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## **WHAT EXCHANGE RATE POLICY FOR SUSTAINABLE ECONOMIC GROWTH IN THE CENTRAL AFRICAN ECONOMIC AND MONETARY COMMUNITY?**

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### **Abstract**

The purpose of this reflection was to analyze the relevance of the current proposals for reforms of the franc zone, based on the long-term relationship between the real exchange rate and sustainable economic growth. To this end, we are developing a non-structural VAR model that describes the interaction between the real exchange rate and macroeconomic variables, which are at stake in current debates, in particular, foreign exchange reserves, real imports and exports, and sustainable growth. Our results tend to give the proponents of exiting the franc zone the right. The real exchange rate does not cause any targeted variables. Only foreign exchange reserves influence the exchange rate. CEMAC's exchange rate policy is not autonomous and cannot solve the problems facing the sub-region. On the other hand, by influencing the exchange rate, the centralization of currencies remains essential. However, it is possible to centralize these foreign exchange reserves at BEAC. However, the effectiveness of an autonomous monetary and exchange rate policy will only be beneficial if the CEMAC countries have a common industrial policy.

**Keywords:** VAR, Real exchange rate, CEMAC, sustainable growth

### **1. Introduction**

The weakness of growth, and the decline in foreign exchange reserves in the operations account of the countries of the Economic and Monetary Community of Central Africa (CEMAC) in recent years, have given renewed interest to the debate on credibility, and the effectiveness of their exchange rate policy, and in particular its ability to stimulate sustainable growth<sup>1</sup>.

This debate on the appropriate exchange rate policy is not new in the CFA zone. It will be recalled that in 1994, the relevance and effectiveness of the devaluation of the FCFA had been questioned with regard to the mechanisms provided for by the monetary agreements, and with regard to the worsening of poverty that it has caused. engendered. Moreover, the transformations of economic structures in favor of the exporting sectors thanks to the changes in relative prices, have not taken place.

In fact, two main mechanisms underpin this CEMAC exchange rate policy: the centralization of foreign exchange reserves, on the one hand, and the fixity of the CFA exchange rate against the

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<sup>1</sup>Growth, in the traditional sense of the term, cannot be considered sustainable, because of the many negative consequences, both environmental and social, in particular, the inequalities within countries but also between countries, which it has engendered.

Euro, on the other. Two main objectives are thus targeted, to avoid a payments crisis, and to guarantee monetary and exchange stability.

According to the principle of centralization, the member countries of the Franc zone are required to deposit 50% of their foreign exchange reserves in the books opened with the French Treasury. The free convertibility of the CFA Franc is ensured by this Operations Account, the balance of which may be debit. Indeed, African central banks have an unlimited drawing right in the event of exhaustion of their foreign currency reserves. In other words, it is in return for the unlimited drawing right that they must deposit a quota of their external reserves into this account. It is also these deposits that allow the French Treasury to provide an unlimited guarantee to the currencies issued by the central banks of the Franc zone and to avoid the payment crises to which these countries could be exposed,

Chapter 2 of the regulation on the harmonization of exchange regulations in the CEMAC States of 2000, in its article 10, stipulates that the purchase and sale rates of currencies other than the euro are established on the basis of the fixed exchange rate of the CFA franc against the euro<sup>2</sup> and the prices of these currencies against the euro on the foreign exchange markets.

The main objective here is the stability of the exchange rate and monetary stability (Guillaumont P and S, (2017)<sup>3</sup>.

It is these mechanisms of exchange rate policy that are today the subject of strong criticism both in their foundations and in terms of their long-term impact, particularly on sustainable growth. The stakes are high. These effects, added to the economic consequences of the Covid 19 pandemic, today form and justify the reforms suggested in the Franc zone, the principle of which was accepted by the Heads of State of the CEMAC on November 22, 2019, at the end of their Extraordinary Conference.

In the economic literature, two types of reforms are recommended. That of the supporters of maintaining the CEMAC countries in the Franc zone (pro CFA franc) and that of the supporters of leaving the Franc zone (anti CFA franc)<sup>4</sup>. Without being exhaustive, we present the foundations of their proposals.

For the first group, the CFA zone's exchange rate policy has positive effects on the long-term economic dynamics of low-income countries. In their study on "Real exchange rate and manufacturing production in Africa: what impacts? »Guillaumont J, and Ping Hua, (2018)<sup>5</sup> show that a depreciation of the CFA can allow African countries in the franc zone to better develop their manufacturing industry. In the same vein, Plane (2018), taking the example of Côte

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<sup>2</sup> 1FCFA = 0.001525 Euros

<sup>3</sup>Patrick Guillaumont, Sylviane Guillaumont Jeanneney (2017), the franc zone in perspective, Revue d'économie du développement, Vol. 25, pages 5 to 40 of Boeck, Paris

<sup>4</sup>A name that is certainly exaggerated, but which reflects the current divide

<sup>5</sup>Sylviane Guillaumont Jeanneney and Ping Hua (2018), "Real exchange rate and manufacturing production in Africa: what impacts? »Journal of Development Economics, Vol 26, p.83-112

d'Ivoire, analyzed the factors of the competitiveness and attractiveness of countries. Among these factors is a "good exchange rate". Finally, Gosh et al, (2002); Aghion et al, (2006), after having found a strong correlation between the adoption of different exchange rate regimes and economic growth, have demonstrated the usefulness of a fixed exchange rate, such as that of the CFA.

In view of these results, the "pro CFA franc", are campaigning for the maintenance of the CFA in the franc zone. They believe that minimal reforms of the Franc zone agreements can achieve the objective of sustainability, especially since the zone is characterized by its stability and a low rate of inflation. Strauss Khan (2019) proposes, the alignment of decision rules with the exchange rate regime supposed to characterize the zone, the strengthening of convergence mechanisms, the adaptation of the perimeter of the zone to current economic realities, and a new monetary cooperation allowing greater openness to the world<sup>6</sup>. Similar proposals are made by Sylviane Guillaumont (2017), who recalls that the reforms that have already taken place in the past have shown the area's capacity to adapt to new situations.<sup>7</sup>.

On the other hand, for the second group, the "anti-CFA Francs", the positive or negative long-term effects of the exchange rate policy on sustainable growth depend on other factors. Aghion, (2005), for example, discusses the level of development of the financial sector. Countries with weaker financial development experience a decline in economic growth, under flexible exchange rates. On the other hand, when the financial sector is well developed, there is no significant effect on growth.

Similarly, Hussain et al (2005) found that the adoption of flexible plans had positive consequences for economic growth in more developed countries. However, the impact in the selected emerging and developing countries could not be determined. This is also the conclusion of Bikai and Owoundi,<sup>8</sup>who analyzed the impact of the exchange rate regime on real exchange rate misalignments. Their results show that the losses or gains in competitiveness induced by misalignments do not depend on the exchange rate regime chosen but more on the intrinsic and structural characteristics of the countries.

The consistency between the objectives of economic policy and the exchange rate, is also according to Glüzmann et al (2012) Levy-Yeyati and Sturzenegger (2007) a condition for exchange rate policy to have positive effects on economic growth. In fact, most developing and emerging economies tend to undervalue or overvalue their currencies to make them coincide with their economic policies. The exchange rate is then considered a remedy. The study by Nnanna Philemon Azu, Alireza Nasiri, (2015)<sup>9</sup>for Nigeria tends to confirm this result. From a VAR model, they show that fluctuations in the real exchange rate are explained positively by real imports and negatively correlated with real GDP and foreign direct investment. These authors

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<sup>6</sup> Dominique Strauss Khan, Franc Zone, for emancipation for the benefit of all

<sup>7</sup> Patrick Guillaumont and Sylviane Guillaumont Jeanneney, (2017) in "the franc zone in perspective", development economics review Vol 25 p.5-40

<sup>8</sup> Communication from the Dschang conference, "the CFA franc in debate" 2019

<sup>9</sup> Nnanna Philemon Azu, Alireza Nasiri, (2015), "Exchange rate Fluctuation and Sustainable Economic growth in Nigeria: VAR Approach", Journal of Economics and Sustainable Development Vol.6, No.13, 2015.

conclude that the appropriate exchange rate policy is that which is decided by the country in full sovereignty and which takes into account the economic objectives and the situation of the international markets concerned. The comparative analysis of the monetary and financial performances of the countries of the Franc Zone and the WAMZ carried out by Seydi Ababacar DIENG and Abdoul Aziz DIAW<sup>10</sup>(2019) refute the preferred hypothesis, of better convergence and better monetary and financial performance of the countries of the Franc Zone compared to those of the WAMZ. Indeed, these results show overall that membership of the Franc Zone does not guarantee better convergence and better results in monetary and financial terms for member countries compared to non-member countries.

