ISSN: 2278-3369
International Journal of Advances in Management and Economics
Available online at www.managementjournal.info

RESEARCH ARTICLE

Monetary Policy Effectiveness under the CEMAC area: an Empirical Evaluation

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Abstract

In this paper, we evaluate the effectiveness of monetary policy under the Central African Economic and Monetary Union. In 1990, the central bank of this currency union operated an important shift in its monetary policy strategy with the implementation of a Monetary Programming. With the final objective of monetary stability, the central bank of the union has adopted instruments that are more market oriented than the previous one. We use a gradual methodology based on a vector auto regression approach. Specifically, we begin by estimating the usual three-variable model which includes the real GDP, the consumer price index and the policy interest rate. This basic model is then extended in order to examine the interest rate channel and the bank lending channel. We find that there are too many differences among the CEMAC countries on the effects of the common monetary policy. This outcome reflects the difficulties encountered by the central bank to implement a common monetary policy in the region. Our results also show that the traditional interest rate channel is not effective enough in the CEMAC area. Moreover, if there is some evidence of a bank lending channel in this region, we are inconclusive on this issue due to the well-known identification problem that arise with the use of aggregate data. Therefore, we argue that further studies are necessary in order to shed more light on the bank lending channel issue.

Keywords: *Bank lending channel, CEMAC, Monetary policy effectiveness, Vector error correction model.*

Introduction

The effectiveness of monetary policy aims at responding to a more primitive question of not how policy is at achieving an optimal combination of output and inflation variance but rather whether a central bank even can have an impact on output and inflation [1]. In general, most economists agree that monetary policy can significantly influence the course of the real economy, at least in the short run. Indeed, a spate of empirical research has confirmed the early finding of Friedman and Schwartz that monetary policy actions are followed by movements in the real output that may last for two years or more [2-4]**.** In fact, a huge number of studies have been conducted aiming at studying the impact of monetary policy on the real economy. The operation of monetary transmission channels varies systematically across countries due to differences in the extent of financial development, the size, concentration, and health of the banking system; the development of capital markets; and the structural economic conditions [5]**.** As noted by Dabla Norris and Floerkemeier [6], the effectiveness of the monetary transmission mechanism is constrained, in most transition economies, by a number of factors. In general, the transmission of policy interest rates to market interest rates may be incomplete and spending and investment decisions may be insensitive to the availability and cost of credit. Empirical evidence has shown that, although the interest rate channel is the most important transmission channel in industrial countries with developed financial markets, the exchange rate channel is generally the dominant channel of monetary policy transmission mechanism in transition economies **[**7]. This has been proved in the case of economies of central Asia [8] and in Armenia [6] These studies also show the weakness of the interest rate channel in emerging countries [1]

The early empirical literature on the existence of a bank lending channel focused on the estimation of reduced-form equations of credit supply using aggregate data. The basic approach was pioneered by Bernanke and Blinder [3] who found that restrictive monetary policy impulses lead to a

decline in both aggregate loans and economic activity. Nevertheless, this strand of literature was criticized on the grounds that it is difficult to identify credit supply responses, given that monetary shocks simultaneously affect the demand for loans [2] As argued by Hulsewig et al. [9], the result of Bernanke and Blinder [3] does not sufficiently prove that the central bank is indeed able to affect the supply of intermediate loans. To address this identification problem, empirical studies have used both firm level and bank level data. Many authors in the recent years have stressed on the use of vector error correction models with aggregate data that accounts for the presence of multiple cointegrating relationships and exclusion, exogeneity and homogeneity restrictions on the cointegrating relationships. Using structural VECM therefore helps to disentangle the loan supply and demand effects of monetary policy moves.

According to Haug et al. [10], a major concern with the formation of a currency union is how a single monetary policy will affect the member countries and whether it would affect all members equally. In this regard, the Lucas [11] critic suggests that differences in the transmission mechanisms that exist prior to currency union may not continue to exist following unification. For Haug et al. [10], differences in transmission mechanisms can generate asymmetric behavior between currency union partners even when they experience the same monetary policy shock. This has the potential to widen existing cyclical variation between currency union partners.

Since 1990, the central bank of the CEMAC has adopted a new monetary policy framework, following important deficiencies of the old system put in place as from 1960 to the eve of the 1990s. The new device of monetary policy relies on a set of complementary mechanisms and instruments embodied in coherent body.These mechanisms and instruments appear less rigid as they are based on market principles and regulations.

Therefore, the aim of this study is to assess how central bank actions impact on the six economies of the region. We do it, putting more emphasis on the traditional interest rate channel and the bank lending channel. The rest of the paper is structured as follows: in section 2, we present the econometric methodology employed in this paper, while our empirical results are analyzed in section 3. Section 4 concludes

The Econometric Methodology

Data Analysis

We use quarterly data from 1990 to 2007. According to the monetary authorities in the CEMAC, the year 1990 marks a shift in the conduct of monetary policy. On October that year, a trend of reforms was launched by monetary authorities in a general framework of a new monetary policy strategy. We endeavored to select the same data series from each of our six countries in order to ensure comparisons among countries. As argued by Haug et al. [10], there is serious reason to question the findings of time series studies that do not properly account for unit roots in the data. Failing to account for the presence of unit roots can lead to inconsistent coefficient estimates and result in wrong inferences being drawn. We therefore begin our analysis by examining the order of integration of our series. Both the augmented Dickey-Fuller test and the Phillips-Perron test indicate that most of our variables in all the countries are I (1). In many cases, the discount rate of the central bank (*Interest*) appears to be stationary in level, according to the ADF test. However, this variable is I (1) following the Phillips-Perron unit root test. The variable for the domestic credit of commercial banks to the private sector (Credit) in Chad is I (0) for both the ADF and PP tests. Due to space problems, all those results are available from the author.

