ECONOMIC FACTORS INTERACTION ON THE CREDIT LEVEL OF THE ECONOMY. A VAR MODEL OF ALBANIA

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Abstract:

The aim of this paper is to show how some macroeconomic factors such as inflation, interest rates, credit and money supply are related to the credit level of the economy. The analysis will be preceded by a brief review of international literature on the development of various models in time, mainly VAR models. The methodology used to achieve this goal is the establishment of an econometric model and its analysis through the method of auto regression vectors (VAR). In our paper we have considered four variables, which are as follows: credit level of the economy (kr); loan interest rate (ikr); inflation rate (infl); circulating money supply (M2) . All data were collected on a monthly basis from 2002 to 2008, involving a total of 84 observations. Through auto regression vectors model (VAR) we will try to discover the link between these variables to conclude which of the model equations is more important. Through various tests such as causality test of Granger we will try to determine which of the dependent variables is independent and which dependent, therefore to determine which of them is the cause or the consequence of other variables. From this paper it was concluded that the credit level of the economy is caused more by the large measure of money supply then by the loan interest rate.

Key words: *credit level, loan interest rate, inflation rate, M2, VAR Model*

1. Introduction

Albania, as well as other countries that change their regimes from a centralized economy to a market economy, faced a series of economic changes, political and social after 90s. A distinguishing feature of our country during this period is an underdeveloped financial system, low financial intermediation and limited use of banking services. This mediation system consists mainly of banks; the other financial institutions play a negligible role.

In the early years of transition, banks hold higher levels of cash. The best form of safer investment was their term investment in government securities. Banks operating in Albania at the time chose to have a low credit consequence of

uncertainties in the implementation of contracts, lack of information about potential borrowers and difficult macroeconomic situation that existed in those years. This situation began to change gradually in the first half of the 2000s, where banks exchanged their risk-free investment with a massive lending by increasing the loan portfolio, also based on bank competition. Later, the Albanian banking system was under pressure of the global crisis and the credit level changed, lending the banks to become more conservative in approving loans , and the borrowers les secure of their ability to pay.

2. Literature Review: Overall view of the Albanian economic and financial environment

Mediating role of Albanian banking sector became more important after 2004. Some of the features that accompanied the economic and financial development, especially in the years 2004-2008, were relatively high rates and steady economic growth, low inflation and mainly within the limits set by the monetary authority, high level of capitalization banks, mainly lending in foreign currencies, extension of credit to borrowers individuals (especially for mortgage loans as demand for this type of loan rose significantly), but without reaching the levels of lending to businesses, relatively high rates of interest on loans, the low level of non-performing loans, a satisfactory rate of return on capital and assets of the banking system, etc. (Kalluci 2012).

Credit from banks is considered as the main source of external financing for enterprises in transition countries. Its rapid growth after 2004 is also supported by the country's economic growth, moving together in the same direction. In a way, speeding up the credit rate came as a result of the convergence of macroeconomic conditions, as well as the greater need of the economy to be credited.

Despite rapid credit growth that was achieved after 2004, the first Albanian economy credit in relation to Gross Domestic Product remained low, because it had started from very low levels in the past.

(Sa 2006) explains better the relationship between the credit rate and the welfare of the country. When the economic situation is optimistic, and the future expectations are the best, expecting so more revenue and profits, which leads to an overstatement of assets (real estate prices). This increases the net worth of firms, lowers premiums external financing and increases their ability to borrow and spend.

According to (Kalluci 2012) there are some specific factors that have contributed to the rapid growth of credit in Albania mainly for the years 2004-2008. First, we can mention *the establishment of financial intermediation* provided by the development of the financial system in general and banking in particular. Banks expanded the range of loan products they offer, giving the customers the opportunity to choose between different types of loans, with different terms and conditions. *Wealth-effect* in terms of the rapid growth of real estate prices, customers banks of a trust created in real estate investment (although funded with loans), was a good and

profitable investment, which led to an increase of demand for mortgage loans. *Stability of exchange rates* insured liability to the borrowers and gave them the opportunity to receive credit in foreign currency. They were willing to take foreign currency loans due to lower rates of interest. *Employment and Income* - Employment growth and expectations of higher incomes, made borrowers (especially those individuals), to receive more loans, with the hope that it will erase in the future, when their financial situation improves. *Interest rates* - Despite the expensive cost of borrowing, credit demand has been high, while not adversely affected by interest rates. Furthermore, the significant difference between interest rates in domestic and foreign currency loans, increased the level of loans granted from the second. *Growth of deposits* - high rate of growth deposits, the sources of funding banks, led and increased opportunities to invest these funds in the most profitable investment option that was lending. *Biggest difference between loan and deposit rates,* served as an incentive for banks to provide more loans, at a time when demand was high sensitivity and high interest rates were low. E*ffect crowding in / out* - Another factor that has contributed positively to the growth of private sector credit was the fiscal consolidation. The decline in the ratio of government debt to GDP, was associated with weight reduction of investment in government securities by banks, by moving funds towards lending to the private sector (businesses and individuals).

