



Analysis of the Effect of Credit to the Economy on Inflation and Economic Growth in Benin

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ABSTRACT

This paper examines the effects of the sources of financing of the economy on macroeconomic stability in Benin. The study is particularly interested in credit allocation for the Beninese economy and their effects on inflation and economic growth. To achieve this, the study employed growth models specified from a Cobb-Douglas production function as well as Error Correction Models (ECM). The analysis revealed that monetary and credit policies of the central bank contributed significantly to reduction in inflation, particularly to its rate of increase relative to national production.

However, from the analysis, it is evident that structure of competition in place does not effectively contribute to a strong and sustainable growth of the Beninese economy.

KEYWORDS :

Introduction

The loans to the economy, an important component of the counterpart for the money supply, play a key role in this process. It is also imperative for the monetary authorities to come at conciliating their evolution with that of growth and inflation, notably by determining a growth objective that reflects the rate of growth of national wealth and the economic politics as a whole. When they are inadequate, they act negatively on growth while, in case of need, they can be source of inflation.

According to James (1970), money is a means of action. It is not a simple "veil" or just an "intermediate of exchange" and a "standard values" but a lever allowing to promote the growth of the economy, to modify the distribution of income and preferred source of power. The growth rate adopted should be consistent with monetary equilibrium, at least in the long term. Beyond certain levels, the development of credit operations does not cause more than the rise of prices, and not the development of the activity. The pure monetary theory does not provide a better understanding on the level of that rate. Better, the choice to make, even though it can be lighted up by the national accounts, is still uncertain. The analysis of the evolution of this aggregate in Benin reveals strong growth. Indeed, between 2009 and 2012, the credits to the economy have almost tripled from 102.0 to 293.8 billion while growth remained stable at around 5% during the same period. This situation leads some informed people to think that credits have not served to the increase in national wealth while for others; its level remains insufficient to stimulate economy growth.

Besides, many scholars and economic policy makers agree that high inflation distorts decisions making of private agents about savings, investment, and production and ultimately led to growth slowdown.

Given these concerns, this study aims at determining the impact of credits to the economy on growth and inflation in Benin. The study is a continuation of the work of Hounsa (2003) and intends to use a framework to clarify the type of relationship existing between these aggregates. This exercise takes its interest because it will analyze and confirm or not the theoretical relationship that should exist among the credit to the economy, growth and inflation. Three essential points justify the interest: originality, opportunity and practical interest. It holds its originality because it addresses the issue by relying on both theoretical models and socio-economic data of Benin.

Afterwards, its opportunity relies on the fact that given all the polemic observed on the use of credits for capital transfers outside, it is of great interest to make this assessment.

Finally, on a practical level, this study will provide insight to the political and economic planners, given the theoretical considerations and the specificities of Beninese economy, the relationship among these three aggregates. It will allow a better orientation of their decisions in the direction of optimal conduct of credit policy, regarding the economic indebtedness of this country, for which the indirect funding is primordial.

1. Literature review

Literature is more or less abundant on the relationship between credit and macroeconomic variables specifically inflation and economic growth. In this paper, we deal with theoretical and empirical aspects of the research.

2.1 Monetary Policy and Inflation: Theoretical Foundations

Several research studies lead to the conclusion that an expansionist monetary policy, although favorable to the economic growth, has more or less mitigated effects on the general price level.

Classical authors, focusing their analysis on what they consider as the real economy, reduce the effects of a variation of the quantity of money to a simple change of the price level. Neoclassists give a new dimension to this approach by building with the use of mathematical formalism, a real balance without money, and showing that the introduction of money does not bother the balance. Bodin (1568) rejects the idea that the price increase would only be due to the depreciation of the unit of account. To get the same amount of goods at the beginning of the century, one must deliver a larger amount of metal. Hume (1752) makes a mechanical presentation of the effects of a change in the money stock on the prices that bring us to the modern formulations of the quantitative theory. According to this author, if in one night, four fifth of money circulating in Grand Britain disappear, the prices should fall in the same proportions. On the contrary, if by miracle this amount of money quintupled during this night, the opposite effect would occur. James (1970) defined inflation as a global and not strictly monetary phenomenon. It is global because it affects the economy as a whole; modify the prices, the revenues structures, the quantum and the production orientation.

2.1 Monetary policy and growth

The introduction of money in the new growth theories perpetuated the usual division among the authors for whom any monetary policy is doomed to failure and those for whom in the Keynesian tradition an expansionist monetary allow to influence the level of activity.

