European Crisis and Sustainability of the CFA Franc Fixity to Euro

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Abstract

This study aims at assessing the pertinence of a fixed exchange rate between the CFA franc and the euro during the present European crisis. The paper shows negative impact of the European crisis on the real exchange rate (RER) and the misalignment of the CFA franc, and negative effects on the macroeconomic equilibrium of the zone. In fact, an aligned exchange rate is supposed to promote the twin goals of internal and external target of equilibrium. The results from simulation of reduced equations, derived from the Dependent economy model are consistent with those already highlighted in the literature. Indeed, the outbreak of the Eurozone crisis tends to usher the RER appreciation and thus, uphold the misalignment of the CFA franc. This has a significant rippling effect on the GDP growth and trade balance. One can therefore assume that the exchange rate policy of the CFA zone should be guided towards a fluctuating exchange rate within a precised threshold as a “honey moon effect” to curb vulnerability of external effects and promote the alignment of the exchange rate which is essential to the macroeconomic stability.

Keywords: Fixed exchange rate, CFA franc, European crisis, RER, Misalignment, Dependent economy model, Macroeconomic equilibrium.

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1. Introduction

Frankel (1999) said: "No single currency regime is right for all countries or at all times". This expresses the complexity of the exchange rate policy. Although International Monetary System advocates a generalization of flexibility since 1971 following the collapse of the Bretton Woods system (with the idea that the exchange rate as the basic price of the economy –alongside the interest rate and wages– must necessarily be flexible, so that, market adjustments lead to internal and external balances), the fixed exchange rate regime subsists in the currency areas (Vedel, 1995). This is the case in the CFA zone which remains a worldwide incomparable monetary zone (Vizy, 1989).

The CFA franc was pegged to the French franc until 2000. The commitment of France to the Eurozone, however, created the problem of maintaining the CFA zone on both legal and economic scheme. Because of the consistency and the reciprocity of interests, all CFA member countries attach great importance to the continuity and the
development of this cooperation. Some authors refer to article 109 of the Maastricht Treaty as a basis of the compatibility agreements between the CFA zone and the European texts. It is argued that, euro’s advent will not change anything, technically or legally, in the arrangement with France; it provides even more an additional guarantee of stability and credibility. This should enable more stable interest and exchange rates in the CFA zone, and strengthen trade and financial flows between Europe and the two CFA sub-regions (Hugon, 1999; Zafar, 2005).

According to our calculations based on data obtained from the World Bank, during the initial phase of its implementation, the single European currency raised export revenues and capital inflows of over 30% and 100% on average, respectively, in Cameroon, Ivory Coast and Senegal. However, some economists like Monga and Tchatchouang (1996) insist that the benefits associated to the peg of CFA franc to euro are more theoretical than real, because of the primitive nature of foreign trade and the lack of industrial production structures of CFA zone member countries. Moreover, the increased importance of intra-European Union trade makes the ECB less concerned by the instability of the euro-U.S. dollar exchange rate. This may imply an increased uncertainty in financial costs of imports and external debt for CFA zone countries (Magouangou, 1998). Therefore, the peg of CFA franc to euro is not necessarily a guarantee of stability, contrarily it can lead to unsustainable exchange rates.

However, it is important to underline the fact that, the peg of CFA franc to euro played an important role on the economic integration of CFA zone member countries to euro area (Hugon, 1999), which remains their main trade partner and one of the most important sources of capital according to the IMF and the OECD. This is why the outbreak of the European debt crisis in 2011 negatively affected the macroeconomic performance of CFA zone member countries. A study of the African Development Bank (ADB) indicates that a decline of economic growth of 1% in OECD countries leads to a downward change of nearly 0.5% in growth rate in African countries. As stated by Songwe and Subran (2012), the recent global financial crisis negatively affected some macroeconomic variables in the region like terms of trade, external debt, foreign direct investment (FDI), remittances, credit conditions and official development assistance.

With their progressive integration into the global economy for more than 15 years, the strong dependence of CFA zone member countries to the euro area thus increases their vulnerability as they are heavily indebted countries. Besides, the fixed exchange rate increases the decoupling between real (low factor productivity, low growth, etc.) and monetary spheres (convertibility, low inflation, etc.), and leaves little room to adapt to the external environment. Giving the importance of the exchange rate policy for trade promotion and for the generation the optimal output path (Abdih and Tsangarides,
2006), the difficulties experienced by European countries raise questions about sustainability of the fixity of CFA franc to euro.

