, the tested equation is the following:

$$fccgr_t = c + a_*ip_t + \beta_*nw_t + \gamma_*fcd_t + \delta_*fcfd_t + \lambda_*euribor3_t + \nu_*unp_t + \varepsilon_t \quad (2)$$

where: *fcd* represents the foreign currency deposits' growth rate, *fcfd* is the foreign currency credit to foreign currency deposits growth rate, *euribor3* is the EURIBOR at 3 months, the other variables being known. The econometric results are presented in the table bellow:

Table 2. The results of the econometric tests

	Dependant variable - dccgr	*Dependant variable - fccgr*
Explanatory variables	*Estimated coefficients*	*Estimated coefficients*
c	78.255***	-1.9867**
	(7.1427)	(-2.358)
ip_t	3.9490***	0.00111
	(7.7913)	(0.0334)
nw_t	-1.0766**	-0.2088***
	(-2.0049)	(-5.384)
dcd_t	1.5748***	
	(6.2346)	
fcd_t		1.1953***
		(72.24)
$fcfd_t$		-1.3054***
		(-86.60)
$robid3_t$	-1.7729***	
	(-3.3539)	
$euribor3_t$		-0.09995
		(-0.5132)
unp_t	11.271***	0.09392
	(5.5498)	(1.057)
R^2	0.47	0.99
Number of observations	94	94
Significant at: 1%(***); 5%(**); 10%(*); t-Statistic in the brackets.		

Source: Author's calculations

For the domestic currency credits' growth rate, all the estimated coefficients are statistically significant. The unemployment rate and the industrial production explain an important part of the domestic currency credits' growth rate dynamics. When the economic activity is negatively affected, the credit activity suffers. An interesting observation is related to the net wages growth rate which is negatively correlated with the credit growth rate. If the revenues of the populations increase, people's orientation towards banking loans decreases. This result is however controversial because high wages facilitate the access to credits. The interest rate is negatively correlated with the credit growth rate, in accordance with our expectations. However, these factors are not the only ones explaining the domestic currency credit trend. This is pointed out also by the fact that the coefficient of the constant is very high and the R squared riches only 0.47. The covered period is August 2001 to May 2009.

For the foreign currency denominated loans, the situation is different. The coefficients of the industrial production and of the unemployment are insignificant. Surprisingly, the evolution of the Euribor at 3 months does not explain the credit

dynamics, the coefficient being insignificant. This means that local banks are not significantly guided by the international context when establishing the credit activity conditions. The net wages and foreign currency deposits growth rate are the only variables which explain the credit dynamics in this case. A large amount of foreign currency denominated deposits ensures the foreign currency loans growth. The foreign currency denominated deposits to credits ratio is also important when predicting the credit evolution. If this ratio is high, the foreign currency denominated credits growth rate decreases.

4. Forecasting the non-governmental credit growth rate

4.1. Methodology

The credit dynamics has temperate last year as a result of the financing costs increase, determined by the tightening of the monetary policy and by the external financing contraction, in the context of persistent turbulences on international financial markets. Nowadays, due to economic recession menace, the authorities relaxed the monetary conditions. Are however these measures efficient? Which will be the non-governmental credit growth rate trend?

In the forecasting exercises, different econometric methods are used, such as the VAR models for the log-difference, the cointegration analysis based on VAR models, the random walks as well as the ARIMA models. The forecasts based on econometric models using stochastic simulations can also be applied on the condition that the exogenous variables are not correlated[1]. The correlations matrix shows that there is no significant correlation between the variables (see Appendix 1).

The method chosen to forecast the credit growth rate depends on the availability of the forecasted independent variables. If the values of these indicators are known at the (t+1) moment, it is possible to predict the future values of the endogenous variable. Our historical monthly data range between August 2001 and May 2009. Taking into account the fact that for *robid3* we dispose of FORTIS Bank's forecasted data up to December 2009, we restrained our forecast analysis at seven months (June – December 2009). The forecasted values of *euribor3* were obtained based on the futures interest rate quotation (Euronext-liffe).

