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Constraints and Effectiveness of Monetary Policy in the DRC

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Abstract The purpose of this paper is to analyze the environment in which monetary policy in Democratic Republic of Congo (DRC) is driven in order to appreciate its possible efficiency and to identify main constraints that hinder its efficiency thereafter. To achieve this goal, we mobilized a vector error correction model (VECM) using monthly Congolese data from January 2002 to December 2018. The results of the evaluation show that the monetary policy of the "Central Bank of Congo" (CBC) endures a weak efficiency because of the absence of the links existing between its policy tool (nominal interest rate) and the objective of the monetary authority (inflation). On the other hand, the survey concludes that the high level of dollarization, the exchange rate (regime), the undeveloped financial system, budgetary or fiscal dominance and external debt constitute main constraints that weigh on the conduct of the monetary policy of the CBC altogether. It being, measures of complete dedollarization or "De jure dollarization", an optimal exchange rate régime, a financial system development, an orderliness budgetary focused on rules and debt sustainability prove to be necessary to orient actions of the monetary authority in order to reach the efficiency of its policy.

Keywords: *constraints, efficiency, monetary policy, central bank, vector error correction model*

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1. Introduction

The conduct of monetary policy has undergone major development for several decades, both theoretically, empirically and methodologically. Indeed, the desire for central banks to conduct an effective and temporally coherent monetary policy at the Kydland and Prescott [1] has abounded in new contributions and new research perspectives. Moreover, the search for a low and stable level of inflation has prompted central banks around the world to equip themselves with the necessary tools to enable them to fully achieve their objective of price stability.

In fact, in order to achieve their objective, central banks must generally manipulate a certain number of instruments at their disposal in an efficient manner and to do this, they proceed either by a strategy of direct inflation targeting[1] in order to fully fulfill their mission of price stability. Moreover, recent years have seen the central banks of many countries pursue a strategy of raising interest rates early in order to prevent a rise in inflation due to the overheating of the economy. For this strategy to be successful, monetary authorities must be able to accurately assess the pace and impact of their actions on the economy, which requires an understanding of the mechanisms by which monetary policy affects the economy [2].

Therefore, to improve the effectiveness of their interventions through a proactive monetary policy, central banks must have analytical tools enabling them to carry out an in-depth analysis of the economic situation and meticulous monitoring of the factors likely to influence the evolution of prices. To do this, they equip themselves with models for forecasting both economic activity and inflation, and this is by considering the transmission times for monetary policy impulses, which are sometimes quite long (which can range from 12 to 24 months) for a decision by the central bank (for example, a change in the key rate) to be transmitted to the real sector and thus impact the evolution of prices [4].

Generally, the decisions of monetary authorities affect activity and prices through complex processes called "monetary policy transmission mechanisms". These processes depend on many factors. This mainly concerns the operational implementation framework as well as the

[1] According to Bernanke, Mishkin and Svenson, inflation targeting is a framework for monetary policy characterized by the public announcement of official quantitative targets (or target ranges) for the rate of inflation at one or more deadlines as well as by the explicit announcement of a low and stable predefined level of inflation as the primary objective of medium- and long-term monetary policy. It was applied for the first time in New Zealand towards the end of the 80s precisely in 1989 and later, several other central banks will apply it throughout the world in particular the central bank of Canada, England, … See Latrèche [3] for more details on the adoption of this inflation targeting rule by central banks around the world.

ability of the monetary policy instrument used to affect key macroeconomic variables, the economic and financial structures in place, the economic situation, etc. Such dependence of the effects of monetary policy on many factors maintains uncertainty about its ability to serve as a reliable and effective policy tool. Whereas, these factors are dynamic; it is then likely that the way monetary policy acts on the economy changes over time depending on the environment [5].

Thus, in a monetary policy framework based on steering interest rates, the decisions of the monetary authorities do not directly influence the set objective. The degree of transmission between interest rates is therefore the keystone of the effectiveness of monetary policy and is based on the state of the financial system in place. The central bank can only succeed in adjusting its policy interest rates to the target inflation rate, thereby enhancing its credibility and effectiveness if the transmission mechanism between interest rates works well. Dysfunctions within the financial system and/or its low level of development can weaken the transmission mechanism between interest rates and lead to ineffective monetary policy [6].

From an empirical point of view, some studies have attempted to analyze the dynamic environment in which monetary policy is conducted in order to identify the main constraints that weigh on its effectiveness because the environment of monetary policy is often complicated by a number of factors and have shown in this regard that central banks can enjoy poor efficiency. Indeed, Desquilbet [7] identifies three main constraints that hinder the effectiveness of Lebanese monetary policy. These are in fact public indebtedness, dollarization and the fixed exchange rate. Ertugrul, Hericourt and Reynaud [8] show that in Turkey, the constraint to monetary policy is the difficulty of reconciling internal-external objectives. In other words, this constraint is therefore materialized both by the transition from an adjustment by prices (i.e. by the interest rate) to a quantitative adjustment (i.e. by foreign currency reserves), and by the resolution of the dilemma in favor of external equilibrium alone. These two mechanisms then destabilized the Turkish economy, leading to the crisis of 2000/2001.