In fact, the CFA zone, by creating a stable exchange rate, aimed to ensure and maintain macroeconomic stability which is essential to economic growth (Zafar, 2005). A sustainable economic growth also requires consistency of economic policies between member countries. Under these conditions, the maintenance of fixed exchange rates may be desirable if macroeconomic policies are broadly consistent with exchange rate policy. Thus, this paper aims to analyze the relevance of the fixed exchange rate of the CFA franc with regard to the euro, particularly within the context of the current European crisis. This paper also examines implicitly the impact of the crisis on macroeconomic balance of the area, given the fact that a proper aligned exchange rate is supposed to promote the twin goals of internal and external balances.

The rest of the paper is organized as follows. Section 2 provides a brief literature review about the questions of interest. Section 3 presents the analytical framework and data used for the analysis. Section 4 presents the empirical results and simulated impact of the European crisis on CFA franc RER, and its impact on the macroeconomic balance. Section 5 presents the implications of our results for CFA zone and concludes.

2. Brief Literature Review

It is supposed that the pegged parity of CFA franc is economically justified in a way that, during the independence period, it was devaluated only once in 1994. The devaluation of 50% administered by international financial institutions was nevertheless not an appropriate policy for all countries except for Cameroon, Togo, Congo, and Niger (Ondo Ossa, 1992). But this result is weakened by the theory of Purchasing Power Parity\(^2\) (PPP) which is generally used for estimating real equilibrium exchange rate (REER). As some empirical studies (Rogoff, 1996; MacDonald, 2000) did not entirely support the PPP theory, alternative approaches are proposed.

2.1 About the Appropriate Methods for Measuring the REER

There exist some alternative approaches in literature to calculate the real equilibrium exchange rate. Balassa (1964) differentiates two sectors in an economy: sector which produces tradable goods, and sector which produces non-tradable goods. The distinction itself is the base of the definition of RER in the whole class of “general equilibrium models” in which the RER is defined as the relative price of tradable and non-tradable goods. The RER which depends on external (world prices, capital flows, world interest rates…) and domestic variables (customs duty, quotas, budget deficits…)

\(^2\) PPP theory predicts that price levels are equalized when they are measured in the same currency, which suggests that the real equilibrium exchange rate should be constant and equal to unity in the long-run.
satisfies both internal and external balances (Edwards, 1989). In that way, it synthesizes the incentives which lead the allocation of resources among sectors, and consumers.

Some economists try to explain weaknesses of the PPP theory due to lack of reference to conditions of macroeconomic equilibrium. The macroeconomic approach, which is a part of New-Keynesian modeling, takes into account the RER as a global competitiveness indicator that orientates demand towards domestic or foreign goods. Therefore, Williamson (1994) defines the Fundamental Equilibrium Exchange Rate (FEER) as the RER which allows current balance to reach a target when the internal balance is realized. But this static model requires full employment production level in both domestic and foreign countries which is a major difficulty in the determination of the RER. Aware of this weakness, Artis and Taylor (1993) propose the idea of the Desired Equilibrium Exchange Rate (DEER) which is defined according to the desired level of current balance and employment. Later on, Clark and MacDonald (1997) suggest a composite model called Behavioral Equilibrium Exchange Rate (BEER). This approach estimates the REER from a reduced equation which links RER to fundamentals that are able to influence the RER in the long-run.

2.2 Possible Determinants of the CFA Franc RER

Most works with particular relevance to the CFA franc real equilibrium exchange rate use standards models (often BEER) applied to developed economies. These studies implement econometric models with a restricted number of variables neither taking into account the existing rigidity, nor providing any explicit economic theories (Edwards and Savastano, 1999), and neglecting countries’ characteristic features.

However, studies denote globally that the REER depends on a dynamic process based on a cointegrating relation between the RER and the economy’s fundamentals like government expenditure, debt service, terms of trade, openness, remittances, investment, world interest rate, capital flows, credit level.3

The impact of terms of trade on the RER is theoretically ambiguous related to income and substitution effects (Elbadawi and Soto, 1997; Baffes et al., 1999). Ouattara and Strobl (2008) indicates that a positive shock on terms of trade leads to an increase in the domestic demand, and an increase in the relative price of non-tradable goods, which finally leads to an appreciation of the RER and vice versa (Abdih and Tsangarides, 2006).

Openness as a proxy of trade policy is theoretically supposed to lead to a depreciation of the RER through the positive impact of trade liberalization on economic performance (Baffes et al, 1999).

For the external debt, its impact on the RER depends on the choice of debt variable. Mongardini (1998) and Coudert (1999) use debt service as a proxy. Their results

3 This captures Balassa-Samuelson effect.
indicate that an improvement of debt service depreciates the RER while a debt relief produces the opposite effect.

