



## RETROSPECTIVE ANALYSIS OF THE APPLICATION OF THE ECB'S KEY INTEREST RATES TO THE MACROECONOMIC INDICATORS OF THE CEMAC



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### ABSTRACT

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This article focuses on a comparative analysis of the responses of the CEMAC macroeconomic variables to the shocks of the key interest rates fixed by the BEAC and the ECB. To do this, we used a panel for the period 2011-2018. Thanks to the analysis of the simulations made possible by the SVAR estimate, we find that the CEMAC macroeconomic variables namely real GDP, private investment and inflation respond positively to the shocks of the ECB lending marginal rate, unlike that of the BEAC. In addition, the economic activity and private investment of the CEMAC countries are sensitive to the shocks of the deposit facility rate of the ECB and not to that of the BEAC. Furthermore, the application of the BEAC deposit facility rate only stimulates inflation in the CEMAC. The CEMAC macroeconomic variables have similar responses both in shock of the BEAC TIAO and that of the ECB. Therefore, it would be advantageous for the monetary authorities of the BEAC to apply the marginal lending facility rate and the deposit facility rate of the ECB; because it is a pledge of economic prosperity of the CEMAC countries. However, the success of this monetary policy also requires the support of public authorities.

**Contribution/ Originality:** This study is one of very few studies which have investigated on how BEAC can modify its monetary policy in order to boost economic activities and private sector investment of the CEMAC countries.

## 1. INTRODUCTION

The deliberate policy of lowering rates by all central banks in developed and developing countries has resulted in massive capital market effects. Central bank policy rates set the tone for bank rates. They correspond to the "rent" of money set by central banks when they lend to commercial banks. The key interest rates are the rates applied by a central bank to the banking sector. They reflect the direction of the central bank's monetary policy by which they are set. The fall in these rates benefits the real economy by facilitating access to credit for businesses. In France, for example, 9 out of 10 SMEs now obtain the investment credit they requested and loans to households increased by 4.5% in 2015. In fact, low rates encourage the borrower the possibility of going into debt at little cost, which logically leads to increased consumption and opens up investments.

In the same vein, the ECB (2016b) notes the increase in business and household lending in the euro area related to the application of negative interest rates on deposits. Taking into account the fact that credit growth is currently limited to offset the impact of the fall in interest margins and the positive correlation between credit growth rate and interest margins over the last few years suggests that it is unlikely that the volume of credit goes up again under these conditions.

Claessens, Coleman, and Donnelly (2016) show that a reduction in the policy rate compresses in all cases the banks' net interest margin, but that the effect multiplies when the rates are at low levels. In an analysis that aims to identify the specific role played by the rigidity of deposit rates, Ampudia and Van den Heuvel (2017) find that rate cuts at or below zero have been interpreted by the markets as detrimental the future profitability of banks, let alone those with a higher relative share of deposits: their stock market values have been reduced to a greater extent as a result of decisions to lower the key interest rate at or below from scratch. Heider, Saidi, and Schepens (2019) who observe that banks with more deposits lend less to businesses after the negative rate is applied than banks with smaller deposits. A bank will suffer losses on its excess liquidity when the rate applied to it is less than the marginal cost of financing (Buiter & Panigirtzoglou, 2003).

According to ECB (2017a) loan rates have significantly declined more than the average reference rate on the interbank market (the rate at which banks can finance themselves in this market). In the context of the euro zone, the negative rate has thus amplified the effect of forward looking guidance (Cœuré, 2016): since low rates are still expected in the future, this reduced the expectations of future rates, which shifted the rest of the yield curve well beyond the short-run segment. The presence of a lower bound can constrain the ability of the central bank to commit to further easing monetary policy (Goodfriend, 2016). The negative rate can therefore be considered as a measure that strengthens the action of both conventional and unconventional monetary policy (Rostagno et al., 2016). According to Brunnermeier and Koby (2019) in order to maximize the impact of the measures through the bank credit channel, the key rates should have fallen back to their lower limit before considering the implementation of a credit program of quantitative easing.

Figure 1 below show that the interest rate competition in CEMAC has had the effect of pulling the average rate of auctions to the highest rate of the market, rather than containing it around the TIAO.

