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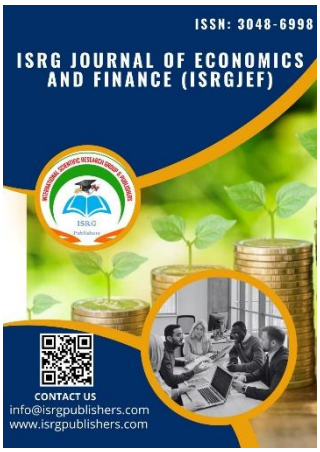

REAL EXCHANGE RATES AND COMPETITIVENESS IN THE CEMAC ZONE: AN ANALYSIS USING THE FGLS AND PCSE METHODS

Christophe KUIPOU TOUKAM[1*], Marcel TAKOULAC KAMTA[2]

[1, 2] Lecturer-researcher HTTTC University of Bamenda-Cameroon

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***Corresponding author:** Christophe KUIPOU TOUKAM
Lecturer-researcher HTTTC University of Bamenda-Cameroon

Abstract

The aim of this study is to examine the relationship between the real exchange rate and the economic competitiveness of the CEMAC zone countries using the Feasible Generalized Least Squares (FGLS) and Panel Corrected Standard Errors (PCSE) method. Our study covers the period from 1987 to 2018. The results obtained show that the real exchange rate positively and significantly affects the competitiveness of the CEMAC zone. Similarly, trade openness and corruption also positively and significantly impact competitiveness in the CEMAC zone. Thus, countries with more competitive real exchange rates tend to have better economic performance. In terms of recommendations, each country should develop a competitiveness index adapted to its economy that takes into account economic vulnerability factors (climate shocks and socio-political violence) as well as those of economic attractiveness (labor market, infrastructure, human capital, financial capital, political governance and economic governance).

KEYWORDS: Exchange rate, Real exchange rate, Competitiveness, FGLS, PCSE and CEMAC

1. Introduction

The countries of Central Africa recognized early on the importance of economic cooperation and regional integration as factors likely to contribute to accelerating their growth and development. For this reason, they have committed themselves to making the CEMAC region an emerging one by 2025. Despite these ambitious objectives, member states have not yet been able to create a dynamic economic environment to reinforce the Community's power and influence. Given that the exchange rate of the Franc de la Coopération Financière en Afrique Centrale (FCFA) is pegged to the euro, monetary stability has two dimensions: an internal dimension relating to price stability, and an external dimension relating to a sufficient rate of external coverage of the currency by its foreign currency assets. The price stability objective adopted by the BEAC assumes, on the one hand, that inflation is detrimental to economic performance and, on the other, that the BEAC has the capacity to control price dynamics within the monetary union through its

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monetary policy decisions. Furthermore, the primacy given to the objective of price stability suggests the existence of potential conflicts between price stability and the objectives of other economic policies developed in the Union, including that of economic growth (Keungne and Ousman, 2014). The 1985 crisis, culminating in the 1994 CFA franc devaluation, prompted CEMAC governments to implement economic stimulus measures and structural adjustment programs with donor support, putting medium and long-term reflections on hold. Pegging to the euro is said to have led to an 18.7% appreciation of the CFA franc between 2000 and 2010, compared to just 6.6% between 1994 and 1999 (Zafar, 2005; Couharde et al., 2012). However, the euro's appreciation over the same period may have pushed the real exchange rate of the CFA franc above its macroeconomic fundamentals, potentially resulting in a deterioration of the current account, loss of competitiveness, and reduced economic growth (Coulibaly, 2013).This appreciation has thus led to an overvaluation of the FCFA.Grekou (2015) believes that overvaluation could be beneficial through its reducing effect on foreign currency-denominated debt. Similarly, with regard to undervaluation, while authors such as Hausmann et al (2005) and Béreau et al (2012) highlight the positive effect of undervaluation in terms of improved competitiveness, others stress that undervaluation may not be profitable insofar as the exchange rate weapon alone is not enough to solve growth problems linked, for example, to the narrowness of domestic markets or poor diversification of production (Guillaumont-Jeanneney, 1988).

The Central African Economic and Monetary Community (CEMAC) experienced a significant decline in GDP growth rate, plummeting from 1.7% in 2015 to 0.2% in 2016, down from 4.9% in 2014. This drastic decline was largely due to the drop in oil prices, which heavily impacted the region's economy. The CEMAC countries, being heavily reliant on oil revenue, faced substantial fiscal and macroeconomic challenges. At the root of this counter-performance were cuts in public investment and oil production. The fall in commodity prices, with its impact on export values, has led to the persistence of the CEMAC zone's current account deficit, which continues to widen. The current account deficit in the Central African Economic and Monetary Community (CEMAC) zone is indeed a concern, particularly in countries like Congo, Equatorial Guinea, and Chad. According to the International Monetary Fund (IMF), the zone's current account deficit was estimated at 6.7% of GDP in 2016, showing some improvement from 9.2% in 2015.

This deficit is largely driven by the region's dependence on oil exports, which makes it vulnerable to fluctuations in global oil prices. The CEMAC zone has been working to improve its economic resilience and reduce its reliance on oil revenue.

What's more, since 2014, we've seen a sharp deterioration in the external accounts of CEMAC countries induced mainly by public deficits, with a consequent significant decline in foreign exchange reserves. Indeed, in most countries in the zone, rising public spending has resulted in an increase in imported goods and a significant outflow of foreign currency, concomitantly with falling foreign currency inflows linked to the value of exports, particularly oil (CEMAC, 2015).

The real exchange rate is an important macroeconomic concept that reflects relative price movements and is a key indicator of the price competitiveness of economies in international trade. Thus, it is essential that the real exchange rate does not deviate significantly and persistently from its equilibrium level determined by economic fundamentals, so that relative prices remain close to equilibrium over time and a country's external position is sustainable. However, the real exchange rate equilibrium is not directly observable and must be estimated using appropriate models, so that price competitiveness can be judged on the basis of an analysis of the misalignment of the exchange rate from its equilibrium in relation to the evolution of the trade balance.