The Estimation Methodology

For each country, we adopt a gradual estimation methodology. We begin by a standard VECM which is then extended to account for the specific channels of monetary transmissions we are interested in. Such an approached was adopted by Dabbla-Norris and Floerkemeier [6] in the case of Armenia. In fact, we focus principally on the traditional interest rate channel and on the bank lending channel of monetary transmission mechanism. Therefore, our basic model is the three-variable model which includes real GDP, the consumer price index (CPI) and the discount rate or the central bank policy rate as endogenous variables. To compute quarterly data on GDP, we used the methodology of Boot et al. [12]

Except for Central African Republic, all the other five countries of the CEMAC area are petroleum exporters. In most of this countries petroleum accounts for more than 50% of exports revenues. Therefore we, include as exogenous variable,

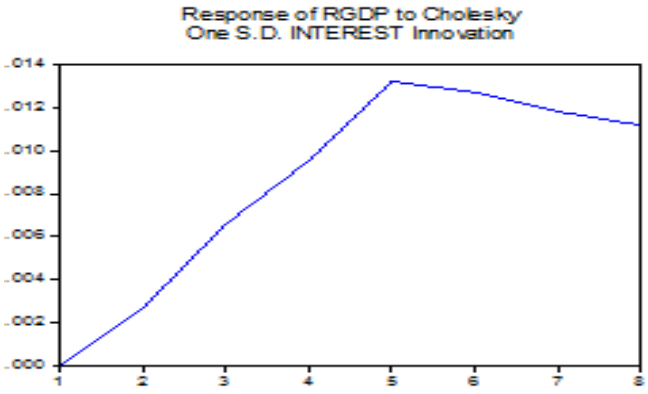
petroleum average crude price (Oil). Moreover, we account for the devaluation of the local currency (the Franc CFA) by defining a dummy variable. This variable equals zero before 1994 and one thereafter. The basic model is then extended with the inclusion of the monetary aggregate (*Money*), the lending rate, the aggregate bank deposits *(deposit*) and the domestic credit to the private sector (*Credit).* Each of these variables is introduced individually in the basic model. We explicitly account for unit roots and co-integration in our data by setting a VECM methodology. In order to identify the short-run effects of monetary policy shocks on the levels of the endogenous variables in the VECM, we use a standard Choleski decomposition. The Choleski decomposition we use to derive impulse responses depends crucially on the ordering of the variables in the system. As mentioned earlier, all of our VECMs include real GDP, CPI and the policy rate (Interest). In those VECMs, additional variables are included after Interest. Therefore, we assume that the policy rate is responsive to cotemporaneous changes in real GDP or the CPI, but not vice versa. This ordering also allows contemporaneous changes in the policy rate to influence the monetary aggregate, the level of bank deposits or the domestic credit by the banking industry to the private sector. Clements et al. [13] suggest that such an ordering allows for the interest rate equation in a VAR to be interpreted as a monetary policy reaction function. However, although the policy rate may be considered as an indicator of policy stance in the CEMAC, other results indicate that the monetary aggregate M2 and in some circumstances the domestic credit to the private sector could also be considered as so. Therefore, when introducing M2 into the basic VECM, we assume that the reduced-form responses of economic variables to innovations in the monetary aggregate should also measure the effects of policy. The rational of such assumption stems from the fact that this variable is an intermediary objective for monetary policy. All variables, except for interest rates, are measured in log-levels. Also, the exogenous variable (Oil) is transformed using first differences so that it enters the VECM in stationary form. All data are from the International Financial Statistics CD-ROM published by the International Monetary Funds. Due to data availability, the ending periods slightly vary across countries, the starting period remaining the same for the six countries. Those ending periods are settled to 2006:4 for Cameroon, Chad and Gabon, 4 for Central African Republic and Equatorial Guinea; and 2007:4 for Congo.

We applied the Schwartz Bayesian information criterion (SBIC) to specify our models. In most of our basic VARs, we were unable to choose a length of more than three lags. We also used the Johansen's maximum likelihood-based method to test for no-cointegration among our series. We focused mainly on the trace statistic. Based on these results, we were able to find at least one and even more cointegrating relationships among our variables for all the countries. Results of those various test are also available on request. Therefore, it seems more suitable to conduct our study in a VECM framework rather than using simple VARs in levels as suggested by Haul et al. [10].

Empirical Results

Results of the basic VECM

In each country, the VECM includes the real GDP (RGDP), the consumer price index (Price) and the discount rate of the central bank (interest). We then derive the impulse responses of the real GDP and CPI due to a Choleski one standard innovation on Interest for our six countries, setting the time horizon to 8 quarters (2 years). Our results, from figure 1 to figure 6, show that, in a total of six countries, the response of output is as expected only in two (Central African Republic and Equatorial Guinea). In these two countries, a contractionary monetary shock induces an output decline from its baseline, which bottoms 4 quarters after the shock in each country. In Cameroon, Chad, Congo and Gabon, a positive monetary shock rather increases output at least during the first two quarters like in Congo and Gabon (the entire period for Cameroon and Chad). If this positive output response can be explained by the model in Lucas [14], such outcome is less plausible in the CEMAC countries which experience very low inflation rates all around our period of study. However, Ganev et al. [15] find that a short-term interest rate shock leads to different reactions across the transition countries with industrial output increasing in some and decreasing in others. As for the reaction of CPI, the CEMAC countries also fall into two groups. In the first (Cameroon, Central African Republic, Chad), CPI sharply declines after a positive shock on the policy rate, remaining below its equilibrium level till the end of the period. In the remaining 3 countries (Congo, Equatorial Guinea, Gabon), there is evidence of a price puzzle [16], which is a common finding in the literature and is thought to reflect endogenous nature of monetary policy.