On the other hand, remittances may lead to a Dutch disease effect on the RER. As shown in Amuedo-Dorantes and Pozo (2004), an increase of 100% in remittances causes an appreciation of 22% in RER in 13 Latin American countries.

Others studies also show that an increase of FDI leads to a demand expansion for tradable goods. As the prices of tradable goods are internationally determined, the prices of non-tradable goods will also rise. This will consequently lead to an appreciation of the RER (Edwards, 1989).

2.3 Overvaluation, Misalignment and Macroeconomic Performance

This analysis puts forward the role of the exchange rate as an economic indicator. From theoretical and empirical point of views, the broad consensus is that misalignment and overvaluation have a long-term negative impact on macroeconomic performance, as it reduces economic efficiency. This implies that successful developing countries, like in East and Southeast Asia, owe much of their successes to having maintained their exchange rate close to the long-run equilibrium level (Hinkle and Monteil, 1999; Abdih and Tsangarides, 2006). Misalignment should then be considered as an alarm by the authorities about the state of their economies.

Few studies are done on the relationship between economic performance and exchange rate in the CFA Franc zone. Ghura and Grennes (1993) and Sekkat and Varoudakis (1998) explain the economic recession in CFA zone member countries during 1980s and 1990s by the overvaluation of CFA franc which negatively affected the competitiveness of tradable goods. According to Bouoiyour and Kuikeu (2007) this is the main reason of the CFA franc devaluation in 1994. The studies of Sinzogan (2000) and Linjouon (2004) are limited to one country, i.e. Benin and Cameroon, respectively. Therefore, current analysis aims to test the effects of the CFA franc misalignment over the economic performance of the CFA zone member countries.

3. Analytical Framework and Data

The approach adopted in this study aims to overstep the limits of BEER model, which is frequently being used in the empirical literature. In this sense, I adopt here the dependent economy model used by Devarajan and De Melo (1987) in order to find the fundamentals of RER in Cameroon, Senegal and Ivory Coast. This model allows one to take into account some features of the monetary cooperation with France, and structural characteristics leading to the general equilibrium of an economy.

This approach is justified by the fact that, more than 50 years after their independence, CFA franc zone member countries still remain strongly dependent on the
exportation of raw materials. It also allows relating directly exchange rate policy to the macroeconomic equilibrium of CFA zone member countries.

3.1 Model Setup

As the CFA zone member countries have the same structural characteristics, the relative sub-regions WAEMU and CEMAC are subject to a similar analysis. Consider a small open economy in full employment, without any influence in international prices. It produces two typical goods: tradable and non-tradable goods. Also, the small local industry produces imperfect substitute of imported goods (the Armington assumption). This local industry with the sector of non-tradable goods forms the sector of semi-tradable goods. The model is constructed in five blocs:

- **production**

  \[ Y_E = AL_1^\alpha \]  
  \[ Y_{SE} = BL_2^\beta \]  

  where \( Y_E \) and \( Y_{SE} \) denote production in the specialized sector (tradable goods), and production in the semi-tradable sector, respectively. \( L_1 \) and \( L_2 \) denote levels of employment specialized and non-specialized sectors. \( A \) and \( B \) are exogenous parameters, \( \alpha \) and \( \beta \) are the elasticity of tradable and semi-tradable goods in their respective level of employment.

  \[ L_1 + L_2 = \bar{L} \]  

  where \( \bar{L} \) corresponds to the level of full employment.

- **Price**

  As the REER is a trajectory rather than a value, like in Edwards (1989) and Baffes et al. (1999), the RER here is defined as the relative price of tradable and non-tradable goods.

  \[ RER = E \times \frac{P^E}{P} \]  

  \( E \) is the nominal exchange rate; \( P^E \) and \( P \) are the price of tradable and non-tradable (or semi-tradable) goods, respectively. RER is appreciated if \( P^E \) is lower than \( P \). This means a loss in internal competitiveness of semi-tradable goods compared to tradable goods.

  We assume that there exist trade barriers. \( P^*_x \) and \( P^*_m \) correspond then to world market export and import prices, respectively, thus \( P_x \) and \( P_m \) represent their values in domestic currency:
\[ P_X = E \times P_X^* (1 - S) \] (5.1)
\[ P_M = E \times P_M^* (1 + T) \] (5.2)

The expression of terms of trade which is the ratio between export and import prices follows up as
\[ TE = \frac{P_X = E \times P_X^* (1 - S)}{P_M = E \times P_M^* (1 + T)}. \]

We can derive then RER for producers and consumers:
\[ RER_{PROD} = E \times \frac{P_X}{P} \] (5.3)
\[ RER_{CONS} = E \times \frac{P_M}{P} \] (5.4)

\[ Consumption \]