According to (Edwards, 1989), the exchange rate misalignment presented by deviations of the observed real exchange rate from its long-run equilibrium value is likely to generate macroeconomic imbalances, giving it a primordial place in economic policy. Understanding exchange rate behavior is important for any open economy. This is true for positive perspectives, such as the effect of a real appreciation on the country's trade, and for normative perspectives, such as the desirability and extent of devaluation (Balassa, 1985). However, the exchange rate is determined by the exchange rate regime, which refers to the set of rules by which a country or group of countries organize the determination of exchange rates. There is a wide variety of exchange rates, corresponding more or less to two main types of regime: the fixed exchange rate regime and the floating (or flexible) exchange rate regime. The choice of exchange rate regime is a crucial aspect of a country's or currency zone's monetary policy. The CEMAC countries have adopted a fixed exchange rate regime, with the CFA franc pegged to the euro. This regime is based on four key principles:

- Fixed parity: The CFA franc is pegged to the euro at a fixed rate.
- Convertibility: France guarantees the convertibility of the CFA franc.
- Freedom of transfers: There is total freedom of transfers between Franc Zone countries.
- Pooling of foreign exchange reserves: The CEMAC countries pool their foreign exchange reserves.

This exchange rate regime has both advantages and disadvantages. On the one hand, it provides stability and predictability, which can attract foreign investment and promote economic integration within the region. On the other hand, it limits the ability of individual countries to implement independent monetary policies and adjust to external shocks.

Competitiveness is a complex, multi-dimensional concept, with no universal definition. The concept is generally used to analyze the macro-economic performance of countries. Competitiveness is based on different concepts, depending on whether it is used for a country, a region, a sector or a company. But competitiveness is also a relative concept, which can only be measured when compared with a similar entity (country, region, sector, company), and a dynamic, evolving concept. This second characteristic implies an ongoing process of adaptation to the country's economic situation, but also to the international environment. Indeed, for a country and its trading partners, competitiveness is analyzed by comparing certain factors characteristic of the economy, which provide elements for assessing the evolution of international trade (Ayongwa et al., 2020). Competitiveness can be viewed from two perspectives (Lafay, 1997), namely the results perspective and the means perspective. In terms of results, the competitiveness of a national economy can be defined as its ability to face up to international competition. Thus, the various sub-accounts of the balance of payments are commonly used to reflect a country's performance in its trade with the rest of the world (Raffinot and Venet, 2003). Two types of competitiveness can be distinguished: competitiveness in the strict sense, as measured by the balance of trade, and competitiveness in the broad

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sense, as measured by the current account. Thus, "the appreciation of the nominal effective exchange rate, reinforced by a higher inflation rate in the subregion than among its partners, in particular its suppliers, has also contributed to the deterioration in the price competitiveness of the CEMAC economies" states the BEAC to justify this situation (BEAC, 2018). A country's competitiveness refers to its ability to produce globally competitive goods and services, sustainably in terms of both price and quality, and for the purposes of improving the level of well-being of its population (Djahini, 2015). The exchange rate is a key factor for the competitiveness of CEMAC economies. A competitive exchange rate boosts exports and stimulates economic growth, while an overvalued exchange rate can make local products less competitive in the international market. Competitiveness is a major challenge for CEMAC economies, which are heavily dependent on raw material exports.

This study aims to assess the effect of the real exchange rate on the external competitiveness of the CEMAC economy. To achieve this objective, we will structure our work in three main parts. First, we will present the literature review and then expand on the methodology. Next, we will present the results of the descriptive analysis, and finally, we will discuss the results of the explanatory analysis.

2. Exchange rates and competitiveness: theoretical and empirical investigation of the literature

Trade liberalization is still considered by most theorists to be the optimal trade regime, despite significant protectionist measures in trade. Some authors of the new theory of international trade and many others (Krugman, 1984) demonstrate that protection is an instrument for promoting exports and improving competitiveness in the long term. Under certain conditions, protectionism leads to the emergence of economies of scale, increased productive efficiency and thus gains in external competitiveness. A summary of the various theoretical and empirical studies will be presented.

2.1. Theoretical summaries of the literature

International trade theory is the branch of economics concerned with modeling the exchange of goods and services between states. It is also concerned with questions of international investment and exchange rates. It comprises two main branches. The first is based on classical thought inspired by David Ricardo, while the second draws on the tools of industrial organization and geographical economics. Two dimensions - political and spatial - need to be taken into account: the classical theory of international trade and the new geographical economy. As it was unable to introduce imperfect competition or increasing returns satisfactorily, and faced with problems of empirical validation, classical theory nevertheless gave way to the new theory of international trade.

2.1.1. The evolution of international trade theories: from traditional to the role of exchange rates

The study of the effect of the ERR on international competitiveness is linked to the evolution of theories of international trade and economic growth. From Ricardo's theory of comparative advantage (1817) to the "demand for difference" thesis of Lassudrie - Duchêne (1971), the success of exports was thought to depend solely on their low price. The natural conditions of production - relative factor endowment in Heckscher (1919) and Ohlin (1933), or labor productivity in Ricardo - explained export performance, while relative prices explained competitiveness. It is also important to note Krugman's new theory of international trade (1984), the explanatory theories of the exchange rate (Mundell, 1963; Tobin, 1969), portfolio models (Tobin, 1969) and the rational bubble approach (Hecksher, 1931 and Keynes, 1936). These theories tried to show the importance of international trade in a country's development, but also the role played by the exchange rate in international competitiveness. In addition to these theories, other theories were developed to explain the role of the exchange rate in international trade, highlighting the critical elasticity theorem or Marshall-Lerner condition developed by Robinson (1937), and Alexander's absorption theory (1958). Depreciating the real exchange rate (REER) was a way of improving international competitiveness.