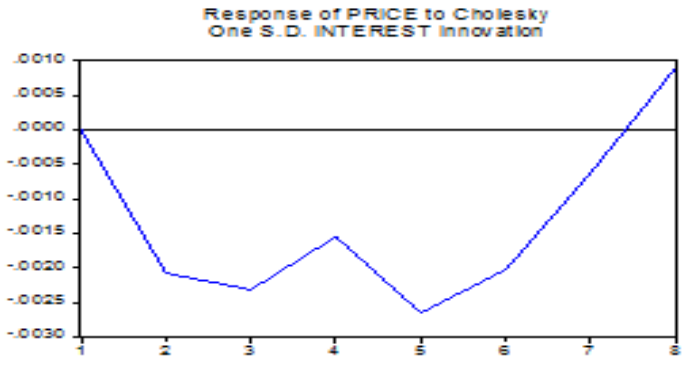
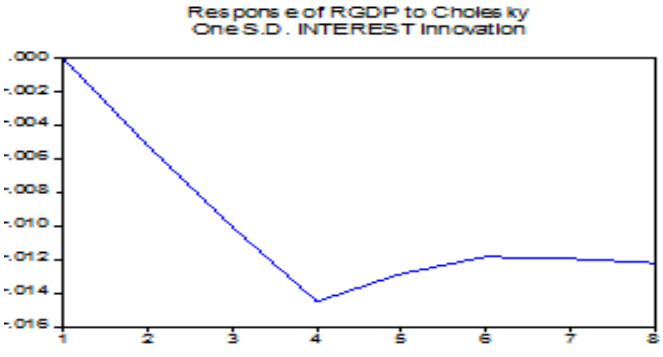


Fig. 1: Basic VECM for Cameroon



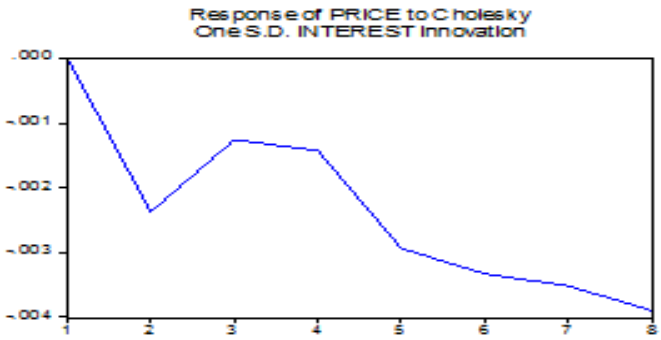
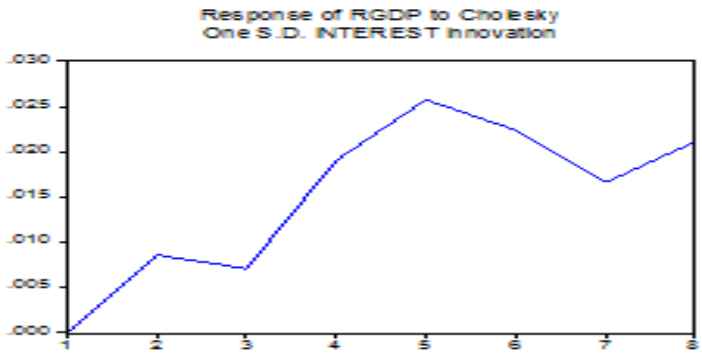


Fig. 2: Basic VECM for the Central African Republic



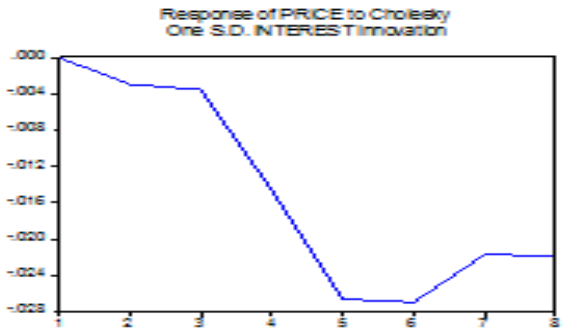
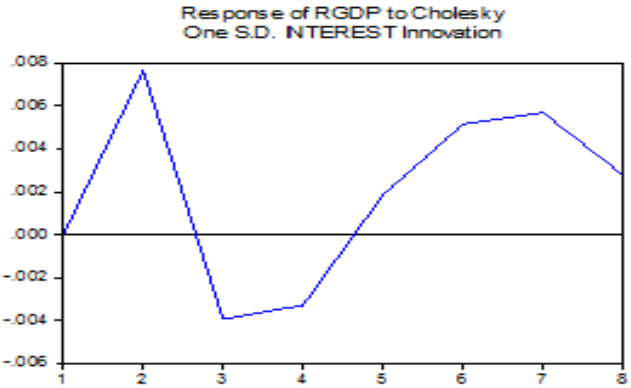


Fig. 3. Basic VECM for Chad



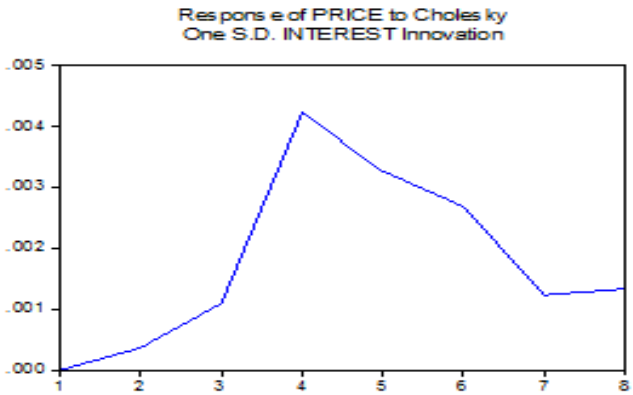
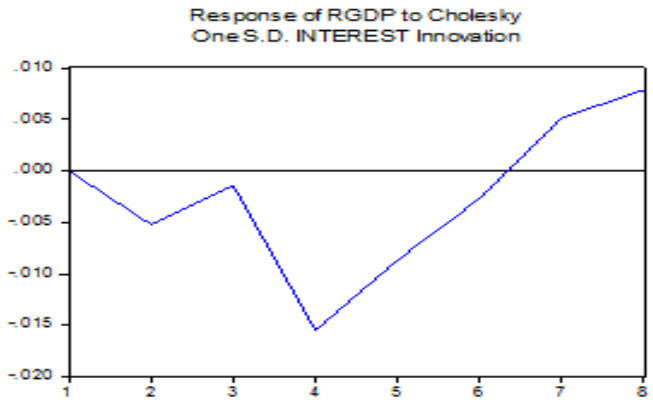


