The Fundamental Determinants of International Competitiveness in African Countries with Special Reference to the CFA Franc Zone

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Abstract

This study evaluates the competitiveness of African countries. In contrast to the macroeconomic perspective which focuses on the behavior of the real exchange rate, the framework adopted in this study emphasizes the fundamental determinants of a country's ability to maintain competitive advantage in international markets through high-value production and economies of scale while at the same time raising the standard of living of its citizens. The study reviews existing measures of competitiveness and in the empirical section analyzes the proposed measure – trade weighted relative GDP per capita. The empirical approach estimates OLS, fixed and random effects models explaining the dependent variable by a set of price and non-price factors using a panel dataset of 40 African countries during 1980-2011. The results suggests that CFA franc zone countries aren't necessarily less competitive than their sub-Saharan African peers and the factors that undermine competitiveness in the franc zone are poor infrastructure, heavy external debt burden, high domestic demand pressures and greater trade openness. Thus, to improve competitiveness, franc zone states must maintain a stable macroeconomic framework, vigorously curb informal cross-border trade with its neighbors while striving to upgrade the quality of its infrastructure and institutions.

1.0 **Introduction**

International competitiveness is a concept that has gained prominence in analyzing countries' external macroeconomic performance and advantage[1]. Countries are increasingly evaluating their competitiveness in global markets and trying to provide empirical explanation with respect to the fundamentals that drive their international competitiveness. This is particularly important for African countries most of which are small open economies aiming to provide their citizens with opportunities to improve their living standards and quality of life through employment and productivity gains[2] (Ramirez and Tsangarides, 2007). This study aims to use an appropriate framework and suitable measurement indices to uncover the fundamental determinants of international competitiveness in African countries.

Scott (1985) defines national competitiveness as "a nation state's ability to produce, distribute, and service goods in the international economy in competition with goods and services produced in other countries, and to do so in a way that earns a rising standard of living". Fagerberg (1988) defines competitiveness as the ability of a country to achieve the twin goals of raising the standard of living of its citizens by way of sustained growth in income and employment, and doing so without running into balance of payment difficulties. The OECD Program on Technology and the Economy (1992) defines competitiveness as "the degree to which, under open market conditions, a country can produce goods and services that meet the test of foreign competition while simultaneously maintaining and expanding domestic real income" (p. 237). These definitions suggest that competitiveness is more a matter of strategies than it is about endowments (Scott 1985). In other words, they emphasize competitive advantage through high value production and economies of scale rather than comparative advantage based on resource endowments.[3]

In effect, competitiveness could be defined as the ability of a country to achieve sustained inclusive growth under stable macroeconomic conditions. This definition is consistent with the frameworks underlying the annual competitiveness rankings and reports including the Global Competitiveness Report (GCR) of the World Economic Forum (WEF), the World

[1] Measures and determinants of international competitiveness are becoming hot topics in academic and policy circles. As Ramirez and Tsangarides (2007) posit, competitiveness analysis is about identifying the elements necessary to ensure sustainable growth and improvement in living standards.

[2] Productivity is therefore a driver of economic growth and important as both determinant and indicator of competitiveness.

[3] This also marks the distinction between the new trade theory that emphasizes increasing returns to scale production and the conventional trade theory of comparative advantage.

Competitiveness Scoreboard of the International Institute for Management Development (IIMD) as well as the African Competitiveness Report (ACR).

Economic research on competitiveness in Africa has focussed mainly on the CFA franc zone, probably due to the fixed exchange regime operational in those countries. However, most of these studies have relied on the macroeconomic framework which does not explicitly account for the role of non-price factors in competitiveness. Our study makes two important contributions to the literature. First, we identify an appropraite competitiveness framework and measurement indice which incorporates both relative price-cost factors as well as non-price factors. Second, our framework attempts to incorporate an analysis of the potential impact of trade with non-CFA members (neighborhood effects) on the competitiveness of franc zone economies - an approach that is relatively new in the literature, to the best of our knowledge.

1.1 **Motivation**

Despite relatively stable macroeconomic environments, Africa as a region lags behind other regions of the world in all the global competitiveness rankings. After a period of slow growth from late 1970s into early 1980s, African countries, during late 1980s through early 1990s, began implementing sound macroeconomic policies with the view that a stable macroeconomy would create the conditions for investment and growth. Despite the stable macroeconomic environment achieved through the 1990s, the expected growth outcomes did not manifest. Indeed the 1990s is commonly referred to as the "lost decade" in African policy circles. Subsequently, African countries recorded impressive macroeconomic performance in the 2000s evident in low inflation rates, improved current account positions and relatively high rates of economic growth. However, these performances were accompanied by rising unemployment and poverty rates, and the lack of productivity growth in most sectors.[4]

In essence, African countries did undergo three different regimes between 1970 and 2012: (1) a period of macroeconomic instability coupled with slow growth between 1970 and early 1980s; (2) a period of relative macroeconomic stability coupled with slow growth during the late 1980s and 1990s; and (3) a period of macroeconomic stability accompanied with high growth but also

[4] A rational explanation for this recent experience is that Africa rode on the back of China and other BRICS countries to achieve the growth records rather than experience some endogenous growth across the continent. Thus, while demand for Africa's resources and high commodity prices drove GDP, the structural drivers of competitiveness were largely unchanged. This also logically explains the unemployment and poverty dynamics. Although African countries experienced youth bulge in their labor markets to varying degrees, it is also the case that job creation rates were anemic across the continent as growth was not centered on value addition arising from efficient resource re-allocation toward higher value-addition activities.

with rising unemployment and stagnating or rising poverty rates since the new millenium. The last two of these regimes present paradoxes that bring into question the relative role of macroeconomic performance in Africa's competitiveness as well as the relevance of existing approaches to analyzing competitiveness. It does seem policies are yet to address the fundamental determinants of competitiveness on the continent.

Nowhere on the African continent is this paradox more evident than the CFA franc zone (henceforth, franc zone). The currency board-type fixed exchange regime in existence in the *zone* since 1946 has undoubtedly contributed to low inflation and sound external positions over several decades. Yet the relatively sound macroeconomic performance has not translated into substantial growth in per capita incomes, lower unemployment rates and improved living standards of the population of these countries.

In a bid to explain this paradox, scholars and commentators have argued that fixed exchange regimes are inherently uncompetitive and as a result, much of the blame for lack of competitiveness of the franc zone compared to other African countries has been levied on the exchange regime in place (Monga, 1997; Amin, 2000; Nubukpo, 2012). Over and above the usual pecularities of fixed exchange regimes, these authors argue that the specific design of the franc zone has also inhibited competitiveness.

To examine the utility of this argument, we compare the performance of the franc zone (which consists of the CEMAC and WAEMU groups of countries) with carefully selected comparator groups of African countries. We begin by noting the heterogeneity that exists within the franc zone itself. The CEMAC (Communauté Economique et Monétaire d'Afrique Centrale) economies, which comprises Cameroon, Gabon, the Central African Republic, the Republic of Congo, Equatorial, Guinea and Chad, are dominantly oil exporters. On the other hand, the WAEMU (West African Economic and Monetary Union) economies, which comprises Benin, Burkina Faso, Côte d'Ivoire, Senegal, Togo, Mali, Niger and Guinea-Bissau, export mainly agricultural products.

To facilitate the illustration, we compare the CEMAC zone with flexible-exchange rate oil-exporting African economies which include the Democratic Republic of Congo (DRC), Nigeria, Angola, Sierra Leone, Uganda and Mozambique[5]. Similarly, we compare the WAEMU zone with Ghana (during the time-frame of our study), Guinea, Malawi, Zimbabwe, Ethiopia, Kenya,

[5] We label this group as CEMAC-C, short for CEMAC Comparators.

Tanzania and Gambia[6]. In the following section, we compare economic, social, and other structural indices of these groups of countries. As much as possible, we make the comparison over four different periods or regimes: (1) the period 1970-1985 during which the franc zone enjoyed stable macroeconomic conditions while the comparator groups experienced instability; (2) the period 1986-1993 during which most African countries went through structural adjustment programs; (3) the period 1994-1999 during which the Franc CFA was devalued but remained pegged to the French Franc; and (4) the period after 1999 during which the Franc CFA became pegged to the Euro.