However, the configuration of international trade has led to the identification of the influence of demand specificity on the level and structure of exports. By introducing the element of taste into consumer demand, Lassudrie-Duchêne (1971) showed that matching supply to consumers' "demand for difference" was a factor in increasing exports. The capacity for technological innovation, which makes it easier to adapt supply to foreign demand, is therefore a determinant of external competitiveness. Endogenous growth theorists (Rivera-Batiz & Romer, 1991; Barro & Sala-i-Martin, 1997; Lucas, 1988) have shown that, beyond trade protection, strategic state interventions can foster endogenous economies of scale and enhance external competitiveness. Key drivers include research and development, public infrastructure investment and Human capital development. These investments can lead to improved product quality, reduced costs, and increased competitiveness in global markets.

External competitiveness is therefore influenced by government efforts in physical and human capital accumulation, as well as technology transfer.

2.1.2. Natural Real Exchange Rate (NATREX) approach and exchange rate misalignment

Introduced by Karlhans and Stein (1994), NATREX adopts a positive approach like BEER (Behavioural Equilibrium Exchange Rate), but is based on a real exchange rate that ensures balance-of-payments equilibrium, just like FEER (Fundamental Equilibrium Exchange Rate). Unlike competing models, NATREX explicitly distinguishes between medium-term equilibrium (medium-term NATREX) and long-term equilibrium (long-term NATREX). NATREX is based on a rigorous theoretical construction that draws on intertemporal optimization methods under uncertainty to describe the behavior of different agents. NATREX is therefore the real exchange rate that simultaneously achieves internal and external equilibrium in the economy. It is an optimal rate without economic policies being socially optimal or welfare-maximizing. It should be remembered that internal equilibrium is achieved when the economy pursues its non-inflationary growth path, while external equilibrium is synonymous with long-term current account sustainability. Exchange rate misalignments refer to situations where the observed exchange rate deviates from its equilibrium level. Depending on the direction of this deviation, a distinction is made between exchange rate undervaluation and overvaluation. When the exchange rate is quoted at a certain level, undervaluation refers to the situation where the observed exchange rate is below the equilibrium exchange rate. In this case, a nominal appreciation or revaluation is necessary to restore equilibrium. Conversely, overvaluation refers to the situation where the exchange rate is above its equilibrium level. In this case, a depreciation or devaluation restores equilibrium.

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In short, this review of the theoretical literature shows that international competitiveness is determined by two types of factors. Factors directly influencing the external price of goods, known as determinants of price competitiveness and factors affecting the long-term efficiency of exporting sectors, known as determinants of structural competitiveness. All these theoretical analyses shed light on the conduct of economic policy (fiscal policy and monetary policy) and its consequences at national and international level. They also help us to understand the effects of the exchange rate on competitiveness in the CEMAC zone.

2.2. Review of empirical work: Real exchange rate variation and competitiveness

Empirical literature is mixed on the influence of exchange rates on an economy's external competitiveness. Experience in both emerging and developed countries suggests that exchange rate movements generally have significant effects on export (price competitiveness) and import volumes. Some studies show that a variation in the real exchange rate has an effect on competitiveness, while others argue that competitiveness is not a matter of currency value. Some economists maintain that a country's competitiveness is linked to the value of its REER (Achy, 2003; Hoarau, 2000), while others stress that a country's competitiveness is not linked to the value of its REER, but to structural factors such as the business climate, the level of infrastructure, technology and product quality (Djahini, 2015; Delgado et al. 2012).

Fluctuations in exchange rates are the main driving force behind changes in competitiveness, not only because they are much more variable than relative prices, but also because they condition the competitive strategies implemented nationally or at company level (Blot and Cochard, 2011). Thus, central banks use the exchange rate in their monetary policies as a tool for adjusting and rebalancing economic activity and, above all, for stimulating growth. The transmission of exchange rate variations to macroeconomic performance has given rise to debate about their impact, particularly on growth. As shown by various theoretical and empirical studies, the exchange rate is a transmission channel for monetary policy, particularly for countries with a high degree of openness (Benadda, 2016). This channel influences economic growth through three mechanisms: the exchange rate regime (Fränkel and Rose, 2000), exchange rate variability (Edwards 1988) and exchange rate misalignment (Mishkin, 1996). However, the exchange rate cannot be considered as a transmission channel for monetary policy in the CEMAC zone, due to its peg to the Euro.

Ogun (1993) shows that the introduction and maintenance of a policy reducing real effective exchange rate misalignment and the development of a stable exchange rate system were conducive to Nigeria's export growth (excluding oil). In other words, the country's external competitiveness could be improved by greater stability in the value of the currency. It analyzes the competitiveness of Nigeria's exports over the period from 1960 to 1990. The results of estimates based on an equation describing the real effective exchange rate show that an improvement in the terms of trade, an increase in net capital flows, a rise in public spending on non-tradable goods, or excessive credit creation would appreciate the real effective exchange rate. Conversely, greater openness, technical progress and a devaluation of the TCN would lead to a depreciation of the REER.

Achy (2003) carried out a study in Morocco to better understand and even quantify how textile, clothing and leather exports react to changes in price and/or income. The author drew on the model originally presented by Goldstein and Khan. Using OLS, Achy finds that an appreciation of the REER reduces the export potential of Moroccan industries. On the other hand, a depreciation of the national currency favors exports and therefore competitiveness, as shown by Mundell and Fleming's model for which exports are a decreasing function of the REER. Indeed, exports depend on the ratio of internal and external prices, and consequently on the REER.

In addition, Bessone and Heitz (2005), and Deruennes (2005), based on an estimation of this relationship over the short term using an error correction model (ECM), point out that traditional export equations cannot explain the changes in export market shares for France and Germany over the recent period. It is therefore necessary to include variables capturing structural competitiveness in this model.