Fig. 4: Basic VECM for Congo



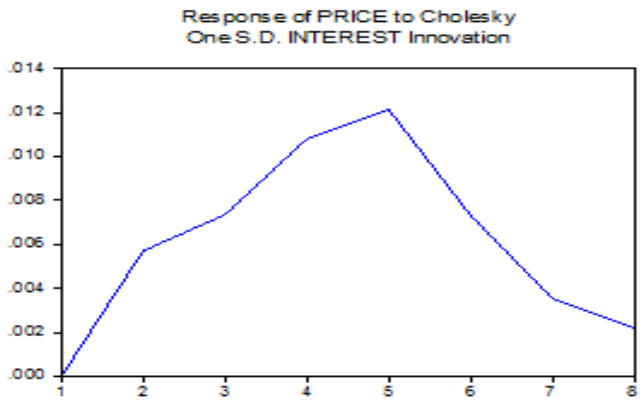
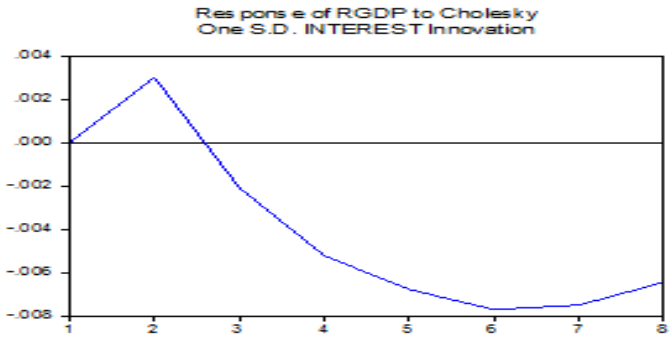


Fig. 5: Basic VECM for Equatorial Guinea



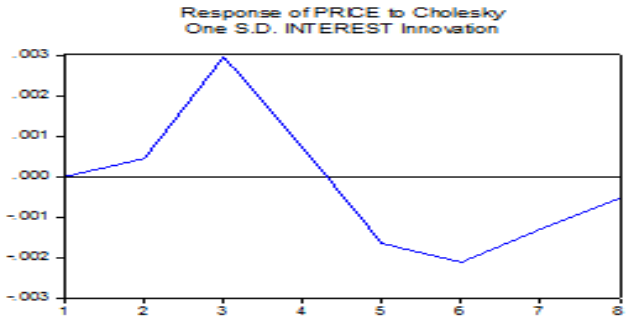


Fig. 6: Basic VECM for Gabon

Model Extension 1: The Inclusion of Monetary Aggregate M2

In this model, M2 is added after the interest rate to show that interest rate impacts on the monetary aggregate.

$Y = (RGDP, Price, Interest, Money)$. The impulse responses for this model specification are not shown here, but are available on request.

A shock to M2 appears to produce a rapid and sharp decrease on output in four of the six countries. While the effect is persistent for quite the whole period in Chad and Congo (with a slight raise in the first two quarters), it lasts for about four quarters in Cameroon and Central African Republic bottoming at the third and second quarters respectively. However, the response is as expected in Equatorial Guinea and Gabon with an immediate and long lasting increase in output for the entire period.

On the other hand, a Choleski one standard innovation shock on M2 induces an immediate increase of the price level in four countries: Cameroon, Central African Republic, Chad, and Gabon. The effect is persistent in the last two countries while in Cameroon and Central African Republic, prices rise for one year before falling below the equilibrium level. In Congo and Equatorial Guinea, the raise in the price level is not immediate, but rather occurs after a drop during the first three quarters in Congo and the first two quarters in Equatorial Guinea, respectively.

Model Extension 2: The Interest Rate Channel

To examine the interest rate channel, we extend the basic VECM by adding the interest rate on new bank loans (the lending rate) ordered after the discount rate.

$Y = (RGDP, Price, Interest, Lending)$. Impulse responses are shown from figure 7 to fig. 12.

We find that except from Chad, an unanticipated shock to the policy rate leads to a higher lending rate at least for the first two quarters after the shock. However, results highlight many differences among countries, on the effects of changes in the bank lending rate to economic activity and prices.

In Cameroon, Central African Republic, Congo and even Chad, shocks to the lending rate are accompanied by an immediate and long lasting drop of the output level. On the contrary, output rather increases following lending rate shocks in Equatorial Guinea and Gabon.