1.1.1 Macroeconomic Performance

Figure 1 presents inflation data. As expected, inflation rates were in very low digits in the franc zone economies but higher in the flexible exchange counterparts. In particular, oil exporting countries in CEMAC seem to have benefited most from the fixed exchange regime as inflation rates, on average, shot up from about 350% to above 1100% between 1986-1998 and 1994-1999 in the flexible exchange CEMAC-C block.[7] Inflation rates remain much lower in the franc zone when compared to the flexible exchange rate economies even in their post-adjustment phase (2000-2011)

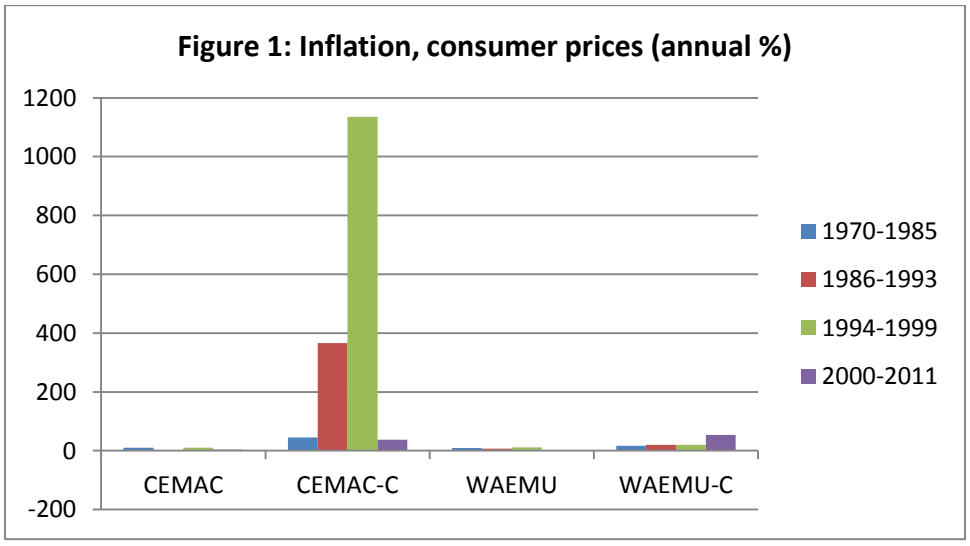


Figure 2 presents average per capita GDP for countries in each grouping. We observe that, in per capita income terms, CEMAC performed significantly better than the comparator economies

[6] This group of countries is labelled as WAEMU-C.

[7] The extreme inrease in inflation is driven largely by two countries: the Democratic Republic of Congo where inflation rate reached a peak of 23773 percent in 1994 and Angola where it reached 4145 percent in 1996

while the performance of WAEMU was not distinguished from those of the comparator economies. In addition, the pattern of changes in per-capita GDP is similar for all the four blocks: it decreased between 1970-1985 and 1986-1993 periods, and rose between 1994-1999 and 2000-2011 periods. The main difference is that the increase during the last period was far more pronounced in CEMAC than in CEMAC-C whereas the changes were not different between WAEMU and WAEMU-C. Thus, not only did CEMAC perform better than its comparators on levels, it also performed better in growth terms.

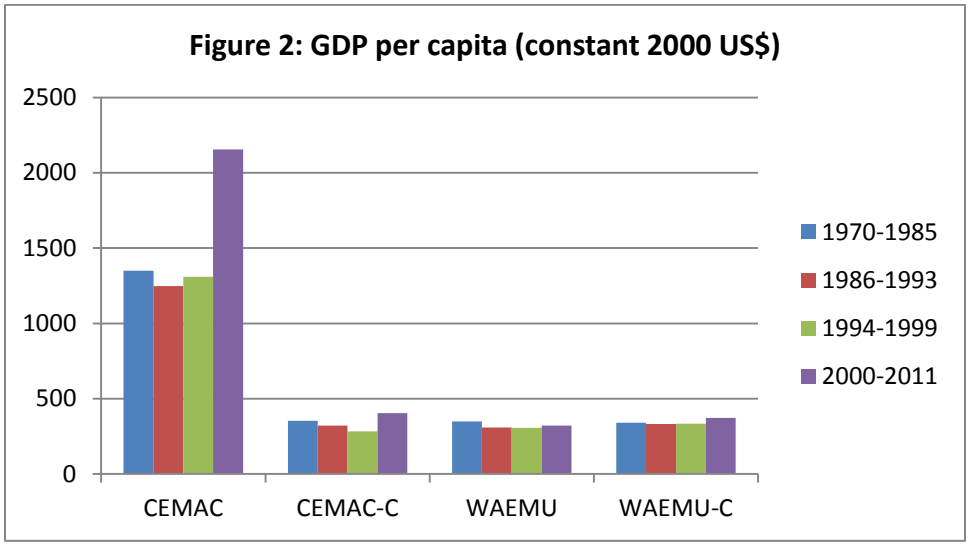
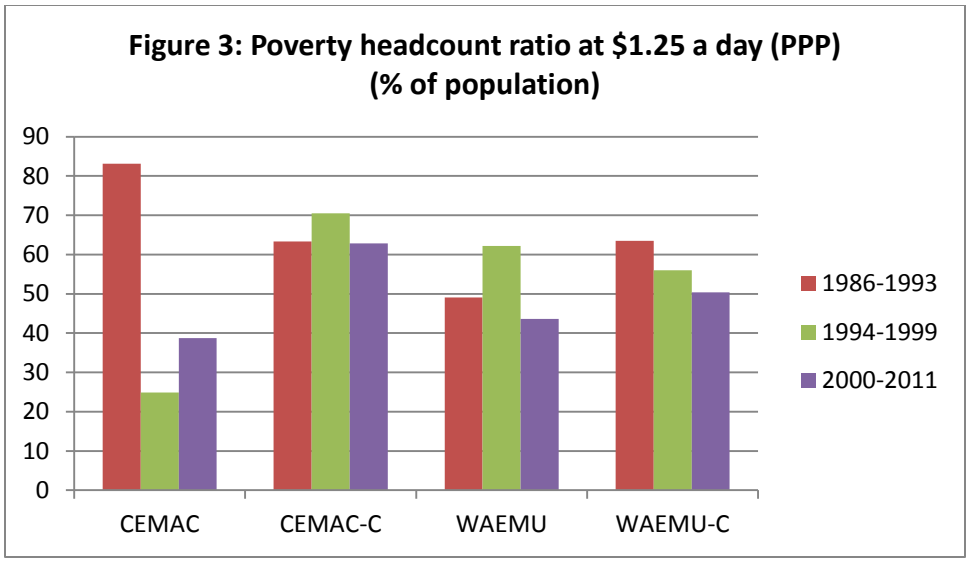


Figure 3 presents data on a measure of poverty. In CEMAC, a slight increase in per-capita GDP between 1986-1993 and 1994-1999 was associated with a large decrease in poverty headcount but a large increase in per-capita GDP between 1994-1999 and 2000-2011 was accompanied by increase in the rate of poverty. The reverse is true for CEMAC-C, where modest decrease in per-capita GDP was associated with modest increase in poverty and modest increase in per-capita GDP was associated with modest decrease in poverty. For WAEMU and their comparators, whereas there are no significant differences between the groups in terms of changes in per-capita GDP, poverty initially rose and fell afterward in WAEMU but has been falling over time in WAEMU-C. This contradictory pattern of changes in poverty rates between CEMAC and WAEMU, compared to their respective comparators, suggests that poverty reduction programs account in large part for the observed different dynamics rather than the conventional wisdom that economic growth reduces poverty.



Human Development

We present evidence on four dimensions of human development namely, infant mortality rates, life expectancy at birth, adult literacy rates and age dependency ratio. From figure 4, in spite of the continual decline in infant mortality rates across African countries, CEMAC performed better than CEMAC-C while WAEMU performed worse than WAEMU-C. In respect to life expectancy in Figure 5, CEMAC clearly does better than CEMAC-C while WAEMU performed worse than WAEMU-C in history but caught up in the most recent period. In respect to adult literacy rates in Figure 6, CEMAC currently outperforms CEMAC-C while WAEMU underperforms relative to WAEMU-C. In Figure 7, given that African countries are generally young, the data on age dependency ratio shows that CEMAC is clearly ahead of its comparators in the demographic transition process while WAEMU is behind its comparators and CEMAC. The combination of a larger working population ratio and higher literacy rates places CEMAC in a potentially more competitive position than its comparators while the reverse is true for WAEMU.