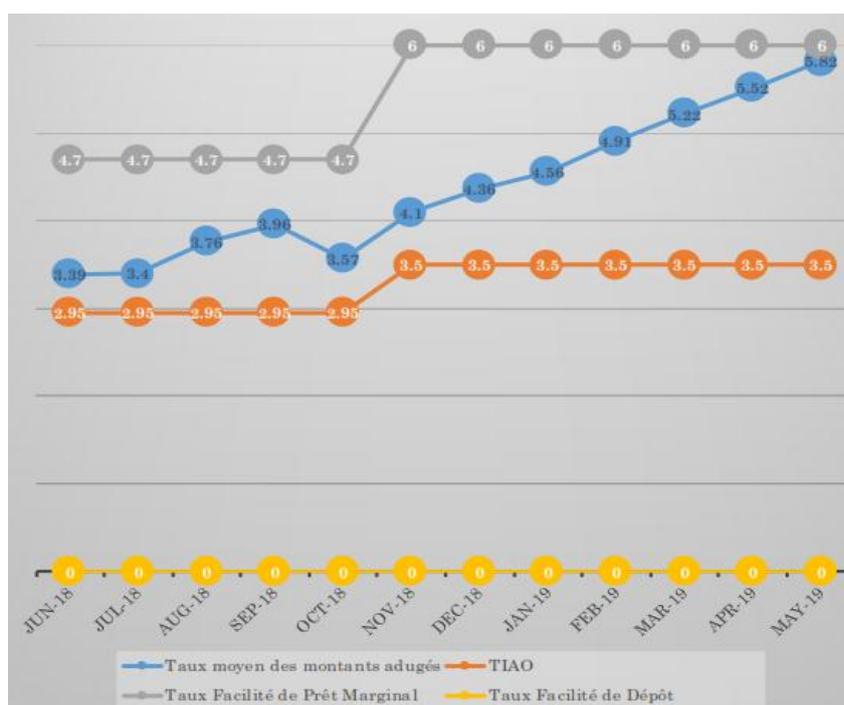


Figure-1. Result of the implementation of the new monetary policy instruments.  
Source: IMF presentation, May 2019.

In the CEMAC zone, economic activity stabilized in 2017, following the mild recession of 0.2% recorded in 2016. This sluggishness reflects contrasting situations between, on the one hand, countries that are mainly oil exporters and on the other hand, Cameroon and the Central African Republic. Economic activity thus continued to decline in the Congo, Chad and Equatorial Guinea, while GDP growth in Cameroon (whose economy is more diversified) and that of Central Africa remained strong. Finally, economic activity remains weak in Gabon. The decline in oil revenues, which feed the economy of the majority of member countries, has been accompanied since 2015 by a slowdown, or a recession, in other sectors of activity. The tender interest rate (TIR) has thus been raised from 2.45% to 2.95% in 2018. Although no new rate hike has occurred since that date, the BEAC is saying that ready to raise its rates even more if the situation required it. However, as key rate hikes by a central bank can only be fully effective if bank liquidity is well controlled, the BEAC has embarked on a parallel exercise to ensure more effective control of this liquidity. Due to a still weakly developed interbank market and therefore difficult liquidity transfers from surplus banks to loss-making banks, BEAC maintains a surplus of liquidity compared to the forecasts of autonomous banking liquidity factors. After having experienced very high levels, bank liquidity has stabilized at its lowest levels, but these must ultimately be further reduced. Two causes explain the reduction of this bank liquidity: The first is mechanical and related to the decline in net foreign assets (2130 billion CFA francs at the end of 2017, compared with 7690 billion at the end of 2014). Indeed, when commercial banks buy currencies from their central bank, they sell the domestic currency, which is removed from the banking system. The second is a more restrictive BEAC policy. The end of direct advances to the States (recorded in the articles of association in December 2017, following the decisions of the extraordinary summit of heads of state in December 2016), the decrease in refinancing of banks from mid-2017 (outstanding the advances of the BEAC amounted to 492 billion as at 30 April 2018, against 678 billion a year earlier) and the increase in reserve requirement ratios (the Monetary Policy Committee of March 2018) also participate in this movement. In 2018, the BEAC decided to pursue this strategy in order to avoid excessive banking liquidity which could jeopardize the still fragile reconstitution of foreign exchange reserves.

The introduction of the new reserve requirement system shows, as shown in [Figure 2](#) below, that excess liquidity continues to be deposited at the BEAC at the rate of 0%, but their insufficiency is not financed by these surpluses and the banks continue to cover this liquidity need at the BEAC either at the marginal lending facility rate of 6%, or when they have no collateral, at the penalty rate for non-compliance with the level of constitution at 8,30%. This reflects the lack of dynamism of the interbank market ([IMF, 2019](#)).

Concretely in CEMAC, only 14% of households and 30% of firms have access to financial services, a state that does not allow an inter-temporal transfer of well-being in terms of savings for households and a bank financing of investments for the firms. In addition, the proportion of firms with access to banking services includes 15% of large firms whose capital is limited in terms of their investment needs and 15% of small and medium-sized enterprises facing funding guarantees. In fact, the banking sector has very little information on the health of the firms it faces, and the central bank has contributed somewhat to fueling ambient excess liquidity by its dual intervention principle, puncturing and injecting simultaneously ([Mvondo, 2019](#)). It remains important to point out that neither the experience observed so far, nor the analyzes cited here show any recessive effect of the negative rate in absolute terms, as defined by [Brunnermeier and Koby \(2019\)](#). Furthermore, most of the empirical studies concerning developed countries and focus on the impact of very low or negative rates on the profitability of banks ([Borio, Gambacorta, & Hofmann, 2015](#); [Borio. & Gambacorta, 2017](#); [Busch & Memmel, 2017](#); [Claessens et al., 2016](#); [Dombret, Guenduez, & Rocholl, 2017](#); [Drescher et al., 2016](#); [Heider et al., 2019](#)) and the credits allocated to households and businesses. What about economic growth and inflation? This article complements these shortcomings by carrying out a retrospective analysis of the application of ECB interest rates to CEMAC macroeconomic indicators (sustained growth, low inflation and the promotion of private investment). The answer to

this question leads us to perform simulations, by analyzing the impulse responses in order to assess the appropriateness of adopting the key rates of the ECB.