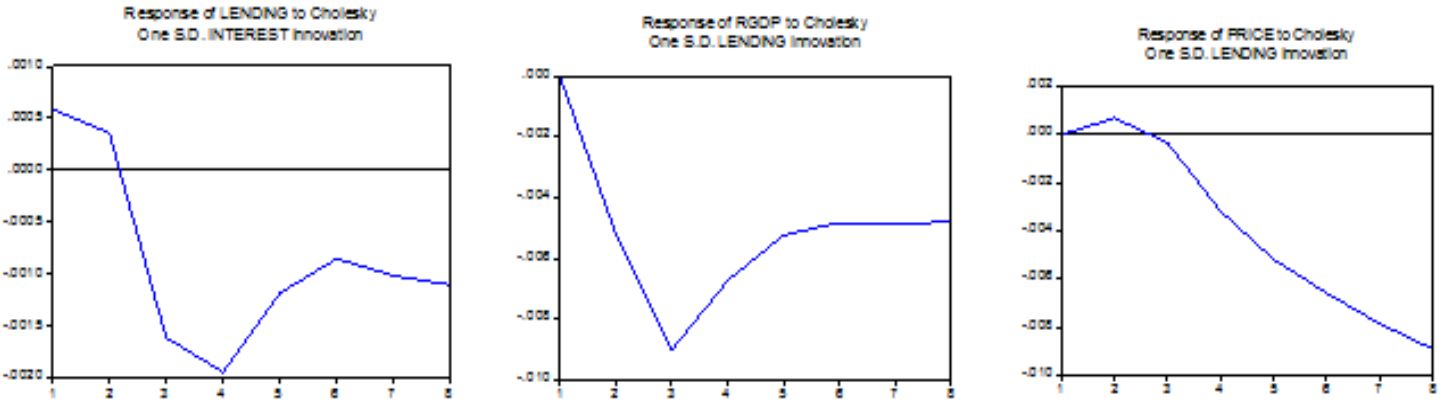


Fig. 7: Model extension 2 in Cameroon

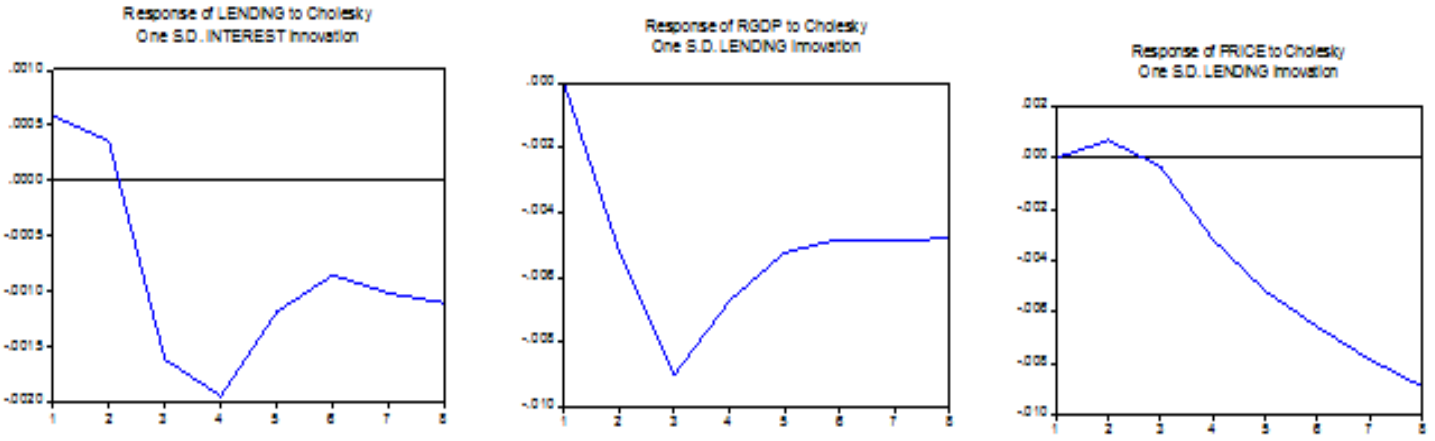


Fig. 8: Model extension 2 in Central African Republic

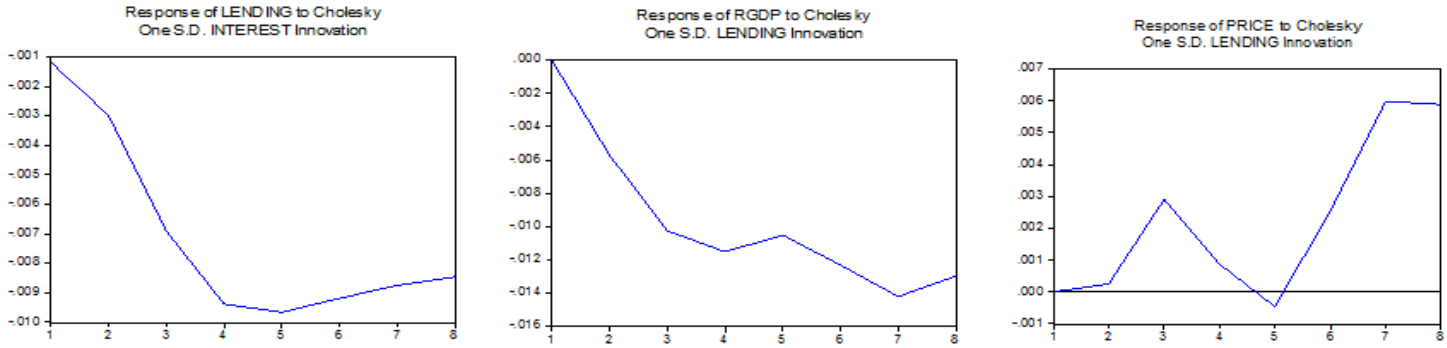


Fig. 9: Model extension 2 in Chad

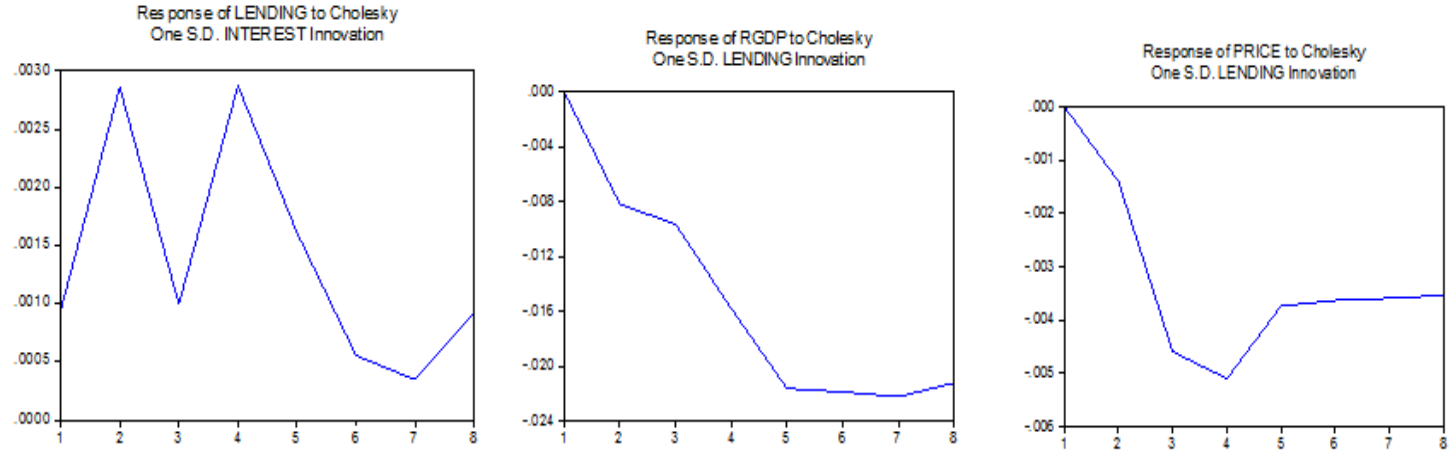


Fig. 10: Model extension 2 in Congo

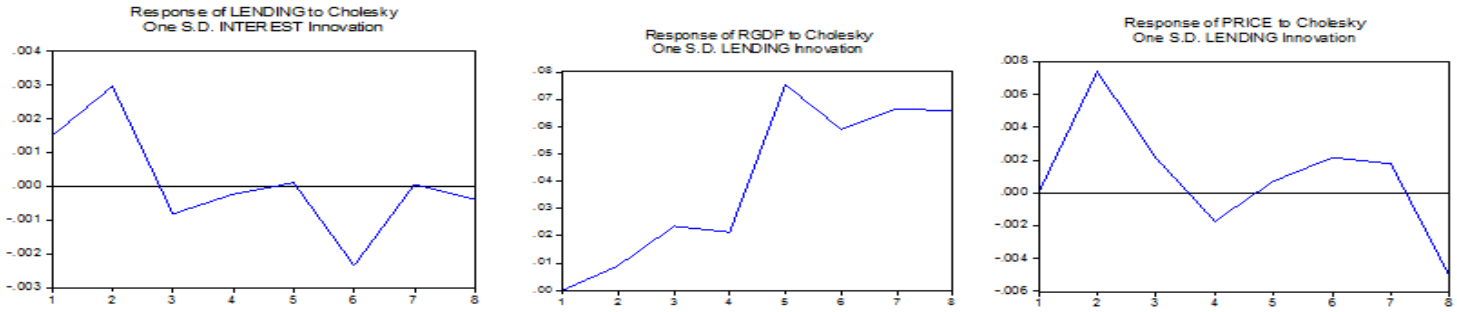


Fig. 11: Model extension 2 in Equatorial Guinea

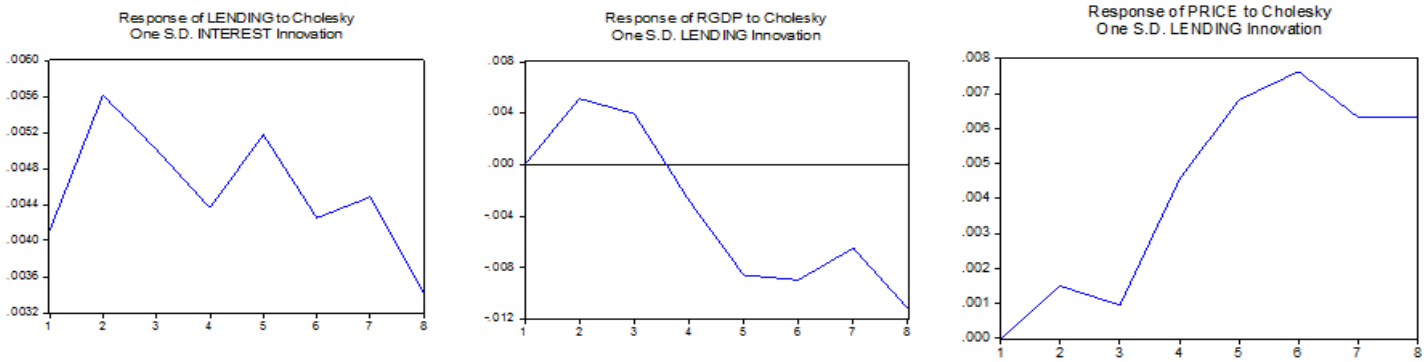


Fig.12: Model extension 2 in Gabon

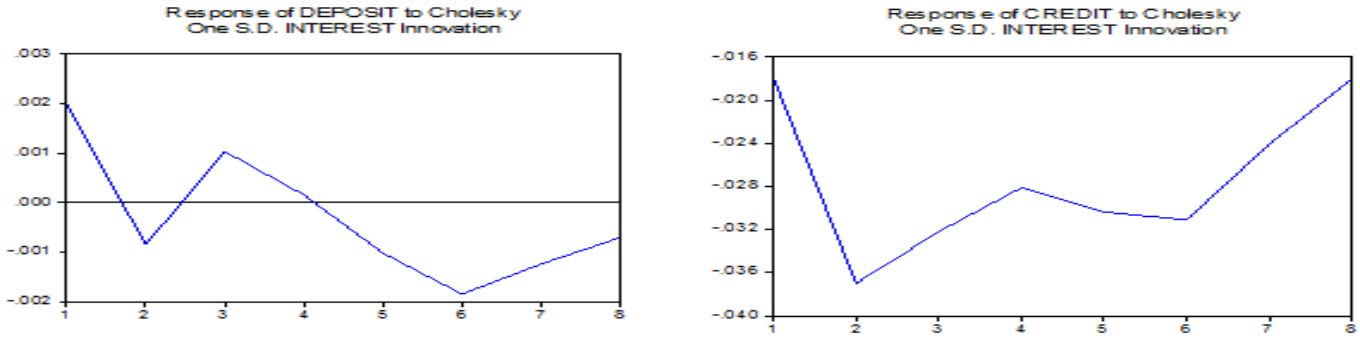


Fig. 13: Model extension 3 in Cameroon

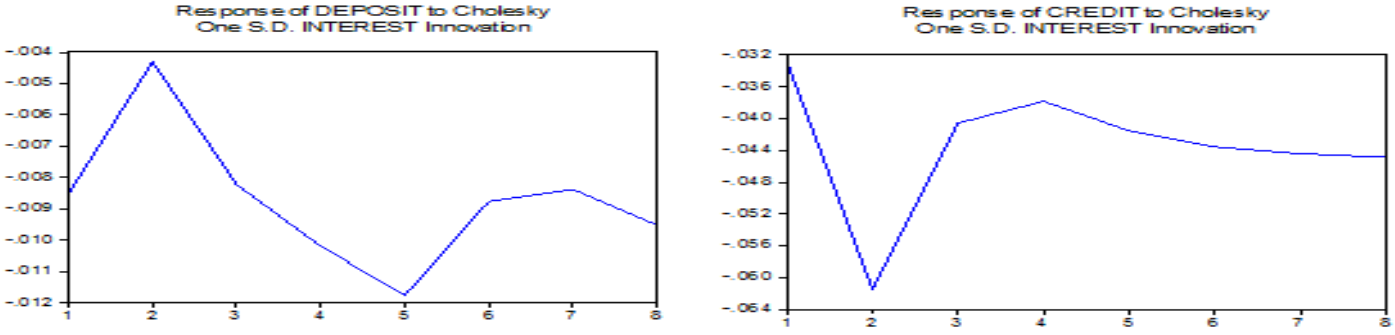


Fig. 14: Model extension 3 in Central African Republic

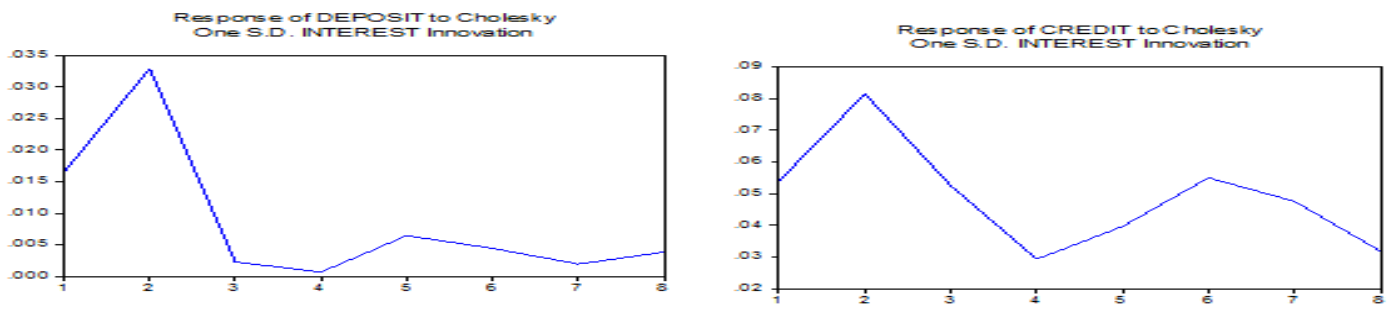


Fig. 15: Model extension 3 in Chad

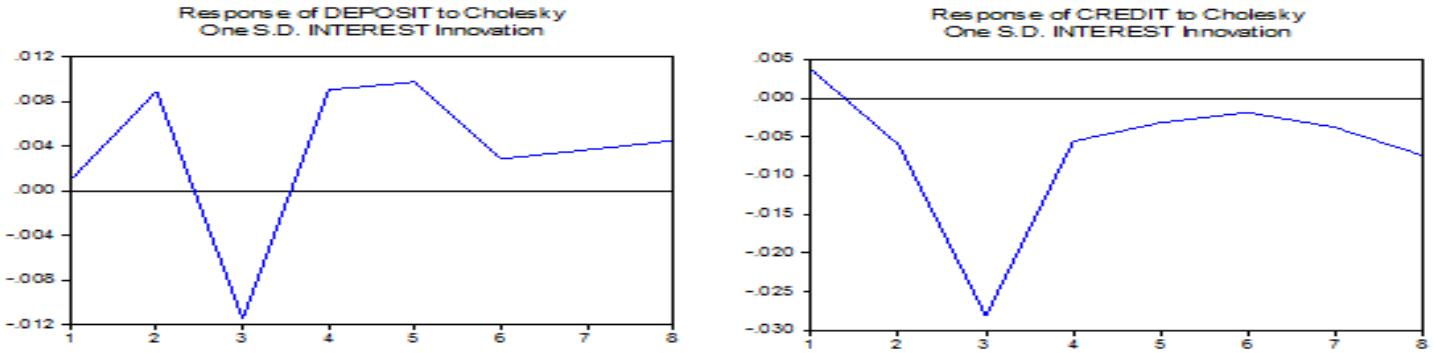


Fig. 16: Model extension 3 in Congo

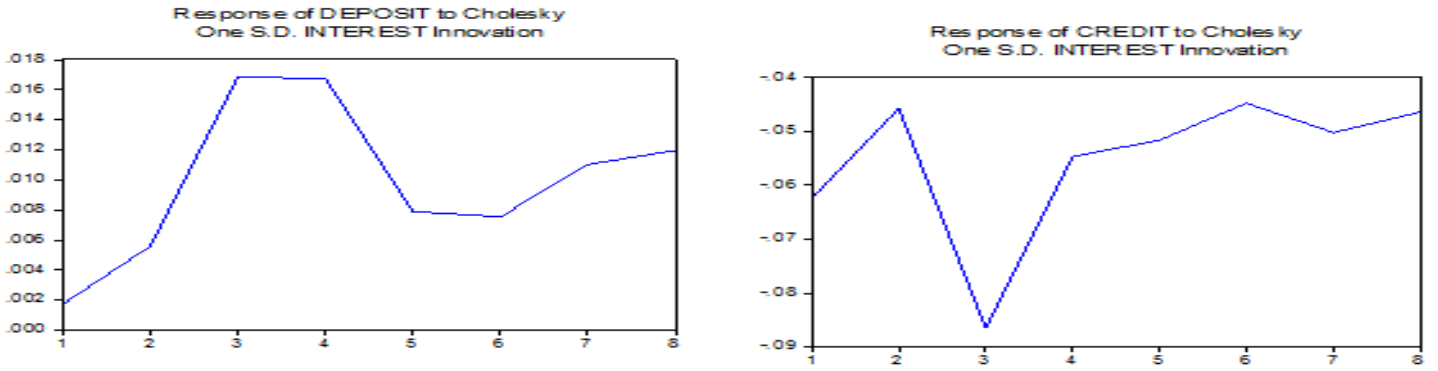


Fig.17: Model extension 3 in Equatorial Guinea

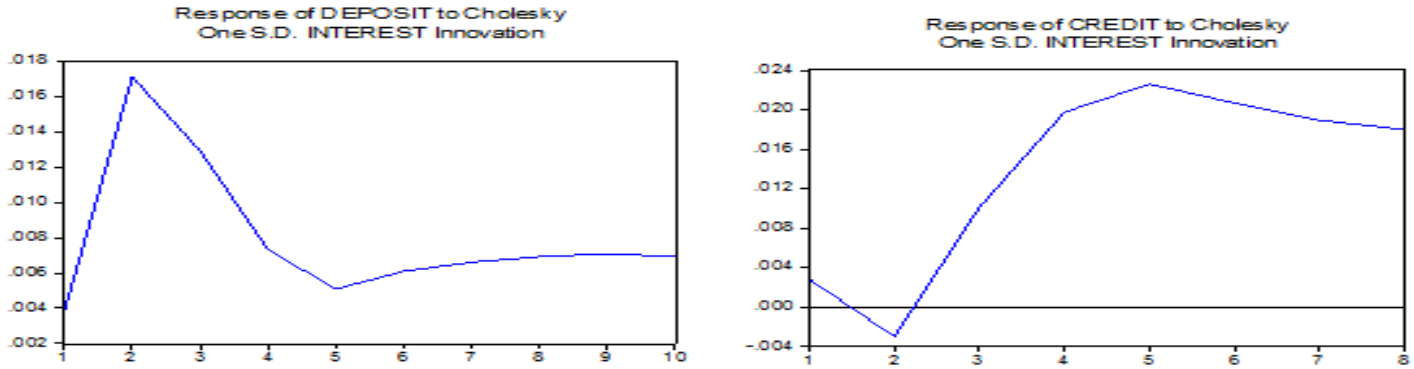


Fig.18: Model extension 3 in Gabon

As for the price level, its reaction is the same as that of output in Equatorial Guinea and Gabon. A positive innovation in the lending rate is accompanied by an upward movement in the price level (3 quarters for Equatorial Guinea, the whole period for Gabon). The same upward trend is also observed in Chad for about one year. On the other hand, the expected drop in the price level after a shock on the lending rate is observed in Cameroon (4 quarters) and Congo (the whole period).

Model Extension 3: The Bank Lending Channel