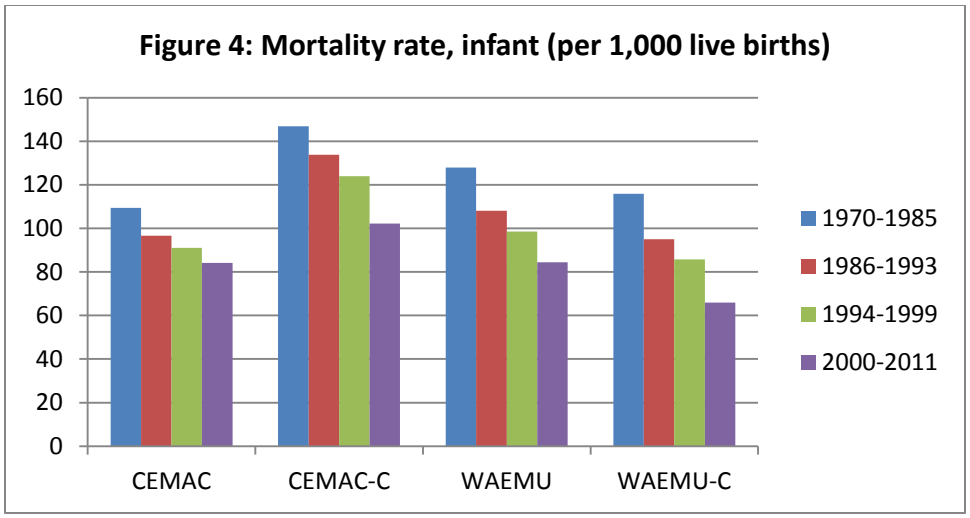


Figure 4: Mortality rate, infant (per 1,000 live births)
160
140
120
100
80
60
40
20
0
CEMAC
CEMAC-C
WAEMU
WAEMU-C
1970-1985
1986-1993
1994-1999
2000-2011

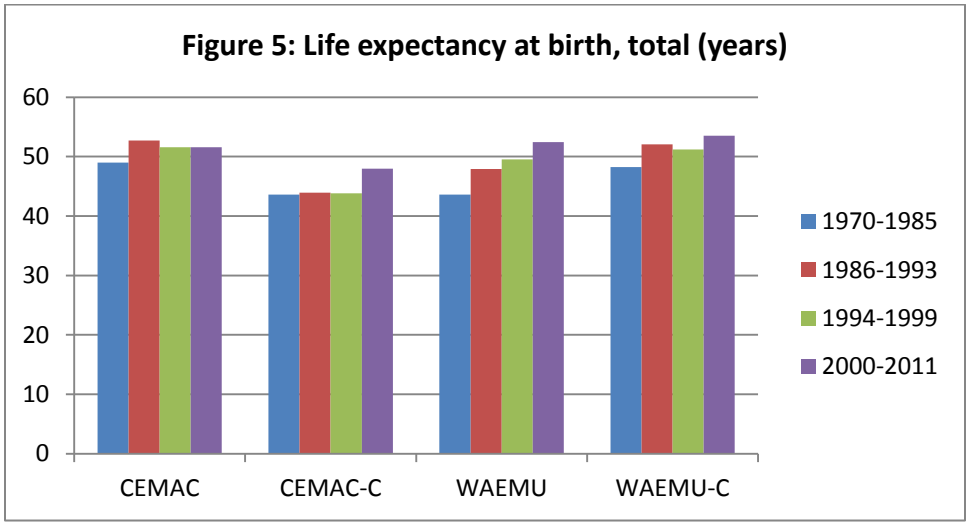


Figure 5: Life expectancy at birth, total (years)
60
50
40
30
20
10
0
CEMAC
CEMAC-C
WAEMU
WAEMU-C
1970-1985
1986-1993
1994-1999
2000-2011

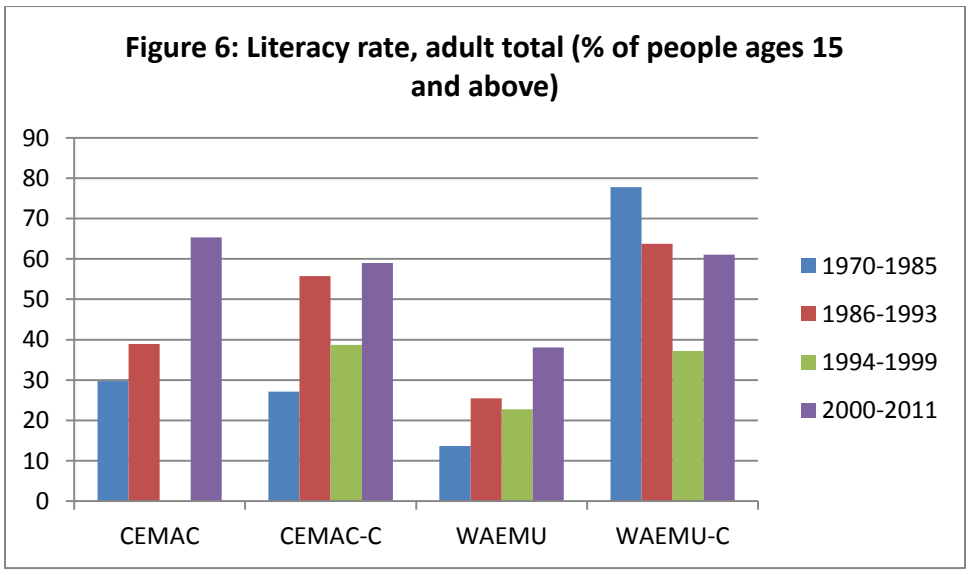
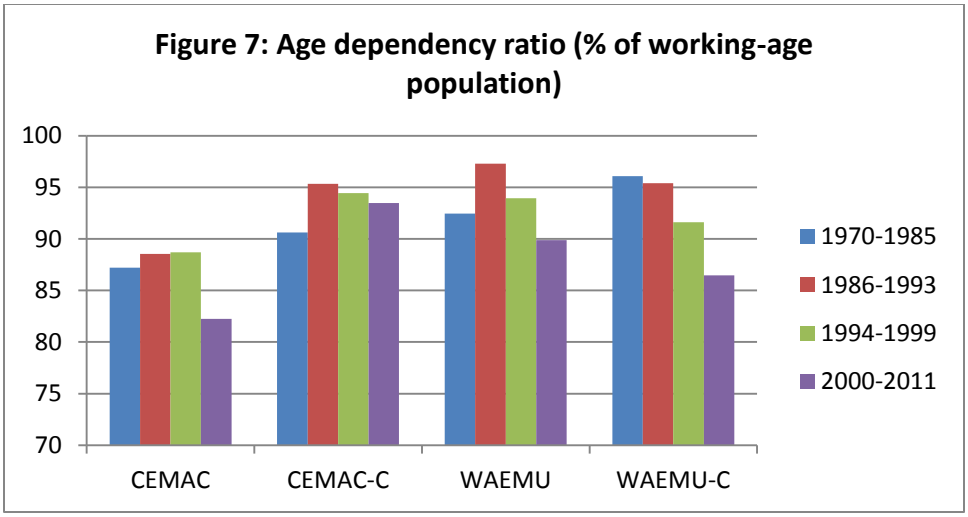
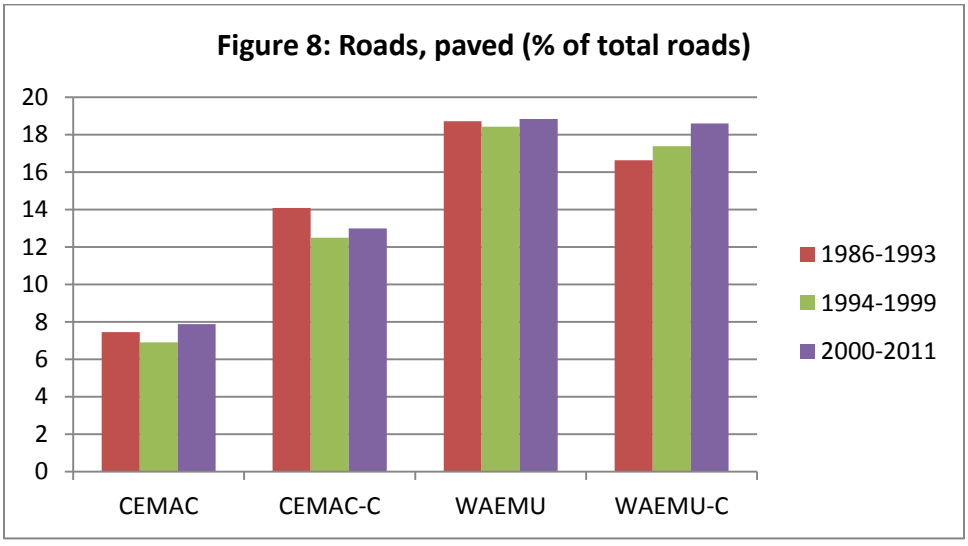