Fischer, Lundgren, and Jahjah [9] also show that dollarization and institutional weakness weigh on Congolese monetary policy and believe that to strengthen the effectiveness of monetary action, there is not a multitude of options that strengthening the current monetary policy framework remains the best way forward. In parallel, Pinshi [10], also identifies the high level of dollarization (85.7%), fiscal dominance, the illusion of monetary policy independence, the high level of the informal economy, the absence of a good state of the financial system as constraints to monetary policy. In Haiti, Castel [11] notes two types of constraints to monetary policy: economic constraints, in particular fiscal dominance, the lack of efficiency of transmission channels, vulnerability to shocks and pass-through, and among the non- economic, it underlines the political instability. Christensen and Schanz [12] show that high leverage can reduce the effectiveness of monetary policy for most African banks. They explain that the level and structure of an economy's debt, especially if it is denominated in foreign currencies, can hamper the ability of the central bank to pursue its monetary objectives. Simon [13] also adds socio-political uncertainties[2], dollarization, monetary financing of the state budget as sources of inefficiency.

Blundell-Wignall, Browne and Manasse [14] show that financial liberalization could have effects on monetary policy, but we should not conclude either that financial liberalization harms the overall efficiency of monetary policy. monetary policy when it comes to stabilizing inflation at a low level. As expectations play an increasingly important role in the transmission of monetary policy, it is the mix of the various measures that becomes decisive. For Mishra, Montiel and Spilimbergo [15] with regard to developing economies, the rigidity of exchange rate regimes, the mixed development of financial markets (or the financial system in general) as well as the shortcomings in the regulation and supervision of financial institutions constitute the main monetary policy challenges. Some authors like Weber [16] and Guillaumont [17] identify the constraints of heterogeneity of the macroeconomic situations of the countries which make up the union for the banks in monetary union as for example the WAMU, the EMU, …

Other authors have similarly shown that fiscal policy is also a real challenge for monetary policy in developing countries [18]. These authors believe that governments can use monetary policy as a stimulus for economic activity since it is generally considered to be less restrictive than lowering taxes or increasing public spending. However, such a policy can favor the emergence of inflationary biases which result from excessive monetary creation not responding to a real counterpart, this is how central banks began from the 1990s to gradually benefit from a broad autonomy in order to limit the influence that the public authorities can have on the definition of their policies as well as on the effectiveness of their interventions.

Faced with such evidence, it now seems relevant to take a look at the environment in which the monetary policy of central banks and more particularly that of the BCC is conducted in order to identify the main constraints that limit the scope of its efficiency. Since despite multiple actions undertaken by the Congolese monetary authority (raising the key rate, see for example the BCC Report, 2017) over the past few years aimed at countering inflationary pressures, controlling inflation at a level so weak and stable continues to pose difficulties for the Congolese monetary authorities (DRC). Concretely, this paper attempts to answer the question of whether: was the monetary policy of the BCC effective? In the case of negation, what are the main constraints that hinder its effectiveness?

The objective of this paper is to this end to assess the effectiveness of the monetary policy of the BCC and to identify the main constraints that weigh on its effectiveness. It mobilizes a vector error correction model "VECM" applied to Congolese data over a period from January 2002 to December 2018 in order to verify the impact of the key interest rate on the central bank's objective. The rest of this paper is organized as follows: (ii) the second section addresses the methodological approach

[2] Other authors note that the 2008 financial crisis challenged (or constrained) monetary policy [19] and Weber [16] points out that the sovereign debt crisis is a major challenge for monetary and economic union.

and the specification of the analysis model, (iii) the results of the study and their discussion are presented in the third section and finally (iv) the fourth section concludes.

2. Data and Methodological Approach

2.1. Source of Data and Description of Study Variables

The data used in this paper come from the Central Bank of Congo (BCC) and have been supplemented by the World Bank database (WDI, 2020). Thus, the data used in this study cover the period from January 2002 to December 2018. The choice of this period is mainly justified by the availability and accessibility of data. The constraints of these did not allow us to integrate a wide range of variables into the model and to exploit a good part of the study. Furthermore, the variables used in this paper essentially concern the key interest rate (the central bank's preferred instrument), the CPI considered as a proxy for inflation (final objective of monetary policy), the money supply in the sense broad, the exchange rate and variables such as dollarization and financial development captured by domestic credits granted to the private sector, public consumption used as a proxy for budgetary policy and external indebtedness constitute the exogenous variables. The choice of these variables is based on the theoretical/empirical literature and the availability of data as well. In addition, exogenous variables are considered a priori as possible constraints to the effectiveness of monetary policy in the DRC.

2.2. Specification of the Analysis Model

The empirical literature related to the assessment of the effects of monetary policy has largely relied on DSGE (Dynamic Stochastic General Equilibrium) models and VAR (Vector Autoregressive model) models as a methodological response and alternative to traditional macroeconomic models of Keynesian inspiration. In order to assess the effectiveness of monetary policy in the DRC, we will use the VAR model introduced by Sims [20] to assess the operationality of the preferred instrument of the monetary authority and its impact on the objective. of the central bank.

Without loss of generality, the general form of a VAR(p) model, the univariate case is given by:

$$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + A_3 X_{t-3} + \ldots + A_p X_{t-p} + \varepsilon_t \quad (1)$$

The matrix write of a VAR(1) of a variable X takes the following form:

$$X_t = A_0 + A_1 X_{t-1} + \varepsilon_t \quad (2)$$

The bivariate case of a VAR(2) model with exogenous variables can be written as follows in its matrix form:

$$X_t = A + \sum_{t=1}^{p} A_i X_{t-i} + BM_t + \varepsilon_t \quad (3)$$

Where $X_t = \left(X_{1,t} \ldots, X_{k,t}\right)^T$ is a vector of "k" endogenous variables are each variable constitutes an equation and B vector of the coefficients associated with the exogenous variables, i.e. the matrix (M_t) and ε_t the vector of residuals. The system (2.1) is said to be autoregressive because each variable depends on its own lagged values (X_{t-i}), in addition to those of the others whose optimal lag "p" for all the variables constitutes the order of the VAR model studied obtained on the basis of certain criteria (AIC, SIC, etc.). To specify a VECM, first consider a VAR(p) noted X_t of dimension (N,1) as defined in (1). We are going to represent this process in the form of a VECM, and for this we are going to differentiate it in order to obtain the following:

$$\begin{aligned} & X_t - X_{t-1} \\ & = A_0 + \left(A_1 - 1\right) X_{1-1} + A_2 X_{t-2} + \ldots + A_p X_{t-p} + \varepsilon_t \\ & \Leftrightarrow X_t = A_0 + \left(A_1 - 1\right)\left(X_{1-1} - X_{t-2}\right) \\ & + \left(A_2 + A_1 - 1\right) X_{t-2} + \ldots + A_p X_{t-p} + \varepsilon_t \\ & \Leftrightarrow X_t = A_0 + \left(A_1 - 1\right)\Delta X_{t-1} \\ & + \left(A_2 + A_1 - 1\right)\left(X_{t-2} - X_{t-3}\right) + \ldots + A_p X_{t-p} + \varepsilon_t \end{aligned}$$

And so on. Finally, we come back to the specification likely to be a VECM below:

$$\Delta X_t = B_0 + B_1 \Delta X_{t-1} + B_2 \Delta X_{t-2} + \ldots + B_p X_{t-p+1} + \Pi X_{t-1} + \varepsilon_t \quad (4)$$

or again

$$\Delta X_t = \sum_{i=1}^{p-i} B_i \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t \quad (5)$$

Where the matrices B_i are function of A_i and with ΠX_{t-1} in long term relation where:

$$\Pi = \alpha\beta' = \sum_{i=1}^{p} A_i - I$$

We also note that: Δ is the first difference operator; β and α are (k*r) cointegration matrices and adjustment coefficients respectively, r being the cointegration rank; $\alpha\beta' X_{t-1}$ refers to the error corrector term with the matrix α the coefficient of the restoring force which must be statistically significant and negative and β is the cointegration vector. B_i $(i = 1; \ldots ; p-1)$ denotes the matrix (k*k) of short-term coefficients and the vector ε_t is the residual assumed to be white noise.

In the context of our study, equation (5) will be estimated given (3). Indeed, the vector of dependent variables X_t includes the consumer price index (CPI) as a proxy for the inflation rate and the bank's objective, the money supply as an intermediate objective, the key rate as the main instrument of authority. currency as well as the exchange rate channel. Exogenous variables include dollarization, domestic credit as well as fiscal policy captured by public consumption. We will use BCC data for a period from 2002 to 2018 (monthly frequency) which will be analyzed using Eviews 10 software by estimating a VECM model.

3. Analysis of Results

In order to avoid any misleading estimation and misinterpretation of our results, one of the important conditions for the validity of the model is stationarity. By this is meant whether or not the structure of the underlying process is assumed to evolve over time. If the structure remains the same i.e. is not modified over time, the process is then said to be stationary. In other words, a stationary series is therefore one for which the mean and the variance oscillate around fluctuations of constant amplitude. Appendix A.1 provides us with the summary of the Augmented Duckey-Fuller test (ADF test) and shows that all the variables are stationary in their first difference I(1). The cointegration test using the Johansen procedure was carried out in order to identify the existence of series following the same long-term equilibrium path (i.e. the existence of a possible cointegration vector) and to eliminate its effect, if any. Appendix A.2 shows us the existence of two cointegration relationships between the different variables, according to the laTrace test and that of Maximum Eignevalue, and thus justifies the use of a vector error correction model. "VECM" instead of a VAR model.

3.1. Estimation Result of a VECM

Before estimating any VAR model, it is a good idea to determine its optimal delay. This is obtained by minimizing certain statistical criteria, in particular that of Akaike (AIC), Schwartz (SC), Hannan-Quinn (HQ). Appendix A.3 shows that the optimal delay which simultaneously minimizes the criteria is 2, so we will estimate a VAR (2). Moreover, the existence of at least one cointegration relationship allows us to estimate a VEC model instead of a VAR model. Indeed, the results of the estimation of a vector error correction model (VECM) are globally satisfactory. The coefficient of the restoring force towards equilibrium is negative and statistically significant at the 5% level and thus justifies the validity and specification of a VECM. In addition, the coefficient of determination is acceptable as well as the F-statistic of Fischer according to appendix A.4. The results of tests on the residuals as well as the stability of a VAR model are provided in the appendices. This being the case, we can for this purpose move on to the interpretation of our results and their discussions.

Thus, our analyzes show that in the long term, the CPI is essentially explained by the money supply, the key rate and the exchange rate significantly at the 5% threshold. The money supply presents a counter-intuitive sign (-0.38) in the long term, we believe that this could be explained by the informal nature of the Congolese economy. However, in the short term, it acts strongly on the CPI but not significantly with regard to Student's t, in accordance with the predictions of the TQM. In addition, we note that the preferred instrument of the BCC, the key rate, presents a sign consistent with the theory only in the long term but with such a weak impact with regard to the value of the coefficient obtained (-0.10). In the short term, on the other hand, it presents a positive sign contrary to theoretical and empirical evidence, which reflects the "low efficiency" of this instrument in the short term. This result could be explained by the absence of links existing between the instrument (key rate) and the objective (inflation) of the monetary authority according to Nabukpo [21] on the one hand and by the fact that the transmission times for monetary policy impulses are sometimes long enough (ranging from 12 to 24 months) for a central bank decision (for example, a change in the key rate) to be transmitted to the real sector and thus impact the price evolution on the other hand [4].