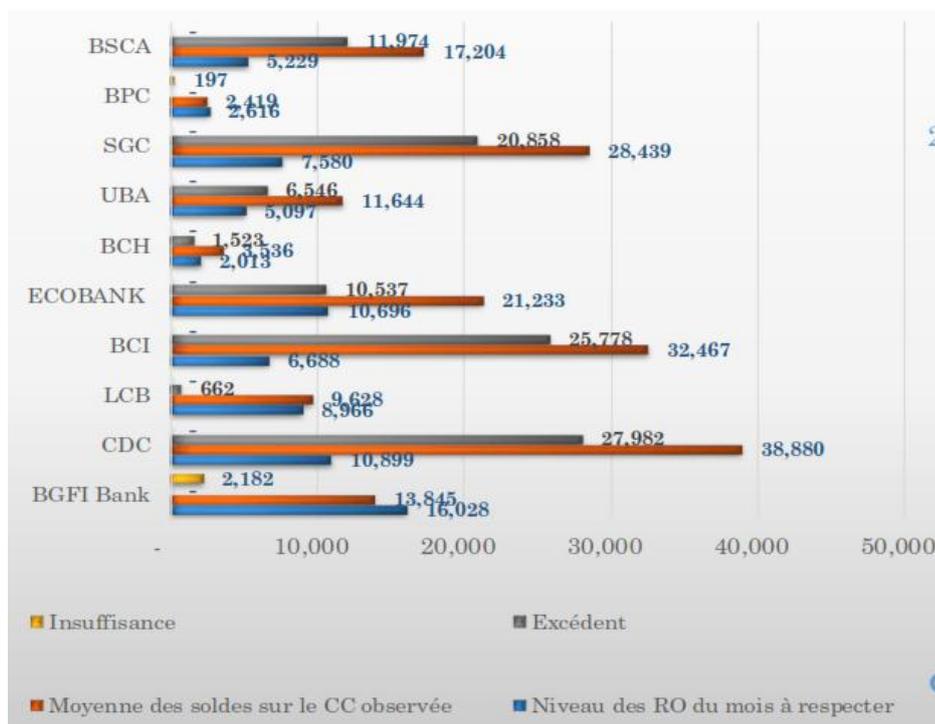


Figure-2. Result of the implementation of the new reserve requirement system.

Source: IMF presentation, May 2019

This article is organized as follows: Section 2 briefly reviews the literature the effect of zero lower bound interest rate on bank profitability and economy, section 3 describes the data and methodology, Section 4 presents and interprets the results of the simulations and Section 5 concluded with policy implications.

## 2. THEORETICAL FRAMEWORK AND EMPIRICAL LITERATURE

The related literature has not provided a consistent theoretical framework that explains the direct link between low interests. In fact, there is no agreement in the economic profession on the effectiveness of negative interest rate policies (NIRPs). Theoretically, there is uncertainty about the effectiveness of monetary policies below the zero lower bound (ZLB). According to academic and policy circles, monetary policy becomes ineffective below the ZLB. So, banks would not be able to lower interest rates on deposits, which in many jurisdictions represent their main source of funding, below zero, because market participants would rather hoard cash. Thus, when short-run interest rates approach zero, central banks would not be able to stimulate lending and demand by lowering short-run interest rates (Eggertsson & Woodford, 2003; Keynes, 1936). Moreover, NIRPs could be contractionary because negative rates reduce bank's profits and lead to a reduction in loan supply (Altavilla, Burlon, Giannetti, & Holton, 2019; Eggertsson, Juelsrud, Summers, & Wold, 2019). For Rogoff (2017) the ZLB constraint should not be considered as a law of nature and negative rate policies can work pretty much as "central bank business as usual". Agarwal and Kimball (2015) also argue against the existence of disruptive effects of negative rates. Ultimately, it is an empirical question whether the ZLB constitutes a black hole upending the laws of economics or can work pretty much as business as usual. Limited experience of NIRPs and data availability have so far prevented researchers from answering this question.

Empirically, debates on the effects of low interest rate on economy led to mitigate result. Using US data for the period 1980-2008, Coibion, Gorodnichenko, Kueng, and Silvia (2012) believe that monetary expansion reduces income inequality; a conclusion corroborated by Claeys, Darvas, Leandro, and Walsh (2015) in the case of ultra-

expansionist policies of recent years. Using panel banking data to assess the extent to which banks are likely to convert their excess liquidity, Demiralp, Eisenschmidt, and Vlassopoulos (2016) use the response of a given bank's loans to non-financial corporations and households (as a percentage of core assets) to the excess liquidity of the same bank and to excess liquidity multiplied by an indicator variable "negative rates". They achieve the results that a one percentage point increase in a bank's excess liquidity leads to a 0.01 percentage point increase in its loans to households and non-financial corporations by banks in euro zone. Hence, about 20% increases in the average monthly flow of new loans to households and non-financial corporations by banks in euro-zone countries. It is also significantly higher than the estimated response in the period preceding the introduction of negative rates. In addition, there has been an increase in sovereign bond purchases related to the holding of excess liquidity.

### 3. DATA AND METHODOLOGY

In this section, we discuss the data used in the analysis as well as the empirical methodology used to identify how CEMAC economy and its private sector view the effect of negative interest rates by employing a panel econometric approach.