Tobin (1965) shows that the money is able to influence the level of activity by modifying the household portfolio. The money is seen as a financial asset. Given a certain level of wealth, the capitalistic intensity of the economy (capital/head) depends on the distribution

of this wealth between capital and currency. If ever the profitability of money declines as a result of inflation then the agents will prefer to hold real assets in their portfolio, which will lead to an increase of investment and thus higher growth.

According James (1970), money is a means of action. Neither it is a mere "veil nor just an "intermediate of exchange" and a "standard values" but a lever to promote the growth of the economy, to modify the distribution of income and preferred source of power. "Beyond certain levels, the development of credit operations no longer causes the rise in prices and not the development of the activity. The monetary authorities must work together to seek what is, among the possible growth rates, the most consistent with monetary equilibrium.

McKinnon and Shaw (1973) emphasized that the financial sector accelerates economic growth and enhances the performance of an economy by facilitating the movement of capital to the most productive sectors. The development of financial markets and the deepening of intermediation help the economic development, in opposition to the situation where investors are forced to fully self-finance.

Samba (1998), through the theoretical framework of "Integrated Model of Macro-econometric Projection and Simulation for the Member States of UEMOA," presents the transmission mechanisms of monetary policy in the economies of the UEMOA, especially relationship credits to the economy and price. The model is based on two sectors and two goods, and stipulates that the banking system influences the economic activity both through credits to the economy and through the impact of monetary policy on prices.

With Hounsa (2003), the function of credits to the economy results from an analysis of the banks behaviors, based on the portfolio management approach. The author also indicates that the level of credit to the economy is insufficient to fund the Beninese economy.

2. Data description

In this part, we present firstly the sources of data used in the empirical analysis and the first grid of analysis of these data, which may help to better understand the possible links of credits to the economy, inflation and economic growth. Secondly, we examine the stationary property of the series.

3.1 Data Presentation

The data stems from the national accounts of INSAE, DGAE statistics, balance of payments of BCEAO, Internet researches and also interviews with resource persons in the field. The table 1 summarizes the variables used. For econometric estimates in this study, some variables have undergone a logarithmic transformation. Thus, the following notations are adopted.

Tableau 1: Notation des variables

Variables	Denomination
Gross Domestic Product	GDP _r
Credit to the Economy	CE
Rate of Domestic Inflation	RDI
Rate of Gross Investment	RGI
Interest Rate	IR
Exchange Rate	ER

3.2 Study of the stationary series

The results of many empirical studies show that most of the macroeconomic and financial time series are not stationary. It is then necessary to study stationary. Stationary of the series therefore assumes that the stochastic characteristics such as the expectation and variances are modified over time. This property is demonstrated by the study of the correlogram reinforced by the Augmented Dickey-Fuller (ADF) test of unit root which takes into account only the presence of autocorrelation in the series. These tests have been

presented in many empirical literatures. They will therefore not be formally presented here. However, it should be recalled that the implementation of this test involves three different basic models namely:

$$\Delta X_t = \Phi X_{t-1} + \sum_{j=1}^p \gamma_j \Delta X_{t-j} + \omega_t \tag{Model [1]}$$

$$X_t = \Phi X_{t-1} + \alpha + \sum_{j=1}^p \gamma_j \Delta X_{t-j} + \omega_t \tag{Model [2]}$$

$$\Delta X_t = \Phi X_{t-1} + \alpha + \beta_t + \sum_{j=1}^p \gamma_j \Delta X_{t-j} + \omega_t \tag{Model [3]}$$

For the series is considered stationary, one tests the null hypothesis of existence of a unit root test. One decides of the stationary of the time series when the obtained ADF statistics is less than the critical value. The results of these tests for the variables in this study are summarized in the table 2.

Tableau 2: Results of stationary test

Series	Level of difference	Type of Model	Delay	ADF Statistics	Critical value	Observations
CE	1	[1]	P=1	-6.1124	-1.9529	stationary*
ER	1	[1]	P=1	-5.0569	-1.9540	stationary*
RGI	1	[1]	P=1	-5.4077	-1.9540	stationary*
RI	0	[1]	P=4	-2.5463	-1.9544	stationary*
GDP _r	0	[2]	P=1	-4.8746	-2.9639	stationary*

* indicates the rejection of null hypothesis at 5%.