At the same time, in the long term, the CPI remains essentially explained by the exchange rate with a significantly negative coefficient (-0.72). The negative sign of this coefficient reflects a loss in the value of the national currency and therefore a depreciation of the national currency which has a direct impact on the price level through the pass-through effect of the exchange rate. This result is consistent with what the theory predicts and goes in the same direction as Fischer, Lundgren and Jahjah [9], Muganza [22] in the DRC, Ahishakiye, Bidengako and Niyongabo [23] in Burundi. The strong influence of the exchange rate on inflation makes it effectively the main determinant of inflation in the DRC and therefore a secondary effect of dollarization and constitutes for this purpose an important constraint for the conduct of the policy. monetary.

3.2. Identification of Monetary Policy Constraints in DRC and Discussion

We found that monetary policy suffers from meager long-term effectiveness and the operational and privileged instrument of the monetary authority presents a counter-intuitive sign in the short term. This could undoubtedly be explained by various constraints that hinder its effectiveness, which we will try to discuss below. Indeed, several factors seem to hinder the effectiveness of monetary action for central banks around the world and these differ according to the country (Cf. the introductory part of this paper where we discussed these constraints to which banks centers are often confronted). In the introductory part of this work, we tried to list some but, in the Congolese context, we considered only a very limited number of variables as taken as constraints taking into account the availability of data, since in general, developing countries face the problem of accessibility and availability of data.

a) More advanced dollarization of the economy: a paradox?

The results of the estimation reveal the notorious and significant influence of dollarization [3] on the central bank's objective (CPI), which supports and confirms the result of the exchange rate and therefore constitutes an obstacle to efficiency. monetary policy, especially in a country operating under a floating exchange rate regime like the DRC where its level is close to nearly 86% of total bank deposits on average. This result is in line with that obtained by Desquilbet [7], Fischer, Lundgren and Jahjah [9] respectively in Lebanon and the DRC but contradicts that obtained by Arès [25] in Ecuador where dollarization had had positive effects on inflation. Certainly, dollarization in itself is not at all bad because it has both advantages and disadvantages, but also and above all it depends on the specificities of each country. In the past, dollarization allowed the system to adjust to hyperinflation

[3] For a large literature on dollarization, see Mule et al. [24].

and large macroeconomic shocks associated with imprudent fiscal management.

However, high dollarization leads to limited options in terms of monetary policy, i.e. reduces the effectiveness of monetary policy to deal with shocks and manage vulnerabilities, and high exposure of the banking sector as This is currently being observed in the DRC where the rate of dollarization, measured by the ratio between deposits in foreign currency and the total deposits held by the banking system, has continued to rise. In fact, this rate, which was 51.3% in January 2001, reached a peak in April 2005 at 93.4% to fall back gradually to stand at 85.6% at the end of November 2013 [24]. Despite this decline, this level remains relatively high. According to the BCC report (2018), this rate averaged 86.33% between 2012 and 2018.

Moreover, according to a study by World Bank experts (2015) on the DRC, high levels of dollarization mean: *(i)* loss of room for maneuver in terms of monetary policy, *(ii)* excessive dependence against foreign currency reserves to maintain monetary and banking stability, in the event of conversion or withdrawal of foreign currency deposits, and *(iii)* loss of seigniorage income, which could reach up to 2% of the GDP if the dollarization of the economy was low or non-existent. Indeed, the dollarization of the Congolese economy is a phenomenon whose causes and effects are to be sought ineluctably in the political uncertainty and the deep macroeconomic imbalances recorded by our economy, since the Second Republic; the immediate roots are inflation and the depreciation of the domestic currency, the quality of which the monetary authority has not been able to guarantee, i.e. its ability to sustainably safeguard the stability of the prices and to arouse the confidence of economic agents so that they use it in their commercial and financial transactions. In a context of collapsing economic activity and failing banking system, the development of a parallel foreign exchange market has only aggravated the country's heavy dependence on foreign currencies.

Moreover, the lack of credibility of stabilization may explain the reluctance of depositors to convert their dollarized assets back into national currency [7]. If residents perceive that there remains a strong probability of depreciation of the national currency, they prefer to keep their deposits in foreign currency. In a context characterized by a sharp drop in local production of basic necessities (gasoline, corn flour, dairy products, etc.) and in a context of falling prices for raw materials, the main source of foreign currency for the State, it It is not strange to note that in the eyes of economic agents (consumer, administration, producer), the fact of holding even the smallest dollar is considered a panacea. In a typically dollarized economy, this phenomenon traditionally has implications for monetary stability, thus making monetary policy less effective and more complex to conduct[4]. In other words, dollarization is considered an obstacle to the conduct of a coherent and independent monetary policy. An economy plagued by dollarization also faces low economic stability, higher capital flow volatility and higher interest costs [24].

b) The pre-eminence of fiscal policy

In this paper, our results show that fiscal policy is inflationary, which could undoubtedly result from the monetary financing of the public deficit. This result corroborates with that obtained by Sylla et al. [26] in Guinea, Nyangezi [27] in Rwanda, Muganza [22] in DRC and Ravoahangindrainibe [28] in Madagascar. On the other hand, it is observed that the impact of the budgetary policy is slightly so weak and insignificant, that could be due to a prudent budgetary management initiated by the government these last few years although its influence is nowadays not negligible on monetary policy. In short, this result implies either good coordination of the policy-mix by the government in the conduct of economic policies (monetary and budgetary) capable of contributing to the achievement of the objectives qualified by Kaldhor's magic square or either the adoption of budgetary rules explicit, which gives it a certain budgetary discipline in order to avoid having to print money.

