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Monetary policy transmission: Does the credit channel perform in Cameroon?

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Abstract. This article evaluates the monetary policy transmission through the credit channel in a macroeconomic GDP targeting approach with evidence in Cameroon. We use a macroeconomic approach based on the time series method. On data from the 1960-2012 period, statistical tests reveal the existence of successive causality between macroeconomic variables of the credit channel, confirming the existence of this channel in Cameroon. The Autoregresive vectors modeling (VAR) analysis then reveals a delay of two years in the GDP reaction from the monetary impulses, and that the credit channel is narrow with a low rate in Cameroon, a central African Developing country.
Keywords. Monetary policy, GDP targeting, Credit channel, VAR, Cameroon.
JEL. E51, E52, E58, G32.

1. Introduction

Growth in gross domestic product (GDP) is an important objective for Cameroon, with a view to its projected economic emergence by the public authorities by 2035. In this perspective, the country's economic policy uses the budgetary and monetary instruments for an efficient targeting of the global production. To achieve this, the International Monetary Fund (IMF) recommends that sub-Sahara African countries improve the transmission of their monetary policy to the productive sphere of the economy (IMF, 2014). However, the international financial crisis of 2007-2010 has shown that monetary policy is no longer entirely satisfactory: the mechanisms of transmission of its effects through the credit system no longer function properly (Artus & Broyer, 2014). It is under these conditions that the central banks of certain countries (United States of America, Japan, European Union) now resort to unconventional monetary policy. This policy mobilizes new instruments (quantitative easing, credit easing, etc.) to increase the liquidity needed to finance the economy (Artus, 2014). On the theoretical level, the old debate on the best channel for transmitting the effects of monetary policy is thus revived.

In the countries of the Economic and Monetary Community of Central Africa (CEMAC), the problem of economic activity financing arises permanently with particular acuity. In Cameroon, the evolution of bank lending supply remains worrying in light of the growth objectives projected by the public authorities. Less than 30% of corporate credit applications are favorably received by banks (IMF, 2014). In addition, the allocation of credit to the economy by term is unfavorable to the financing of productive activities. Out of a total amount of CFAF 2,267.4 billion in 2013, short-term credit, generally used for commercial activities, represents 62 %, i.e. CFAF 1392.6 billion, medium-term credit 33% and long-term credit 5% (BEAC, 2013). This bank lending supply remains weak compared to the real potential of the economy and the banking system: bank credit represents 8.9%

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of GDP in Cameroon in 2014, compared with 29.75% in the least developed countries, 66.65% in Latin America and the Caribbean, and 56.95% in lower-middle-income countries. Only 17 adults out of 1000 borrow from banks in Cameroon (IMF, 2014). This weakness of credit supply contrasts with banking liquidity, which accounts for 43% of banking assets in Cameroon, compared to 3% in the European Union, 19% in Latin America and the Caribbean, and 30% in South-East Asia (World Bank, 2014).

One of the major consequences of this quantitative and qualitative credit shortage is the weakness and stagnation of the real growth rate, which is around 3.52% per year over the period 2005 to 2014 in Cameroon (IMF, 2014). Although it reaches 4.8% in 2014, this growth rate remains well below the target of 7% in the past two decades, hoping to halve poverty and achieve economic emergence by 2035. In addition, there is a macroeconomic under-liquidity, with the M2 money supply accounting for only 24.8% of GDP. However, in the absence of a well-functioning financial market, the financing of the Cameroonian economy in particular and that of the CEMAC countries in general can not be better done than by bank credit. With this in mind, the central Bank of Central African States (BEAC) organized an international conference on the financing of CEMAC economies on 13 June 2013 in Libreville (Gabon). This conference recommended, inter alia: (a) to reformulate the monetary policy of the BEAC to make it more effective; (b) to ensure the effectiveness of banking intermediation for more appropriate financing of public and private investment by placing the impetus of monetary policy of paramount importance. It is in this perspective that we question the effective transmission of the effects of the monetary policy of the BEAC to the real economy of the countries of the Zone. We are interested in the particular case of Cameroon. More specifically, this article aims to evaluate the credit channel in Cameroon. In the following, we review the literature (II), the presentation of the methodology (III) and the presentation of the results and discussions (IV).