The preferences of private sector are described by a Constant Elasticity Substitution function, and the demand for domestic and foreign goods depends on prices of domestic production and import prices.
\[ C \quad M \left\{ \frac{E \times P_X^* (1 + T)}{P} \right\}^\sigma = \sum \]

\[ C \quad M \text{ are respectively demand for domestic and foreign goods (imports), } \sigma \text{ is the elasticity of substitution between the two categories of goods. It also measures the dependence level of economy to external good.} \]

\[ Public Finance \]

The membership to CFA zone offers great possibility to a country to get into debt from other member countries. Thus, the government spending \((G)\) is financed by this foreign debt \((D)\), but also by central bank advances \((AV)\), imports and exports duty revenues. These tax revenues are divided into two between tradable \((m)\) and semi-tradable goods \((1 - m)\):
\[ E\left[ TP_M^* + SP_X^* + D \right] + AV = mGP_M^* + (1 - m)PG \] (7)

\[ Central Bank \]

In the pegged exchange regimes, one of the main objectives of the monetary authority is to control the level of international reserves through the quantity of credit
granted to the economy. Changes in reserves stock adjust balance of payments disequilibrium according to monetary approach.\(^4\) This is the principle of sterilization:

\[
CE = CARES
\]  

(8)

3.2. Conditions of Equilibrium

For a small economy, internal balance requires that the markets of tradable and semi-tradable goods are in equilibrium. In others words, as I assume that the unemployment rate corresponds to its natural rate, internal balance requires equality between supply and demand of tradable and semi-tradable goods:

\[
Y_{SE} = (1-n)C + (1-m)G
\]  

(9.1)

\[
Y_{E} + M = X + mG + I + nC
\]  

(9.2)

As \( Y = C + I + G + (X - M) \) \( Y = Y_{SE} + Y_{E} \)  

(9.3)

Besides, the monetary approach of balance of payments gives the external balance condition.

\[
(X - M - SD) + R + FDI + D = \Delta RES
\]  

(10)

where \( X - M \) is trade balance (\( BT \)), \( R \) denotes remittances, \( SD \) denotes debt service, and \( FDI \) represents foreign direct investment.

As the labor market is competitive, at equilibrium, wages are same in both tradable and semi-tradable goods sectors, and correspond to their marginal productivity:

\[
\alpha EP_{X}^s (1-S)AL_{1}^{a-1} = \beta PBL_{2}^{b-1}
\]  

(11)

Since \( \frac{dZ}{Z} = z \), the model resolution (Appendix A) leads to following equations in reduced forms:

\[
rer = rer(te, g, tax, i, sd, fdi, prod, \Delta res)
\]  

(12)

\[
\dot{y} = \dot{y}(rer, te, g, ce, i, r)
\]  

(13)

\[
bt = bt(rer, ce, te, g, tax, i, y)
\]  

(14)

These last three equations present theoretical framework of the CFA franc real exchange rate, domestic and external balances.

3.3. Data

The annual data from 1999 to 2010 is gathered from the World Development Indicators (2012). The data consists of aggregated annual average for 8 countries of CFA

\(^4\) This suggests that any disequilibrium has a monetary origin, and requires a variation of the quantity of currency in circulation.
franc zone which are divided into two sub-regions (WAEMU and CEMAC). The study implements a panel cointegration methodology which is useful for avoiding the problem of “fallacious regressions”. So, the general form of the relationship is:

\[ Z_{it} = \alpha_i + \Omega F_{it} + \varepsilon_{it} \]  

(15)

\( Z \) is the dependent variable, \( F \) is the vector of determinants, \( \alpha_i \) shows individual effects, \( \Omega \) is the vector of parameters and \( \varepsilon \) is the vector of error terms.

Eight countries of CFA zone are considered because of the availability of time series. The economic growth is measured by GDP growth; \( bt \) represents the ratio of trade balance to GDP; \( te \) represents terms of trade defined as the logarithm of the ratio of export prices to import prices; \( tax \) is a proxy variable for openness which is the logarithm of the ratio of trade volume (imports + exports) over GDP; \( prod \) is the productivity of CFA zone members relative to the euro area members measured by the logarithm of the ratio of CFA zone GDP per capita to euro area GDP per capita; \( i, sd, fdi, r, \Delta res, ce, \) and \( g \) represent, respectively, the logarithm of the ratios of investment, debt service, FDI, remittances, net foreign assets, domestic credit, and government expenditure over GDP. \( y \) denotes total production and is measured by the logarithm of GDP per capita. Since theoretical works show that the use of real effective exchange rate with multilateral scale is better than bilateral RER, here we consider the logarithm of the real effective exchange rate.