#### 3.1. Data

This article uses panel data from the six CEMAC countries for the period 2011-2018 to perform a retrospective analysis of the effect of BEAC's application of the ECB's key interest rates on CEMAC's economic activity. Table 1 present the full description of the data. It provides us with a number of observations equal to  $N * T = 48$  where  $N$  is the number of countries (6) and  $T$  is the number of years (8). While Table 2 present the correlation between the keys interest rate of the BEAC and BCE with the macroeconomic indicators of CEMAC. The both table are successively represent as follows:

Table-1. Summary statistics.

Variables and their descriptions	gdp	infl	pri	dfrbce	dfrbeac	mlfrbce	mlfrbeac	tirbce	tirbeac
Mean	1.62	3.62	14.34	-0.14	0.13	0.73	4.89	0.31	3.21
Me	3.83	2.38	17.69	-0.23	0.00	0.33	4.70	0.075	3.14
Max	8.88	37.14	28.90	0.50	0.60	2.06	5.75	1.25	4.00
Min	-36.04	-3.70	2.61	-0.40	0.00	0.25	4.20	0.00	2.45
Std. Dev.	6.97	6.45	6.49	0.29	0.21	0.66	0.57	0.43	0.58
Obs.	48	48	48	48	48	48	48	48	48

Table-2. Correlation matrix.

Variables	gdp	infl	pri	dfrbce	dfrbeac	mlfrbce	mlfrbeac	tirbce	tirbeac
gdp	1								
infl	0.1342	1							
pri	0.3517	-0.2875	1						
dfrbce	0.1707	-0.0398	-0.0533	1					
dfrbeac	0.2237	-0.0737	-0.0173	0.9201	1				
mlfrbce	0.2038	-0.0598	-0.0349	0.9396	0.9855	1			
mlfrbeac	0.2135	-0.0607	-0.0467	0.8238	0.8799	0.9171	1		
tirbce	0.2076	-0.0609	-0.0319	0.9565	0.9914	0.9962	0.8960	1	
tirbeac	0.2125	-0.0899	-0.0295	0.7086	0.7961	0.8192	0.9493	0.7985	1

Note: **gdp**: Annual growth rate of GDP per capita; **infl**: Real inflation rate; **pri**: Gross fixed capital formation for private sector; **dfr**: Deposit facility rate, **mlfr**: Marginal lending facility rate, **tir**: Tenders interest rate.

3.2. Methodology

The basic model is a panel structural VAR, inspired by the work of Mamadou and Adama (2014). As part of our analysis, it is more efficient than the "VAR" model, which considers the contemporaneous effects of one variable on another resulting in the "0" and goes against the theoretical considerations. Therefore, it costs the VAR model its credibility and casts doubt on its results (Jonas, 2018). Moreover, in the SVAR modeling, it is possible to make modifications to the matrix A (to carry out a structural factorization) which ceases to be an identity matrix.

$$AY_{it} = \lambda + \sum_{k=1}^p B_k Y_{it-k} + u_{it} \dots \dots \dots (1)$$

In Equation 1, A is the matrix (4 × 4) of the simultaneity relations between the variables of our economy;  $Y_{it}$  is our endogenous vector composed of 4 variables namely the real growth rate (gdp), private investment (pri), inflation (inf) and the key rate (td),  $B_k$  the matrix (4 × 4) associated with the lag and  $u_{it}$  the vector of the structural residues of independent and identically distributed type ( $u_{it} \sim iid(0, \sigma)$ ). The vector AutoRegressive model is presented by the system of Equation 2 to 5 as follows:

$$\left\{ \begin{array}{l} gdp_{it} = \beta_0 + \sum_{k=1}^p \beta_{1k} pri_{it-k} + \sum_{k=1}^p \beta_{2k} infl_{it-k} + \sum_{k=1}^p \beta_{3k} td_{it-k} + u_{it} \dots \dots \dots (2) \\ td_{it} = \lambda_0 + \sum_{k=1}^p \lambda_{1k} pri_{it-k} + \sum_{k=1}^p \lambda_{2k} infl_{it-k} + \sum_{k=1}^p \lambda_{3k} gdp_{it-k} + u_{it} \dots \dots \dots (3) \\ infl_{it} = \delta_0 + \sum_{k=1}^p \delta_{1k} pri_{it-k} + \sum_{k=1}^p \delta_{2k} gdp_{it-k} + \sum_{k=1}^p \delta_{3k} td_{it-k} + u_{it} \dots \dots \dots (4) \\ pri_{it} = \lambda_6 + \sum_{k=1}^p \beta_{1k} gdp_{it-k} + \sum_{k=1}^p \beta_{2k} pri_{it-k} + \sum_{k=1}^p \beta_{3k} td_{it-k} + u_{it} \dots \dots \dots (5) \end{array} \right.$$

The reduced form is given by Equation 6:

$$Y_{it} = A^{-1}\lambda + \sum_{k=1}^p A^{-1}B_k Y_{it-k} + A^{-1}u_{it} \dots \dots \dots (6)$$

In principle, the minimum number of restrictions "n" to impose on a system (VAR or SVAR) is given by the formula:  $n = \frac{k(k-1)}{2}$ , where k is the number of endogenous variables or the number of equations of the system.

For this work, we will impose at least n= 6 constraints to hope for the identified.