Moreover, it is important to understand that the issue of fiscal policy revolves around the question of the method of financing the public deficit. The State has several instruments, the most commonly used of which remains public expenditure and its mode of financing: currency, securities and taxes. However, most countries, especially developing ones, are unable to mobilize the last two forms of financing due, for example, to the virtual absence of financial (capital) markets and the strong persistence of corruption[5] causing evasion and tax fraud. The common trend is the use of monetary financing through printing money (seigniorage) which is inflationary. Based on the study by Bennouna, Lahlou and Mossadak [18], these authors have indeed demonstrated that fiscal dominance weighs heavily on the conduct of monetary policy in developing countries resulting from the financing of the budget deficit by the central bank through monetary creation (seigniorage) and thus reduces its independence. This empirical evidence seems to be verified in the DRC through this study in the absence or near absence of prudent budget management.

Indeed, for many developing countries with less effective tax collection systems, underdeveloped capital markets and institutions, governments have no other way than to monetize their budget deficits [29]. What the government does in this case is to raise resources through monetary creation. The income he earns through this mechanism is called seigniorage income. It corresponds in fact to a tax that the State levies on the creation of money and comparable to any other tax levied; this is why it is often called an inflation tax. According to Labossiere [30], this practice of financing the budget deficit by inflationary taxes (monetary creation) generates a credibility problem (in other words reduces the independence of the central bank) and is therefore a source of temporal inconsistency.

In other words, political constraints often prevent tax collection and because many countries continue to

[4] In a small highly dollarized open economy like the DRC, and operating under a floating exchange rate regime, it is important to question the question of the optimality of a floating exchange rate regime in a context of advanced dollarization of the banking sector. While dollarization appears as a variant of the fixed exchange rate regime like the currency board. Unfortunately, however, this question is not the subject of this study. Furthermore, it may be the subject of future research.

[5] Corruption is one of six dimensions of governance published by the World Bank (Kaufmann et al. [31]).

have a limited capacity to issue domestic debt (due to underdeveloped capital markets), developing countries tend to depend more in addition to seigniorage. In short, the major problem with this method of financing is its inflationary nature and the rules of strict monetary management require that seigniorage income be minimized. For this to be possible, the central bank must have relative independence [6] to carry out its austerity policy. When this is not the case, the authorities tend to maximize the seigniorage income without taking into account its harmful consequences.

c) Weak development of the financial system

Developing countries are generally characterized by an underdeveloped financial system or which are still at an embryonic stage. The DRC is no exception and being characterized by the existence of an underdeveloped, less operational and embryonic financial market, it is limited to the Central Bank and interbank money market on which the volume of transactions remains modest; and dominated by high dollarization. In this paper, financial development was captured by the ratio of domestic credit provided to the private sector to GDP, also called "financial deepening". Several studies have shown that the weak development of the financial system is in fact a constraint to monetary policy, in particular those of Fischer, Lundgren, and Jahjah [9]; Pinshi [10] and Tadenyo, [6]. Nassirou [32] notes that very underdeveloped financial markets do not allow good hedging of exchange rate risk, while the exchange rate seems to be a relevant indicator of inflation. From this point of view, the still embryonic state of the financial system in place in developing countries by limiting the leverage role of financial factors could alter the transmission of signals emitted by changes in central bank interest rates. Thus, the pursuit of a "price stability" objective by adjusting key interest rates to changes in the inflation rate could prove to be of limited effectiveness [6].

Indeed, the central bank being the lender of last resort, this function implies that it must inject into the money market as much liquidity as necessary to allow its proper functioning. However, such central bank intervention is justified by the fact that it ensures the proper functioning of the system [34]. The result obtained in this study empirically confirms this point of view. Thus, there is an urgent need for greater and better mobilization of credit, as part of the fight against recession, or even to serve an anti-inflationary policy (Medaci, [35]). Moreover, with the underdevelopment of the financial market and the malfunctioning of the money market, economic growth is on the sidelines of the financing of the economy. At the same time, the adaptation of the framework in which the financial/banking system evolves, the reforms to be undertaken in order to both give credibility to the action of the central bank in its mission of inflation targeting, are proving necessary in order to integrate monetary policy in a process of growth.

Indeed, it is true that the underdevelopment of the financial sector is an obstacle to economic growth and monetary policy. The mechanism can be stated as follows for a small country like the DRC, whose volume of domestic credits as a percentage of GDP considered as a proxy for financial development is less than 10%, i.e. an average of 4.85% as a percentage of GDP from 2000 to 2018 compared to that of the USA over the same period of 97.5% as a percentage of GDP where the financial sector is very developed (WDI, [36]). As the private sector (firms for example) does not receive funding from the banking system, it follows that investments will be reduced, and domestic production costs would be almost non-existent or low. Hence an increase in imports, ceteris paribus. Faced with a strong demand for imported foodstuffs whose prices are indexed to the exchange rate, a depreciation of the latter results in an increase in inflation through the pass-through effect (as confirmed by the results exchange rate above).

To reverse this situation, given the importance of the financial and banking sector in the development of economic activities, several reforms can be put in place, such as strengthening the institutional framework for banking regulations, promoting the autonomy of monetary policy and the credibility of central banks. Under these conditions, it is necessary to have instruments and procedures capable of containing the harmful effects of financial instability linked, in particular, to the procyclical nature of banking activity and to the imperfections and asymmetries of information on the financial markets [37].

d) Debt as a constraint to monetary policy

The level of external debt has become a major concern of economic policy makers and its increase may prompt a change in the direction of economic policy. We also find that external indebtedness and the objective of monetary policy are related. It is observed that an increase in debt of 1% leads to an increase in the CPI or inflation of 1.17%. This intuitively reflects the binding nature of the debt on the central bank's objective. In other words, debt is also a constraint on monetary policy in the DRC. This conclusion has been proven by Desquilbet [7] in Lebanon where public debt constitutes an obstacle for the Lebanese central bank.