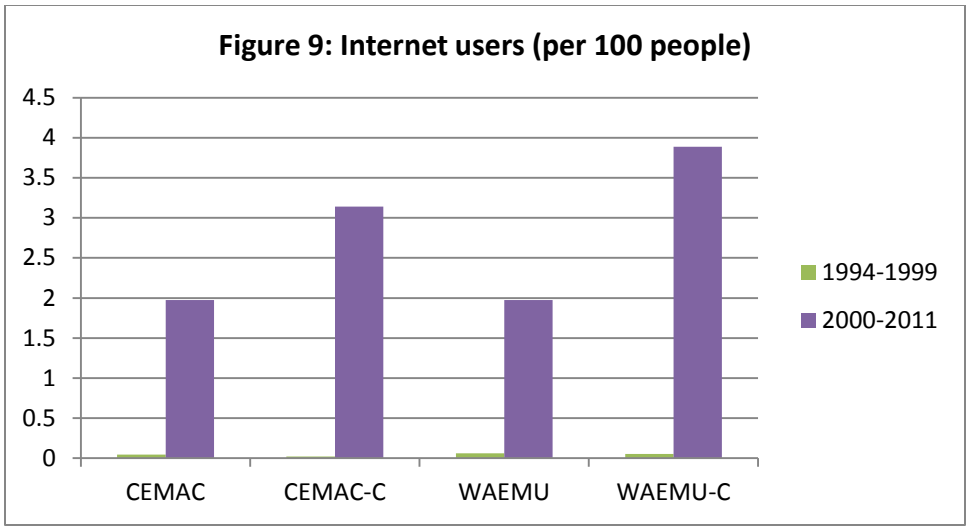
Figure 6: Literacy rate, adult total (% of people ages 15 and above)
90
80
70
60
50
40
30
20
10
0
CEMAC
CEMAC-C
WAEMU
WAEMU-C
1970-1985
1986-1993
1994-1999
2000-2011

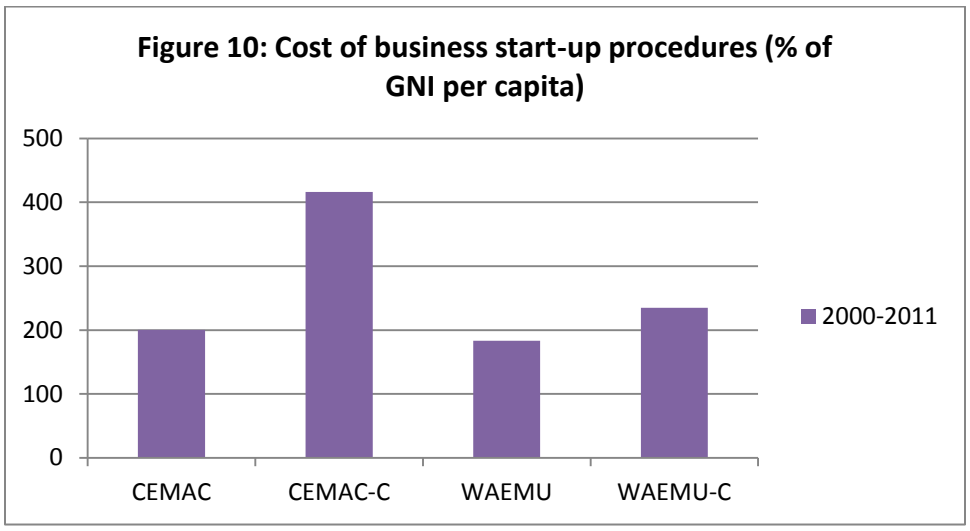


Infrastructure and Business Environment

The stock of paved roads in Figure 8 is one category of outcomes where CEMAC underperforms relative to CEMAC-C while WAEMU did slightly better than WAEMU-C historically but lost the edge in the most recent period. The rate of internet subscription is lower for both CEMAC and WAEMU relative to their comparators as Figure 9 shows. The evidence in Figure 10 suggests it is probably much cheaper to start a business in the franc zone countries than elsewhere in sub-Saharan Africa. However, once started, the business enviroment, as determined by the state of infrastructure and other components, is likely to make the franc zone less competitive for firms in comparsion to other SSA economies. The relatively poor state of infrastructure in the franc zone (particularly in CEMAC) could be one of the reasons for the lack of competitiveness of franc zone economies.







The evidence presented in Figures 1 to 10 suggests that the fixed exchange regime (and potential exchange rate misalignments) might not be a sufficient justification for the failure of franc zone countries to improve the living standards of their citizens. In fact, better performance of CEMAC on all measures of human development relative to CEMAC-C does suggest that the fixed exchange regime might have been beneficial to CEMAC countries. While demographic realities and systemmatic capacity differences could contribute to performance differences between CEMAC and WAEMU, neighborhood effects in the monetary union as well as the poor state of infrastructure are factors that could limit competitiveness of the franc zone.

Thus, while competitiveness research and policies have focused mainly on the real exchange rate, the preceding discussions suggest the imperative of incorporating non-price factors into

the analysis as well. This calls for an alternative aproach to analyzing competitiveness that is different from the macroeconomic framework.

1.2 **Statement of the Problem**

Existing systemmatic research on competitiveness adopts the framework in which improvements in unit labor cost (ULC) relative to the rest of the world leads to increases in the volume of trade in international markets, and a competitive (low) real effective exchange rate (REER) attracts foreign demand and thus leads to increases in a country's share of world market. In this framework, overvaluation of a country's currency (a manifestation of REER misalignment) results in loss of economic competitiveness. The same happens when the ULC exceeds or grows faster than the real value added per worker. Therefore, explanations for loss in competitiveness have always been sought from the underlying causes of movements in the REER and the ULC.

This framework however faces three main challenges when applied to African countries. First, the framework is suitable for economies that export manufactured goods rather than those that export raw materials. This is because prices of raw materials are largely determined in international markets and as such, not significantly influenced by producers' ULCs. In other words, export demand for primary products neither depends on domestic cost of production nor the exchange rate, but on international market prices. Given that most African countries export mainly raw materials, this framework is of little use. Second, improvements in non-price factors, which may raise the level of productivity in the economy, may not lead to increase in the volume of international trade but may instead show up in improvements in the terms of trade (Durand and Giorno 1987, p. 148). This may be more important for developing countries with large non-traded sectors and may cause the REER to miss important gains in competitiveness. Third, movements in the REER of small open economies hardly reflect the exact state of countries' competitiveness owing to the preponderant influence of external shocks (favorable and unfavorable) arising from both international goods and capitals markets[8]. This raises the likelihood that REER changes reflect more of the *symptoms* than the underlying causes of uncompetitiveness in these economies.

[8] For instance, expenditure-switching adjustment policies that were pursued in the late 1980s by African states in response to adverse external shocks to their economies inevitably produced large exchange rate appreciations with consequent loss in competitiveness. On the other hand, oil-exporting countries facing oil price increases inevitably face exchange rate appreciations or the dutch disease. The negative impacts of these exchange appreciations on competitiveness have however persisted due to the sluggish speed of adjustment in these economies.

1.3 Research Objectives

The foremost objective of this research is to identify an appropriate framework for analyzing competitiveness in African countries. The second objective is to develop an alternative analytic measure of competitiveness that are consistent with this framework and to compare its performance with the performance of existing measures. The third objective is to apply the framework to the franc zone in order to analyze the contributory impacts of fixed exchange rate pegging and neighborhood spill-over effects.

1.4 Justification

After a decade of growth that is driven by high commodity prices, African governments and policymakers are increasingly developing plans to achieve sustained economic growth by improving competitiveness and moving their economies toward higher productivity sectors and activities. From a policy perspective, it is pertinent that analysis of competitiveness be carried out using models that are suitable to the state and structure of African economies. This justifies the search for a suitable framework for analysis of competitiveness in African countries.

2.0 Literature Review

2.1 Theoretical Literature

Policymakers, scholars and analysts consider competitiveness as an important goal. However, there are as many views as to the definition of competitiveness as there are approaches for analyzing the concept. Nonetheless, three broad perspectives stand out in the literature namely, the macroeconomic, international competition, and business strategy frameworks. A detailed discussion of each of these and other relevant frameworks is provided below.