However, research into the relationship between exchange rates and competitiveness has produced mixed results. For some, a variation (depreciation or appreciation) in the exchange rate has a significant impact on exports. Gan (1997) has shown, using a time-series model, that 10% depreciation in Malaysia's REER generates a 4.7% increase in manufactured exports. Similarly, Chakroun (2002) used the same technique to show that real exchange rate appreciation worsens the competitiveness of Tunisian exports. Héricourt et al (2014) also show that appreciation and depreciation have almost symmetrical effects for French companies. They show that a 10% appreciation/depreciation of the euro leads to a 6% decrease/increase in French exports.

Complementary to this type of explanation, at a more cyclical level, these external deficits could be explained by deterioration in competitiveness, i.e. a possible overvaluation of the currency. Hoarau (2000), for example, had already shown that poor foreign trade performance, resulting in particular from a lack of dynamism on the export side, could be explained by a wide range of factors, including price competitiveness.

Many empirical studies focus on the real effective exchange rate as an explanatory factor for competitiveness. However, there are other factors that can explain an economy's external competitiveness. These include the quality of products sold abroad, their brand image, and the innovation and technology used. Reunion's weak industrial sector has structural reasons linked to its distance from world markets, small size, lack of natural and energy resources, colonial dependence or choice of development strategy (Delgado et al. 2012). Candau & al (2010) show that this country's very high trade deficit and poor foreign trade performance cannot be blamed on a euro that is "too strong", but should lead decision-makers to reflect on the structural causes of an under-performing economic model. This leads them to study Réunion's price competitiveness by calculating and examining the statistical properties of the real effective exchange rate indicator. It emerges that this rate is stationary around a trend and that it does not reveal any significant overvaluation phenomenon.

Similarly, Couppey-Soubeyron (2012) concludes that medium- and long-term competitiveness is not a matter of currency value, but rather depends on the quality of products sold and the ability of companies to export their products. This author points out that, with the same Euro exchange rate, Germany, the Netherlands and Belgium have trade surpluses, while France, Italy and Spain have deficits. This is in line with the findings of Guillou (2008), who showed that the euro's appreciation had no effect on the deterioration in France's competitiveness. In his view, France's loss of

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competitiveness is not due to the appreciation of the euro, but rather to a cost disadvantage relative to competitors whose currencies are depreciating.

Delgado et al (2012) note the importance of infrastructure to a country's economic performance. They find that resource endowments are important to a nation's competitiveness. Using a sample of 130 countries covering the period from 2008 to 2011, they highlight the role of macroeconomic factors as predicted by Porter (1990). They show that political and social infrastructures have a positive effect on a country's competitiveness.

In another study of Hong Kong, Singapore and Taiwan, Mody and Reinjeld (1995) examined the contribution of infrastructure to the competitiveness of economies. Using a number of factor cost and environmental quality indicators, they analyzed the factors leading to business efficiency and competitiveness. These economists came to the conclusion that advances in infrastructure lead to lower procurement costs, higher productivity, shorter delivery times and faster model production cycles. As a result, they deduced that maintaining the competitiveness of manufactured goods in these three countries required an increase in infrastructure construction.

In 2015, Djahini in turn analyzed the main determinants of the international competitiveness of Sub-Saharan African economies using the framework of theoretical analysis developed by Porter (1990), modified by Moon et al. (1998) and adopted by Agbor and Taiwo (2014). The results postulate the existence of a positive link between inflation and the competitiveness of SSA countries, while also revealing that the quality of institutions continues to hinder the competitiveness of African countries. It also reveals a positive link between the initial level of competitiveness and the current state of SSA economies.

With regard to the countries of the CEMAC community, and given the work we have reviewed, very few studies have focused on the effect of the REER on the competitiveness of this economy. However, these studies have very often focused on the misalignment of the REER, without taking into account the other structural and monetary variables that can affect the competitiveness of the economy of the aforementioned zone. Our analysis therefore incorporates factors explaining price competitiveness, mainly through the REER, but also includes a number of structural variables, in order to bring theory closer to reality.

In short, we have come to the conclusion that the notions of REER and competitiveness are very important in the context of macroeconomics and international trade. Our various reviews show that the real effective exchange rate has been the subject of several studies. For some, it has an impact on the economy's competitiveness, for others not at all. The empirical studies presented above not only provide an overview of the literature, but also edify us on model specification and methodology.

3. Data and methodological approach

Our model is based on the economic argument that a country's competitiveness depends on both price and structural factors. Thus, we use a multiple linear regression model in which the evolution of exports depends mainly on the real effective exchange rate and other factors that can affect the competitiveness of an economy at national and international level. We drew inspiration from the work of Achy (2003) in his study carried out in Morocco, which has its origins in that of Goldstein and Khan (1985) and Djahini (2015). The difference with this study lies in the use of a panel of countries allowing us to take into account the six countries of the CEMAC zone over the period from 1987 to 2018, and the introduction of new variables. When trading with countries outside the FCFA zone, the exchange rate of the euro against other currencies is a key determinant of price competitiveness. Indeed, the relative strength of the single currency, in a context of recession, is potentially a factor weighing on price competitiveness for exports denominated in euros or other currencies. To estimate our econometric model, we will employ two robust methods: Feasible generalized least squares (FGLS) and panel-corrected standard errors (PCSE). FGLS and PCSE are both useful methods for dealing with heteroskedasticity and autocorrelation in panel data. The choice between the two methods depends on your research objectives and the structure of your data. By employing FGLS and PCSE methods, we can ensure that our economic model is estimated reliably and robustly, providing valuable insights into the relationships between the variables of interest.

3.1. Nature, data sources and presentation of variables

Our data are all from secondary sources and taken from the World Bank's World development indicator (2019). The data are both qualitative and quantitative in nature. They cover the period 1987 to 2018.