In the same sense, the studies carried out by MONDJELI et al, (2019) show that belonging to the Franc Zone does not determine the attractiveness of FDI in sub-Saharan Africa. In this regard, the guarantee of stability and convertibility offered by the CFA Franc combined with the related monetary discipline as recalled by Guillaumont and Guillaumont (2017) are not enough to encourage potential investors, unlike what is happening in the eurozone.

Consequently, for the “anti CFA franc”, the effects of sustainability can only be obtained if monetary sovereignty is established, which supposes the creation of a new currency, disconnected from the Euro and not dependent on the Treasury. French.

The object of this reflection is to analyze the relevance of the above reform proposals through this double research question: can the current exchange rate policy generate sustainable growth in CEMAC? if not, what exchange rate policy reform should be implemented to achieve the sustainability objectives?

The fundamental assumption underlying this thinking is that:

- On the one hand, the current exchange rate policy and the mechanisms in force in the Franc zone cannot generate sustainable growth in the CEMAC;
- On the other hand, to achieve the objective of sustainability, the reform must move towards an exchange rate regime that reconciles flexibility and stability and therefore the aim is to transform the CEMAC economies into production economies capable of sustaining strong growth and sustainable development for both present and future generations;

In this perspective, we are targeting aggregates whose level has focused the attention of the IMF, the Bank of France and the French Treasury during the last meetings.<sup>11</sup> with the CEMAC Authorities, namely, the alarming level of foreign exchange reserves, the scale of external deficits, which could worsen the Covid 19 pandemic, and sustainable growth.

We are only interested in the interrelationships and interactions between these variables and the long-term exchange rate. This is what justifies here the use of non-structural VAR modeling

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<sup>10</sup> Symposium on CFA under debate, University of Dschang, 2019

<sup>11</sup> Meeting between the IMF and the authorities of the countries and the CEMAC commission in Yaoundé 2017, Ndjamena, Washington in December 2018 and Paris in February 2019.

popularized by Sims (1980). Unlike the studies cited above, it also makes it possible to take into account the causality between the target variables and the exchange rate; causality which determines the transmission channels of long-term exchange rate policy. At a time when the CEMAC authorities must decide on the reform to be initiated, this reflection, by extending this recent work, sheds new light on this questioning.

The outline of this reflection is as follows: in the second part, we set out the reasons which today push for reform. The third part is devoted to the methodology used. The results of our estimates and the orientation of the reforms that follow will be presented in the fourth part, before the conclusion (part 5).

## **2.Explanatory memorandum**

The reasons for reforming exchange rate policy are based first of all on the practical limits of monetary cooperation mechanisms as we saw in the review of the literature in the introduction. In recent years, they have become more dogmatic and political. We set out these political reasons, before presenting the current economic situation of CEMAC and the post-Covid 19 outlook.

### **2.1. Political motives**

The decision of ECOWAS to create a common currency "Eco" and the legitimate aspiration of the African populations to freedom and the full capacity to define their own destiny, constitute two related political events which oblige the CEMAC countries. to decide on the content of the exchange rate policy reforms to be carried out.

#### **2.1.1. The decision of ECOWAS to create a common currency "the ECO" and the official position of France**

The decision of ECOWAS to create a common currency in West Africa, "the ECO", constitutes the first element that can motivate reflection on the reform of the CFA franc in Central Africa. Although the economic structures and the level of integration are different, the CEMAC countries must henceforth imperatively prepare for a new development in monetary relations between France and these former colonies and between ECOWAS and CEMAC, notes the Foundation for Education and Research in Central Africa (FERDAC)<sup>12</sup>. L French authorities<sup>13</sup>themselves expressed the possibility of negotiations with African countries, regarding the direction of their monetary destiny, at a time when demonstrations against the CFA are more and more numerous among young people who aspire to freedom, and to the full capacity to define their own destiny. CEMAC countries cannot therefore run the risk of being subjected to a decision which they have not given sufficient thought to.<sup>14</sup>.

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<sup>12</sup> Note to the President of the Commission (2019)

<sup>13</sup> The French Minister of Economy and Finance, Bruno the Mayor, expressed the 22 December 2019, sure RFI about the question of a possible evolution of the CFA franc in Central Africa.

<sup>14</sup> Saturday, December 21, almost 60 years after African independence. Emmanuel Macron and Alassane Ouattara announced in Abidjan the disappearance of the Franc from the African Financial Community. RFI source

Regarding the relationship between CEMAC and the West African Economic and Monetary Union (UEMOA), although the two currencies are pegged to the Euro at an identical rate (655.957 francs for 1 euro), their use is not interchangeable. In fact, we cannot pay in CFA UEMOA for products sold in Central Africa and vice versa. For lack of a clearing system, an exchange commission and or an informal exchange rate is established between the two currencies, thus making trade between the two zones difficult.

### **2.1.2. Conflict of objectives and the legitimate aspiration of the African populations for freedom and the full capacity to define their own destiny**

To this pressure from the ECOWAS decision, is added that exerted by African youth eager to finally enjoy full sovereignty since independence. The virulence of their criticisms, admittedly passionate, on certain characteristic aspects of the Franc Zone, including the presence of France in decision-making bodies or the centralization of a substantial part (50%) of foreign exchange reserves in the operations account, cannot be understood without taking into account these aspirations, the minimization of which cannot go without damaging the effectiveness of development policies and cooperation between CEMAC and Europe (Bekolo, 2020). However, one of the conditions for the success of these policies is the full support of these populations. Taking into account the continuous improvement of their living conditions,

In fact, colonial heritage<sup>15</sup> the Franc Zone still appears, today, as a unique experience of monetary cooperation since it has lasted for more than 75 years, and atypical, because its operating mechanisms and its objectives have remained relatively the same, despite the many changes in economies of member countries and fluctuations in the international environment. The area's operating mechanisms were primarily designed to preserve French interests after the 1929 crisis and the Second World War. The CFA franc is thus seen as a colonial currency, Kako Nubukpo (2016)<sup>16</sup> and this, despite its adoption by African countries after independence. The Franc Zone thus appears as a colonial avatar, despite numerous reforms of which it has nevertheless been the object, in which France would control the functioning through its presence in the governance bodies of the various sub-regional monetary and banking institutions, as well as the holding of reserves in an operations account opened in the books of its public treasury, all of which would constitute obstacles to the definition and implementation of relevant development policies. The conflict of objectives is more noticeable today. While the problem of the CEMAC countries remains the financing of its economies and economic recovery, the

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<sup>15</sup>Although the Zone Franc entity was formally recognized internationally in 1939 with the establishment of a common exchange rate policy for all French territories, it was only from 1945 that we were going to witness to a real organization of the Franc Zone. Indeed, on December 26, 1945, an official press release from the Minister of Finance officially gave it birth.

<sup>16</sup> Kako Nubukpo (2016), *Getting Africa out of monetary bondage: Who benefits from the CFA franc? La Dispute editions, Paris.*



objective of monetary policy remains the control of inflation, which has long been around 3%. This point of view is also that of other European governments, notably Italy.<sup>17</sup>

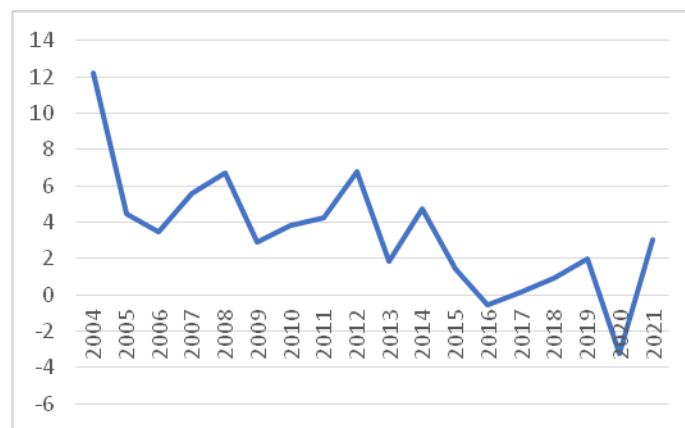
## 2.2. The economic situation of CEMAC and the post-covid outlook 19

The weak economic performance of CEMAC is one of the main reasons for the reform of the exchange rate policy. The aggregate demand management measures recommended in the 2017 economic and financial recovery program (PREF-CEMAC) do not seem to give the expected results, either in terms of growth, or in terms of the sustainability of imbalances and debt. However, we will mainly focus on the targeted variables? which were the subject of the latest discussions with the French Treasury and the IMF, namely real growth, external deficits and the level of foreign exchange reserves.