2.1.1 The Macroeconomic Perspective

The macroeconomic perspective originates from macroeconomic theory and policy and is notably influenced by the framework outlined in Corden (1994) and Boltho (1996). In this framework, competitiveness entails maintaining internal and external balance in the short-run (Wignaraja 2005). Internal balance is usually defined in terms of full employment (the lowest possible rate of unemployment that is consistent with an acceptable rate of inflation) while external balance is defined in terms of current account equilibrium (or some desirable level of the current account). In this context, international competitiveness is defined as the level of the

real exchange rate that, in combination with the requisite domestic economic policies, achieves internal and external balance (Boltho 1996). Thus, competitiveness policy is synonymous with exchange rate policy and competitiveness is more or less equated to the behavior of the real exchange rate. This approach emphasizes the exchange rate as the strategic variable and hinges on the link between the real exchange rate, balance of payments, resource allocation across sectors and competitiveness. For example, large current account deficits are related to exchange rate appreciations which in turn hamper the competitiveness of the tradables sectors of the economy (Wignaraja, 2005).

Economic theory (in particular trade theory) defines the real exchange rate as the ratio of domestic prices of non-tradables to tradables, $e = p_n/p_t$. An increase in the ratio denotes an appreciation of the exchange rate while a decrease denotes a depreciation. However, this definition of the real exchange rate faces two empirical challenges. First, because the measure uses domestic prices, it lumps exports and imports into the same category as tradables. Boltho (1996) argues that the measure is only appropriate for small open economies where the terms of trade are set by the world market. Second, regular data on tradable and non-tradable prices are hardly available (Wignaraja 2005; Boltho 1996). These challenges have led scholars to rely on proxies for the real exchange rate.

The first set of proxies are indicators of relative consumer prices. These indices include the Consumer Price Index (CPI) and other indices relating to the cost of living, and are readily available in most countries. However, the drawbacks associated with these measures are: inclusion of a range of goods and services that are not subject to international competition such that components and their weights vary across countries. Relative indicators based on GDP deflators are sometimes used as alternatives but these also beset by the same limitations.

The second set of proxies are those measuring relative producer prices of traded manufactured goods and are usually collected from declarations at the customs. Although these measures have some merits in the sense that the data is easy to collect and they relate to actual trade, they also suffer many setbacks. First, by focusing on actual trade, they ignore potential trade and therefore fail to cover all tradable goods and sectors. Such exclusion may be problematic by not taking into account possible loss of competitiveness of excluded goods as they become too highly priced to be traded. Second, there are variations in the quality of the measures across countries as well as lack of homogeneity in weighting and coverage. These shortcomings make international comparisons less meaningful. Third, changes in competitiveness tend to be heavily

influenced by changes in prices of intermediate goods. Fourth, by focusing on relative price changes, these indices are only meaningful in markets with differentiated products. In perfectly competitive settings where prices are given, competitiveness manifests in terms of profits rather than prices (Boltho, 1996).

The third set of proxies are relative cost indices. The most commonly used is the index of relative unit labor cost (ULC) in the manufacturing sector, defined as labor cost per unit of manufactured output. The advantage of this measure is that improvements in competitiveness, through increase in labor productivity, fall in wages or nominal exchange rate depreciation, are associated with "either declines in tradable prices or with increases in profitability, or with a mixture of the two, depending on what strategies firms follow and on the nature of the markets in which they compete" (Boltho 1996, p.3). The challenge with the ULC is that it ignores other costs of production. However, Boltho (1996, p.3) argues that "cost of capital and other raw materials will be more similar across countries due to capital mobility and the existence of international commodity markets." For international comparison, these costs are converted to a common currency, typically the US dollars. In practice, most analysis use the real effective exchange rate (REER) obtained from the purchasing power parity (PPP) framework. The REER is obtained by deflating a trade-weighted average of the nominal exchange rates between a country and its trading partners. The deflators being used in practice include relative consumer prices, relative producer prices, relative GDP deflators and unit labor costs in manufacturing. The REER is considered as an index measuring the ULC of a country relative to the weighted average of its trading partners' ULCs. The OECD regularly publishes indicators of competitiveness based on consumer prices, export unit values, unit labor costs and indices of REER.

Researchers have noted the shortcomings of the two most common measures of competitiveness in this framework – REER and relative ULC – particularly in relation to developing countries. Cashin *et al.* (2002) point out that the usual behavior of REER in many developed and developing countries may not apply in the case of commodity-exporting countries. To corroborate this point, Harberger (2004) argues that the common conceptual measure of real exchange rate as the ratio of the domestic price of traded and non-traded goods runs into trouble when large inflow of earnings due to a rise in commodity prices induces an appreciation of the currency, a phenomenon commonly referred to as the Dutch disease. Using the case of an oil exporting economy to illustrate the problem, he noted:

> *"But if we use an index of tradables prices in a (p_n/p_t) definition of the real exchange rate, such an index can actually end up indicating a depreciation of the real exchange rate if in this case the oil price has a sufficient weight to make the tradables price index p_t go up. To me, the Dutch disease case is very clear. An increase in the flow of export receipts leads to an excess supply of foreign currency. The equilibrating variable -- the real exchange rate -- has to appreciate as a result. We therefore should steer clear of definitions of the RER that can produce ambiguous results in such a case" (Harberger, 2004; pp. 4–5).*

There is also the possibility that the price-cost measures may be meaningless when the price of tradables do not reflect the cost of domestic inputs. Durand and Giorno (1987, p.150) argued that

> *"As for transactions in raw material and energy products, these take place on world markets where price differentials are generally arbitraged away so that price-based measures of relative competitiveness would in principle not yield useful information. The same holds for agricultural products whose prices are highly regulated in many markets - including the largest ones."*

Thus, the REER and ULCs are suitable for measuring competitiveness principally in economies exporting manufactured goods. Application of these measures to countries exporting primary products will be less meaningful. These criticisms are validated especially in Africa where non-traded commodities represent a large share of most economies.

Further, the idea that increases in a country's RULC leads to loss of competitiveness has been shown to be rather weak. For example, differential changes in non-labor costs will affect competitiveness but this will not be reflected in RULC. In addition, higher capital-labor ratio, which entails higher capital costs and lower labor costs, can lead to RULCs that overstate competitiveness.[9] Fagerberg (1988) notes, citing empirical evidence, that countries which achieved the fastest growth in terms of exports and GDP in the early post-war period also experienced much faster growth in relative unit labor costs than other countries. This phenomenon, referred to as "Kaldor Paradox" in reference to Kaldor (1978), implies that the focus on relative unit labor costs as an important determinant of competitiveness is rather too simplified, and could be sometimes misleading.

[9] These insights are credited to Scott Rogers, the IMF Country representative in Nigeria.

In summary, the utility of relative price-cost measures in assessing competitiveness in the presence of substantial structural and capacity constraints is thus questionable. Fagerberg (1988, 1996) and Dosi et al. (1990) have concluded that a competitive real exchange rate alone does not deliver international competitiveness if backward institutions, deficient technology, inefficient business environment, poor infrastructure and low human capital exists in an economy. Wignaraja (2005) argues further that these factors could be more important for competitiveness of developing countries, including those in Africa.

2.1.2 **The International Competition Perspective**

Given the shortcomings of the macroeconomic approach, economists began to turn to the Schumpeterian notion of competitiveness wherein competition arises from *"the new commodity, the new technology, the new source of supply, the new type of organization"* and *"strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives"* (Schumpeter, 1943, p. 84).

The competition approach focuses on domestic factors that affect the ability of countries to compete in international markets as the core determinants of competitiveness rather than on price-cost measures. This approach marks a shift from exchange rate and labor costs as indicators of international competitiveness to world market shares attainable by a country. In describing the approach, Fagerberg (1988) notes that a theory of international competitiveness must establish the links between the growth and balance-of-payments position of an economy and the factors that influence the process. His model of international competitiveness relates growth of market shares to the set of factors that determine ability to compete in technology, ability to compete in price, and ability to compete in delivery. Using data from 15 OECD countries, the results from the model show that factors relating to technology and capacity are very important for long-run differences across countries in growth of GDP and market shares while price factors play a more limited role than is assumed in the macroeconomic perespective.

However, there are two issues that limit the usefulness of this approach in analyzing African economies. First, the measure is developed for analyzing manufactured goods, whereas manufactures constitute negligible fractions of exports of most African countries. Second, conceptual issues relating to measurement of market shares of developing countries, as well as difficulties in obtaining suitable proxies for most of the explanatory variables in the model (in particular, proxies for the relative unit labor cost) render this approach less appealing.