- **Dependent variable: competitiveness (COMP)**

More generally, competitiveness reflects an economy's ability to face foreign competition. Competitiveness on an international scale is a complex and relative concept (Seddi, 2012). In the short term, competitiveness is linked to a country's ability to place its products on the market. In the long term, however, it is about improving living standards for residents. The calculation of a country's competitiveness index is based solely on prices: it is the ratio between the import price index and the producer price index. Due to the absence of data on the competitiveness index in CEMAC countries, it will be captured here by the volume of exports. It has been used in economic literature to capture the external competitiveness of the economy by Achy (2003) and Chiappini, 2011).

- **Independent variables**

Real effective exchange rate (REER): The use of the REER as a measure of the exchange rate is due to the fact that the level of a country's currency cannot be reduced to its exchange rate against a single currency (the dollar, for example). The economic argument put forward for the effect of an exchange rate variation is that the appreciation of a country's currency reduces its price competitiveness and therefore penalizes its exporting companies (Chiappini, 2011).

Openness to trade (OPEN): a measure of a country's degree of dependence on the outside world (Blot and Cochard, 2008). In other words, the openness rate of an economy measures the role played by the rest of the world in a country's economy.

Financial development (M2/GDP, CPRIV): This is captured by the money supply and credit extended to the economy. In our analysis, it is captured by the economy's liquidity rate (M2/GDP) and private credit (CPRIV).

Real interest rate (RIR): To capture the real interest rate variable, Maurizio et al. (2016) use the Central Bank's key rate or the interbank market interest rate, depending on data availability.

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Devaluation (DEVAL): aimed at improving the competitiveness of national production to promote growth, to the detriment of partner countries.

Inflation (INF): this is measured by two indicators: the consumer price index (CPI) and the gross domestic product (GDP) deflator, each with specific characteristics.

Corruption (COR): Ulman (2013), using WEF global competitiveness indicators, shows that corruption has a significant influence on competitiveness.

Public expenditure (DEPENS): Barro (1990, 1991) presents a growth model in which public expenditure plays a driving role (Agenor, 2000). Public spending is traditionally seen as a factor stimulating economic growth. The expected sign is positive.

Population growth rate (TCPOP): A country's competitiveness is not an easy concept to define or measure. Over the years, however, a consensus has emerged that a competitive economy is one that manages to increase the income and prosperity of its population (Denayer and Vandecandelaere, 2012).

3.2. Econometric model and estimation method

For the construction of our model, we have drawn on the work of Achy (2003) and Chiappini (2011) in panel. We regress a series of independent variables on the dependent variable, which is exports relative to GDP.

The econometric model is given as follows:

$$COMPit = \alpha_0 + \alpha_1 TCER_{it} + \alpha_2 OPEN_{it} + \alpha_3 M2/PIB_{it} + \alpha_4 CPRIV_{it} + \alpha_5 TIR_{it} + \alpha_6 INF_{it} + \alpha_7 DEVAL_{it} + \alpha_8 TCPOP_{it} + \alpha_9 DEPENS_{it} + v_i + \mu_t + \varepsilon_{it}$$

v_i, μ_t and ε_{it} are the individual, time and cross-country effects respectively.

The model will be estimated using the Feasible Generalized Least Squares (FGLS) method on panel data and the Panel Corrected Standard Error (PCSE) method. Panel data offer an inescapable advantage because they take into account at least two dimensions, individual and temporal. To obtain a robust result, preliminary and robustness tests will be carried out, following the example of the first and second generation panel unit root tests: Livin Lin Chu test (LLC) and Im, Perasam and Shin test (IPS). In addition to preliminary tests, robustness tests such as homogeneity, heteroscedasticity and Wooldridge autocorrelation will also be carried out.

4. Results and interpretations

This section presents the results of our model estimation, followed by economic interpretations. The results of the stationarity tests show that all the variables in the LLC test, with the exception of the COMP variable, are stationary in first difference. On the other hand, with the IPS test, all variables are stationary (see Appendix 2).

The results in the table below show that the model is globally significant at the 1% threshold. The adjusted coefficient of determination R^2 is equal to 79.88%, so the independent variables explain 79.88% of competitiveness, while the remainder (20.12%) is explained by other variables not included in the model when using the FGLS method. It can also be noted that with the PCSE method, the independent variables explain 71.35% of competitiveness.

The real effective exchange rate (REER) variable has a positive and significant coefficient at the 1% threshold. The positive and significant sign of the coefficient of the REER variable reflects the fact that the competitiveness of the CEMAC zone is strongly affected by the relative price level of its exports. This is contrary to the findings of Achy (2003), who concludes that an appreciation of the REER reduces the export potential of Moroccan industries, but agrees with Guillou (2008). CEMAC countries' weak export performance stems from more than just the euro's appreciation; non-price factors like product quality, infrastructure, and human capital are likely contributing to their challenges. Structural factors such as innovation, product quality and the business environment may explain their poor export performance. Moreover, CEMAC countries are mainly oil exporters. It accounts for 90% of exports in Equatorial Guinea, 85% in Congo, 84% in Gabon, 82% in Chad, and 42% in Cameroon. These statistics explain their vulnerability to global shocks, such as the current oil crisis. As a result, their exports are poorly diversified. By way of illustration, the export diversification index in 2015 was 0.21 in Cameroon, and 0.14 in Congo and Gabon.

The coefficient of the OPEN variable is positive and significant at the 1% level. This variable has a positive impact on the zone's exports. The results show that trade openness is favourable to the competitiveness of the CEMAC zone.