3. Methodology – Auto regression vector model

In our paper we have considered four variables, which are as follows: credit level of the economy (kr); loan interest rate (ikr); inflation rate (infl); circulating money supply (M2) . All data were collected on a monthly basis from 2002 to 2008, involving a total of 84 observations.

VAR models were introduced in the early 80 ', in response to criticism of "structured models" based on simultaneous systems (SES). Economic and financial variables are often not only auto correlated but also cross correlated because of various delays. In the analysis of time series with many variables the auto regression vector model or VAR model is used, whose was proposed by Sims in 1980.

VAR models are used for the analysis of causality. In general, the empirical analysis of economic data, the relationship of cause and effect is very difficult to determine. If we consider two variables *x* and *y* and see that these variables show a high correlation then we can say that they have an apparent tendency to move together, but in the absence of more information, cannot add more significantly in the direction of causality. I cannot assert with certainty what the random links, can be a variable that causes the trend (trend) of each other, or vice versa, or the existence of a third variable z, which is the cause of both. Therefore different tests are used, which take into account a possible report or a simple statistic of Fisher. The correct way to interpret these tests is to consider as graphical analysis that is required to see if the performance of a variable precedes another.

VAR model is a system with some equations where all variables are treated as dependent variables. So that there is one equation for each variable as dependent variable. Each equation has values for all variables included as dependent variables, including the dependent variable itself. Since there is no explanatory variable included in the model simultaneously, the model is in a reduced form. So equations have the same form as long as they have the same variables on the right side of the equation.

VAR model with two time series data y_t and m_t has the following form:

$$y_t = a_1 y_{t-1} + ... + a_k y_{t-k} + a_{k+1} m_{t-1} + ... a_{k+1+n} m_{t-n} + e_t^y$$

$$m_t = b_1 y_{t-1} + ... + b_k y_{t-k} + b_{k+1} m_{t-1} + ... b_{k+1+n} m_{t-n} + e_t^y$$

Two endogenous variables y and m are also explanatory variables in the form of delays. To decide how many delays to put is an empirical issue, which is placed in the evaluation step.

3.1. Factors involved in the model

In this paper we will see how some macroeconomic factors such as inflation, interest rates, credit and money supply are related to the credit level of the economy. In this section each of these factors will be treated theoretically.

Inflation is an increase in the price of goods and services, caused by the elevation established between a small quantity of goods on the market and a large quantity of money in circulation. Inflation may be caused by the increase of the quantity of money in circulation derived from the demand for conducting government spending or as a result of printing new money. Inflation may also come as a result of lower supply of goods. Inflation is an indicator of changing the overall levels of prices in an economy and is measured as the change in the consumer price index (CPI), which measures the change in price of a basket of items for these goods typically consumed by a household. The Bank of Albania has set a target inflation rate of 3% ± 1% in order to ensure a sustainable economic growth, without major fluctuations in the general price level. During the years 2000-2005 there is a tendency to decrease the annual rate of inflation (with the exception of 2003), while starting from 2006 onwards indicator has been steadily increasing (with the exception of 2008).

Loan interest rate represents the return that the lender asks for lending his money and expressed as a percentage of the loan principal or it could be seen as an indication of the average rate of loans granted by commercial banks for different periods. While the base rate is the rate that is announced by the Central Bank of each country and represents the minimum rate at which the lender covers its costs. With the increase of the interest rate, increases also the loans and deposits interest. As a result, people are supposed to increase their deposits in banks with the hope of benefiting from higher interest rates, reducing money in circulation. This theory is just conjecture, because the parallel increase of loan interest, which leads to the tendency of the public to curb credit. Considering this development, it should be understood that deposit interest rates have been declining steadily as a result of the collapse of the credit. Interest rates rise with time of maturity for maturities shorter than 6 months to 1-

3 years, but the interest rates for maturities longer than three years is lower than the interest rates for maturities 1-3 years.