In order to investigate the presence of a bank lending channel in the CEMAC area, we introduce bank deposits (deposit) and bank loans to the private sector (Credit) in our basic VECMs. To obtain deposit, we summed up demand, time and savings deposits together. We expect both Deposit and Credit to drop following a monetary policy tightening, alongside with the drop in output. Such a methodology is also applied by Kakes and Sturm [17] while analyzing German banking groups. The two extended VECMs are:

$Y = (RGDP, Price, Interest, Deposit)$, and.

$Y = (RGDP, Price, Interest, Credit)$ respectively.

Results for this last specification are displayed from figure 13 to figure 18

According to the response of bank deposits following a monetary policy shock, CEMAC countries can be ranged into 3 groups. In the first group (Chad, Equatorial Guinea and Gabon) bank deposits increase immediately, peaks after two

quarters in Chad and Gabon, and 4 quarters in Equatorial Guinea; then remain above their equilibrium level for the rest of the period. In the second group (Cameroon and Congo), bank deposits become more volatile, but increase in the first quarter (the first two quarters in Congo). Finally, Central African Republic is the sole country where bank deposits persistently fall following a shock to the interest rate. We now turn to the responses of bank loans to the private sector.Our results also indicate that after a monetary policy shock, there is a rapid fall in bank loans in four of the CEMAC countries. In Cameroon and Central African Republic, the effect bottoms after two quarters, while in Congo and Equatorial Guinea, it practically bottoms after three quarters. It is worth