The public expenditure variable (DEPENS) has a negative impact on the competitiveness of the CEMAC zone. The coefficient of the corruption variable (COR) is positive and significant at the 5% level. This result is surprising, given that corruption is an indicator of poor governance and should therefore have a negative impact on exports. This theoretically recognized link is difficult to verify empirically (Shleifer and Vishny, 1993). This can be explained by the fact that corruption is a hidden behavior of individuals and is therefore difficult to measure. The economy's liquidity ratio (M2/GDP) and private credit (CPRIV), which capture the impact of financial development on exports, both have a negative sign.

Nevertheless, private credit has a significant negative impact on growth at a threshold of 10%. Inflation (INF) has a negative and insignificant sign on exports from the CEMAC zone. This shows that an increase in the general price level does not contribute to an economy's competitiveness. The population growth rate (TCPOP) has a negative but insignificant impact on exports from the CEMAC zone. An increase in the number of inhabitants in the CEMAC zone does not appear to have a significant effect on the CEMAC zone's level of competitiveness. The table also reveals that the devaluation (DEVAL) suffered by the countries in this zone had no effect on their competitiveness, as the coefficient of this variable is positive but not significant. It did not produce the expected effects in the CEMAC zone, i.e., boosting exports to balance the trade balance. Although this variable has a positive sign, it is statistically insignificant.

Table. Results of estimating the effect of REER on competitiveness using the MCGF and PCSE methods

Independent variables	Dependent variable : competitiveness (**COMP**)	
	MCGF	**PCSE**
	Coefficients (p-value)	Coefficients (p-value)
TCER	0.22627*** (0.000)	0.5087*** (0.000)

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INF	-0.00002 (0.897)	0.0005 (0.329)
OPEN	0.27285*** (0.000)	1.0807*** (0.000)
DEPENS	-0.80697*** (0.000)	-0.0786* (0.014)
TCPOP	-0.65881 (0.700)	-0.4748 (0. 308)
M2/PIB	-0.08369 (0.627)	-1.9975 (0.327)
CPRIV	-0.26345* (0.089)	-0.0321 (0.193)
DEVAL	0.03145 (0.990)	0.1255* (0.063)
COR	1.5547** (0.025)	1.8255 (0.432)
TIR	0.00815 (0.802)	1.7159** (0.023)
Constant	2.2952 (0.358)	2.1816 (0.026)
Number of observations	96	96
Number of countries	6	6
Wald Chi 2	112.43	375.16
Prob > Chi 2	0.0000	0.000
R^2/ R^2 ajusted	0.8094/0.7988	0.7135
Homogeneity test (prob)	0.0000	0.0000
Hausman test (prob)	0.8515	0.8515
Heteroscedasticity test (prob)	0.0343	0.0343

*, **, *** significant at 10%, 5% and 1% respectively. (...) represent P-values

Source: Authors based on our estimates

This reflects the fact that the zone's competitiveness cannot be explained by the price factor alone. Finally, the real interest rate (RIR) variable has a positive but insignificant impact on the competitiveness of the CEMAC zone. The level of interest therefore plays no significant role in CEMAC zone competitiveness.

5. Conclusion and recommendations

Having arrived at the subject of our study, our aim was to assess the effect of the real exchange rate on the competitiveness of CEMAC zone countries. It emerges that the relationship between the REER and competitiveness is controversial, according to different authors and analytical frameworks. In open economics, the exchange rate is certainly a factor that contributes greatly to a country's external competitiveness, but it seems that the exchange rate is no longer the sole determinant of competitiveness. The mechanisms of mutual influence are not always validated, and the exchange rate is not always a preponderant element in the external competitiveness of CEMAC zone countries. The Feasible Generalized Least Squares (FGLS) and PCSE methods used to estimate our model show that the REER improves CEMAC zone exports (competitiveness). We therefore conclude that a better indicator for measuring competitiveness must incorporate both price and non-price factors. REER alone cannot explain exports from the CEMAC zone. Factors such as trade openness, product quality, governance and spending are often just as important as the strict price competitiveness assessed by the REER. As a guiding recommendation, we suggest that the government of each country set up a competitiveness index tailored to its economy that takes into account factors of economic vulnerability (climatic shocks and socio-political violence) as well as those of economic attractiveness (labour market, infrastructure, human capital, financial capital, political governance and economic governance). In addition to the above, these countries should also establish a productive economic fabric, improving the business environment and developing the financial sector could provide solutions to the problem of competitiveness.

6. References

1. Achy, L. (2003), « Taux de change et potentiel d'exportation; au Maroc cas des industries de textile habillement et cuir », *Working Paper n°318,* Economic Research Forum.
2. Agbor J. A. and Taiwo O. (2014), ''The Fundamental Determinants of Competitiveness in African Countries'' *ERSA working paper 463*, September 23, 2014
3. Agbor J. A. et Taiwo O. (2014), « The Fundamental Determinants of Competitiveness in African Countries », Working Papers 463, Economic Research Southern Africa.
4. AYONGWA ANYE Priscilla., KENKOUO Guy Albert., NAFE DABA., OMBA EBIKILI Claise Borgia., MBOHOU Louisa Christelle (2020), « Confection et pertinence des indicateurs de compétitivité durable dans la CEMAC », Etude thématique 2020, -BEAC ET N°01/20-
5. Balassa B. (1985), «Exports, Policy Choices and Economic Growth in Developing Countries After the 1973 Oil Shock», *Journal of Development Economics,* mai-juin, 23-36
6. Barro, R. J.,and X. Sala-I-Martin (1997), Technological Diffusion, Convergence, and Growth, *Journal of Economic Growth*, 2(1), 1–26, 1997. 7
7. BEAC (2018) « Rapport annuel 2015 »
8. Benadda Mokhtaria (2016), « Taux De Change Et Croissance Economique : Une Analyse En Modele Var Du Canal Du Taux De Change : Cas De L'Algerie », Revue algérienne d'économie et gestion Volume 10, Numéro 3, Pages 117-138
9. Béreau S., Villavicencio A.L., Mignon V. (2012), "Currency misalignments and growth: a new look using nonlinear panel data methods", Applied Economics, 44, 27, p.p. 3503- 3511.
10. Bessone, A.-J. et B. Heitz (2005), « Exportations : Allemagne 1- France 0 », Note de conjoncture de l'INSEE : 16-22
11. Blot C. Et Cochard M. (2011), "La compétitivité de la France : mythes et réalités", Revue de l'OFCE, n°322 du 6 juillet 2010.