2.1.3 **The Business Strategy Perspective**

This approach originates from the business studies literature and was pioneered by Porter (1990) who, in his study of eight developed and two newly industralizing countries, attempted to explain why some countries are more successful in particular industries than others (Moon *et al.* 1998; Smith 2010). In contrast to the macroeconomic approach, this approach applies micro-level business strategy concepts in analyzing international competitiveness and considers a nation as an aggregation of industries. In terms of definition, Porter (1990, p. 76) argues that "[t]he only meaningful concept of competitiveness at the national level is *productivity*. The principal goal of a nation is to produce a high and rising standard of living for its citizens..... Productivity is the prime determinant of a nation's long-run standard of living." This perspective implies that continuous upgrade is the key to sustaining a competitive edge and competitive advantage of a country is the result of firm-level innovations and successes in gaining large shares of world markets.

In Porter's model, competitiveness depends on the interplay between a given set of factors in an interactive system. The underlying model, referred to as the "Diamond Model," implies that competitiveness is the outcome of interaction among four critical attributes (diamonds) of a nation which are as follows:

a. Factor conditions: this relates to a country's position in factors of production such as skilled labor and infrastructure necessary to compete in a given industry;
b. Demand conditions: this captures the nature of home-market demand for the industry's product or service;
c. Related and supporting industries: this refers to the presence of supplier industries and other related industries that are internationally competitive;
d. Firm strategy, structure and rivalry: this captures the conditions governing how firms are created, organized and managed and the intensity of domestic competition.

The model classifies economies into four stages that are reminiscent of the Rostow stages of development namely: factor-driven, investment-driven, innovation-driven and wealth-driven. Wignaraja (2005) notes that the diamond model was influential in the development of the Global Competitiveness Indicator (GCI) published regularly by the World Economic Forum, and Professor Porter served as advisor in the process.

The business strategy framework differs from the macroeconomic perspective in terms of the role of public policy. While the macroeconomic perspective prescribes a narrow but direct influence of public policy, the business strategy approach suggests a broader but indirect role. In the former, government institutes controls and protections, and intervenes in the currency exchange market. On the other hand, the business strategy approach emphasizes that public policies can play a role in skill and infrastructure development, industrial clusters reinforcement and promotion of free trade as well as domestic competition. The idea of indirect government role in competitiveness has been supported by some authors in the business strategy literature. Yip (1992) emphasizes the role of government in promoting free trade and privatizing state-owned enterprises while Ohmae (1994) emphasizes defence against external threats and removal of controls on trade and investment.

The diamond model has been criticized and supported by economists as well as business strategists. On the economists' side, Krugman (1994) objects to the idea that countries compete in international markets like corporations. He asserts that international trade is not a zero sum game but one in which specialization and trade according to comparative advantages yields welfare gains to all nations. Waverman (1995) also describes the model as too general that it tries to explain every aspect of international trade and competition but eventually describes nothing. However, Grant (1991) suggests that the model does better than the theories of trade and investment in understanding the patterns of trade and investment in the new world economy.

On the international business side, most of the criticisms have focused on what is missing in the model. Critics point out that the model ignores the attributes of a country's largest trading partners and is flawed if applied to small trading economies (Rugman 1990, 1991). Others point to omission of the role of multinational corporations in the competitiveness of nations (Dunning 1992, 1993). Following these criticisms, the model has been extended to account for the role of external diamonds, resulting in the double diamond model (Rugman 1991, 1992; Rugman and D'Cruz 1991,1993; Rugman and Verbeke 1993), the generalized double diamond model (Moon *et al* 1998) as well as multiple diamond models (Bellak & Weiss 1993; Cartwright 1993).

The term "competitiveness" is fairly straightforward when used in the microeconomic sense but remains vague when used in the macroeconomic sense. In terms of usefulness in economic analysis, a major criticism of the diamond model is that it defines competitiveness as productivity but fails to specify how to measure it – whether it is total factor productivity or an

entirely different measure. Economists have attempted to distill the framework in order to generate relevant measures of competitiveness.

Gray (1991) contends that Porter's definition of national competitiveness comes down to the rate of growth of GDP. Reinert (1995) points out that the definition is hardly operational and argues that competitiveness is divorced from issues of productivity and efficiency, and that high productivity levels do not necessarily lead to competitiveness. He contends that

> *"[a]lthough it is difficult to be competitive if you are not efficient and have a high productivity, it is by no means obvious that being the most efficient producer of an internationally traded product makes a country competitive - i.e. enables it to raise the standard of living" (p.26). However, he concedes that "rapid changes in the level of productivity do tend to lead to competitiveness" (p.26).*

Over time, variants of the business strategy perspective have emerged. These include the technology and innovation perspective and the frameworks underlying the global competitiveness indices. The technology and innovation approach to competitiveness is the most recent and it builds on the business strategy framework in terms of the idea of what competitiveness entails – creation and adoption of technology. Similar to the business strategy perspective, the approach developed out of advances in the microeconomics literature on innovation and learning in the development process. The main thrust of the approach is that technology is an important driver of competitive advantage. Although foreign direct investment, education and stable macroeconomic conditions are necessary, they are not sufficient to ensure continuous technological development in developing countries. The definition of competitiveness in this perspective is summarized in OECD (1992, p.237):

> *In microeconomics, competitiveness refers to the capacity of firms to compete, to increase their profits and to grow. It is based on costs and prices, but more vitally on the capacity of firms to use technology and the quality and performance of products. At the macroeconomic level, competitiveness is the ability of a country to make products that meet the test of international competition while expanding domestic real income.*

There are two strands in this literature. While one strand focuses on absorption of new technologies in developing countries, referred to as the technological capabilities approach (Wignaraja 1998), the other strand focuses on emergence of innovations in the developed countries and is referred to as the national innovation systems approach (Lundval 1992).

Although the approach lays out a model of competitiveness and describes the policy, it does not lend itself to the type of analysis that the macroeconomic approach has been subjected. Instead, the components are easily captured in the Geneva-based competitiveness rankings.

The prominent global competitiveness ratings are the World Competitiveness Yearbook (WCY), Irish National Competitiveness Council (NCC) , Global Competitiveness Report (GCR), Doing Business Index (DBI) and Africa Competitiveness Report (ACR). The WCY framework identifies four main aspects of competitiveness: economic performance, government efficiency, business efficiency and infrastructure, and produces a ranking of countries along those lines. The Irish NCC distinguishes between inputs to national competitiveness (over which policy-makers have considerable leverage) and so-called “essential conditions” that must be present. The GDR produced by the World Economic Forum (WEF) remains the most comprehensive assessment of international competitiveness that combines all the elements of the other frameworks. The GCR framework defines competitiveness as: “the set of institutions, policies and factors that determine the level of productivity of a country,” and analyzes competitiveness based on both “microeconomic and macroeconomic foundations of national competitiveness.” The Global Competitiveness Index (GCI) underlying the GCR is built on twelve pillars that are grouped into three categories that reflect the key drivers of competitiveness in economies at different stages of development: the factor-driven, efficiency-driven and innovation-driven stages. The GCI is sensitive to these differences by varying the weights assigned to the sub-indexes in the computation of national competitiveness along the stages of development. The World Bank DBI also examines some of the components of the GCI framework and produces annual rankings. Although the DBI ranking of countries is dissimilar to the GCI’s, a correlation coefficient of 0.83 has been established between the rankings in GCI 2012/13 and DBI 2013. The ACR complements these efforts by conducting a comprehensive analysis of Africa’s competitiveness challenges and highlighting “areas requiring policy action and investment to ensure Africa lays the foundations for inclusive and sustained growth.”

2.2 **Empirical Literature**

The empirical literature on international competitiveness is also quite vast and has employed several measures, mostly price-cost indices. The REER, coupled with measures of ULC have been the most popular measures of competitiveness around the world and in Africa.

However, despite the importance of the subject, the literature on competitiveness is scarce in Africa outside of the franc zone. This paucity of research on African countries with flexible

exchange regimes is justifiable since most countries follow the macroeconomic framework for analyzing competitiveness wherein exchange rate policies tend to be synonymous with competitiveness policies. Governments, through the central banks, have been intervening in foreign exchange markets to prevent overvaluation of their currencies and to keep exchange rates at levels that ensure competitive pricing of traded goods.

2.2.1 **The CFA franc zone**

The empirical literature on the franc zone can be classified into three strands. The first focuses on the link between the exchange rate and competitiveness, the second focuses on exchange rate issues associated with the CFA franc peg, while the third focuses on the institutions of the fixed exchange regime.