The forecasted net wages (monthly data) were extracted from the Romanian National Forecast Commission database. The European Commission forecasts were used for the unemployment rate. The annual data were transformed into monthly data using the linear interpolation.

In respect of the deposits in "lei" trend, we have expressed this variable depending on a constant and the first lag of the interest rate. The industrial

[1] A stochastic simulation model was also used by Hostland and Karam (2006) for the assessment of external and public debt sustainability and by the Rouabah (2007) for the forecast of the Belgian banking sector vulnerability.

production was expressed based on a temporary trend.

For the second model, related to the foreign currency denominated credits growth rate, the credit to deposit ratio was expressed depending on a constant and on the interest rate (represented by euribor3 in this case). We have assumed that the deposits growth rate follows a temporary trend.

Finally, the forecasted values of the domestic currency and foreign currency credit growth rate were obtained using a stochastic method of analysis (10.000 iterations) based on two different models, each containing three equations:

The model for forecasting the domestic currency credit growth rate contains:

$$\begin{cases} dccgr_t = c + a_*ip_t + \beta_*nw_t + \gamma_*dcd_t + \delta_*robid3_t + \lambda_*unp_t + \varepsilon_t & (3) \\ dcd_t = c + a_*robid3_{t-1} & (4) \\ ipt = c + a_*ip_{t-1} & (5) \end{cases}$$

The model used for forecasting the evolution of the foreign currency credit growth rate includes:

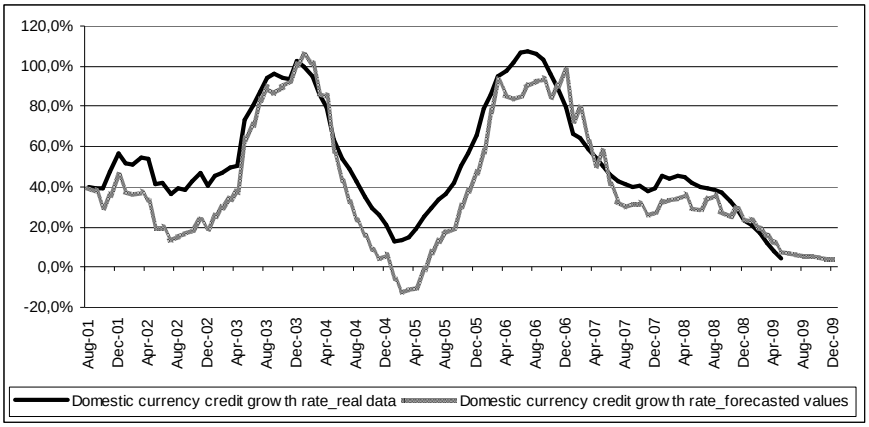
$$\begin{cases} fccgr_t = c + a_*ip_t + \beta_*nw_t + \gamma_*fcd_t + \delta_*fcfd_t + \lambda_*euribor3_t + v_*unp_t + \varepsilon_t & (6) \\ fcd = c + a_*fcd_{t-1} & (7) \\ fcfd = c + a_*euribor3_t & (8) \end{cases}$$

These equations form a system of equations (or an econometric model) which can be used for a stochastic dynamic simulation. A stochastic simulation relies on repeated random sampling to compute the results (it is generally known as a Monte-Carlo simulation). In contrast to the deterministic simulation, where the inputs to the model are fixed at known values and a single path is calculated for the output variables, in the stochastic environment the uncertainty is incorporated into the model by adding a random element to the coefficients. A temporary series is created for every endogenous variable in the model which is solved repeatedly for different draws of the model's stochastic components.

4.2. Forecasting exercise results

The forecasted data are presented in Figure 4, respectively in Figure 5. A forecasting model is considered appropriate when the evolution of the forecasted variable is close to the evolution of the real values, in-the-sample. In this case, the model can be successfully used to forecast out-of-sample.