In its standard formulation and with regard to the international trade theory, the real effective exchange rate is a synthetic indicator equal to the product between the indexes of the bilateral nominal exchange rates and the ratio of domestic prices over foreign prices, respectively, for each of their trade partners. So, given the fact that for CFA zone members, the main part of trade is done with the U.S dollar, the euro-dollar volatility becomes an important issue for the CFA franc RER. Thus, it is supposed that the RER depends not only on fundamentals pointed out by the literature, but also on the euro-U.S dollar exchange rate. Therefore, in order to assess the effects of the euro appreciation or depreciation on the CFA franc, a dummy variable is introduced.

4. Empirical results

Im-Pesaran-Shin (2003) unit root tests cannot reject the null hypothesis of unit root for most variables in level (Table 1). However, their first difference produces stationarity, hence the variables are integrated of order 1 (Appendix C).

Im-Pesaran-Shin test is applied to the residuals of (I), (II) and (III). The results suggest that there exists a cointegration between variables since the null hypothesis of no cointegration is rejected at the 1% level (Table C2 in Appendix). As the residuals of

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5 Cameroon, Gabon, Equatorial Guinea and Republic of Congo for CAEMU; Ivory Coast, Senegal, Togo, Mali for WAEMU.
the long-term dynamics are stationary, I estimate an error correction model which presents the short-term dynamics of the RER. The model integrates variables in first difference, and the constant term should be negative, hence the RER will return to its long-term equilibrium values.

Long-run and short-run relationship between the RER and its determinants is shown in Table 1. As the p-values of the explanatory variables are greater than their confidence level in the long-run estimations, I conclude that all the variables are significant at the 1% or 5% level. Moreover, the homogeneity and the Hausman specification tests point out that there are individual random effects across sub-regions, but there is no correlation between the error terms and explanatory variables. So, the Generalized Least Square estimation method is appropriate.

Table 1. Long and short run dynamic of CFA franc RER

<table>
<thead>
<tr>
<th></th>
<th>Long-run dynamics</th>
<th>Short-run dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant WAEMU</td>
<td>5.59 (0.43)*</td>
<td>-0.27 (0.108)*</td>
</tr>
<tr>
<td>Constant CEMAC</td>
<td>5.44 (0.40)*</td>
<td></td>
</tr>
<tr>
<td><strong>Internal factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>0.16 (0.03)*</td>
<td>-0.01 (0.05)*</td>
</tr>
<tr>
<td>Government expenditure</td>
<td>-0.38 (0.16)*</td>
<td>-0.49 (0.14)*</td>
</tr>
<tr>
<td>Investment</td>
<td>0.11 (0.05)*</td>
<td>0.2 (0.053)*</td>
</tr>
<tr>
<td>Productivity</td>
<td>-0.09 (0.05)*</td>
<td>-0.25 (0.128)*</td>
</tr>
<tr>
<td>Net foreign assets</td>
<td>0.7 (0.42)*</td>
<td>-0.62 (0.244)*</td>
</tr>
<tr>
<td>Debt service</td>
<td>0.021 (0.01)**</td>
<td>0.039 (0.01)*</td>
</tr>
<tr>
<td><strong>External factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remittances</td>
<td>0.013 (0.007)*</td>
<td>0.002 (0.005)</td>
</tr>
<tr>
<td>Term of trade</td>
<td>-0.24 (0.09)*</td>
<td>-0.058 (0.08)</td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>-0.12 (0.04)</td>
<td>-0.06 (0.02)*</td>
</tr>
<tr>
<td>Euro-dollar volatility (dummy)</td>
<td>0.03 (0.20)**</td>
<td>0.011 (0.03)*</td>
</tr>
</tbody>
</table>

| R-squared | 0.8982 | 0.7069 |
| N         | 24     | 24     |

Note: (*) significant at 1% level, ** significant at 5% level.

The results show fluctuations of the CFA franc RER in the short- and the long-run significantly depend on domestic and external factors. More specifically, an increase of FDI, government expenditure, productivity and improvement of terms of trade lead to depreciation of the exchange rate. Besides, remittances, debt service, openness, domestic investment and euro-U.S. dollar volatility lead to the CFA franc real appreciation. Moreover, except for openness and net foreign assets, all the significant variables in short-run have the same effect on the RER. These results are also consistent with the results of Zafar (2005) and Tsangarides and Abdih (2006).
Furthermore, the fixed individual effects also appear with significance and different across sub-regions. This may indicate the persistence of structural or political divergence in spite of the monetary union.