Studies in the first strand of the literature emphasize the impact of unrealistic (uncompetitive) exchange rates on sectoral economic performance (in particular, on agricultural sector performance) in CFA countries: Bogetic *et al* (2007) focuses on the Cote d'Ivoire, and Amin (1996) on Cameroon.[10] Specifically, Amin (1996) demonstrates the link between real exchange rate over-valuation and the lack of competitiveness in Cameroon's agricultural sector. Ouattara and Strobol (2004) approach the subject indirectly by considering the impact of aid flows on the competitiveness of CFA countries and find no evidence of the dutch disease associated with aid flows into CFA countries.

The second strand of literature focuses on the effects of the 1994 devaluation of the CFA franc from different perspectives (Tybout *et al*. 1997; Azam 1997; Mamadou 1997); common convergence path for CFA franc countries (Dramani, 2010); determinants of capital flight in CFA franc countries (Ndiaye, 2011); and whether clustering CFA countries together in a euro peg meets optimum currency area criterion (Loureiro *et al.*, 2011). Rama (1998) examines the causes of overvaluation of the CFA franc beginning from the 1980s until the devaluation in 1994 and concludes that distortionary labor market practices, and in particular, real wage rigidities were to blame. Bogetic *et al*. (2007) examine data from Côte d'Ivoire in the post-devaluation (post 1994) period to find a preponderant influence of cocoa prices in the overvaluation of the Ivorian REER. Clement *et al*. (1996), Devarajan (1997), Baffes *et al*. (1999), and Ahlers & Hinkle (1999) have examined the extent of misalignment of the CFA franc real exchange rate and found this to be significant for the period until the 1994 devaluation. Zafar (2005) also finds

[10] Fosu (1992) carried out a similar study on Ghana.

evidence of a misalignment of the CFA franc following its peg to the euro in 1999. However, recent empirical studies, notably by Abdih and Tsangarides (2010) do not find evidence of any significant misalignment of the CFA franc from its long-run equilibrium, suggesting that any later observed over-valuation of the CFA franc (and consequent loss in competitiveness) might not be due to pegging of the CFA franc to the euro. This later evidence suggests that the sources of uncompetitiveness of franc zone economies could well be rooted in the structural characteristics of these economies.

Scholars in the third strand of literature argue that the fixed exchange regime is not a problem in itself but rather, the arrangements associated with the exchange regime are the problem. In other words, the institutions of the franc zone might have served as constraints to performance. Amin (2000) examined economic performance data for franc zone economies and other countries in sub-Saharan Africa during 1980-1997 and concludes that franc zone economies underperformed relative to non-franc zone economies mainly due to institutional rigidities associated with the monetary and exchange rate arrangements under the fixed exchange regime. Stasavage (1997) suggests that the monetary union with a fixed exchange regime has failed to deliver fiscal discipline in the franc zone mainly due to serious institutional problems associated with the design of the two franc zone central banks, the monetary rules with which the central banks operate, and the relationship between the CFA states and France. Fouda (1997) shows that monetary policy in CEMAC zone, rather than being independent as expected, has been consistent with the political business cycle of its largest member, Cameroon.

2.2.2 **Monetary Union Vs. Informal Cross-Border Trade**

In addition to the institutions of the franc zone, scholars have also argued that neighborhood effects associated with the franc zone are a major problem. They contend that convertibility of the CFA franc enabled informal cross-border trade between countries in the franc zone and neighboring countries outside the monetary union. The extent of this informal trade as well as currency speculations associated with them affect the performance of franc zone economies.

For example, the common way Nigerians circumvert import restrictions is through informal trade with their neighboring CFA countries in order to acquire cheap imports from Europe and Asia. A vivid illustration is the Nigeria-Niger informal trade where the volume of trade rises with the difficulty Nigerians face in obtaining the U.S. dollar (see Mamadou, 1997). In fact, Mamadou (1997) suggests that the dollar and the CFA franc are perfect substitutes in the naira parrallel exchange market.

The USD - CFA franc substitutability in the naira parrallel exchange market is enhanced by three factors namely: the unlimited convertibility of the CFA into the euro, overvaluation of CFA relative to the naira, and the non-convertibility of the naira. Nigerians frequently resort to the CFA in order to preserve the value of their savings (reserve currency motive) and in order to circumvert domestic foreign exchange restrictions on the dollar (importing motive). In line with the importing motive, the fact that the CFA is generally over-valued vis-à-vis the French Franc (and subsequently, the euro) is a strong incentive for Nigerians to use the CFA to obtain cheap European/Asian manufactured goods which are mostly re-exported informally through CFA countries. Thus, each time the CFA is over-valued vis-à-vis the euro, there is another self re-enforcing mechanism through the naira-CFA parrallel exchange market, suggesting that the loss in competitiveness of CFA countries is also tied to the dynamics of the naira-CFA parallel exchange market, in particular, the ease with which Nigerians access the dollar to import manufactured goods.

However, Zafar (2005) observes a different pattern in the competitiveness of the CFA when unrecorded informal trade with non-CFA neighboring countries is accounted for. He claims that the inclusion of unrecorded trade with Nigeria and Ghana results in a lower appreciation of the CFA (to the tune of only 6% in both CFA zones) following pegging to the euro. The justification being that higher inflation rates in Nigeria and Ghana relative to CFA countries confers a natural competitiveness advantage to the CFA relative to these non-CFA countries. However, the evidence from Mamadou (1997) suggests the opposite. Mamadou's account suggest that the reason why the 1994 CFA devaluation failed to boost the competitiveness of CFA locally produced goods (notably, in Niger) vis-à-vis Nigeria is because the devaluation made transit imports (or imports through CFA) much more cheaper to the Nigerians. Coupled with foreign exchange restrictions by the Nigerian government, the CFA devaluation had the effect of stimulating Nigerians' demand for the CFA, which pushed the naira-CFA exchange rate up, resulting in a depreciation of the naira vis-à-vis the CFA (correspondingly, an appreciation of the CFA vis-à-vis the naira) causing competitiveness gains for the Nigerian economy at the expense of the CFA countries.[11] Mamadou (1997) also explains that the abolition of free convertibility between the two CFA francs (issued in WAEMU and CEMAC) in August 1993,

[11]The consequent appreciation of the CFA vis-à-vis the naira raised the competitiveness of transit imports but hampered the competitiveness of CFA locally produced goods. Thus, Mamadou (1997) provides insight into why the CFA devaluation, instead of inducing competitiveness gains for the CFA countries vis-à-vis Nigeria, resulted instead in loss of competitiveness.

ahead of the 1994 devaluation was a desperate attempt by the CFA authorities to curtail informal transactions in the Naira-CFA parralell exchange market.

2.2.3 **Exchange Rate Pegging: From French Franc to Euro**

Very few studies have focussed directly on this question. Existing studies examine the impact of European Monetary Integration - in particular, the move to the euro - on the CFA franc zone (M'bet and Niamkey 1993), and exchange rate options open to CFA franc countries after the introduction of the euro in 1999 (M'bet and Niamkey 1997).

Zafar (2005) explicitly considers the effects of shifting from a French Franc (FF) peg to a euro peg and finds that the switch to the euro peg negatively affected the competitiveness of CFA countries by causing an appreciation of about 8% and 7% in the REERs of WAEMU and CEMAC respectively. Two reasons explain why the peg change affected the competitiveness of the CFA countries. One, inflation rates in France were relatively higher than the euro average prior to the switch to the euro peg, which implies an automatic over-valuation of the CFA following the peg to the euro. Two, volatility in the euro-dollar exchange rate implied that the risks of a misalignment in the CFA-euro exchange relationship were now higher. Drawing from Mamadou (1997)'s preceding analysis of cross-border informal trade with CFA neighbors, the intuition is that, following the switch from FF peg to euro peg, the CFA became stronger, thus, more attractive to Nigerians and Ghanaians for transit import purposes, which in turn, re-inforced both the over-valuation of the CFA and its uncompetitiveness.

3.0 **Theoretical Framework and Methodology**

3.1 **Theoretical Framework**

Reinert (1995) contends that competitiveness is achieved only "when the neo-classical 'law' of factor-price equalization is being defied" (page 26). Because perfect competition implies factor-price equalization in international trade as formulated by Samuelson (1948), he concludes that imperfect competition and economies of scale are key elements behind international competitiveness. This viewpoint is consistent with the new trade theory where international trade takes place under conditions of imperfect competition and is driven by economies of scale instead of comparative advantage (Krugman, 1980; Helpman, 1981).