This result is also in line with that obtained by Christensen and Schanz [12] who showed that high indebtedness can reduce the effectiveness of the monetary policy of most African banks, in other words, the level and structure of an economy's debt, especially if it is denominated in foreign currencies, can hamper the ability of the central bank to pursue its monetary objectives. They explain by saying that the level and structure of an economy's debt, especially if it is denominated in foreign currencies, can hamper the central bank's ability to pursue its monetary goals. This is what Eichengreen and Hausman [38] called the original sin, simply translating the inability for a country to go into debt in its own currency on the international level. The mechanism essentially works through the level of debt in local currency. The higher the level of local debt, the greater the impact of fluctuations in key rates. The central bank may be subject to significant pressure pushing it to maintain

[6] The notion of independence applied to the central bank covers both a political dimension and an economic dimension. Political independence reflects the absence of interference from political power on the decisions taken by the central bank but also the absence of influence of the latter on the institutional organization of the central bank. As for economic independence, it translates both the free choice of the objectives set (quantified or not) and the instruments used by the central bank, but also the impossibility of financing the government budget deficit by monetary creation [33].

key rates at a lower level than justified and to reduce the burden of refinancing, or even to directly cover financing needs through loans or bond purchases [12].

4. Conclusion

This paper has embarked on the issue of assessing the effectiveness of monetary policy in the DRC and identifying the main constraints that could hinder its effectiveness. To achieve this end, we estimated a vector error correction model (VECM) on Congolese data covering the period from January 2002 to December 2018 on a certain number of variables integrating both the preferred instrument of the central bank (interest rate), its target (inflation measured by the CPI), as well as other economic variables considered as possible constraints to the monetary policy of the CBC with regard to the theory and the current Congolese context. At the end of the empirical investigation, the results of the estimation obtained using the VEC model show that the preferred instrument of the CBC, the key interest rate, presents a sign in accordance with the theory only in the long term. term but with such a low impact according to the value of the coefficient obtained (-0.10). In the short term, on the other hand, it presents a positive sign contrary to the empirical evidence, which could reflect the "inefficiency" or the "low efficiency" of this instrument in the short term and this for all the lags retained in our model.

This result could be explained on the one hand by the absence of links between the instrument (key interest rate) and the objective (inflation) of the monetary authority according to Nabukpo [21] and on the other hand by the fact that the delays in transmitting monetary policy impulses are sometimes quite long. This implies a low efficiency of this instrument, and therefore of monetary policy. On the other hand, the study concludes that the weak or underdevelopment of the financial system, the dollarization of the banking system, the exchange rate as well as the budgetary predominance constitute the main constraints which weigh on the conduct of the monetary policy of the BCC well. that there are so many more.

It emerges from this analysis in terms of implications that (i) the dollarization of the economy reduces and limits the monetary transmission mechanism and leads to monetary substitution, (ii) a Congolese financial system remains less effective and on the margins of support an anti-inflationary monetary policy and finally, (iii) exchange rate fluctuations are directly transmitted to prices, which makes it an important channel for the transmission of monetary impulses in the DRC as well as a floating exchange rate regime operating in a context of advanced dollarization of the banking sector and finally (iv) increased recourse to monetary financing of the public deficit fuels inflation and consequently reduces the independence of the central bank.

To this end, to improve the effectiveness of monetary action in the DRC, several strategies may prove to be essential to guide the conduct of monetary policy, including, initially, resorting to direct targeting of inflation, and at the level of the intermediate objective, proceed in a second stage to the use of explicit rules, in particular the exchange rate, which supposes a fixed exchange rate regime on the one hand and the abandonment of discretionary policies on the other. Moreover, the choice of the intermediate objective in the conduct of monetary policy for a small open economy should be made in accordance with the teaching of Poole [39]. In addition, the strengthening of regulation and supervision in the banking system would reduce the uncertainties and informational asymmetries characterizing the Congolese financial system. At the same time, budgetary discipline and/or optimal coordination of monetary and budgetary policies is necessary to increase the independence and credibility of the central bank and, by extension, the effectiveness of monetary policy.

We do not claim to have covered all the aspects relating to this theme in this paper, which is why the results of this study do not constitute an immutable truth and therefore require improvement. Thus, future research can integrate other variables not taken into account in this study and other researchers can take into account the external environment in the conduct of monetary policy given that the DRC is a small open economy. In addition, the use of more efficient methodological tools such as the SVAR/SVECM model and the DSGE model can make it possible to improve the results obtained and to address a large facet of this study such as institutional quality for example.

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Appendices

Table 1. Result of the Augmented Duckey-Fuller stationarity test (ADF test)