However, besides inflation expectations, the yield curve is influenced by many other factors. Uncertainty over the future of financial institutions can cause significant premiums on long-term commitments, which creates the impression that inflation expectations are high, but in fact they reflect a low confidence in the financial system that is a high liquidity premium. Term maturities include a liquidity premium, because the lender waives some degree of flexibility in case of shocks, whether committed with a long-term loan. Moreover, the type of collateral usually required to obtain a loan, should be between maturity and therefore borrowed principal, explains a part of the yield curve. The remainder of the yield curve can be explained by a mixture of inflation expectations and liquidity premium. If there are frequent shocks, which increase the need for flexible financial planning, then they will affect currency loans and credits granted in other currencies. Monetary shocks, which would affect only one currency, are included in inflation expectations conceptually.

Monetary policy is the process by which a country's central bank controls the money supply. There are several ways through which monetary policy can affect the real economy and these are: *interest rates, monetary aggregates, exchange rate, inflation expectations,* etc.. Changes in monetary policy can directly affect the exchange rate and the volume of deposits and loans. Usually, an increase (decrease) in the policy rate will lead to an appreciation (depreciation) of the domestic currency. At the same time, a change in the policy rate would lead to a change in the same direction of interest rates on deposits and loans. Thus, an increase (decrease) in policy rate leads to an increase (decrease) in interest rates for deposits and loans. Passing the interest rate to inflation through interest rate on loans and deposits is via the demand and supply of loans and deposits, respectively. As a reaction to higher (lower) of loans and deposits, loans will fall (rise), while deposits will increase (decrease). Changes in loans and deposits imply changes in money growth, as M2 or M3. Passing from this channel causes changes in the real economy and therefore on economic growth. Monetary tightening (easing) through this channel will lead to a lower pressure (higher) demand and as a result, it can lead to a decrease (increase) of pressure on consumer prices. Inflation in this way can be reduced (up). In order for monetary policy to be transmitted, the deposit interest rates should move in line with the monetary policy rate. Similarly, the credit channel in the transmission of monetary policy can work, if interest rates credit monetary policy changes and demand and / or supply of credit can cause fluctuations in the interest rate on loans. One can conclude that there is a positive relationship between the average interest rate monetary policy and interest rate loan. However, taking into account the overall results, we can conclude that the link between monetary policy and interest rate is almost appropriate connection, showing that monetary policy has impacted the credit channel. Analyses conducted by the Bank shows that channel deposits are working reasonably well, since 2001. In the same spirit, the credit channel in the transmission of monetary policy will work if interest rates react to changes in monetary policy and demand and / or supply

of credit will react to changes in loan rates. From the analysis of Bank of Albanian seems that these relationships are more difficult to catch. Nevertheless, based on the overall results can be concluded that the relationship between monetary policy and lending rate is generally such that monetary policy does not preclude also be effective in lending channel. But not all loans follow rate movements, indicating that there are other determining factors for interest rates, in addition to the base rate.

There are strong indications that show that the role of the dollar in the Albanian economy has fallen, increasing that of the euro. Also, noted that the relationship between the exchange rate of ALL / EUR and domestic inflation is changing. The Albanian Lek (ALL) is assessed, while inflation is not significantly reduced at the same time. This, along with signs of a credit channel more powerful, and most likely also the wage channel, seems to indicate that the exchange rate channel is losing its power in the monetary transmission process, leaving the place toothier channels. For monetary policy, these results mean that attention to the exchange rate should be divided now between developments in the exchange rate, credit and wages. Monetary transmission in Albania will continue to feed through many channels because of all the new developments, the most powerful channels, and at the same time with a greater speed.

The last factor to be included in our model is the credit level of the economy. Banks credit is the main source of external financing in countries that do not have highly developed financial markets and instruments. The credit level of the economy is closely linked to the well-being of a country. When the economic situation is optimistic expectations for the future are good, thus affecting an incentive to individuals and businesses to obtain credit, because they think they will have more opportunities in the future to repay loans obtained from banks.

3.2. Inflation, interest rates, credit level of the economy and monetary supply interaction

In our paper we have considered four variables, which are as follows: credit level of the economy (kr); loan interest rate (ikr); inflation rate (infl); circulating money supply (M2) . All data were collected on a monthly basis from 2002 to 2008, involving a total of 84 observations. Through auto regression vectors model (VAR) we will try to discover the link between these variables to conclude which of the model equations is more important. Through various tests such as causality test of Granger we will try to determine which of the dependent variables is independent and which dependent, therefore to determine which of them is the cause or the consequence of other variables.