4.1 Misalignment of the CFA franc

The misalignment broadly investigates the behavior of RER vis-à-vis to its long-run equilibrium path. The CFA franc misalignment is estimated as difference between the current RER and its long-run equilibrium level. The later corresponds to the permanent component of the estimated long-run RER which is derived through the Hodrick and Prescott method. The results are presented in Table C4, Appendix C.

In the CFA zone, the misalignment seems heterogeneous. In spite of the euro appreciation effects since 2002, the CFA franc is undervalued, on average, by 0.603% in WAEMU and 0.462% in CEMAC. This result suggests that the CFA franc peg to euro still viable as far as the misalignment is not more important than the misalignment of 1990s. Thus, a new devaluation risk is not imminent, because the CFA franc is not significantly disconnected from its fundamentals. But, any misalignment, negative or positive, indicates an inappropriate exchange rate policy (Kiema et al., 2011) that may weaken the trade balance (Table 2).

The econometric analysis also shows an appreciation of the CFA franc recently in both sub-regions, but in different years: in 2009 in WAEMU, and in 2008 and 2010 in CEMAC. As there is no improvement in crisis resolution in Europe, this trend might continue.

Table 2. Impact of exchange rate disequilibrium on macroeconomic balance

<table>
<thead>
<tr>
<th>Variables</th>
<th>Trade balance</th>
<th>Growth (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant WAEMU</td>
<td>2.31 (0.29)*</td>
<td>1.57 (2.89)*</td>
</tr>
<tr>
<td>Constant CEMAC</td>
<td>2.01 (0.11)*</td>
<td>1.53 (2.71)*</td>
</tr>
<tr>
<td>RER</td>
<td>-0.686 (0.28)*</td>
<td>-1.30 (0.670)*</td>
</tr>
<tr>
<td>Misalignment</td>
<td>-0.024 (-0.009)**</td>
<td>0.30 (0.207)</td>
</tr>
<tr>
<td>Terms of trade</td>
<td>0.241 (0.017)*</td>
<td>5.74 (0.88)*</td>
</tr>
<tr>
<td>Government expenditure</td>
<td>0.55 (0.15)*</td>
<td>7.63 (1.34)*</td>
</tr>
<tr>
<td>Investment</td>
<td>0.19 (0.02)*</td>
<td></td>
</tr>
<tr>
<td>GDP/capita</td>
<td>0.09 (0.07)*</td>
<td></td>
</tr>
<tr>
<td>Economy loans</td>
<td>-0.06 (0.02)*</td>
<td>0.360 (0.155)*</td>
</tr>
<tr>
<td>euro-dollar volatility (dummy)</td>
<td>0.07 (0.03)*</td>
<td></td>
</tr>
</tbody>
</table>

R-squared 0.8510 0.7069
N 24 24

Note: * significant at 1% level; ** significant at 5% level.
4.2 Simulated Impact of European crisis on the CFA franc

Simulations made at this stage highlight the fact that a deepening of the European crisis (a deterioration of some economic variables of 10%) leads to significant CFA franc appreciation of 1.1% (0.56%) in the short-run; an appreciation of 1.58% (1.26%) in the long-term, if the euro depreciates (appreciates) against the U.S. dollar.

The problem here is appreciation of the CFA franc which has significant negative impact on trade balance and economic growth as shown in Table 2. Precisely, 10% appreciation of the CFA franc leads to deterioration of trade balance of 6.86%, and slowdown of economic growth of 13%.

5. Policy Implications for CFA zone and Conclusion

In order to reach both domestic and external balances, the RER should be adequately aligned. Otherwise it would deteriorate country's macroeconomic performance. As the exchange rate adjustment in CFA franc zone takes a long time\(^6\), flexible exchange rate regime may be a good policy option, particularly for those which are vulnerable to external shocks. Theoretically, the flexible exchange rate regime allows automatic adjustment through nominal exchange rate movements. However, the weak development of CFA member countries makes flexible exchange rates not very attractive.

Besides, the results of econometric models indicate that the impact of external variables on the CFA franc RER is only 0.043%, while the effect of domestic variables is 0.291%. It highlights the fact that the effects of external variables, like the European crisis, on the CFA franc real appreciation are smaller than the impact of the domestic factors. This confirms the idea that suitable exchange rate policy requires consistent fiscal and/or monetary policies.

On the contrary, if nominal exchange rate cannot be used as a policy tool, flexible domestic economic policies can play a countervailing role. In practice, it is not easy to have flexible economic policies because of long-term development programs implemented in the member countries. In this sense, adopting a crawling peg with upper and lower bounds under the floating exchange rate regime seems the optimal solution. This has the advantage to introduce more flexibility through limited nominal exchange rate movement, to ensure CFA zone authorities a progressive learning of monetary management, an autonomous credibility alongside the imported one from the ECB, and to give a signal about the state of economies in the zone.