### 2.2.1. Real growth

Overall, CEMAC has experienced a downward trend in its economic growth since the fall in oil prices in 2014. In fact, from 2010 to 2016, CEMAC, according to IMF data<sup>18</sup>, recorded an average real GDP growth of 4.5%. In 2017, it was 1.7% and 1.9% in 2019. With COVID 19, the IMF forecasts a growth rate of -1.7% in 2020.

**Graph 1: CEMAC's real GDP growth rate**



Source: compiled from the IMF statistical database

### 2.2.2. The current external balance

According to IMF data, the current balance as a% of GDP, which was on average -3.4% over the period 2010-2016, fell to -4.7% in 2017 and to -2.2% in 2019; In 2020, the IMF estimates that this deficit will be 7.1%. This deterioration in the current account is the result not only of the drop in international prices of a barrel of oil and of the main raw materials exported by CEMAC,

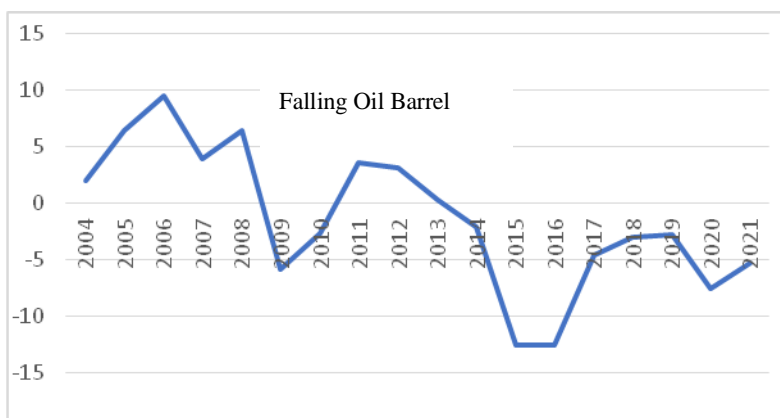
<sup>17</sup> In January 2019, The two vice-presidents of the Italian Council, Matteo Salvini and Luigi Di Maio, have multiplied the criticisms against France and Emmanuel Macron, accusing Paris in particular of "impoverishing" Africa and of using the CFA franc to continue their colonizing work in Africa

<sup>18</sup> IMF, Regional Economic Outlook, April, 2020.

for the years 2015 and 2019, but also of the growth of imports compared to exports, during the 2008-2013 sub-period, caused by the appreciation of the euro against the dollar (Chart 2).

**Graph 2: Evolution of CEMAC's current account as a% of GDP**

Financial crisis and appreciation of the Euro

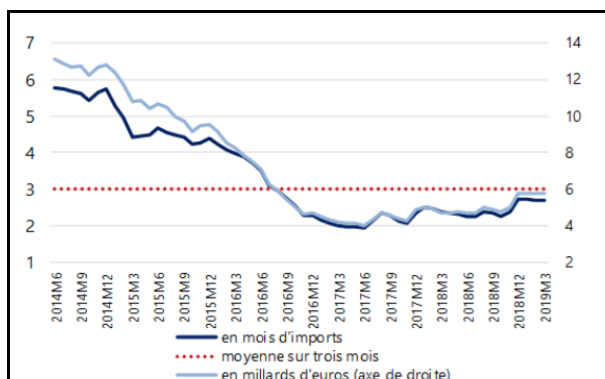


Source: compiled from the IMF statistical database

**2.2.3. The level of foreign exchange reserves**

CEMAC countries are required to deposit 50% of foreign currency reserves with the French Treasury in return for the convertibility guarantee it provides to the FCFA. These reservations passed according to BEAC data<sup>19</sup>, of 3,216.1 billion FCFA in 2017, i.e. 2.7 months of imports to 3,069.0 billion at the end of April 2018, representing 2.5 months of imports. In 2019, foreign exchange reserves stood at 4,361.6 billion in 2019, up 15.5% and represented around 3.24 months of imports of goods and non-factor services.

**Graph 3: Coverage rate of official reserves**



Sources: CEMAC authorities and IMF staff estimates

<sup>19</sup> Cemac, Final Multilateral Surveillance Report 2018 and Outlook for 2019 and 2020, 37th edition, September 2109



The rate of external coverage of the currency has, for its part, evolved from 61.03% to 67.22% between 2018 and 2019. The concern generated by this weakness in reserves comes mainly from the fact that they determine the level of bank loans. Indeed, according to article 11-2 of the statutes of the BEAC, when the ratio between the amount of the external assets of the Central Bank and the amount of its commitments at less than one year becomes less than 20%, the amount of maximum refinancing should be reduced. In fact, starting from the level of net foreign assets (NEA), the main counterpart of the money supply, the monetary authorities deduce therefrom by balance the level of attainable bank credit, compatible with the stock of available currencies, after having satisfied the constraints of the Account. operations (FERDAC, 2020). When these foreign exchange reserves, decrease, as at present<sup>20</sup>, the constraint on financing is even stronger than during more favorable episodes.

Overall, the situation in CEMAC countries has become worrying again, especially since the slight recovery in 2019 is being wiped out by the economic effects of the Covid 19 pandemic in 2020.

#### ***2.2.4. The post-Covid 1 outlook***

Triggered in December 2019, in the city of Wuhan in China, the Covid-19 pandemic has caused, as of May 22, 2020, 5,013,000 cases of infection, 328,400 deaths and confined nearly 5 billion people worldwide.<sup>21</sup> In the CEMAC, there are 8,251 cases of infection and 252 deaths, ie a morbidity rate of 3.05%. In addition to this sad humanitarian observation, the CEMAC countries will have to face a significant decline in economic growth, which nevertheless seemed to be improving.<sup>22</sup>, after the fall in the price of a barrel of oil and raw materials, caused by the slowdown in activity in China, between 2014 and 2016. Since 2020, the already perceptible deterioration of the macroeconomic framework, is a consequence of the constant growth of the pandemic. In Cameroon, for example, Cameroon inter-employer group (GICAM) estimated that 100% of large companies were impacted by the crisis and 95% of SMEs would experience declines in activity in 2019<sup>23</sup>. As of March 22, 2020, CEMAC, through the economic and financial reform program, established an initial assessment of the situation of the covid-19 pandemic in the community. It emerged from the reflection that the economic and financial consequences of COVID-19 in the CEMAC economies are of several types: a significant drop in budget revenues, a significant deterioration in macroeconomic accounts, a decrease in external funding, a disruption intra-community trade, a weakening of external and financial stability and a risk of rising inflationary pressures. In general, according to the 2020 multilateral surveillance report, the overall budget balance, including grants, would become in deficit at 0.9% of GDP, oil revenue losses should reach 992, CFAF 5 billion, the current external deficit, public transfers included, would widen to 4.7% of GDP, while the currency's external coverage rate would drop from 71.6% projected in the initial base scenario to 68, 9% in the revised scenario (covid-19

<sup>20</sup> Net foreign assets increased from 5,668 in 2015 to 2509 in 2018 according to BEAC data, in

<sup>21</sup> Provisional IMF data, in regional economic outlook, 2020.

<sup>22</sup> Thanks to the implementation of the economic and financial recovery plan and the improvement of the oil market in 2018

<sup>23</sup>GICAM Conjoncture in France on the impact of the Covid-19 pandemic on businesses in Cameroon. July 2020

impact). GDP would drop to 1.7%, according to the IMF. These economic prospects give the measure of the urgency for these countries, of the monetary and exchange reform which cannot be postponed any longer.

### **3.Methodology**

As noted above, we have chosen to study the long-term relationship between the exchange rate and a number of target variables, including sustainable growth, exports, imports and foreign exchange reserves. For this purpose, we use non-structural VAR modeling, because we are only interested in the interrelationships and interactions between the variables. It also has the advantage of revealing a set of causal relationships in the sense of Granger [1969], as Fackler and Krieger [1986] underline. VAR modeling therefore respects both the dimension of intrasystemic mutation and the temporal dimension that causal investigation requires (Meuriot, 2008).

We start by specifying the model equation. We will then do the unit root tests, in order to verify the existence of a cointegration relation which allows us to study the long term relation between the variables. Finally, we will do causality tests and impulse analysis.