3. Method of analysis

We aim through this study to analyze the effects of credit to the economy on inflation and economic growth in Benin. In this respect, we employ the error correction models (ECM) (Engel and Granger 1987). The econometric framework of this test implies the stationary of variables involved. Two main types of tests are possible. We distinguish, first, the so-called sequential test procedures that require studying precisely the stationary of the variables and the possible presence of a cointegration relationship before doing the Error Correction Model. The cointegration test developed by Johansen (1988) uses the maximum likelihood method for determining the presence or absence of cointegration vectors in non-stationary series. The cointegration analysis provides a theoretical framework for studying the equilibrium and disequilibrium situations prevailing respectively in the short and long terms. If the variables are cointegrated, they admit a dynamic specification of error correction type. Thereby, considering k variables, all integrated in same order d, one will say that they are cointegrated if there is a vector of cointegration of dimension (k, 1) so that the linear combination of k vectors is integrated of order (d - b) where 0 ≤ b ≤ d. When the series are integrated of the same order and cointegrated, the estimation of a vector auto regression (VAR) in first differences is inappropriate; it suits to parametrize the model as a vectorial model of error correction (Engle and Granger, 1987; Johansen, 1988). ECM model allow reconciling, in the same context, the behavior of short and long term which are choked on the temporal horizons priori antinomic. Far from equilibrium, the influence of these disturbances is predominant but it will amortize in the long term and the system converges to its static equilibrium. MCE model therefore shows how the system converges towards long-term balance.

The formalization of this model can be constructed in a simple two-step.

Consider the following equation:

$$Y_t = a_0 + a_1 X_{1t} + a_2 X_{2t} + \dots + a_k X_{kt} + e_t \tag{1}$$

- The first step is to estimate the long-term relationship by ordinary least squares methods.
- The second step is to take out the residues of this estimation and test their stationary. When the residuals are stationary, cointegration relationship is accepted and we estimate by OLS the short-term relationship of the dynamic model:

$$\Delta Y_t = \alpha_0 + \sum_{j=0}^p \alpha_i \Delta Y_{t-j} + \sum_{j=0}^p \beta_j \Delta X_{tj} + \dots + \sum_{i=0}^r \beta_k i \Delta X_{kt} + \lambda e_{t-1} + \mu_t \quad (2)$$

In the short-term dynamics, the coefficient of the restoring force must be significantly negative; otherwise, we reject a specification of type ECM. Indeed, the mechanism of error correction (catch that allows to move towards the long-term relationship) would then go in the opposite direction and moves away from the long-term target. We adopt this method in this paper.

To empirically test the effects of credit to the economy on economic growth, we start from a Cobb -Douglas function growth that expresses the production according to the volume of capital and labor

$$Y = f(K, L) = A \cdot K^\alpha L^\beta$$

In this functional form, A may be considered as the factor productivity as it provides for a level of utilization of capital and labor inputs the efficacy produced. The variables of economic policy can influence A. To better describe the effect of different measures of economic policy on the total factor productivity, A can be defined as follows:

$$A = A_0 e^{(\lambda CE + \phi DIR + \delta RGI + \mu IR)}$$

The linearization of this equation gives:

$$\ln Y = \ln A_0 + \lambda CE + \phi DIR + \delta RGI + \mu IR + \alpha \ln K + \beta \ln L$$

With $\ln Y = \text{GDP}_t$; $\ln A_0 = \alpha_0$; $\lambda CE = \alpha_1 CE$; $\phi DIR = \alpha_2 DIR$; $\delta RGI = \alpha_3 RGI$; $\mu IR = \alpha_4 IR$; we obtained the following econometric model :

$$\text{GDP}_t = \alpha_0 + \alpha_1 CE_t + \alpha_2 DIR_t + \alpha_3 RGI_t + \alpha_4 IR_t + \epsilon_t$$

Where GDP_t represents le Gross Domestic Product; CE represents the Credits to the economy; RDI is the Rate of Domestic Inflation; RGI is the Rate of Gross Investment and IR le interest rate; α_1 ; α_2 ; α_3 ; α_4 et α_4 the respective coefficients of different variables; t the time and ϵ_t the error term.

Regarding the link between credit to the economy and inflation, we argue for a simple linear regression that relates inflation (DIR) to credit to the economy (CE), at the exchange rate (EC) and gross domestic product (GDP) in these terms:

$$DIR_t = \beta_0 + \beta_1 CE_t + \beta_2 ER_t + \beta_3 GDP_t + \mu_t$$

Where β_1 , β_2 , β_3 et β_4 represent the respective coefficients of different variables; t the time and μ_t the error term.

The model estimation provides empirical explanations of the effects of credit to the economy on inflation and economic growth in Benin through the study of the stationary and cointegration. In the following step, we will present the two-stage estimation of MCE within the meaning of Engel and Granger. These two steps correspond to the long and short relationship also called dynamic model.