2. Literature Review

Economic theory recognizes the power of monetary policy to influence the supply of bank credit. Each monetary policy decision (change in reserve ratio, change in key interest rate, etc.) may lead to a change in the supply of credit to the economy by secondary banks (Kashyap & Stein, 1994). The set of successive adjustment mechanisms that make this process possible is called the credit channel: an expansionary monetary policy (for example) increases the volume of bank loans; There is an increase in investment; Resulting in an increase in gross domestic product (GDP) (Mishkin *et al.,* 2010). This mechanism for transmitting the effects of monetary policy on the real economy is presented in the basic model of Bernanke and Blinder (1988) starting from the IS-LM framework of Hicks (1937). Bernanke & Blinder (1992), Hubbard (1995), and Stein (1995) distinguished the existence condition from the credit channel efficiency condition. For the effective existence of this channel, the Central Bank must be able to influence the supply of bank credit by using the instruments at its disposal (changes in the key rate, the reserve requirement, open market, etc). This requires that, for the majority of the economic agents, bank credit and the other means of external financing (bonds, shares, etc.) are not substitutable. Otherwise, the credit channel is said to be narrow, and channel efficiency is maximal. In an environment of large companies able to access other forms of financing in a developed financial system (self-financing, bond loans, etc.), the effectiveness of the credit channel is diminished and we speak of a broad channel of credit (Lavigne & Villieu, 1996).

However, everything depends on the behavior of the actors. In order to maximize the effectiveness of the credit channel, moral hazard in lender-borrower relationships, adverse selection, informational asymmetries, credit rationing and a deteriorating business environment must be avoided (Stiglitz & Weiss, 1981). The secondary banks must react in such a way as to amplify the effect sought by the central bank (Levieuge, 2003). According to Mishkin (1994), the credit channel is

measured in terms of width, depth, flow and delay. It is broad if the companies have the possibility to finance themselves also in the financial markets, and not only with the secondary banks. It is all the wider as the financial market is developed. The width of the credit channel is thus measured by comparing the share of financing obtained on the stock exchanges (direct financing) with that obtained from the secondary banks (indirect financing). The depth of the credit channel refers to the credit aggregate most sensitive to monetary policy decisions, which is most significantly influenced by monetary policy measures (Goux, 1996). Determining the depth of the credit channel thus requires assessing the sensitivity to the monetary policy of each credit category (domestic credit, credit to the economy, credit to the public sector, etc.), conducting causality tests of Granger (1988).

The flow of the credit channel refers to the degree of response of the supply of credit to monetary policy. When it is weak, there is a lack of influence of the monetary policy on the banking system and consequently on the real economy (Lavigne & Polin, 1996). The credit channel delay is the time it takes for a monetary policy decision to have an impact on the real economy. GDP can thus react positively with a delay of one or more periods. The credit channel will be all the more efficient in that its period will be short. The choice of monetary policy instruments always takes into account the delays associated with each one. Friedman (1948) distinguishes between two types of deadlines: internal delays (the time required to recognize an economic problem, the choice of an instrument and its implementation) and external delays (the time needed for an amendment Instrument can make its impact on the final objective of the economic policy implemented). Between these two types of delay, there are intermediate delays which take account of the fact that some instruments do not act directly on the final objective but pass through an intermediate variable. In this case, the intermediate delay designates the time required between the decision making and the reaction of the intermediate variable.