\(^6\) The return of the CFA franc to its equilibrium rate following a shock lasts 9.5 years, as the error correction term takes the value of 0.27. This means that 0.27% of gap, on average, is eliminated every year. In terms of the years, the formula of the speed of adjustment is the following: \( t = (1 - \beta_0)/(1 - \alpha_0) \); where \( \beta_0 \) is the percentage of shocks to eliminate and \( \alpha_0 \) is the constant in the error correction model. See Elbadawi and Soto (1997) and Linjouon (2004) for further information.
However, as the current European crisis pointed out structural weaknesses of the CFA zone, a sole change of exchange rate regime cannot solve all the problems. This is why it is also important for CFA zone members to strengthen sub-regional integration in order to take advantage of single currency benefits. A greater integration also favors structural homogeneity, real convergence, and adjustment of asymmetric shocks. Moreover, member countries also need to diversify their trade and financial partners, as well as their production systems. Furthermore, they should improve their business environment, i.e. strengthen infrastructures and institutional framework for improving their competitiveness in the international markets. Moreover, coordination of economic policies in member countries with the common exchange rate policy would increase sustainability of the CFA zone. Including a surveillance indicator, like the RER as recommended by the IMF since 2011, may also help to quickly detect divergence in countries’ competitiveness.

**References**


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7 The structure of the CFA franc zone is actually similar to the European Monetary System (EMS) which broke out in the aftermath of the 1992-93 crisis. But contrary to the EMS where every member had its own currency that makes the central banks interventions more complex and difficult, the effective monetary unification in CFA zone makes rather easier to intervene on the single parity with the euro. Besides, the problems of the EMS can be used as the standard base for defining accompanying measures required for such an exchange rate regime. The breaking points of the EMS were the lack of policy unification and the divergence of economic dynamics among member countries which led to political conflicts. This is why European authorities introduced some reforms to intensify economic integration and promote macroeconomic convergence, essential to the stability of the fixed exchange rate systems.


**Appendix A: Model Resolution**

By setting \(\frac{dZ}{Z} = z\), the system becomes:

\[
\begin{align*}
\text{rer} &= e + p_e - p \\
\text{te} &= p^*_e + \varepsilon - p^*_m - \tau \\
\text{rer}_{\text{prod}} &= e + p^*_e - p \\
\text{rer}_{\text{cons}} &= e + p^*_e - p \\
y_e &= a + \alpha_1 l_1 \\
y_w &= b + \beta_1 l_2 \\
\lambda_1 l_1 + (1 - \lambda) l_2 &= 0 \\
\mu_1 d + \mu_2 (p^*_m + t + m) + \mu_3 (p^*_e + x + s) + (1 - \mu_4 - \mu_5 - \mu_6) \Delta v &= \theta p^*_m + g + (1 - \theta) p \\
c e &= c + \Delta \text{res} \\
y_w &= c \rho + g(1 - \rho) \\
y_e &= \delta_1 b c + \delta_2 g + \delta_3 i + (1 - \delta_4 - \delta_5 - \delta_6) c \\
bc &= (1 - \pi_1 - \pi_2 - \pi_3) y - \pi_1 c - \pi_2 g - \pi_3 i \\
\kappa \Delta b c - (1 - \kappa) \Delta s d &= -[\omega_1 \text{FDI} + \omega_2 r] + \omega_3 d + (1 + \omega_4 - \omega_5 - \omega_6) \Delta \text{res} \\
p^*_e + \varepsilon + (\alpha - 1) l_1 &= p + (\beta - 1) l_2
\end{align*}
\]

with \(\varepsilon = -\frac{S}{(1 - S)}\), \(\tau = \frac{T}{(1 - T)}\), \(\lambda = \frac{L_1}{L_1 + L_2}\), \(\rho = \frac{(1 - n) C}{(1 - n) C + (1 - m) G}\), \(\delta_1 = \frac{BC}{Y_E}\), \(\delta_2 = \frac{mG}{Y_E}\), \(\delta_3 = \frac{I}{Y_E}\), \(\omega_1 = \frac{\text{FDI}}{BC - \text{SD}}\), \(\omega_2 = \frac{\text{FDI}}{BC - \text{SD}}\), \(\omega_3 = \frac{D}{BC - \text{SD}}\), \(\kappa = \frac{BC}{BC - \text{SD}}\).
\[ \pi_1 = \frac{C}{Y-C-I-G}; \quad \pi_2 = \frac{G}{Y-C-I-G}; \quad \pi_3 = \frac{1}{Y-C-I-G}; \quad \pi_4 = \frac{Y}{Y-C-I-G} \]

\[ \mu_1 = \frac{D}{mGP_m + (1-m)PG}; \quad \mu_2 = \frac{MP^T_{1r}}{mGP_m + (1-m)PG}; \quad \mu_3 = \frac{SP^T_{1r}X}{mGP_m + (1-m)PG} \]