4. SIMULATIONS RESULTS

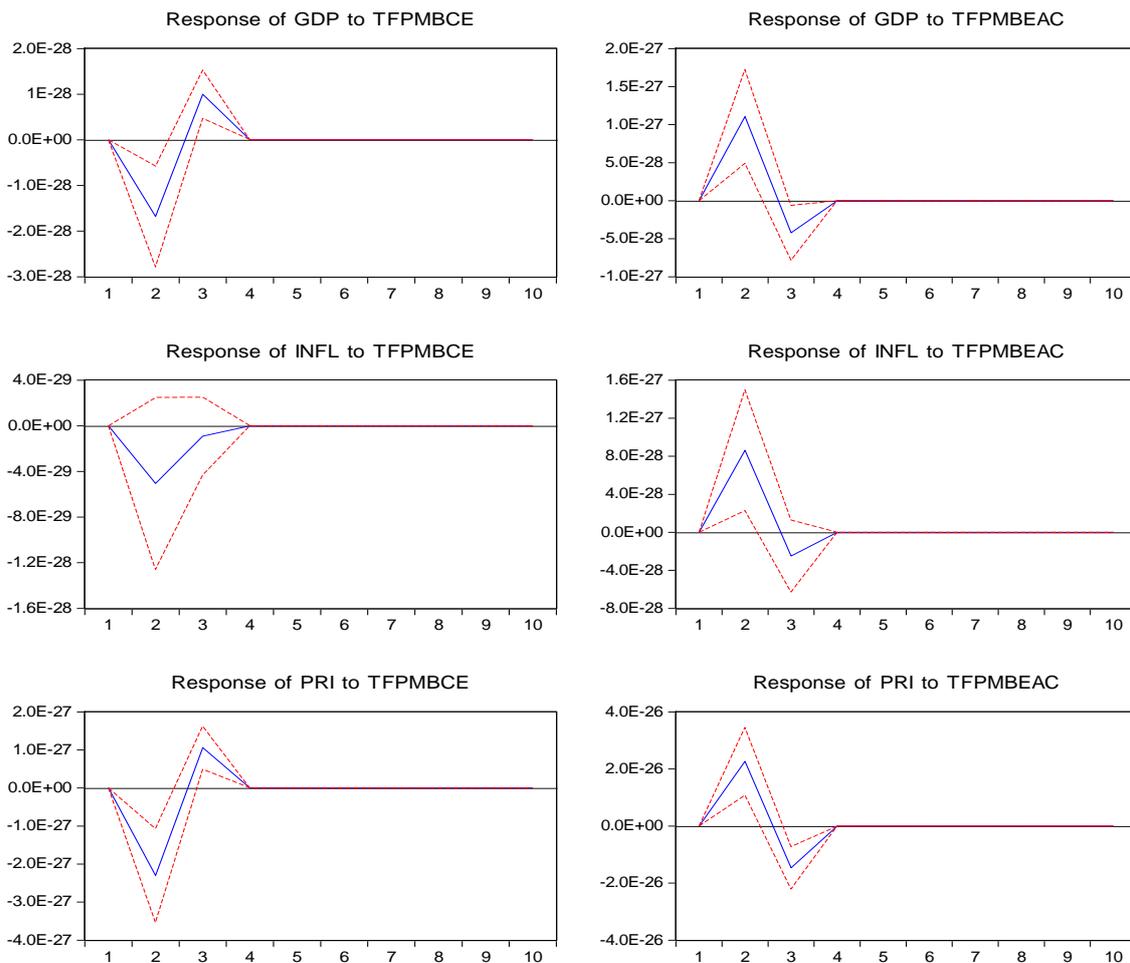
Figure 3 below presents a retrospective analysis of the application of the ECB key rates to the CEMAC economic variables. In fact, it is a question of comparing the response of real GDP, inflation and private investment of CEMAC if it is the key rates of the ECB that were applied compared to the adoption of the key interest rates of the BEAC. Indeed, the shock on the policy rate makes it possible to evaluate the concern of the monetary policy to go towards more regulation with the reduction of the coefficient of smoothing of its key rates. Since the creation of

CEMAC, the key rates are common to all countries in the zone and are fixed by the BEAC. The ceiling rate is the rate of the marginal lending facility (MLFR) at which banks borrow money from the BEAC. The floor rate is the deposit facility rate (DFR) at which the bank's day-to-day deposits with the BEAC are remunerated. In the middle of this corridor, the most used rate that of the main refinancing operations still called interest rate on tender. The shock of the deposit facility rate captures the impact of the volume of bank deposits on economic variables (real GDP, inflation, private investment). The shock on the MLFR makes it possible to capture the impact of the evolution of the cost of capital and the bank's debt capacity with the BEAC on the other variables of the model. The innovations on the IRT make it possible to evaluate the cost of the refinancing of the commercial banks.