#### **3.1. Specification of the econometric model**

The approach often used in the literature to study the determinants of the long-run exchange rate is often based on the theory of the equilibrium real exchange rate (REER) which is the subject of controversy.<sup>24</sup> in the economic literature on the choice of the optimal exchange rate regime. Two theoretical approaches are often used: the so-called fundamental approach (Williamson, 1983 and 1994) and the so-called behavioral approach (Stein and Allen, 1995; Clark and MacDonald, 1998). The first seeks to study the components of economic policy that influence short-term changes in the real exchange rate. The second analyzes the long-term macroeconomic determinants of the real exchange rate. Williamson (1994) and Joly (1998) indeed consider that the optimal exchange rate regime can only be the equilibrium real exchange rate which minimizes the distortion of the exchange rate or makes the misalignment zero. It is determined by the fundamentals of the TCR, in particular the macroeconomic variables affecting the

This approach considers these macroeconomic variables to be purely exogenous. Indeed, it only analyzes their effects on the exchange rate or vice versa, ignoring the “feedback” effects. Some studies do not take delayed effects into account, assuming a priori that all phenomena occur at the same time. It is these limitations that make us prefer non-structural VAR modeling.

Denoting sustainable growth by real GDP ( $GDP = \text{nominal GDP} / (1 + \text{inflation rate})$ ); real imports and exports respectively by ( $IMP = \text{nominal imports} / (1 + \text{inflation rate})$ ) and ( $EXP = \text{nominal exports} / (1 + \text{inflation rate})$ ), and (FER) the foreign exchange reserves, our model which establishes a relationship between the real exchange rate and these determinants is therefore specified as follows:

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<sup>24</sup>Frenkel (1999) denies its existence while Mundell (2000) asserts the contrary without identifying it with precision.

$$RER = f(GDP, FER, IMP, EXP)$$

Either in linear form and in log:

$$\ln RER_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln FER_{it} + \beta_3 \ln IMP_{it} + \beta_4 \ln EXP_{it} + \varepsilon_{it} \quad (1)$$

By introducing a shift, the model becomes:

$$\ln RER_t = \beta_{10} + \beta_{11} \ln RER_{t-j} + \beta_{12} \ln GDP_{t-j} + \beta_{13} \ln FER_{t-j} + \beta_{14} \ln IMP_{t-j} + \beta_{15} \ln EXP_{t-j} + \varepsilon_t \quad (2)$$

All variables are in log. The data are global and concern all the CEMAC countries. They cover the period 1985 - 2019. They come from the IMF database and BEAC statistics.

With the exception of real import (IMP), all variables (including real GDP (GDP), real exports (EXP), and foreign exchange reserves (FER) should have a positive relationship with the exchange rate. real exchange rate (RER)  $\varepsilon_t$  is the error term.

### 3.2.1. Analysis of the stationarity of variables

The stationarity of the selected time series is the only constraint imposed by non-structural VAR modeling. The analysis of Cointegration allows us to identify a possible long-term relationship between the variables; In this perspective, the second generation tests those of Im, Pesaran and Shin more efficient, and more stable, were used. However, these tests have certain limitations; they do not take into account the residual correlation. This is why we also use the Hadri and Panic test which corrects this limit. We therefore test the null hypothesis, all series are non-stationary, against the alternative hypothesis that only a fraction of the series is stationary.

The results of the stationarity test of Im-Pesaran-Shin (IPS) (2004) in appendix 1, show that all the variables are stationary in first difference, at the threshold of 1%, 5% and 10%. These results are confirmed by the Hadri and Panic test, which shows that the variables follow a normal distribution in first difference, because the P-values are greater than 1%, 5% and 10%.

### 3.2.2. The model to estimate

The econometric model to be estimated, derived from equation (2) written in the form VAR, is presented as follows:

$$\ln RER_t = \beta_{10} + \beta_{11} \ln RER_{t-j} + \beta_{12} \ln GDP_{t-j} + \beta_{13} \ln EXP_{t-j} + \beta_{14} \ln IMP_{t-j} + \beta_{15} \ln FER_{t-j} + \varepsilon_t \quad (2)$$

$$\ln GDP_t = \beta_{20} + \beta_{21} \ln RER_{t-j} + \beta_{22} \ln GDP_{t-j} + \beta_{23} \ln EXP_{t-j} + \beta_{24} \ln IMP_{t-j} + \beta_{25} \ln FER_{t-j} + \varepsilon_t \quad (3)$$

$$\ln EXP_t = \beta_{30} + \beta_{31} \ln RER_{t-j} + \beta_{32} \ln GDP_{t-j} + \beta_{33} \ln EXP_{t-j} + \beta_{34} \ln IMP_{t-j} + \beta_{35} \ln FER_{t-j} + \varepsilon_t \quad (4)$$

$$\ln IMP_t = \beta_{40} + \beta_{41} \ln RER_{t-j} + \beta_{42} \ln GDP_{t-j} + \beta_{43} \ln EXP_{t-j} + \beta_{44} \ln IMP_{t-j} + \beta_{45} \ln FER_{t-j} + \varepsilon_t \quad (5)$$

$$\ln FERT_t = \beta_{50} + \beta_{51} \ln RER_{t-j} + \beta_{52} \ln GDP_{t-j} + \beta_{53} \ln EXP_{t-j} + \beta_{54} \ln IMP_{t-j} + \beta_{55} \ln FERT_{t-j} + \epsilon_t \quad (6)$$

where  $t$  is the time dimension;  $J = 1, 2, \dots, 32$ , the number of shifts.

Before the estimation of this model, the latency time was selected using the criteria of Akaike, Schwarz and Hannan-Quinn<sup>25</sup>. We chose the number of options with the highest recommendation. The results of this test, summarized in appendix 3 show that the optimal delay is 1. Similarly, we have taken the usual precautions when using the VAR model by doing the Hausman specification tests.<sup>26</sup> and stability.

The Hausman test, (appendix 5), gives the following results: the probability of the Hausman test is lower than the threshold of 1%, 5% and 10%, we cannot reject the hypothesis of the presence of fixed effects. We must therefore favor the adoption of a fixed-effects model. The effect is therefore specific by country. Likewise, the stability test (graphs 7a and 7b) in the appendix shows that there is a point stability at the significance level of 5%, and that the model is structurally stable at the significance level of 5%.

#### 4. Results of the estimation of the VAR model and their interpretations

We present and successively interpret the results of descriptive statistics, estimation of the VAR model itself, causality tests and impulse response functions.

##### 4.1. Descriptive statistics

Annex 2 presents summary descriptive statistics and the correlation between the variables used. Foreign exchange reserves (FER) have a weak and positive correlation with exports (EXP) and imports; Likewise, the exchange rate (RER) is also weakly correlated with all other variables. The empirical correlation coefficient test also indicates that the adjustment is unfounded between this exchange rate and these explanatory variables at the threshold of 1%, 5% and 10%. Another weak correlation exists between foreign exchange reserves (FER) and sustainable growth (GDP); The empirical correlation coefficient test also indicates that the fit is unfounded between these two variables at the 1%, 5% and 10% threshold.

In contrast, there is a strong correlation between exports and sustainable growth and between imports and sustainable growth; it is also the case between exports and imports. According to Annex 2, the distribution of the exchange rate series is significantly different from the normal distribution at the 1% level. Indeed, the series of exchange rates has an asymmetry coefficient equal to (-0.68) which is less than 0, therefore an asymmetry to the left and by a kurtosis

<sup>25</sup> In some studies such as those by Boubtane et al (2010) and Carstensen et al (2009), the optimal delay is determined using the LM test.

<sup>26</sup> The Hausman test follows a chi-square law with  $k-1$  degree of freedom and makes it possible to make a choice between the fixed-effects model and the random-effects model which take into account the heterogeneity of the data. In the first case we assume that the specific effects can be correlated with the explanatory variables of the model, and in the second case we assume that the specific effects are orthogonal to the explanatory variables of the model. When the probability of this test is lower than the selected threshold, the fixed effects model is preferred.

coefficient equal to (2.30) which is less than 3. The distribution of exchange rates is leptokurtotic. The Jarque-Bera statistic equals 15.6 with a critical probability of 0.00039. The assumption of normality of the series of real exchange rates is rejected. In addition, fluctuations in this real exchange rate remain very small;

The level of sustainable growth fluctuates very little. The distribution of this series is significantly different from the normal distribution at the 1% level. Its asymmetry coefficient is equal to (0.05) is greater than 0. There is therefore an asymmetry to the right. The kurtosis coefficient is equal to (1.70) and therefore less than 3. The distribution of growth levels is therefore leptokurtotic.