On the empirical level, work has been carried out on the verification of the credit channel. Using the Autoregressive Vector (VAR) method, Gertler & Karadi (2015) highlight the credit channel through a monetary policy acting by surprise. Some have proved the existence of this canal in the United States (Bernanke & Blinder, 1988, 1992; Kashyap & Stein, 1994; Bernanke & Gertler, 1995; Meltzer, 1995) Month the reaction time of the GDP to the policy of the Federal Reserve (Ramey 1993; Romer & Romer, 1993). In the European Union, Beadu & Heckel (2001) establish, in line with credit channel predictions, that European firms' investment is sensitive to monetary policy, with asymmetries of shocks between countries and between firms of different sizes. In a macroeconomic approach, Goux (1996) evaluates the credit channel in France using the autoregressive vector method (VAR) and finds that real GDP reacts positively to monetary policy with a 6-month delay, but that a delay of 9 months is necessary to maximize this incidence; It identifies credit to the economy as the depth of this credit channel whose flow is low. On the African economies, particularly those in West Africa, Diagne & Doucouré (2000) estimate the transmission of monetary policy from a seven-variable model (real interest rate on the money market, M2, Credit to the economy, real exchange rate, GDP, private investment, inflation rate) and find in the case of Côte d'Ivoire that a positive shock on the money supply results in successive increases in credit to the economy, improved private investment and GDP growth (according to the credit channel) for a year and a half. In the context of CEMAC in general and Cameroon in particular, theoretical works by Joseph (1996), Bekolo Ebe (1997, 1998, 2002), Okah Atenga (1998), Avom (2006), have not yet carried out an empirical test of the credit channel. However, Ekomane & Yamb (2016) analyzed the measurement of the credit channel in the CEMAC zone as a whole, without specifying individually the case of each country of this community. The aim of this study is therefore to clarify the credit channel operation in Cameroon which economy is the leading one of Central Africa.

3. Methodology

3.1. Variables and data

The main variables are: broad money supply M2, domestic credit (CRI), credit to the private sector (CRP), total investment (INV) and nominal GDP. The data come from the BEAC and IMF bases, covering a period of 52 years (1960-2012) and are presented in the form of a time series.

3.2. Econometric instruments and techniques

The credit channel can be summarized as follows:

$$M2 \Uparrow \rightarrow CRI \Uparrow \rightarrow INV \Uparrow \rightarrow PIB \Uparrow$$

To test the existence of the channel is to verify that this chain of causalities is effective. It will therefore be necessary to carry out tests of causality between M2 and CRI, between CRI and INV, between INV and PIB. We will do this according to the approach of Granger (1969) and Goux (1996) that X causes Y if Y can be better predicted from the past of Y and X rather than from the past of Y. Formally, It is necessary to estimate the following equation:

$$Y_t = \sum_{j=1}^{j=m} b_j X_{t-j} + \sum_{j=1}^{j=m} C_j Y_{t-j} + a + u_t$$

We say that X causes Y in the sense of Granger if at least one bj is different from 0. After the causality tests, and according to the results of these, we will construct a VAR model to measure the causal relationships obtained. Given a vector Y_t consisting of k endogenous variables representing the economy studied, the VAR model with k variables and p shifts, also called the autoregressive model of order p [Ar (p)], is presented in the form:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + ... + \beta_p Y_{t-p} + \varepsilon_t$$

If we take into account the influence of the exogenous explanatory variables, we will have:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + ... + \beta_p Y_{t-p} + \alpha_1 X_{1,t-1} + \alpha_2 X_{2,t-2} + ... + \alpha_m X_{m,t-m} + \varepsilon_t$$

Where X_{it} are exogenous variables that can also be delayed. Finally, based on the results of the estimation of the VAR model, we will estimate a monetary policy transmission function, in the form of the multiple regression model below:

$$PIB_t = \beta_0 + \beta_1 .M2 + \beta_2 .CRI_{t-i} + \beta_3 .CRP_{t-i} + \beta_4 .INV_{t-i} + \beta_5 .PIB_{t-i} + \varepsilon_t$$

With i the number of years of lag that will be determined for each variable as a result of the causality tests and the regression coefficients to be estimated.

4. Findings and discussions

4.1. Preliminary statistical tests and causality tests

The unit root test following Dickey & Fuller (1981), the ADF (Augmented Dickey Fuller) test, in our series yielded the results summarized in Table 1 below.

Table 1. *Results of the ADF stationarity test.*

Variables	M2	CRI	CRP	INV	PIB
Ordre d'intégration	I(1)	I(1)	I(1)	I(0)	I(2)

Source: Our findings.

Only the investment series (INV) is stationary at level. The series M2, CRI and CRP are integrated in order 1, and the series PIB in order 2. Hence the need for the cointegration test of Johansen (1988, 1991) which gave the results in Table 2 below.