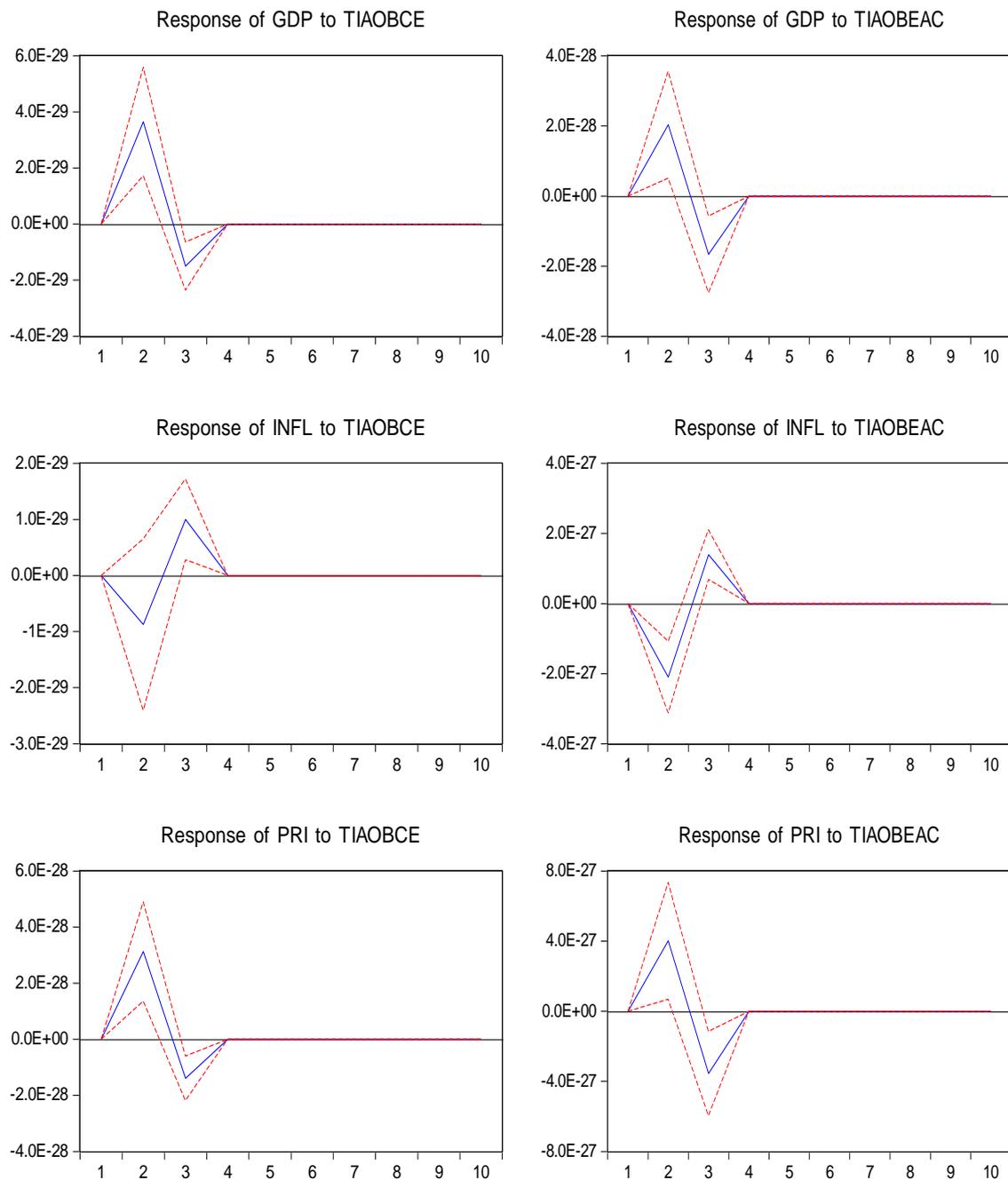
The general conclusion that emerges is that the different shocks are short-run (3 years). The results of the impulse responses of GDP, inflation rate and private investment are similar following a shock on the IRT (interest rate on tender) of the ECB or the BEAC. If the amplitude of this impact of these two rates remains almost identical on both scenarios, it is necessary to note here the reduction of its time of action.

Indeed, an innovation on the ECB's marginal lending rate would have led to a negative reaction of GDP and private investment in the first three years, and then positive in the fourth year and after, the shock fades. Moreover, inflation is negatively correlated with the impact on the MLFR over the entire period. It is noted that the rate applied by the BEAC is well adapted to the economic situation of the CEMAC countries; it results in a positive reaction of GDP, inflation and private investment in the first three years.

a) Shock on the marginal lending facility rate  
 Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.      Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.



b) Interest rate shock on tender (IRT)  
 Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.    Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.



Real economic activity reacts positively throughout the period to the shock on the deposit facility rate of the ECB. The same is true of private investment. So the application of negative interest rates on deposits would encourage companies to reduce their savings volume to invest. In addition, inflation seems less sensitive to the application of the ECB's DFR to the CEMAC economy. In the current context of Central Africa, it is worth noting that the stimulating effect of a very low interest rate can be offset by uncertainties about the future, for example if households react to low interest rates in the future saving more (for the purpose of earning a certain income in case of job loss (unemployment, retirement)).