#### **4.2. Results of the estimations of the different equations of the VAR model**

Before estimating the VAR model itself, it was relevant to identify the appropriate latency period that should be taken into account, based on the available data. The optimal offset of the estimated VAR, the one that minimizes the AIC, SC, and HQ statistics, is "1". This shift corresponds to the order of the estimated var, or VAR (1). (See appendix 3). Consequently, the VAR analysis will be carried out by applying shift 1. The results of this estimation are grouped together in appendix 4.

In the first equation, the real exchange rate (RER) as a dependent variable is positively influenced by the past real exchange rate (RER), real GDP (GDP) and past real exports (EXP). On the other hand, it is negatively correlated with real imports (IMP) and foreign exchange reserves (FER) in previous years. All parameters are statistically significant at the 5% level and the model specified explains about 76% of the variations in the real exchange rate of the CEMAC zone. Our results show that an improvement in sustainable growth or an increase in exports leads to an overvaluation of the CFA franc the following year. On the other hand, an increase in imports or foreign exchange reserves leads to an undervaluation of the CFA.

In the second equation, where sustainable growth is the dependent variable, the VAR results show that an appreciation or overvaluation of the CFA has a significant and positive effect on sustainable growth. The same is true for imports. On the other hand, foreign exchange reserves and exports are negatively correlated with sustainable growth. Equations 4 and 5 prove, moreover, that the overvaluation of the CFA increases at the same time the real imports and exports of the following year. This contradictory result tends to consolidate the position of the "anti-CFA" partisans for whom the current exchange rate policy is determined outside the CEMAC countries, without taking into account their economic structure. It benefits the land of the anchor currency.

In addition, the increase in reserves has a negative effect on sustainable growth. However, this effect is not significant. From the VAR (1) representation estimated previously, we can now proceed to the causality test in the sense of GRANGER.<sup>27</sup>

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<sup>27</sup> Granger considers that one variable is the cause of another if the predictability of the first is improved when information about the second is incorporated into the analysis.

**4.2.1. Model causality estimation**

The above results have been deepened by the analysis of the causality of the variables which makes it possible to identify the existence or not of a bidirectional or unidirectional relation. The results of these tests are collated in the table below:

**Table 5: Causality test**

Null Hypothesis:	Obs	F-Statistic	Prob.	Equation
LnFER does not Granger Cause LnEXP	186	0.05988	0.9419	
LnEXP does not Granger Cause LnFER		3.08492	0.0481 **	(1)
LnGDP does not Granger Cause LnEXP	186	0.65739	0.5194	
LnEXP does not Granger Cause LnGDP		3.10444	0.0472 **	(2)
LnIMP does not Granger Cause LnEXP	186	4.92357	0.0083	
LnEXP does not Granger Cause LnIMP		2.37559	0.0959 ***	(3)
LnRER does not Granger Cause LnEXP	186	1.63633	0.1976	
LnEXP does not Granger Cause LnRER		0.47136	0.6249	(4)
LnGDP does not Granger Cause LnFER	186	8.71031	0.0002 *	
LnFER does not Granger Cause LnGDP		1.16017	0.3158	(5)
LnIMP does not Granger Cause LnFER	186	0.38553	0.6806	
LnFER does not Granger Cause LnIMP		0.62244	0.5378	(6)
LnRER does not Granger Cause LnFER	186	1.98264	0.1407	
LnFER does not Granger Cause LnRER		4.78492	0.0094 *	(7)
LnIMP does not Granger Cause LnGDP	186	5.08973	0.0071 *	
LnGDP does not Granger Cause LnIMP		0.06408	0.9380	(8)
LnRER does not Granger Cause LnGDP	186	0.04621	0.9548	
LnGDP does not Granger Cause LnRER		2.00595	0.1375	(9)
LnRER does not Granger Cause LnIMP	186	0.84350	0.4319	
LnIMP does not Granger Cause LnRER		0.09095	0.9131	(10)

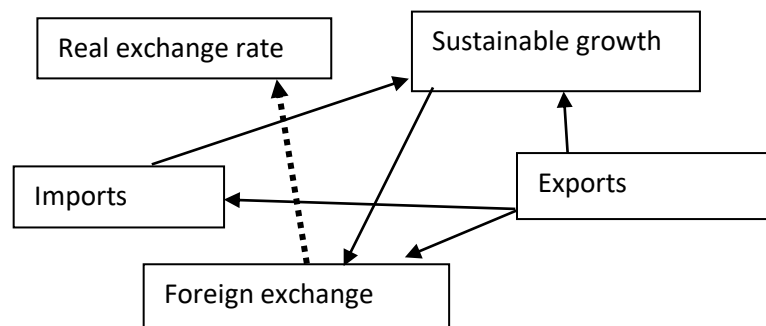
Significance: \* 1%, \*\* 5%, \*\*\* 10%

It emerges from the causality test in the sense of Granger that there are no feedback effects between the variables; most relationships are one-way. The level of foreign exchange reserves is explained by exports; Fluctuations in the exchange rate are explained by the level of foreign exchange reserves. There is a one-way causality going from imports or exports to sustainable growth without a feedback effect.



Moreover, there is no causality between the exchange rate and sustainable growth, nor between imports and foreign exchange reserves. Finally, let us specify that exports are the cause of sustainable growth. Schematically, these links translate as follows:

*Figure 1: Causal links between variables*



This diagram shows the limits of the current exchange rate policy. Only reserves cause the exchange rate, but this requires sustainable growth and increased exports. On the other hand, manipulation of the exchange rate does not generate sustainable growth, nor even a variation in CEMAC exports or imports. These results therefore give reason to the supporters of a radical change in exchange rate policy.

#### 4.2.2. Impulse analysis and decomposition of variance

We can deepen our analysis by studying the propagation of shocks<sup>28</sup> in the VAR model estimated previously. We are mainly interested in shock response functions and variance decompositions of forecast errors. These two instruments make it possible to synthesize the essential information contained in the dynamics of the estimated VAR system. The variance decompositions tell us the relative importance of each shock in explaining real exchange rate fluctuations. As for the shock reaction functions, they will allow us to highlight the nature of the effects of the different shocks on the variables. The results of these two analyzes are grouped together in appendices 7 and 8.

##### 4.2.2.1. Impulse analysis

The following figures retrace the impulse response functions; the dotted lines representing the confidence interval. We consider that the amplitude of the shock is equal to twice the standard deviation and we are interested in the effects of the shock over 10 periods (i.e. 10 years). This horizon represents the time required for the variables to return to their long-term levels. It emerges that a shock on real exports has no contemporary repercussions on real GDP growth and the real exchange rate, which explains why the curve relating to LnEXP starts from the origin (graphs 3 and 5). . This finding is relatively identical to that of Chart 5, where a shock to real GDP growth has no impact on the real exchange rate. For the rest of the graphics,

<sup>28</sup> The shock is artificially introduced into a structure in order to analyze the importance of the disturbances caused during a typical modification (generally of one unit) of one of the variables of the model

Indeed, a positive shock on the real exchange rate translates into a positive effect on real GDP growth during the period considered. It can also be seen that a positive shock to the real exchange rate translates into a positive shock to real imports during the first year. This effect slowly disappears before finding its long-term level. We note that a shock on foreign exchange reserves pushes real imports down from the second year.

#### **4.2.2.2. Variance decomposition**

This analysis, based on the impulse response functions, can be supplemented by an analysis of the decomposition of the variance of the forecast error. The objective is to calculate the contribution of each of the innovations to the variance of the error. In general, we write the variance of the forecast error at a horizon  $h$  (here  $h$  goes from 1 to 10) as a function of the variance of the error attributed to each of the variables.

It emerges from appendix 8 that the variance of the forecast error of LnEXP is due for 81.20% to its own innovations, for 0.16% to those of LnFER, for 0.003% to those of LnGDP, for 18.06% to those of LnIMP and for 0.57% to those of LnRER. Therefore, real imports have a significant influence on real exports.

In addition, the variance of the forecast error of LnFER is due for 91.31% to its own innovations, for 6.84% to those of LnEXP, for 0.79% to those of LnGDP, for 1.05% to those of LnIMP and for 0.004% to those of LnRER. Therefore, real exports and real imports (with a low degree) have a not insignificant influence on foreign exchange reserves.