Table 2. *The Johansen's Cointegration Test Results on the Credit Channel Variables*

Eigenvalue	Likelihood Ratio	Critical Value at 5%	Critical Value at 1%	Numbre of Cointegrating Equation
0.635157	85.41651	68.52	76.07	None **
0.495087	38.83038	47.21	54.46	At most 1
0.182469	11.49562	29.68	35.65	At most 2
0.082149	3.436980	15.41	20.04	At most 3
0.000204	0.008150	3.76	6.65	At most 4

Source: Our results

Note: The stars * (**) denote the rejection of the non-cointegration hypothesis and therefore the acceptance of the cointegration at the level of 5% (1%) and the existence of one cointegrating equation (CE) is assumed.

At the 1% threshold, the M2, CRI, CRP, INV and PIB series should be considered as cointegrated to order 1 (LR = 85.41 > critical value 68.52). There is therefore a stationary linear combination of these variables. This allows the specification of stable and long-term relationships between the different credit channel variables. It remains to verify the possible causal relationships between them. The table 3 below reports the results of the causality test.

Table 3. *Bivariate causality tests*

(Null hypothesis: X does not "Granger cause" Y)

X/Y	P (1 lag)	P (2 lags)
M2 / CRI*	0.00347*	0.00594*
CRI / M2	0.11354	0.34829
CRI/INV*	0.03940*	0.02627*
INV/CRI	0.87663	0.95418
INV /PIB*	0.60812	0.01200*
PIB/INV	0.01908	0.06774
M2/INV	0.06588	0.06588
INV/M2	0.02651	0.02651
CRI/PIB	0.05459	0.84788
PIB/CRI	0.01284	0.05525
M2/PIB*	0.94236	0.01773*
PIB/M2	0.09733	0.04262
M2/CRP	0.12347	0.11686
CRP/M2	0.24910	0.62424
INV/CRP	0.58394	0.83183
CRP/INV	0.35906	0.22033
CRP/PIB	0.07770	0.35859
PIB/CRP	0.18449	0.07844

Source: Our results.

Note: Bold and marked with a star are the actual and significant causalities expected.

These results indicate that M2 causes domestic credit with a delay of one year. This means that domestic credit in Cameroon is more sensitive to monetary policy than other variables. The depth of the credit channel is thus domestic credit. This domestic credit, in turn, causes investment with a delay of one year, and investment causes the GDP with a delay of two years. It is concluded that the credit channel exists in Cameroon. Moreover, there is a direct influence of M2 on GDP, with a delay of two years. Similarly, the interest rate causes investment: a fall in the interest rate causes an increase in investment. An expansionary monetary policy therefore has positive effects on GDP a year later and these effects last two years,

subject to the control of inflation. These results confirm Brunner's (1968), McCallum (2008, 1990), Taylor (1995), and Feldstein & Stock (1994) findings of a robust and stable relationship between money supply M2 and nominal GDP. It therefore seems pertinent to propose a monetary policy with two final objectives: monetary stability and economic growth. The various tests carried out above were aimed at detecting causal and stable relationships between the credit channel variables. This objective is achieved. But the causality test gives no measure of the weight of the relationship. To measure this weight, we now proceed to estimate the VAR model taking into account the causal relationships above.

4.2. Findings from the VAR test

The VAR model to estimate is thus the following:

$$GDP_t = \beta_0 + \beta_1 M2_{t-1} + \beta_2 CRI_{t-1} + \beta_3 CRP_{t-1} + \beta_4 INV_{t-2} + \beta_5 PIB_{t-1} + \varepsilon_t$$

The OLS estimate gives the results in Table 4 below.