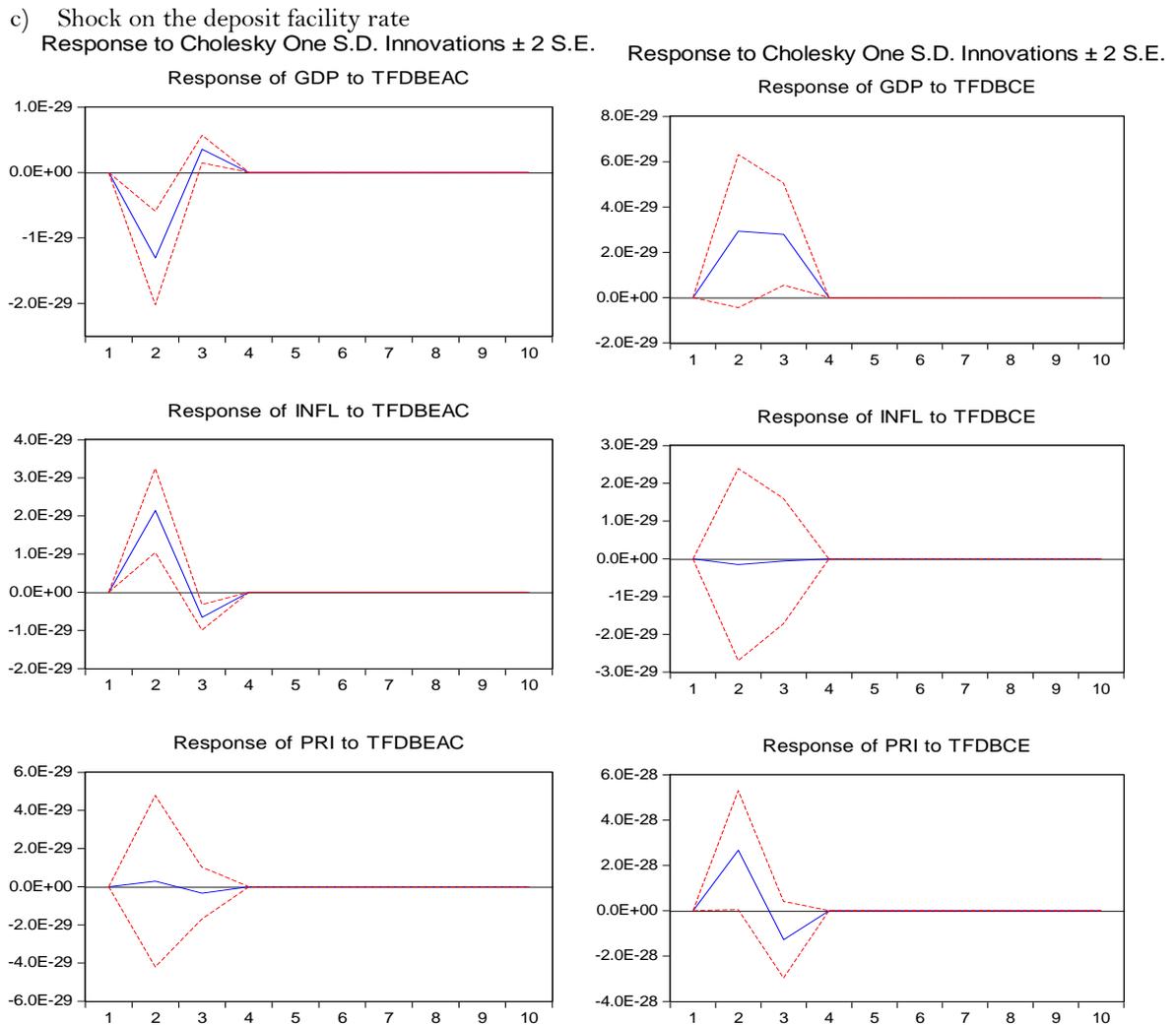


Figure-3. Impulse responses of Cameroon real GDP, inflation rate and private investment to the ECB and BEAC key interest rate shocks.

## 5. CONCLUSION AND RECOMMENDATION

In the end, this article allowed us, thanks to the SVAR model inspired by the work of Mamadou and Adama (2014) to carry out simulations in order to glimpse the reaction of real GDP, private investments and the inflation rate following the adoption by the BEAC of the key rates applied by the ECB. In the analysis, any shock on the key rates is short-term (3 years), and then the shock fades in the fourth year. Indeed, the results are convergent both when the BEAC maintains its main policy rate (IRT) than if it applied that of the ECB. In addition, economic activity and private investment would react positively if BEAC applied the ECB's negative deposit facility rate. However, the adoption of the marginal lending facility rate would have a pejorative impact on all the macroeconomic indicators selected. Nevertheless, as an independent structure, we believe that the BEAC is able to discriminate between the different key rates and to adopt the ECB deposit facility rate (DFR), which is a keystone for the economic recovery of the CEMAC. This decision will complement the arsenal of measures already taken, in particular to increase efficiency and encourage banks to carry out portfolio reallocations in favor of loans. However, the success of this monetary policy requires the support of public authorities to remove structural obstacles that would prevent an increase in private investment and economic growth despite favorable rates.