Figure 4. Domestic currency credit growth rate – forecasted values

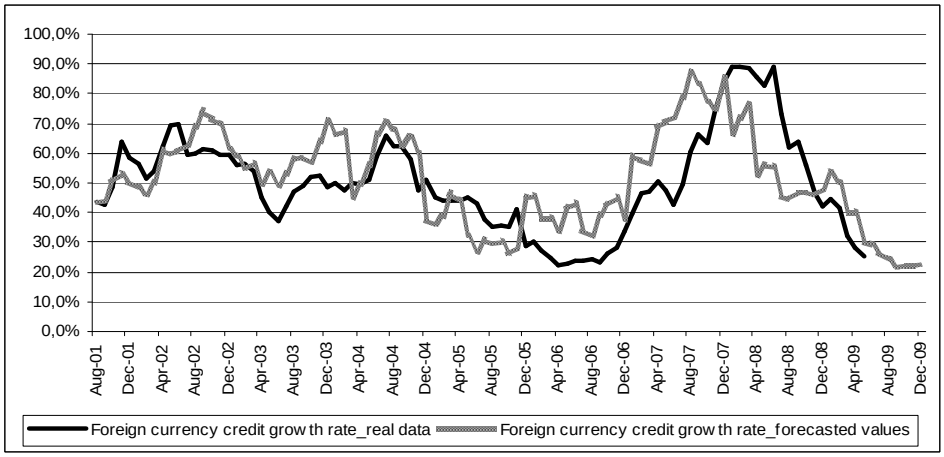


Source: Author's calculations

The first model shows that the growth rate of domestic currency credits has decreased severely, from 40% in April 2008 to 8% in April 2009. In accordance with our estimations, the credit growth rate in "lei" will decrease furthermore and will reach only 3% in December 2009. In these conditions we can speak about a credit crunch phenomenon.

The foreign currency credit did not experience a better situation. Nevertheless, the growth rate decrease was less severe. The model forecasts a drop in the growth rate from 25% in May 2009 up to 22% in October 2009. Afterwards, this level will remain relatively constant.

Figure 5. Foreign currency credit growth rate – forecasted values



Source: Author's calculations

Both models perform well in-the-sample. However, it seems that the forecasting model anticipates in advance the credit growth rate trend, with some exceptions. A careful interpretation of the model's outcome has to be made due to the fact that, within the context of global economic climate degradation, the forecasted values reflect rather an optimistic scenario. But the conclusion appears obvious: Romania registered a transition from a credit boom to a credit crunch.

5. Conclusions

After a period with an intense credit activity, the transition countries, including Romania, experience an economic crisis which seems not to reach to an end. In this context, the analyses related to this subject are very important.

Avoiding the credit activity blockage represents a prerequisite condition to enable the economic activity revival. Therefore, the credit trend forecast proves a very interesting exercise for the authorities, as well as for the investors.

We have used in this paper a stochastic simulation model for the credit growth rate, having as basis and starting point its determinant factors. The outcome of the model points out that, towards the end of 2009, the credit growth rate diminishes both for the domestic currency and for the foreign currency component.

Even if the model's forecasting capacity is considered as acceptable when we compare the real evolution with the in-the-sample estimated data, we have to show precaution when interpreting the obtained results. Firstly, the model does not take into account the degradation of the national and international economic climate. Secondly, the model does not analyse the banking market liquidity crisis. Thus, in the context of the global economic crisis, the trend forecasted for the credit growth rate seems to be the result of an optimistic scenario.

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Appendix 1. Correlation matrix

Correlation matrix for domestic currency credit growth rate determinants

	ip	*nw*	*dcd*	*robid3*	*unp*
ip	1.000000				
nw	0.352399	1.000000			
dcd	0.490274	0.371346	1.000000		
robid3	0.093498	0.641080	0.142824	1.000000	
unp	0.085192	0.505616	0.419387	0.798993	1.000000

Correlation matrix for foreign currency credit growth rate determinants

	fcd	*fcfd*	*nw*	*ip*	*unp*	*euribor3*
fcd	1.000000					
fcfd	-0.388252	1.000000				
nw	0.579645	-0.126343	1.000000			
ip	0.089293	0.147174	0.352399	1.000000		
unp	0.174808	-0.150051	0.505616	0.085192	1.000000	
euribor3	0.346803	0.241205	0.189734	0.366399	-0.313291	1.000000