4. Results and Discussion

We organize this section in two stages: The first stage concerns the results of cointegration tests. The second stage deals with the discussion of the results before making recommendations for the conduct of policy for economic development.

5.1 Results of the cointegration tests

The order of maximal integration of variables from the unit root tests above is equal to one (01) and thus, there is a presumption of a co-integrating vector. The results of tests carried out to confirm or deny the existence of this relationship are summarized in the table 3.

Tableau 3 : Results of co integration tests on the trace of variables

Null Hypotheses	Proper Values	Statistical traces	Critical Value 5 %
R=0	0.818498	98.82513	69.81889

R=1	0.602390	49.33698	47.85613
R=2	0.415889	22.59072	29.79707
R=3	0.166096	6.998481	15.49471
R=4	0.057943	1.731001	3.841466

The analysis of the table 3 shows that Johansen Statistics relative to the first proper value is higher than its critical value at 5% (0.818498 < 69.81889). So, we have no argument to reject the null hypothesis (R = 0) at 5%. Johansen Statistics relative to the sixth proper value is less than the critical value at 5% (19, 64996 < 19, 96). Hence, we accept the null hypothesis (R = 5) which states that there are five cointegration relationships amongst variables. In conclusion, the diagnostic tests performed confirm the existence of cointegration and allow us therefore to proceed to different estimates of MCE, given that the series are stationary in first differences.

5.2 Discussion of results: Credit to the economy, inflation and economic growth

5.2.1 Summary of result of model estimation

5.2.1.1 Model GDP

For the empirical analysis, we adopt the Engel and Granger test of estimation in two stages. The estimation results are summarized in the table 5.

Equation	Relation de LT		
Xt	Coefficient	ΔX_t	Coefficient
CE	0.038708 (-0.91133)	D(CE)	0.047945 (-1.09229)
DIR	-0.249128 (-1.93429)	D(DIR)	-0.127221 (-1.04301)
GIR	-0.25021 (1.562058)	D(GIR)	0.091116 (2.277092)
IR	0.375656 (2.613928)	D(IR)	0.350104 (2.556694)
		GDP(-1)	-1.306537 (-0.693168)

() t-student

The model of error correction is accepted as the restoring force in equilibrium (that is to say the coefficient of the lagged endogenous variable) is negative and significant at the 5% threshold. The value of the restoring force in equilibrium is -0.693168. So we can say that we adjust at least about 70% of the imbalance between the value of the expected GDP and the actual value. The regression is globally good based on Fisher Statistics and the high value of coefficient of determination.

5.2.2 Tests and diagnostic validity of the model

The results of the test of normality on the residue show that they are not normal because the probability associated with the statistical JB (0.67826) is greater than 5%. All the estimated coefficients are unbiased.

The results of Breusch-Godfrey tests imply that the residues are not auto - correlated because Prob (F-statistic) is equal to 0.000520 which is less than 5%. Thus, the estimators are unbiased. All of these tests led us to conclude that the estimated model is validated statistically.

5.2.3 Analysis of results

The Engel and Granger causality tests indicate that a long-term relationship does exist among real GDP, credits to the economy, inflation and the actual total investment. The MCE model is valid and globally good, since the error correction coefficient is negative (-1.30) and significant at 5 %. All variables are significant at the 5% level except inflation rate which is significant at 10% in the long term. The adjusted R square shows that the equation of the model of error correction explains 70% of GDP growth.

The credits to the economy are positively correlated with economic growth in Benin, both in short and long term. The elasticities respectively stand at 0.03 and 0.04. Accordingly, the sensitivity of economic growth to the change in credit to the economy is almost identical to both short and long term. This could be explained by the credits in place, mainly supporting business operations without significant added value, do not affect production. Instead, they encourage consumption and imports, including the re-export trade,

mainly for the benefit of the Nigerian economy. This result raises two fundamental questions: the question of monitoring of the economy and that of the financial architecture suitable to the needs of the economy as a whole.

On the first aspect, to monitoring by the monetary authorities should go beyond a simple control of bank creation of fiduciary or scriptural money. It is also necessary to control the use of different economic units that they make of their cash money. Monetary policy implies therefore a control of the economy as a whole.

As for the latter, it is rooted in the structure of the banking system. Indeed, the Beninese banking system, in its current form, is essentially made up of commercial banks, whose policy mainly focuses on the financing of low balance sheet of the enterprises under account loans to allow them to cover their needs cash. These commercial banks are little well equipped to support a stronger economic growth, which inevitably involves the renewal and strengthening of the productive system. The financial market would have no significant impact if it was based on financial intermediaries accepting to hold long assets in their portfolio.