A combination of (3'), (4'), (5'), and (10') implies:

\[ \text{rer}_{\text{prod}} = \text{rer} + \frac{(1-z)}{z} \times \text{te} \]

\[ \text{rer}_{\text{cons}} = \text{rer} - z \times \text{te} \] (11')

A combination of (3'), (4'), (5'), (10'), and (11') implies:

\[ y_c = a + \varphi \text{rer} = a \left[ \text{rer} + \frac{(1-z)}{z} \times \text{te} \right] \] (12')

\[ y_{se} = b + \eta \text{rer}_{\text{prod}} = b + \eta \left[ \text{rer} + \frac{(1-z)}{z} \times \text{te} \right] \] (13')

If I replace it in (8'):

\[ c = \frac{y_w - \rho g}{(1-\rho)} = \frac{\eta \left( \text{rer} + \frac{1-z}{z} \times \text{te} \right) - \rho g}{(1-\rho)} \] (14')

with \[ \phi = \frac{\alpha(1-\lambda)}{\lambda(1-\beta) + (1-\alpha)(1-\lambda)}, \] (15')

and \[ \eta = \phi \times \frac{\beta \lambda}{\alpha(1-\lambda)} \] (16')

As the REER ensures simultaneous internal and external balance, by combining the value of c in (8.2') and equalizing with (9'):

\[ \text{rer} = (1-\rho) \left[ \frac{(1-k)\delta d + \omega_1d + \gamma + (1+\omega_1 + \omega_2 - \omega_3)A \text{res} - (1-\pi_1 - \pi_2 - \pi_3) + \pi_1 + \rho + \pi_3}{\eta} \times \frac{(1-z)}{z} \times \text{te} \right] \]

Note that \( y \) is also a function of terms of trade, productivity as showed in (14') and (15'). Likewise, \( d \) is a function of trade duty; government expenditures, and central bank advances to government (see 7').
## Appendix B: Summary Statistics of Data

### CEMAC

<table>
<thead>
<tr>
<th>Variables</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Err.</th>
<th>[95% Conf. Int.]</th>
<th>Skewness</th>
<th>Kurtosis</th>
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<tbody>
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### WAEMU

<table>
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<th>Variables</th>
<th>Obs</th>
<th>Mean</th>
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<th>[95% Conf. Int.]</th>
<th>Skewness</th>
<th>Kurtosis</th>
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### Appendix C: Tables and Figure

**Table C1: Unit root test results: IPS (1997)**

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<th>Variables</th>
<th>In level</th>
<th>First Difference</th>
<th>Conclusion</th>
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<td>Without trend</td>
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<td>Without trend</td>
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*These values are compared to the critical values: without trend at 1% (-2.54), 5% (-2.10), 10% (-2.06); with trend at 1% (-3.21), 5% (-2.8), 10%(-2.7). The latter are available in IPS (1997).*

**Table C2: Unit root test in residuals of rer**

- ipshin RES if panel<3, lags (0)
- Im-Pesaran-Shin test for cross-sectionally demeaned Residuals
- Deterministics chosen: constant
- t-bar test, N,T = (2,12) Obs = 22
- Augmented by 0 lags (average)

<table>
<thead>
<tr>
<th>t-bar</th>
<th>cv10</th>
<th>cv5</th>
<th>cv1</th>
<th>W(t-bar)</th>
<th>P-val</th>
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<tr>
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</table>

**Table C3: Test of homogeneity**

- Fixed-effects (within) regression
- Number obs= 24
- Group variable (i): panel
- Number of group  = 2
- R-sq: within = 0.9079
- Between= 1.0000
- overall = 0.0511
- Obs per group: min = 12
- avg    = 12.0
- max    = 12
- corr (u_i,Xb) = -0.9274
- prob>F = 0.0003
- sigma_u 0.23928827
- sigma_e 0.3034171
- rho 0.98417622 (fraction of variance due to u_i)
- F test that all u_i = 0: F(1, 1) = 1.39  Prob> F = 0.2632
### Table C4. Real equilibrium exchange rate and CFA misalignment

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<th>Years</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
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#### Figure C1. CFA franc misalignment