Variables	Hypothèses	En Niveau		En différence première		Ordre d'intégration
		ADF value	*Probabilité*	*ADF value*	*Probabilité*	
LDRATE	*Intercept*	-2.1634	0.2204	-13.430	0.0000	*I(1)*
	Trend & Intercept	-1.808	0.6975	-13.445	0.0000	
	None	-1.508	0.1231	-13.443	0.0000	
LIPC	*Intercept*	-0.418	0.9024	-8.552	0.0000	*I(1)*
	Trend & Intercept	-1.326	0.8786	-8.531	0.0000	
	None	4.3167	1.0000	-5.246	0.0000	
LM2	*Intercept*	-2.462	0.1263	-13.272	0.0000	*I(1)*
	Trend & Intercept	-0.893	0.9537	-13.578	0.0000	
	None	10.653	1.0000	-3.749	0.0002	
LEXCHANGE	*Intercept*	-0.448	0.8971	-10.343	0.0000	*I(1)*
	Trend & Intercept	-2.009	0.5926	-10.318	0.0000	
	None	2.828	0.9989	-9.763	0.0000	
LDOLLAR	*Intercept*	-3.417	0.0115	-15.181	0.0000	*I(1)*
	Trend & Intercept	-3.279	0.0728	-15.220	0.0000	
	None	0.831	0.8899	-15.155	0.0000	
LBUDGET	*Intercept*	-1.885	0.3389	-5.293	0.0000	*I(1)*
	Trend & Intercept	0.392	0.9989	-5.997	0.0000	
	None	0.399	0.7978	-5.281	0.0000	
CREDOM	*Intercept*	-1.164	0.6899	-5.128	0.0000	*I(1)*
	Trend & Intercept	-2.696	0.2394	-5.151	0.0002	
	None	0.894487	0.9003	-4.803	0.0000	
LDEBT	*Intercept*	-0.491	0.8891	-3.474	0.0097	*I(1)*
	Trend & Intercept	-1.679	0.7574	-3.461	0.0467	
	None	-2.988	0.0030	-2.437	0.0147	

Table 2. Result of the Johansen Cointegration Test

Date: 08/12/20 Time: 17:10

Sample (adjusted): 2002M04 2018M12

Included observations: 201 after adjustments

Trend assumption: Linear deterministic trend

Series: LIPC LDIRECTOR LM2 LCHANGE

Exogenous series: CREDOM LDOLLAR LPOLBUDG LDEBT

Warning: Critical values assume no exogenous series

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.177756	75.29506	47.85613	0.0000
At most 1 *	0.136194	35.95571	29.79707	0.0086
At most 2	0.028675	6.527965	15.49471	0.6331
At most 3	0.003378	0.680101	3.841466	0.4096

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.177756	39.33935	27.58434	0.0010
At most 1 *	0.136194	29.42774	21.13162	0.0027
At most 2	0.028675	5.847864	14.26460	0.6328
At most 3	0.003378	0.680101	3.841466	0.4096

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

Table 3. Determination of the optimal delay number of a VAR model

VAR Lag Order Selection Criteria

Endogenous variables: LIPC LDRATE LM2 LEXCHANGE

Exogenous variables: C CREDOM LDOLLAR LDEBT LBUDGET

Date: 26/11/20 Time: 17:34

Sample: 2002M01 2018M12

Included observations: 196

Lag	LogL	LR	FPE	AIC	SC	HQ
0	368.3067	NA	3.36e-07	-3.554150	-3.219649	-3.418728
1	1564.888	2283.272	1.97e-12	-15.60089	**-14.99879***	-15.35713
2	1597.062	60.07997	**1.67e-12***	**-15.76593***	-14.89623	**-15.41384***
3	1611.534	**26.43413***	1.70e-12	-15.75035	-14.61304	-15.28991
4	1617.143	10.01707	1.89e-12	-15.64432	-14.23941	-15.07555
5	1627.991	18.92827	2.00e-12	-15.59175	-13.91924	-14.91464
6	1638.739	18.31438	2.12e-12	-15.53815	-13.59804	-14.75270
7	1652.695	23.21254	2.17e-12	-15.51729	-13.30958	-14.62351
8	1666.193	21.90127	2.24e-12	-15.49177	-13.01646	-14.48965

* indicates lag order selected by the criterion.

Table 4. Result of the estimation of a VECM

Vector Error Correction Estimates
Date: 08/12/20 Time: 17:13
Sample (adjusted): 2002M04 2018M12
Included observations: 201 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LIPC(-1)	1.000000
LDRATE(-1)	-0.100765
	(0.02108)
	[-4.77957]
LM2(-1)	-0.385567
	(0.09141)
	[-4.21821]
LEXCHANGE(-1)	-0.721542
	(0.25592)
	[-2.81940]

Error Correction:	D(LIPC)	D(LDRATE)	D(LM2)	D(LEXCHANGE)
CointEq1	**-0.069430**	0.249879	-0.028129	-0.062329
	(0.01213)	(0.17586)	(0.02423)	(0.02011)
	[-5.72551]	[1.42092]	[-1.16075]	[-3.09944]
D(LIPC(-1))	0.280113	3.014053	0.146260	-0.000866
	(0.09627)	(1.39616)	(0.19239)	(0.15966)
	[2.90954]	[2.15882]	[0.76022]	[-0.00542]
D(LIPC(-2))	-0.089785	-0.340555	-0.441360	-0.421941
	(0.09623)	(1.39556)	(0.19231)	(0.15959)
	[-0.93300]	[-0.24403]	[-2.29506]	[-2.64395]
D(LDRATE(-1))	0.001663	-0.015177	0.010530	0.012679
	(0.00507)	(0.07349)	(0.01013)	(0.00840)
	[0.32825]	[-0.20652]	[1.03979]	[1.50871]
D(LDRATE(-2))	0.004175	-0.077712	0.015527	0.010361
	(0.00486)	(0.07052)	(0.00972)	(0.00806)
	[0.85871]	[-1.10205]	[1.59788]	[1.28492]
D(LM2(-1))	0.042496	0.038119	-0.125566	0.103765
	(0.04043)	(0.58624)	(0.08078)	(0.06704)
	[1.05122]	[0.06502]	[-1.55434]	[1.54783]
D(LM2(-2))	-0.024117	0.340636	0.002841	-0.008043
	(0.04057)	(0.58832)	(0.08107)	(0.06728)
	[-0.59448]	[0.57900]	[0.03505]	[-0.11956]
D(LEXCHANGE(-1))	-0.039638	1.157803	0.196293	0.116848
	(0.06187)	(0.89718)	(0.12363)	(0.10260)
	[-0.64071]	[1.29049]	[1.58772]	[1.13892]
D(LEXCHANGE(-2))	-0.002106	0.525628	0.135114	0.138309
	(0.06047)	(0.87697)	(0.12085)	(0.10029)
	[-0.03483]	[0.59937]	[1.11806]	[1.37916]
CREDOM	0.000671	0.019188	-0.000882	0.001562
	(0.00061)	(0.00889)	(0.00123)	(0.00102)
	[1.09463]	[2.15808]	[-0.71977]	[1.53624]