To accomplish this will prove different delays from the smallest (p = 1) and increasing p until that moment that the links fade, and then become irrelevant. Also we will try to test the connection between them that these variables determine the long-term if it resists the connection times or not knowing that this is a problem in practice accompanying economic and financial series. This will be accomplished through the use of Engle-Granger test, based on which will see the combination of our series. These series should be I (1), the first order stationary and in the end their

combination should give a series of I (0), so that their long-term relationship is stable. This long term can also be tested by Johansen test, which relies on the theory of matrices and vectors of its values, where *r* is for the number of vectors that co integrate with each other (0 <r <k-1) and *k* is for the number of series in co integration. Johansen test uses two statistics to answer this. Statistics is the first or Trace, according to which if Trace is greater than the critical value, the null hypothesis falls down, then there are more than r vectors that kointegrojnë each other. The second statistic is the one of its maximum value, according to which if this value is greater than the critical value, the null hypothesis falls and the answer is the same as above.

4. Evaluation of the VAR model

The VAR model is:
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IKR = C (1,1) * IKR (-1) + C (1,2) * infl (-1) + C (1,3) * KR (-1) + C (1,4) * M2 (-1) + C (1,5)
Infl = C (2,1) * IKR (-1) + C (2,2) * infl (-1) + C (2,3) * KR (-1) + C (2,4) * M2 (-1) + C (2.5)
KR = C (3,1) * IKR (-1) + C (3,2) * infl (-1) + C (3,3) * KR (-1) + C (3,4) * M2 (-1) + C (3,5)
M2 = C (4,1) * IKR (-1) + C (4,2) * infl (-1) + C (4,3) * KR (-1) + C (4,4) * M2 (-1) + C (4,5)

The estimated
Vector Autoregression Estimates
Date: 02/17/13 Time: 15:23
Sample (Adjusted): 2002M02 2008M12
Included observations: 83 After Adjustments
Standard errors in () & t-statistics in []

	IKR	Infl	KR	M2
IKR (-1)	0.640524	-0.098322	3.38 +10	2.91 +10
	(0.08400)	(0.06365)	(2.1E +10)	(5.4E +10)
	[7.62526]	[-1.54470]	[1.59876]	[0.54029]
Infl (-1)	0.190610	0.794769	2.90 +10	-5.31 +10
	(0.09177)	(0.06954)	(2.3E +10)	(5.9E +10)
	[2.07709]	[11.4295]	[1.25350]	[-0.90236]
KR (-1)	-4.00-14	1.28-14	0.999621	0.036273
	(3.5E-14)	(2.7E-14)	(0.00888)	(0.02261)
	[-1.13555]	[0.47760]	[112 599]	[1.60448]
M2 (-1)	4.04-14	-2.66-14	0.047614	0.955938
	(5.7E-14)	(4.3e-14)	(0.01435)	(0.03653)
	[0.70905]	[-0.61644]	[3.31872]	[26.1651]
C	0.032411	0.028347	-2.04 +10	1.35 +10
	(0.02420)	(0.01833)	(6.1E +09)	(1.6E +10)
	[1.33957]	[1.54617]	[-3.34488]	[0.86877]

R-squared	0.512987	0.724610	0.999573	0.993043
Adj. R-squared	0.488012	0.710487	0.999551	0.992686
Sum sq. resides	0.006578	0.003777	4.18 +20	2.71 +21
SE equation	0.009183	0.006958	2.31 +09	5.89 +09
F-statistic	20.53998	51.30865	45630.24	2783.296
Log likelihood	274.1095	297.1338	-1904.852	-1982.434
Akaike AIC	-6.484565	-7.039369	46.02052	47.88998
Schëarz SC	-6.338852	-6.893655	46.16623	48.03570
Mean dependent	0.137108	0.030422	1.40 +11	4.07 +11
SD dependent	0.012834	0.012932	1.09 +11	6.89 +10

Resid covariance determinant (dof adj.)	6.24 +29
Resid covariance determinant	4.87 +29
Log likelihood	-3307.928
Akaike information criterion	80.19104
Schëarz criterion	80.77389

Each column in the table corresponds to an equation in the VAR.