noting that bank loans decrease in Central African Republic and Equatorial Guinea coincides with an immediate fall in real GDP, which suggests that the response of bank loans is induced by demand effects [3, 17]. The decline of both aggregate credit and economic activity is consistent with the bank lending channel, according Bernanke and Blinder [3]. On the other hand, the response of bank loans might be induced by supply effects in Cameroon and Congo, as real GDP remains above its equilibrium level at least two quarters after a policy shock (it persistently increases for the whole period in Cameroon).Based on these results, it's difficult to disentangle the loan supply and the loan demand effects of monetary policy moves, a recurrent limit of studies that use aggregate data as pioneered by Bernanke and Blinder [3]. According to Romer and Romer [2] ,monetary shocks simultaneously affect both the demand and the supply for loans.

Finally, in Chad and Gabon, an interest rate shock produces a persistent increase in bank loans which remain above their equilibrium for the whole period (the fall in Gabon appears to be insignificant). Consequently, one can conclude that there is no evidence of bank lending channel in these two countries [18-24].

Conclusion

In this paper we evaluate the impact of monetary policy in the six countries of the Central African Economic and Monetary Community. Overall, our results indicate that there are too many differences among the CEMAC countries in the effects of the common monetary policy. Using the short term interest rate and the monetary aggregate alternatively as the policy instrument of the central bank, we show that output and inflation react differently after a monetary shock. Usually, countries in the CEMAC area fall into two groups, one in which the outcomes are as expected, and the other one with counterintuitive responses to policy actions. This feature is also present when we emphasize in some channels of the monetary transmission mechanism. We reported that although the lending rate increases following a monetary tightening, important differences remain as for the transmission from the lending rate to the output and price levels. This channel is not effective enough. Our results also show that in some countries, bank deposits and bank loans fall after a positive monetary shock. This fall in some circumstances indicate the presence of a bank lending channel of monetary policy especially when it is accompanied by a simultaneous drop on GDP. However, the use of aggregate data in the sense of Bernanke and Blinder [3] is plagued by an identification problem so that we are inconclusive on this issue. Subsequent studies might be conducted to shed more light in this issue.

Those results indicate that a single monetary policy does not affect equally the member countries of the CEMAC area, although the formation of a currency union between these countries. The existing differences in the transmission mechanisms of monetary policy, when reflecting the difficulties encountered by the central bank in implementing a common policy, are likely to widen existing cyclical variation between the currency union partners.

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