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DOI: 10.5281/zenodo.16788579

12. Blot c. et m. Cochard (2008), « L'énigme des exportations revisitées. Que faut-il retenir des données de panel? », *Revue de l'OFCE, 3(106)* : 67-100
13. Blundell, R., and S. Bond (1998), ''Initial conditions and moment restrictions in dynamic panel data models'', *Journal of Econometrics*, 87(1), 115–143, doi: 10.1016/S0304 4076(98)00009-8, 1998.
14. Candau, F., Goujon, M., Hoarau, J-F. et Rey, S. (2010), « Taux de change réel et compétitivité de l'économie réunionnaise », CERDI, Etudes et Documents, E 2010.29..
15. CEMAC (201) « Rapport annuel 2015 »
16. Chiappini, (2011), « comment mesurer la compétitivité structurelle des pays dans les equations d'exportation ? post-print halshs-00853434, HAL
17. Couharde, C., I. Coulibaly, and O. Damette (2012), ''La dynamique d'ajustement des taux de change réels dans la zone franc CFA'', *Revue économique*, 63(3), 545–555, 2012. 13
18. Couharde C. Et Al. (2013), "Revisiting the theory of optimum currency areas: Is the CFA franc zone sustainable?", Journal of Macroeconomics, 38, PB, p.p. 428-441.
19. Coulibaly I., Gnimassoun B. (2013) – Optimality of a monetary union: New evidence from exchange rate misalignments in West Africa, Economic Modelling, 32, C, p.p. 463-482.
20. Delgado M. et Ketels C.H.M. (2012), « The Determinants of National Competitiveness », Working paper series NBER.
21. Delgado, M., Ketels, C., Porter, M. E., And Stern, S. (2012), "The Determinants of National Competitiveness," NBER Working Paper, 18249, 2-36.
22. Denayer et Vandecandelaere, (2012), « les defis de la competitivité : reflets et perspectives de la vie economique », LI, 5-9
23. Deruennes, A. (2005), « Quelle lecture faire de l'évolution récente des exportations…….
24. Djahini E. (2015), ''The main determinants of international competitiveness in SubSaharan'', Africa Universite de Lome, 13 June 2015
25. Dorner, Alexander. 1958. The Way Beyond "Art." New York, N.Y.: New York University Press.
26. Edwards S. (1988), Exchange rate misalignment in developing countries, Baltimore, Johns Hopkins University Press.
27. Edwards S. (1989), Exchange rate misalignment in developing countries, Baltimore, Johns Hopkins University Press.
28. FMI (2015) « Rapport annuel 2015 du FMI », Unis face aux défis
29. Frankel, J. A. and Rose, A. K.(2002), "An estimate of the effect of common currencies on trade and income". Quarterly Journal of Economics, 117 (2), 437-466.
30. Grekou, Carl (2015) "Revisiting the nexus between currency misalignments and growth in the CFA Zone," Economic Modelling, Elsevier, vol. 45(C), pages 142-154.
31. Guillaumont-Jeanneney S.G. (1988), « Dévaluer en Afrique *? », Revue de l'OFCE, 25,* 1, p.p. 123-143.
32. Guillou, S. (2008), « Pourquoi les entreprises françaises souffrent-elles de la force de l'Euro? », *Lettre de l'OFCE* n°295, février.
33. Hausmann, R., L. Pritchett, and D. Rodrik (2005), ''Growth Accelerations'', *Journal of Economic Growth,* 10(4), 303–329, 2005.
34. Heckscher, E. (1919). "The Effect of Foreign Trade on the Distribution of Income"; Ekonomisk Tidskrift, 21, 497-512.
35. Héricourt, J., Martin, P. et Orefice, G. (2014), Les exportateurs français face aux variations de l'euro, la lettre du CEPII n°340, 4pages.
36. Hoarau, J.F. (2000), "Les exportations: un moteur possible pour la création d'emplois", Economie de La Réunion, 105, troisième trimestre, pp. 6-8
37. Karlhans Sauernheimer & Jerome L. Stein, 1994. " The Real Exchange Rates of Germany," CESifo Working Paper Series 68, CESifo.
38. Keungne Kouotang et Ousman Aboubakar (2014), ''Croissance monétaire, Croissance réelle et Inflation dans l'Union Monétaire d'Afrique Centrale: Quelques évidences empiriques'', *BEAC Working Paper BWP N° 03/15,* Novembre 2014
39. Keynes, J. M. (1936), « Théorie générale de l'emploi, de l'intérêt et de la monnaie » (livres I à III)
40. Krugman P. (1984), « Import Protection as Export Promotion: International Competition in the Presence of Oligopoly and Economies of Scale », in KIERZKOWSKI H. (éd.), Monopolistic Competition and International Trade, larendon Press, Oxford
41. Krugman, P. (1994), «Competitiveness: A dangerous Obsession » Foreign Affairs.
42. Lafay G. (1997), «Distorsions monétaires et commerce», Revue française d'économie, XII (4), automne, 123140.
43. Lahrèche-Revil Amina (1999) "Taux de change réel et croissance: Perspectives pour une zone euro en Méditerranée. In: *Revue d'économie financière, n°52, 1999*. L'euro et lfinancement de la croissance en Méditerranée. pp. 117-132. doi : 10.3406/ecofi.1999.3533
44. Lassana Yougbare (2019) ''Effets macroéconomiques des régimes de change: Essais sur la volatilité, la croissance économique et les déséquilibres du taux de change réel'' thèse de Doctorat, Université d'Auvergne, Clermont Ferrand, FSEG, Centre d'Etudes et de Recherches sur le Développement International (CERDI)
45. Lassudrie-Duchêne B. (1971), « La demande de différence et l'échange international, Economies et sociétés », Cahiers de l'ISMEA, Vol. 5.1971, 5, pp. 961-982
46. Lucas R. E. (1988), « On the mechanics of economic development », Journal of Monetary Economics, n°22 pp 3-42.
47. Maurizio Michael and al, (2016), "The Real Exchange Rate and Economic Growth: Revisiting the Case Using External Instruments", *Working Paper Series*, European Central Bank, N°1921, June 2016.
48. Mishkin Frederic (1996), « Les Canaux De Transmission De La Politique Monétaire », Bulletin de la Banque de France N°27, Mars 1996.
49. Moon H.C., Rugman A.M. et Verbeke A. (1998), « A Generalized Double Diamond Approach to the Globalized Competitiveness of Korea and Singapore», International Business Review, Vol. 7, pp. 135–150.
50. Mundell R.A. (1963) "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates", *The*