The positive correlation between the total real investment and growth, as well in short as in long term, comes once again to corroborate the need of increased bank financing.

5. Conclusion

This study was designed to measure the impact of a change in credit to the economy on the rate of inflation and economic growth. To achieve these goals, two models were constructed, one for inflation and the second for economic growth. The use of the error correction mechanism principle as an analytical tool helped to point out the following results: the existence of a stable long term relationship (cointegration) between the credit to the economy and growth in Benin. The credits to the economy are positively correlated to growth in both short and long term with the elasticities standing at 0.28 and 0.34 respectively. Thus, an increase of credits of 1% induces an increase of 0.28% of real GDP in short term and 0.34% in long term. While it is true that the expected signs are obtained, the difference between the elasticities seems quite low. What could be justified by the fact that credits are mainly implemented in short term (70%) and fund merely commercial transactions (importation of manufactured goods and exportation of raw materials slightly processed) that have no training effect.

As stated by Guillomont-Jeanneney (2002), "weakness of short and long term credit provided by the banking system is one of the disturbing aspects of the credit policy." This situation states with acuteness the problem of compatibility of the financial architecture with the needs of economy financing; in regards to inflation, the impact of changes in credit to the economy on prices is essentially significant in the short term and presents the expected sign. Thus, a 1% increase in credit to the economy induced, all things being equal, an increase of 0.1 percentage points of inflation. However, in long-term, although the coefficient obtained was not statistically significant, it has the expected sign.

In total, even though it is true that overall the policy of the monetary and credit of the Central Bank contributed to controlling inflation, given the pace of increase compared to domestic production, it remains a fact that the structure of competition in place do not effectively contribute to a strong and sustained growth. Based on this outcome, it is urgent to initiate deep reflection on the architecture of the banking system in order to make it compatible with the objectives of economic policy. The creation of specialized banks (commercial banks, investment or development), the commissioning of the guarantee fund and venture capital firms and the improvement of banks' intervention framework, including the judicial level, are the main factors that could rapidly boost the banking business in favor of credit to the economy in the long and medium term, necessary to further boost economic growth and meet the objectives of the fight against poverty.

Data Base

Years	GDP _r	ER	DIR	GIR	CE	IR
1982	2.24	271.7	1.45	4.155	25.42	-0.13
1983	-4.35	328.6	2.75	4.77833333	12.45	9.31
1984	7.93	381.1	5.78	5.20916667	14.45	12.31
1985	7.53	437	8.86	4.35833333	18.53	20.37
1986	2.17	449.3	10.69	3.1075	18.126	17.74
1987	-1.5	300.5	11.5	3.85166667	18.025	10.16
1988	3.41	297.8	11.45	3.82416667	25.45	14.28
1989	-2.85	319	12.47	4.19166667	56.45	12.58
1990	3.21	272.3	4.45	4.385	44.15	14.22
1991	4.72	282.1	2.41	4.6375	35.56	15.19
1992	4.01	264.7	1.22	4.615	35.42	12.95
1993	3.52	283.2	0.44	4.49166667	29.45	12.42
1994	5.37	555.2	8.53	7.17666667	26.44	12.001
1995	5.6	500	7.46	8.43333333	25.12	11.587
1996	3.55	512	4.91	6.77583333	24.44	10.45
1997	6.15	583.7	3.47	7.74583333	13.45	12.12
1998	4.54	590.1	5.75	4.71583333	17.45	11.89
1999	4.7	615.7	0.33	5.7475	20	11.45
2000	5.8	712	4.17	5.60833333	26.46	11.78
2001	5	733	3.98	5.59	14.23	11.33
2002	4.5	696.9	2.49	4.41916667	17.25	12.02
2003	3.9	581.2	1.49	5.35083333	34.45	11.55
2004	3.1	536	0.87	4.28166667	30.45	11.66
2005	2.9	530	5.36	4.29833333	35.78	10.89
2006	4.1	498.4	3.78	7.8375	10.45	11.621
2007	4.6	490	1.3	9.815	12.45	11.29
2008	3.1	435.4	7.95	10.5075	15.45	11.113
2009	3.8	452.7	2.16	9.34416667	18.55	11.22
2010	4.4	472	2.31	9.32083333	25.485	11.205
2011	5.3	511.5	3.42	9.37166667	29.81	11.3
2012	5.0	510.6	3.20	8.521326	28.63	10.9

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