Table 4. *VAR Results on the Credit Channel in Cameroon*

Sample : 1960 2012
Number of observations : 52
Standard deviation & Student t Statistic (in parentheses)

	PIB	M2	CRI	CRP	INV
PIB(-1)	1.567444*	0.058160	-0.000841	0.124159	7.656884
	(0.15134)	(0.06865)	(0.08520)	(0.08848)	(18.2273)
	(10.3569)	(0.84714)	(-0.00988)	(1.40326)	(0.42008)
M2(-1)	1.324756*	0.329188	0.614084	0.478723	0.253251
	(0.49399)	(0.22409)	(0.27809)	(0.28880)	(59.4945)
	(2.68176)	(5.93147)	(2.20826)	(1.65764)	(0.00426)
CRP(-1)	0.003633*	0.293811	0.637895	1.096771	6.298438
	(0.39839)	(0.18073)	(0.22427)	(0.23291)	(47.9813)
	(0.00912)	(1.62573)	(2.84430)	(4.70899)	(0.13127)
INV(-1)	0.002259*	0.001350	-0.000446	0.000930	-0.204702
	(0.00152)	(0.00069)	(0.00086)	(0.00089)	(0.18302)
	(1.48685)	(1.95797)	(-0.52184)	(1.04737)	(-1.11848)
C	56.15214*	13.67725	13.18606	25.20111	97.34512
	(41.8780)	(18.9974)	(23.5748)	(24.4829)	(5043.66)
	(1.34085)	(0.71996)	(0.55933)	(1.02934)	(0.01930)
R^2	0.997716	0.984924	0.977099	0.956338	0.332327
Adjusted R^2	0.996928	0.979725	0.969202	0.941282	0.102094

Source: Author.

The estimated VAR is therefore as follows:

$$GDP_t = 56.15 + 1.57 GDP_{t-1} + 1.32 M2_{t-1} + 0.004 CRP_{t-1} + 0.002 INV_{t-2} + \varepsilon_t$$
$$(41.878)...(0.151).....(0.494).....(0.398).....(0.0015)$$
$$\cdots\cdots(1.34).....(10.35).....(2.68).....(0.009).....(1.487)$$
$$R^2 = 0.99$$

The VAR generates interesting explanatory relationships between the nominal GDP and the monetary policy transmission variables, thus confirming the different causalities established above:

$$M2\uparrow \rightarrow CRP\uparrow \rightarrow INV\uparrow \rightarrow GDP\uparrow.$$

This relation establishes the influence or not of the central bank on production through the channel of bank credit. This model allows to target the GDP by the monetary policy is indicated here by the variations of the aggregate M2, while taking into account the transmission of such a policy by means of the credit as revealed by the test of causality. The selected credit aggregate is the one-year credit

extended to the private sector (CRP) t-1. Regarding investment, although the causality test was only significant for the two-year delayed investment (INVt-2), the VAR test completes this result by revealing a positive correlation of GDP with l Delayed investment of one year (INVt-1). This induces a GDP reaction with a small magnitude indicated by a coefficient of 0.002.

5. Conclusion

The aim of this paper was to assess the functioning of the credit channel in the transmission of the effects of monetary policy in Cameroon. In addition to the literature review, the analysis was conducted in a macroeconomic approach using time series as part of VAR modeling. It appears that the credit channel operates in Cameroon, but with limits. Indeed, the different successive causalities expected between the variables of transmission of the monetary policy are established, in particular between the money supply M2, the domestic credit, the investment and the real GDP. In addition, the VAR analysis revealed an interesting relationship between GDP and macroeconomic monetary and financial variables representative of the transmission of monetary policy. With regard to the delay, it is two years. However, a conclusive causality test on the chain of monetary policy transmission variables does not guarantee the fluidity of the credit channel in Cameroon. Indeed, it hides many limitations linked in particular to the weak influence of the issuing institution on the behavior of secondary banks in terms of credit supply. This is particularly true of credit to the private sector, as evidenced by the lack of causality between the money supply and credit to the private sector. The opportunistic behavior of borrowers and the risk aversion of banks have often made it difficult to finance the economy through credit. In the future, the BEAC's influence on the behavior of secondary banks should be strengthened by restoring it part of the authority abolished by the financial liberalization of the early 1990s (administration and credit selectivity). This renewal of authority would make it possible to steer credit towards productive growth sectors. It also appears necessary to extend the credit channel by consolidating the financial markets of the zone and by creating new specialized financial institutions. Public action aimed at minimizing the perverse effects of the opportunistic behavior of borrowers and banks that have made the offer of bank credit in Cameroon chilly would also be necessary.

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