For each variable, on the right, are the estimated coefficients, standard error (in round brackets) and *t* statistics [in square brackets]. EViews displays additional information over the coefficients. The first part represents the standard statistic of OLS regression for each equation. Results are calculated separately for each equation using suitable waste and are displayed in the appropriate columns. The last part of tables contains summary statistics for all VAR system. They can be used to compare different models of VAR.

As we see from the table, the first equation shows the dependence of the loan interest rate from other variables and of themselves, while other equations respectively show the dependence of inflation, credit level of the economy, money supply (M2) by itself and other variables with a time delay. By examining the values of the determining coefficients ($R^{2)}$, we notice that equations 3 and 4 are the most explained (respectively with an R^2 equal to 99.9% and 99.3%) which explain the dependence of the economy and credit supply of itself and other variables. Based on the Fishers values we see that all equations are important and the model with the largest Fisher is the third equation of the credit economy equal to 45630.24, which has the highest level of explanations.
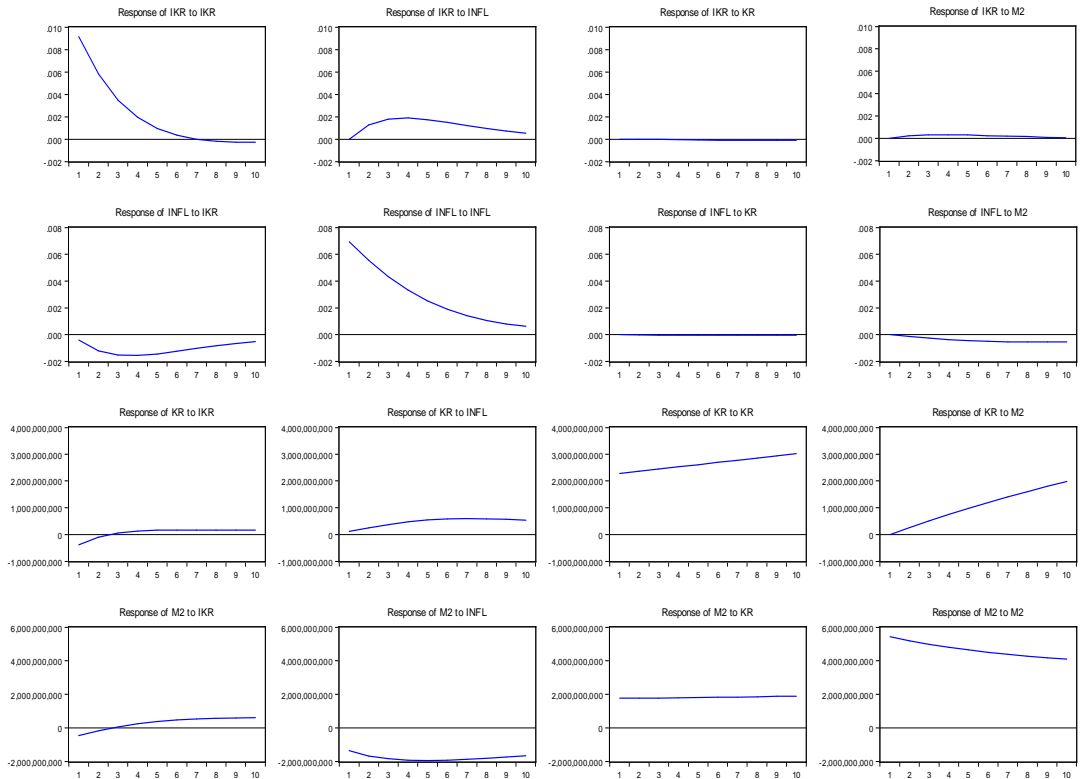
5. Conclusions

This study brought into attention a really discuses for all times. Taking into account the variability in the behaviour of credit in Albania, it was necessary to analyze its interaction with several macroeconomic factors such as inflation, interest rates on loans and money supply. This analysis was conducted through the tests of auto regression vector model. As we saw in the paper the credit level of the economy for the period 2004-2008 grew rapidly, this growth was caused by various factors such as

the establishment of financial intermediation, wealth effect, exchange rate stability, employment and income, interest rates, deposit growth, etc..

VAR models are systems with some equations where all variables are treated as dependent variables and used more when it comes to economic variables, which need to be tested for their cause-effect relationships.

Response to Cholesky One S.D. Innovations

6.   References

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