LDOLLAR	-0.103413	0.319815	-0.035762	-0.098606
	(0.01898)	(0.27519)	(0.03792)	(0.03147)
	[-5.44970]	[1.16217]	[-0.94306]	[-3.13345]
LBUDGET	0.001283	-0.058079	-0.003714	0.005583
	(0.00859)	(0.12451)	(0.01716)	(0.01424)
	[0.14946]	[-0.46646]	[-0.21643]	[0.39212]
LDEBT	0.011657	0.011379	0.007909	0.013833
	(0.00263)	(0.03813)	(0.00525)	(0.00436)
	[4.43311]	[0.29839]	[1.50517]	[3.17217]
R-squared	0.366050	0.143934	0.139628	0.212871
Adj. R-squared	0.325585	0.089292	0.084710	0.162629
Sum sq. resids	0.041855	8.802348	0.167147	0.115106
S.E. equation	0.014921	0.216382	0.029817	0.024744
F-statistic	9.046097	2.634109	2.542502	4.236888
Log likelihood	566.7169	29.18614	427.5580	465.0464
Akaike AIC	-5.509620	-0.161056	-4.124955	-4.497974
Schwarz SC	-5.295974	0.052590	-3.911309	-4.284328
Mean dependent	0.011367	-0.009447	0.024214	0.007895
S.D. dependent	0.018169	0.226741	0.031167	0.027040
Determinant resid covariance (dof adj.)		2.29E-12		
Akaike information criterion		-15.16314		
Schwarz criterion		-14.24282		
Number of coefficients		56		

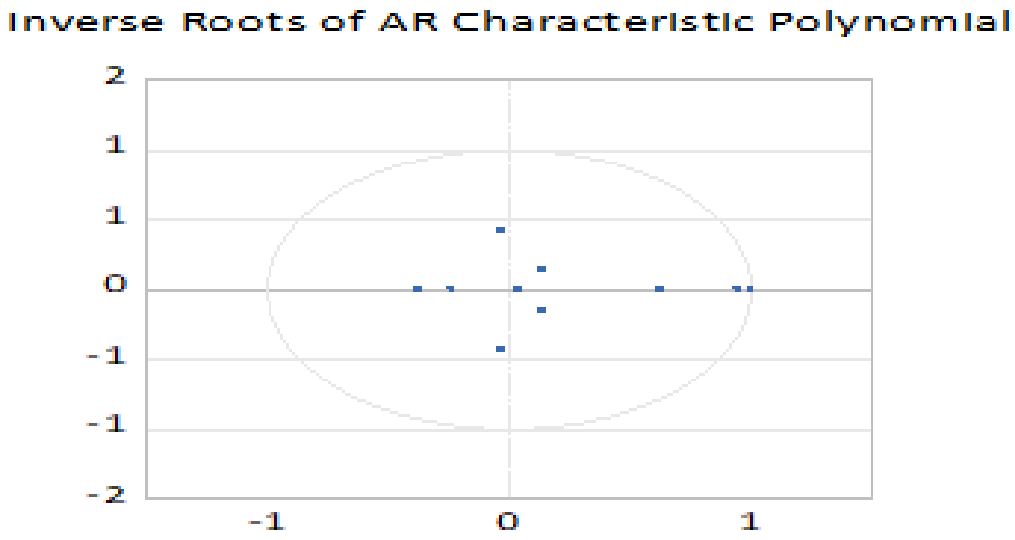

Figure 1. Stability of a VAR model

Table 5. Error autocorrelation test

VEC Residual Portmanteau Tests for Autocorrelations

Null Hypothesis: No residual autocorrelations up to lag h

Date: 08/12/20 Time: 17:20

Sample: 2002M01 2018M12

Included observations: 201

Lags	Q-Stat	Prob.*	Adj Q-Stat	Prob.*	df
1	0.716442	---	0.720025	---	---
2	4.114965	---	4.152703	---	---
3	14.94286	0.9790	15.14466	0.9769	28

*Test is valid only for lags larger than the VAR lag order.

Table 6. Descriptive Statistics of Variables

	Credom	*Debt_Ext*	*Director*	*Dollarisat*	*Exchange_r*	*IPC*	*M2*
Mean	5.238884	54.24292	25.29456	85.90022	801.4624	93.12675	2359241.
Median	6.039635	26.27668	20.50000	86.88114	904.0427	98.52098	1572603.
Maximum	12.12478	133.3149	155.0000	93.38542	1647.806	232.9900	9581773.
Minimum	-0.318427	10.14447	2.000000	69.62543	318.0375	23.65574	69685.56
Std. Dev.	3.479098	41.72640	22.58121	4.641107	360.0320	56.73719	2404926.
Skewness	0.004775	0.513383	1.795627	-1.665834	0.757187	0.647116	1.138121
Kurtosis	1.797273	1.764783	8.224655	6.392426	3.012285	2.831171	3.526132
Sum	1068.732	11065.56	5160.090	17523.64	163498.3	18997.86	4.81E+08
Sum Sq. Dev.	2457.136	353441.8	103512.0	4372.594	26313476	653479.0	1.17E+15
Obs.	204	204	204	204	204	204	204