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## REFERENCES

- Agarwal, R., & Kimball, M. (2015). Breaking through the zero lower bound. International Monetary Fund Working Paper N°15/224.
- Altavilla, C., Burlon, L., Giannetti, M., & Holton, S. (2019). Is there a zero lower bound? The effects of negative policy rates on banks and firms. Working Paper Series n°2289/2019, European Central Bank, 1-56. Retrieved from: [ecb.wp2289\\_1a3c04db25.en.pdf](https://www.ecb.europa.eu/press/pr/2019/wp2289_1a3c04db25.en.pdf).
- Amputia, M., & Van den Heuvel, S. (2017). Monetary policy and bank equity values in a time of low interest rates. Retrieved from: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2976372](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2976372).
- Borio, C., Gambacorta, L., & Hofmann, B. (2015). The influence of monetary policy on Bank profitability. BIS Working Paper N°514.
- Borio, C., & Gambacorta, L. (2017). Monetary policy and bank lending in a low interest rate environment: Diminishing effectiveness? *Journal of Macroeconomics, Elsevier*, 54(PB), 217-231. Available at: 10.1016/j.jmacro.2017.02.005.
- Brunnermeier, M. K., & Koby, Y. (2019). The reversal interest rate. IMES Discussion Paper Series 2019-E-6. 1-41. Retrieved from: <https://www.imes.boj.or.jp>.
- Buiter, W. H., & Panigirtzoglou, N. (2003). Overcoming the zero bound on nominal interest rates with negative interest on currency: Gesell's solution. *Economic Journal*, 113(490), 723-746. Available at: <https://doi.org/10.1111/1468-0297.t01-1-00162>.
- Busch, R., & Memmel, C. (2017). Bank net interest margin and the level of interest rates. *Credit and Capital Markets*, 50(3), 363-392. Available at: <https://EconPapers.repec.org/RePEc:kuk:journl:v:50:y:2017:i:3:p:363-392>.
- Claessens, S., Coleman, N., & Donnelly, M. (2016). Low-for-long interest rates and banks, interest margins and profitability: Cross-country evidence. International Finance Discussion Papers No. 1197.
- Claeys, G., Darvas, Z., Leandro, A., & Walsh, T. (2015). The effect of ultra-loose monetary policies on inequality. Bruegel Policy Contribution, N°2015/09.
- Cœuré, B. (2016). *Assessing the implications of negative interest rates*. New Haven, USA: Speech at the Yale Financial crisis Forum.
- Coibion, O., Gorodnichenko, Y., Kueng, L., & Silvia, J. (2012). Innocent bystanders: Monetary policy and inequality in the US. NBER Working Paper, n°18170.
- Demiralp, S., Eisenschmidt, J., & Vlassopoulos, T. (2016). The impact of negative interest rates on bank balance sheets: Evidence from the euro area. *Mimeo ECB*.
- Dombret, A., Guenduez, Y., & Rocholl, J. (2017). Will german banks earn their cost of capital? *Contemporary Economic Policy*, 37(1), 1-12. Available at: <https://doi.org/10.1111/coep.12266>.
- Drescher, C., Ruprecht, B., Gruender, M., Papageorgiou, M., Toews, E., & Brinkmann, F. (2016). The crux of the matter with deposits: Low interest rates squeezing credit institutions margins. Research Brief, Deutsche Bundesbank. 1-5. 2016-2004-research-brief-data.pdf.
- ECB. (2016b). Adapting bank business models: Financial stability implications of greater reliance on fee and commission income. *Financial Stability Review*, 2, 147-157.
- ECB. (2017a). MFI lending rates: Pass-through in the time of non-standard monetary policy. *Economic Bulletin, Issue 1/2007*, 40-63.
- Eggertsson, G. B., & Woodford, M. (2003). The zero bound on interest rates and optimal monetary policy. *Brookings Papers on Economic Activity*, 34(1), 139-235.
- Eggertsson, G. B., Juelsrud, R. E., Summers, L. H., & Wold, E. G. (2019). Negative nominal Interest rates and the bank lending channel. NBER Working Paper N° 25416.
- Goodfriend, M. (2016). *The case for unencumbering interest rate policy at the zero lower bound*. Jackson Hole Economic Policy Symposium. Jackson Hole, Wyoming, 26-27: Federal Reserve Bank of Kansas City.
- Heider, F., Saidi, F., & Schepens, G. (2019). Life below zero: Bank lending under negative policy rates. *Review of Financial Studies*, 32(10), 3728-3761. Available at: <https://doi.org/10.1093/rfs/hhz016>.

- IMF. (2019). CEMAC: Common policies of member countries and common policies in support of member countries reform programs. IMF Country Report n°215/19. 1-38. Retrieved from: <https://www.imf.org>.
- Jonas, K. (2018). The VAR structural model: Elements of theory and practice on software. Post-Print cel-01771221, HAL. Retrieved from: <https://hal.archives-ouvertes.fr/cel-01771221>.
- Keynes, J. M. (1936). The general theory of employment, Interest, and Money. *Mac Millan*.
- Mamadou, D., & Adama, D. (2014). Fiscal policy and macroeconomic stability in Economic and Monetary Union: The case of the West African Economic and Monetary Union (WAEMU). *OFCE Review*, 137, 181-209. Available at: 10.3917/reof.137.0181.
- Mvondo, T. (2019). Financial reforms and interest rate formation in central Africa: An approach through the DSGE model. *Papers in Political Economy*, 61, 1-30.
- Rogoff, K. (2017). Dealing with monetary paralysis at the zero bound. *Journal of Economic Perspectives*, 31(3), 47-66. Available at: <https://doi.org/10.1257/jep.31.3.47>.
- Rostagno, M., Bindseil, U., Kamps, A., Lemke, W., Sugo, T., & Vlassopoulos, T. (2016). *Breaking through the zero line: The ECB's negative interest rate policy*. Paper presented at the Presentation at the Brookings Institution Conference on Negative Interest Rates: Lessons Learned so Far, Washington DC, USA.

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