As for the variance of the forecast error of LnGDP, it is due for 58.49% to its own innovations, for 28.97% to those of LnEXP, for 4.24% to those of LnFER, for 8.28% to those of LnIMP and for 0.02 % to those of LnRER. To this end, with the exception of real imports and foreign exchange reserves which have a non-negligible influence on real GDP, real exports have a strong influence on real GDP. The variance of the forecast error of LnIMP is due for 58.52% to its own innovations, for 35.54% to those of LnEXP, for 4.13% to those of LnFER, for 0.80% to those of LnGDP and for 1.01% to those of LnRER. So real exports have a high degree of influence on imports, however,

Finally, the variance of the forecast error of LnRER is due 89.13% to its own innovations, for 35.54% to those of LnEXP, for 6.61% to those of LnFER, for 2.23% to those of LnGDP and for 1.39% to those of LnIMP.

#### **5. Conclusion**

The object of this reflection was to analyze the relevance of the current reform proposals for the franc zone, from the long-term relationship between the real exchange rate and sustainable economic growth. To this end, we are developing a non-structural VAR model which describes the interaction between the real exchange rate and macroeconomic variables, issues of current debates, in particular, foreign exchange reserves, real imports and exports, and sustainable growth. The model was subsequently subjected to a causality analysis, which made it possible to determine the links between the chosen variables. In particular, we used the cointegration tests on panel data recently proposed by Im, Pesaran and Shin (1997, 2003) Pedroni (1997, 1999,

2000, 2004), to demonstrate the existence of several sources of impulse influencing the long-term real exchange rate in CEMAC countries.

Our results tend to credit the view that CEMAC's foreign exchange policy is not autonomous, and is not likely to solve the problems facing the sub-region. Our first starting hypothesis is therefore confirmed. These results partly contradict the conclusions of supporters of maintaining in the franc zone (Pro - CFA) who believe that sustainable growth can only be obtained through a devaluation of the CFA. Indeed, in the long term, the overvaluation of the CFA and the increase in imports of the previous year are here beneficial for sustainable growth. Conversely, foreign exchange reserves and exports negatively influence sustainable growth. This effect of exports, which seems contrary to economic theory, is explained by the fact that the CEMAC countries structurally suffer from a serious current account imbalance, given the incompressible nature of imports, including in the agricultural sector for the import of foodstuffs. This result confirms that of FERDAC for which, taking into account the economic structure of CEMAC, the trend overvaluation encourages more to import than to increase supply, thus keeping these countries in a rationale of rent.

Likewise, the principle of centralization of reserves remains the only way to influence the value of the exchange rate, partly giving reason to the supporters of maintaining the CEMAC countries in the franc zone. However, it is essential to centralize these reserves at the BEAC, which can decide in full sovereignty on its placement under conditions to be defined in order to make the balance/stability/development triptych viable. This centralization of currencies at the central bank would also make it possible to immobilize financing capacities that could and should be allocated to the financing of economic activity.<sup>29</sup> What is more, the operation of the operating account mechanism is such that it leads to a restrictive monetary policy which is detrimental to the economy (Bekolo, 2020).

Ultimately, our second hypothesis is relatively verified here. The contradictory effects on imports and the lack of feedback effects show that exchange rate policy must serve a common industrial policy. Likewise, it must be coupled with a new monetary policy whose objective is no longer only the defense of the currency with an emphasis on the control of inflation, the defense of parity, and financial stability, but especially support for growth and employment.

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<sup>29</sup> This criticism is old, since it was already the main criticism made against the reserve management policy by President Hamani Diori of Niger, on behalf of all the member countries, in a memorandum presented in 1970.

**Appendices**

**Annex 1: Stationarity test**

<b>Im-Pesaran-Shin (IPS)</b>				
<b>Variables</b>	<b>Thresholds and P-Values</b>			<b>Results</b>
	<b>1%</b> (-2.43900) *	<b>5%</b> (-2.43900) *	<b>10%</b> (-2.02000) *	
<b>D (LnRER)</b>	-10.0949 *	(0.0000) **		Stationary
<b>D (LnGDP)</b>	-9.54938 *	(0.0000) **		Stationary
<b>D (LnFER)</b>	-14.5529 *	(0.0000) **		Stationary
<b>D (LnIMP)</b>	-10.4331 *	(0.0000) **		Stationary
<b>D (LnEXP)</b>	-10.1429 *	(0.0000) **		Stationary

Im, Pesaran and Shin W-stat \* at 1%, 5% and 10%, in first difference for all variables, at the same significance level the P-Values \*\*

Source: Author, from Eviews 10 software

**CPIS stationarity test**

Null Hypothesis: Stationarity

Series: D (LnRER)

Method	Statistic	Prob. **
Hadri z-stat	-0.96545	0.8328

Series: D (LNGDP)

Method	Statistic	Prob. **
Hadri z-stat	-0.81294	0.7919

Series: D (LNFER)

Method	Statistic	Prob. **
Hadri z-stat	1.62658	0.0519

Series: D (LNIMP)

Method	Statistic	Prob. **
Hadri z-stat	-0.19466	0.5772

Series: D (LNEXP)

Method	Statistic	Prob. **
Hadri z-stat	-0.73246	0.7681

Source: Author based on Eviews 10 software

**Annex 2: Descriptive statistics and correlation**

Stat	lnRER	lnGDP	lnFER	lnIMP	lnEXP
Mean	2.671354	9.672733	8.473376	9.189477	9.163858
Median	2.698230	9.695381	10.61795	9.264065	9.352569
Maximum	2.865127	10.54336	12.49084	10.02231	10.10006
Minimum	2,422740	8.930019	0.000000	8.300429	8.089919
Std. Dev.	0.126601	0.456185	4.780480	0.484061	0.608948
Skewness	-0.685077	0.057556	-1.164713	-0.168002	-0.346169
Kurtosis	2.363113	1.708446	2.473319	1.845324	1.652842
Jarque-Bera	15.69525	11.55937	39.21237	9.942455	15.77240
Probability	0.000391	0.003090	0.000000	0.006935	0.000376
Sum	440.7734	1596,001	1398.107	1516.264	1512.037
Sum Sq. Dev.	2.628565	34.12921	3747,891	38.42762	60.81407
Observations	165	165	165	165	165
lnRER	1				
lnGDP	0.125089	1			
lnFER	0.353965	0.065291	1		
lnIMP	0.209215	0.937228	0.128649	1	
lnEXP	0.174870	0.911916	0.065689	0.948105	1

**Annex 3: Offset selection criteria**

The G	LogL	LR	FPE	AIC	SBIC	HQ
0	-220.6476	N / A	2.54e-05	3.610361	3.723494	3.656321
<b>1</b>	<b>367.8273</b>	<b>1120,456</b>	<b>3.09e-09 *</b>	<b>-5.405237 *</b>	<b>-4.726442 *</b>	<b>-5.129478 *</b>
2	388.1260	37.02471	3.34e-09	-5.330015	-4.085557	-4.824458
3	406.4053	31.87917	3.74e-09	-5.222485	-3.412364	-4.487128
4	434.0565	46.01163	3.61e-09	-5.264904	-2.889121	-4.299749
5	456.7945	36.01700	3.80e-09	-5.228712	-2.287266	-4.033758
6	476.3779	29.45342	4.24e-09	-5.142046	-1.634937	-3.717293
7	497.9021	30.65046	4.62e-09	-5.086434	-1.013662	-3.431881
8	534.9940	49.85151 *	3.97e-09	-5.279904	-0.641469	-3.395553

\* indicates the shift order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error; AIC: Akaike information criterion; SBIC: Schwarz information criterion; HQ: Hannan-Quinn information criterion. Note: The offset is selected based on the level with the most \* (asterisk) among all the criteria.