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DOI: 10.5281/zenodo.16788579

Canadian Journal of Economics and Political Science / Revue canadienne d'Economique et de Science politique, 29, 4, p.p. 475-485.
51. Ogun (1993), « Nigeria's Trade policies during and after the oil boom: appraisal" Economy university Press, Ibadan.
52. Ohlin B. (1933), « Interregional and International Trade », Harvard University Press, Cambridge, Mass., édition revue, 1968.
53. Porter M. E. (1990), « The Competitive Advantage of Nations », Harvard Business Review
54. Raffinot, M. et Venet, B. (2003). La balance des paiements. La Découverte, Paris
55. Ricardo D. (1817), « Principes de l'économie politique et de l'impôt », trad. franç, Calmann-Lévy, Paris, 1970.
56. Rivera-Batiz L. et Romer P. (1991), « Economic Integration and Endogenous Growth », The Quarterly Journal of Economics, vol. 106, issue 2, 531-555
57. Rose, A. K. (2000). One money, one market: The effect of common currencies on trade. Economic Policy, 30, 7-33.
58. Seddi Ali (2012), « compétitivité économique : quel potentiel pour l'Algérie? », université de Mohamed Ben Ahmed d'Oran 2, 2012
59. Ulman, S. (2013), "Corruption and National Competitiveness in Different Stages of Country Development," Procedia Economics and Finance 6 (2013) 150 – 160
60. Zafar A. (2005) ''the Impact of the Strong Euro On the Real Effective Exchange Rates of the Two Francophone African CFA Zones'', Rochester, NY, Social Science Research Network

7. Appendices

Appendix 1: Table of selected variables and sources

Variables	Meaning	Sources	Authors
TCER	Real effective exchange rate	WDI	Chiappini (2011)
OPEN	Trade openness	WDI	Blot et Cochard (2008).
M2/PIB	Liquidity rate of the economy	WDI	Chiappini (2011)
TIR	Real interest rate	WDI	Maurizio et al. (2016)
DEVAL	Devaluation	WDI	Guillou (2008)
INF	Inflation	WDI	Seddi (2012)
DEPENS	Public expenditure	WDI	Denayer et Vandecandelaere (2012)
CPRIV	Private credit	WDI	Chiappini (2011)
COR	Corruption	WDI	Denayer et Vandecandelaere, (2012)
TCPOP	Population growth rate	WDI	Denayer et Vandecandelaere (2012)
COMP	Exports to GDP ratio	WDI	Seddi (2012), Achy (2003) et Chiappini (2011)

Source: Author based on exhaustive literature

Appendix 2: Results of the Levin Lin and Chu and Im Pesaran Shu stationarity tests

Variables	Test Levin – Lin - Chu			Test Im - Pesaran - Shin		
	LLC Cal	Probabilité	Décision	IPS Cal	Probabilité	Décision
COMP	-4.2342	0.1292	I(1)	-2.2480	0.0694	I(0)
TCER	-	-	-	-2.3803	0.0217	I(0)
INF	-10.001	00000	I(0)	-5.8907	00000	I(0)
OPEN	-4.4596	0.0022	I(0)	-2.6600	0.0212	I(0)
DEPENS	-4.5730	0.0150	I(0)	-1.9978	0.0874	I(0)
TC POP	-5.0440	0.0711	I(0)	-2.1735	0.0741	I(0)
M2/PIB	-4.4678	0.0771	I(0)	-1.9964	0.10231	I(0)
CPRIV	-5.0220	0.0162	I(0)	-1.9883	0.0636	I(0)
DEVAL	-4.3152	0.0139	I(0)	-1.9939	0.0555	I(0)
TIR	-9.2745	0.0000	I(0)	-4.4953	0.0000	I(0)
COR	-7.4452	0.0029	I(0)	-2.6998	0.0392	I(0)

Source: Author based on estimates

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Appendix 3: Variable descriptions

Variables	observations	Mean	Std. Dev.	Min	Max
COMP	192	44.56376	29.96731	4.540122	124.3932
TCER	192	109.335	26.71691	70.11577	208.3888
INF	192	203.4891	1960.141	-33.78553	26762.02
OPEN	192	116.2156	74.31894	25.71045	300
DEPENS	192	11.49673	6.195898	2.2877	39.71343
TC POP	192	2.75904	.6100051	1.576261	6.247093
M2/PIB	192	15.4224	5.086172	4.827053	30.7871
CPRIV	192	8.739509	6.389342	.6827951	32.46814
DEVAL	192	.71875	.4507847	**0**	**1**
TIR	192	10.48674	5.105892	5.5973	20.01345
COR	192	.8024297	.1142321	.5256655	.9325655

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