Appendix 4: Vector Autoregression Estimates (VAR)

Independent variables	Dependent variables				
	(1)	(2)	(3)	(4)	(5)
	LnRER	LnGDP	LnFER	LnIMP	LnEXP
LnRER (-1)	0.902245 ** (0.04410)	0.104807 ** (0.04576)	4.049712 (2.37795)	0.122403 *** (0.05757)	0.099088 *** (0.06465)
LnGDP (-1)	0.040125 ** (0.03375)	0.914576 ** (0.03503)	-1.034497 (1.81997)	0.037193 ** (0.04406)	-0.123552 ** (0.04948)
LnFER (-1)	-0.001493 * (0.00117)	-2.37E-05 * (0.00121)	0.647340 *** (0.06288)	0.001811 * (0.00152)	-0.003085 * (0.00171)
LnIMP (-1)	-0.038983 ** (0.04158)	0.092976 ** (0.04315)	1.519257 (2.24203)	0.876614 *** (0.05428)	0.235724 *** (0.06095)
LnEXP (-1)	0.006470 ** (0.02742)	-0.016131 ** (0.02846)	-0.531384 (1.47882)	0.057839 ** (0.03580)	0.892904 ** (0.04020)
VS	0.187869 (0.16511)	-0.139676 (0.17136)	-6.884199 (8.90403)	-0.080119 (0.21558)	-0.207274 (0.24207)
<b>R-squared</b>	<b>0.757513</b>	0.979174	0.493783	0.970907	0.976701
Adj. R-squared	0.749640	0.978498	0.477348	0.969963	0.975945
Sum sq. residues	0.636948	0.686082	1852,307	1.085795	1.369016
SE equation	0.064312	0.066746	3.468136	0.083968	0.094285
F-statistic	96.21712	1448,136	30.04353	1027,884	1291.150
Log likelihood	215.0691	209.1244	-422.9512	172.3987	153.8564
Akaike AIC	-2.613363	-2.539055	5.361891	-2.079984	-1.848205
Schwarz SC	-2.498044	-2.423736	5.477210	-1.964665	-1.732886
Mean dependent	2.671943	9.683003	8.476284	9,197,135	9.173892
SD dependent	0.128531	0.455186	4.797222	0.484488	0.607908
Determinant resid covariance (dof adj.)		3.50E-09			
Determinant resid covariance		2.89E-09			
Log likelihood		437.7024			
Akaike information criterion		-5.096280			
Schwarz criterion		-4.519685			
Number of coefficients		30			

Note: the table summarizes the coefficient of the independent variables. Z statistics and asterisks are shown in parentheses. \*, \*\* and \*\*\* indicate the rejection of the null hypothesis at the significant levels of 1%, 5% and 10% respectively.



**Annex 5: Hausman specification test**

Correlated Random Effects - Hausman Test

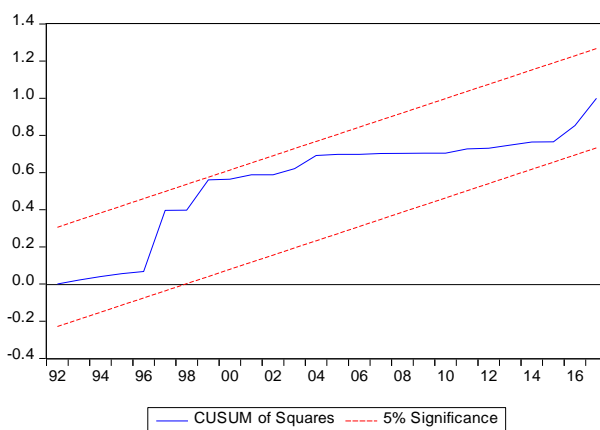
Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob.
<b>Cross-section random</b>	<b>18.659722</b>	<b>4</b>	<b>0.0009</b>

Cross-section random effects test comparisons:

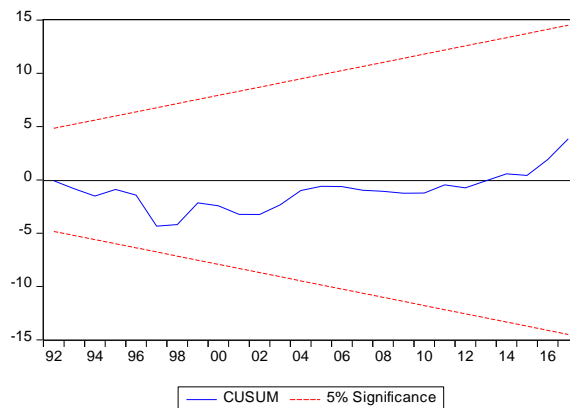
Variable	Fixed	Random	Var (Diff.)	Prob.
LnGDP	-0.547937	-0.125303	0.010452	0.0000
LnFER	0.006729	0.008202	0.000001	0.2130
LnIMP	0.247596	0.143995	0.002067	0.0227
LnEXP	0.265205	0.009203	0.005011	0.0003

**Annex 6: Stability test**

**Figure 7A: Analysis of one-off instability of the real exchange rate**

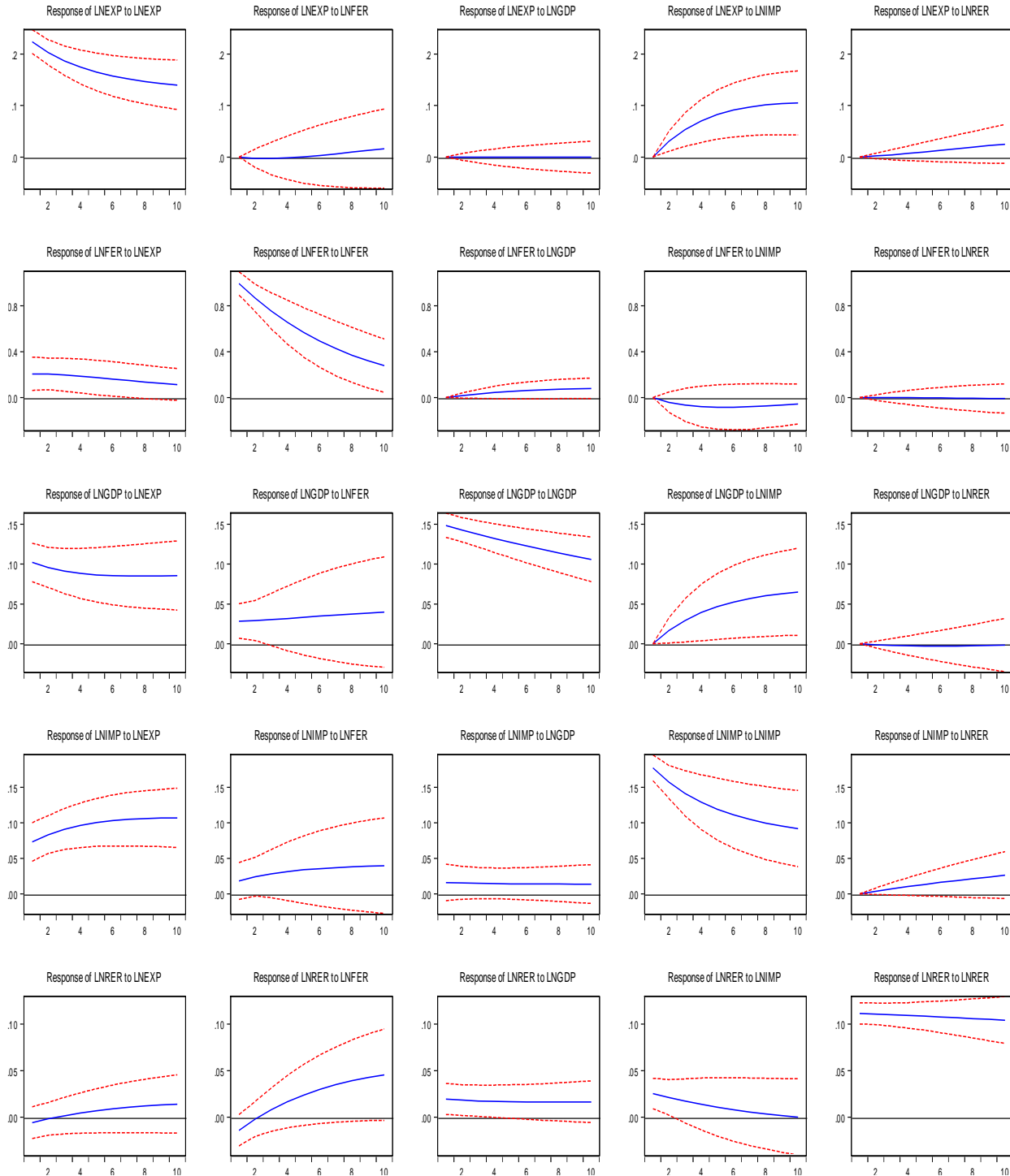


**Chart 7B: Analysis of structural instability of the real exchange rate**

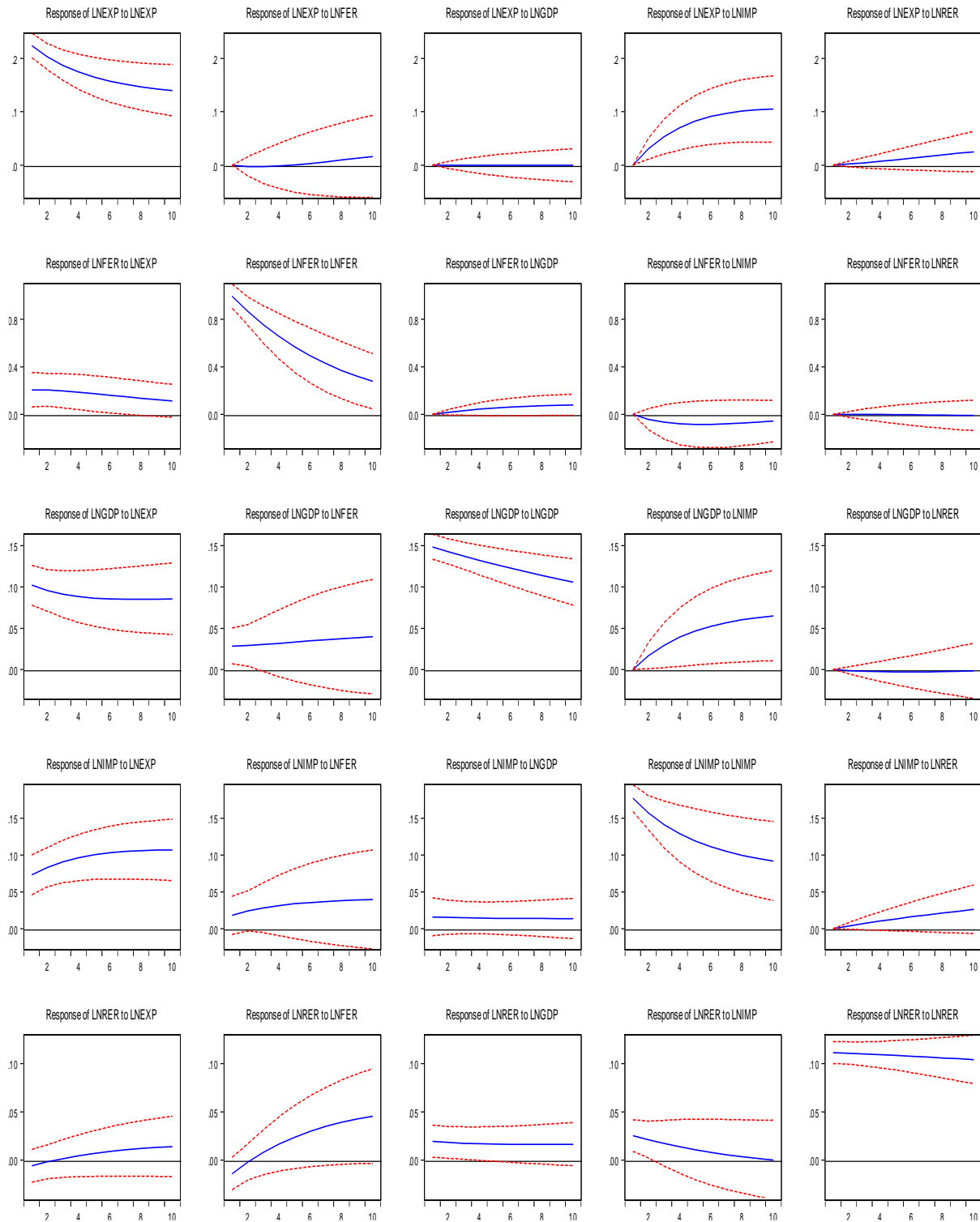


Annex 7: Impulse responses

Response to Cholesky One S.D. (d.f. adjusted) Innovations  $\pm 2$  S.E.



Response to Cholesky One S.D. (d.f. adjusted) Innovations  $\pm 2$  S.E.



## Annex 8: Variance decomposition

**Table 1 A: Variance Decomposition of LNEXP:**

Period	SE	LNEXP	LNFER	LNGDP	LNIMP	LNRER
1	0.223588	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.303438	98.98499	0.006803	1.25E-06	1.003874	0.004335
3	0.360328	97.08432	0.011140	2.00E-06	2.886707	0.017828
4	0.406469	94.71450	0.010600	1.67E-05	5.230967	0.043917
5	0.446365	92.17438	0.008855	5.48E-05	7.731387	0.085328
6	0.482116	89.65400	0.011721	0.000114	10.19010	0.144067
7	0.514837	87.26084	0.024817	0.000182	12.49265	0.221515
8	0.545183	85.04660	0.052517	0.000243	14.58210	0.318539
9	0.573576	83.02839	0.097682	0.000284	16.43804	0.435604
10	0.600311	81.20342	0.161784	0.000300	18.06163	0.572860

**Table 1 B: Variance Decomposition of LNFER:**

Period	SE	LNEXP	LNFER	LNGDP	LNIMP	LNRER
1	1.017869	4,149888	95.85011	0.000000	0.000000	0.000000
2	1.354492	4.645515	95.25104	0.017123	0.086289	3.75E-05
3	1.565267	5.081991	94.63015	0.056003	0.231805	5.20E-05
4	1.709971	5.461724	94.02550	0.115441	0.397287	4.39E-05
5	1.813503	5.789335	93.45793	0.193785	0.558877	6.85E-05
6	1.889328	6.070439	92.93698	0.289022	0.703345	0.000212
7	1.945718	6.310889	92.46508	0.398881	0.824576	0.000575
8	1.988139	6.516343	92.04043	0.520937	0.921034	0.001254
9	2.020365	6.692015	91.65897	0.652712	0.993962	0.002339
10	2.045075	6.842572	91.31562	0.791771	1.046132	0.003901

**Table 1 C: Variance Decomposition of LNGDP:**

Period	SE	LNEXP	LNFER	LNGDP	LNIMP	LNRER
1	0.182471	31.31049	2.434907	66.25460	0.000000	0.000000
2	0.252974	30.57248	2.593330	66.40241	0.429765	0.002014
3	0.304987	29.96792	2.770572	66.03480	1.221327	0.005384
4	0.347686	29.50049	2.963203	65.31913	2.208109	0.009068
5	0.384583	29.16345	3.167548	64.37706	3.279533	0.012407
6	0.417432	28.94482	3.379893	63.29421	4.366041	0.015033
7	0.447244	28.83053	3.596710	62.12968	5.426290	0.016789
8	0.474658	28.80625	3.814818	60.92375	6.437512	0.017669
9	0.500111	28.85838	4.031489	59.70362	7.388750	0.017765
10	0.523916	28.97451	4,244,487	58.48747	8.276290	0.017242

**Table 1 D: Variance Decomposition of LNIMP:**

Period	SE	LNEXP	LNFER	LNGDP	LNIMP	LNRER
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1	0.193202	14.32823	0.895298	0.710482	84.06599	0.000000
2	0.264273	17.62692	1.315033	0.728827	80.30864	0.020584
3	0.315025	20.76031	1.744505	0.743200	76.68427	0.067720
4	0.355751	23.65369	2.162411	0.754712	73.28915	0.140033
5	0.390415	26.27450	2.557279	0.764254	70.16815	0.235818
6	0.420982	28.61778	2.924318	0.772498	67.33206	0.353348
7	0.448566	30.69482	3.262873	0.779928	64.77135	0.491029
8	0.473857	32.52540	3.574597	0.786884	62.46567	0.647444
9	0.497313	34.13279	3.862271	0.793599	60.38999	0.821357
10	0.519257	35.54078	4.129076	0.800231	58.51823	1.011685

**Table 1 E: Variance Decomposition of LNRER:**

Period	SE	LNEXP	LNFER	LNGDP	LNIMP	LNRER
1	0.116791	0.248548	1.457040	2.738670	4.717260	90.83848
2	0.163313	0.139768	0.762107	2.655347	4.093570	92.34921
3	0.198566	0.100825	0.678063	2.574897	3.534313	93.11190
4	0.228303	0.114625	1.039053	2.500328	3.046703	93.29929
5	0.254706	0.165785	1.705377	2.433550	2.630401	93.06489
6	0.278834	0.241546	2.566573	2.375592	2.280525	92.53576
7	0.301270	0.331941	3.539455	2.326832	1.989919	91.81185
8	0.322361	0.429541	4.563863	2.287205	1.750673	90.96872
9	0.342327	0.529037	5.597892	2,256,362	1.555039	90.06167
10	0.361314	0.626798	6.613476	2.233789	1.395912	89.13003

Cholesky Ordering: LNEXP LNFER LNGDP LNIMP LNRER

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