In this framework, technological advancement leads to large economies of scale and reduction in cost of production. Due to imperfect information, the entire benefits of reduced costs are not

passed onto consumers in the form of lower prices through international trade as would be the case under perfect competition, but part of the benefits (referred to as "rents") are kept within the producer country and distributed in the form of profits, wages and, ultimately, taxation income, all of which are important determinants of living standards. Therefore, a country becomes competitive by reallocating resources into these "high-value sectors or industries" that in effect leads to rising national living standards while simultaneously producing goods that meet the test of international markets.

By design, Porter's diamond framework hinges on factors that are pertinent to economies of scale and the creation of high value sectors and industries. As a result, we adopt the generalized double diamond model of Moon et al (1998) and Reinert (1995)'s framework for interpreting competitiveness in the model. In the double-diamond model, the ability of firms operating in a country to generate economies of scale through technological innovation depends on both domestic and foreign diamonds, that is, on characteristics of the home economy as well as its trading partners. Thus, the model incorporates the influence of trade externalities in international competitiveness. What matters in this setting is, in effect, the ability of a country to capture rents relative to its trading partners where trade externalities are material.

African economies have substantial tradable primary as well as secondary sectors. Because the market for primary products are largely non-differentiated, a country's ability to earn distributable rents from primary goods depends on both exogenous (world supply and demand conditions) as well as endogenous (production) conditions. It is in the secondary sector where products are differentiated that substantial competitive rents can potentially be reaped as these depend more on endogenous production conditions. Thus, a good index of competitiveness in this framework should capture a country's ability to earn distributable rents from both primary and secondary sectors.

A reasonable index of competitiveness in the double diamond framework must rely on the rate of accumulation of distributable rents per unit of output in the tradable sectors. From first principles, a suitable measure is of the form: $C = \frac{A-B}{Y}$ where C is simply rent-per-unit of output in the traded sectors of the economy, A is the sum of current year rent distributed in the form of wages and profits in those sectors, B is what the sum of wages and profits would be in the absence of current year rents (proxied possibly by previous year's wages and profits) and Y is the sum of output of the tradable sectors. However, this index may not capture the entire gains in national competitiveness as the impact of distributable rent on the economy may not be

entirely captured by profits and wages in the traded sectors alone. For example, financial intermediaries in the tertiary sector will capture a portion of the rent through service fees and charges to tradable sectors. In the light of this, the non-tradable services sector needs to be included along with tradable primary and secondary sectors.

A broader index will cover the entire economy, both tradable and non-tradable sectors, in order to capture all forms of externalities associated with distributable rents within the economy. That is, rents generated in the tradable sectors could induce increases in wages and profits in the non-tradable sectors of the economy. In addition, other factors of production, including capital, may capture part of the rent through deliberate or speculative pricing mechanisms. Therefore, a broad measure of competitiveness will cover all tradable and non-tradable sectors in order to capture the extent of aggregate rent. In this framework, competitive economies are those able to accumulate aggregate rents faster than others.

3.1.1 **Measuring Competitiveness**

The measure of competitiveness proposed in this framework is the (logarithm of) real per capita GDP of a country relative to its main trading partners, using statistically determined trading weights. In effect, changes in this measure indicate the rate of change in domestic income relative to (trade-weighted) foreign income. By comparing accretion of value (induced to a large extent by rents) in a country to its trading partners, and in essence, comparing rate of accumulation of rents at home and abroad, the proposed measure is consistent with the interpretation of competitiveness under the conditions of trade in the new trade theory.

Notably, the denominator, (trade weighted) foreign income has been used to measure the real GDP of a country's trading partners (Dos Santos et al 2003) and is a well-established determinant of price and demand for a country's exports in the international trade literature (Cronovich and Gazel 1998; Vieira and Haddad 2011).[12] Movements in the ratio of domestic income to foreign income is a plausible indicator of the extent to which a country is making technological progress and gaining larger shares of global value chains relative to the rest of the world in the double-diamond framework. In line with this interpretation, Abdih and Tsangarides (2006) referred to the measure as "productivity index" and used it as proxy for technological progress in their analysis of equilibrium real effective exchange rate.

[12] In addition, Adolfson et al (2007) demonstrates its usefulness in Central bank forecasting models.

Wagner and Zeckhauser (2006) used the proposed measure to demonstrate the differential rates of competitive progress among 157 countries around the world over the period 1960-2000. A graph of trade-weighted relative GDP per-capita against relative GDP per-capita (see Figure 1) shows Singapore, South Korea and Ireland as three countries that achieved substantial progress during the period covered, with Singapore being the most successful in moving from the bottom left quadrant (low-income group) to the top right quadrant (rich and competitive group). Coincidentally, Singapore and South Korea were the two Newly Industrializing Countries (NICs) included in the study by Porter (1990) that led to the development of the diamond model. In particular, the outcomes in Figure 1, which shows that Singapore was more successful than South Korea, is consistent with the finding by Moon et al (1998) in the context of the generalized double diamond model.

3.1.2 **Productivity Index Vs. the REER**

Ramirez and Tsangarides (2007) provide a comparison of our proposed measure–the productivity index–and the REER for countries in the fixed exchange rate franc zone. The graphs of the different measures presented in Figure 2 shows striking disimilarities over the period 1993-2006. Consider the period 1993-1998, which covers the incidence of devaluation and subsequent appreciation of the REER. While the REER was volatile during this period, the economy instead made gradual gains in productivity in both CEMAC and WAEMU zones as the trade-weighted relative real GDP per capita rose slightly but gradually. In the next phase, 1999-2001, the economies of the franc zone began to experience declining productivity relative to trading partners as indicated by the first graph, implying loss in competitiveness. Meanwhile, the bottom graphs were indicating depreciation of the REER, which implies gains in competitiveness, thus contradicting the first graph. In the third phase, 2001-2006, the economies continued to experience declining productivity relative to trading partners as measured by the top graph. Incidentally, the bottom graphs show appreciation of REER which also signifies loss in competitivenes in the macroeconomic framework. However, the appreciation of the REER had nothing to do with technological downturn or any fundamentals of these economies: rather, it was the consequence of a strenghtening Euro, the currency to which the CFA franc was pegged during the period (Ramirez and Tsangarides 2007). Indeed, the continued downward movement of the productivity index is consistent with indices of competitiveness and labor productivity around the world which indicate that other regions of the world were gaining in productivity over Sub-Saharan Africa.

Aside from these observations, the productivity index is also potentially more relevant than the REER for measuring competitiveness in African countries for the following reasons:

a) As we have noted, the productivity index proxies for technological progress in an economy, see Abdih and Tsangarides (2006). It is well known that exporters of raw materials capture very trivial portions of product value chains. Banga (2013) shows that only 8% of total value added in global value chains accrue to less-developed and developing countries whose exports are typically dominated by raw materials. In the absence of improvement in domestic technology to enable primary commodity exporters capture increasing portions of value chains while their trading partners continue to improve their production techniques, the process of normalizing value addition rates by the weighted average of trading partners' will lead to a decrease in the proposed measure. In contrast, favorable commodity price shocks as well as adverse external shocks will produce an appreciation of the REER through both the Dutch disease mechanism as well as higher domestic inflation (resulting from adjustment policies pursued in response to those shocks); even when relative technologies have not changed.
b) Our proposed measure captures changes in both price factors and non-price factors such as structural and capacity constraints that affect competitiveness. Movements in the measure therefore reflect changes in labor productivity, capacity, and technological progress of the country relative to its trading partners.
c) A good measure of competitiveness must be relevant to countries with different economic structures at different stages of development and enable international comparison despite these differences. International comparability of this measure has been demonstrated by Wagner and Zeckhauser (2006).

3.1.3 **Trade-Weighted Relative Per Capita GDP (TWRPCGDP) for African Countries**

We present in Figure 3 a graph of trade weighted relative per capita GDP for a sample of African countries and the position of their GDP per capita relative to the Sub-Saharan African (SSA) average for 5-year periods covering 1980-2011. The empirical range of values on the vertical axis is reasonable given that all the economies are smaller than their trading partners. On the horizontal axis, we placed a line at the value of 1 to indicate the position of the average SSA economy during the respective period. A movement northward (along the vertical axis) reflects an increasing rate of value addition per capita relative to the country's trading partners (driven perhaps by productivity gains in global value chains) while an eastward movement

(along the horizontal axis) reflects an expansion of the economy relative to the SSA average. An economy that is simultaneously gaining increasing share of global value chains and expanding faster than the average SSA rates will progress in the north-east direction.

Economies that basically extract and sell primary commodities in response to world demand will remain roughly in the same spot for the entire period. Because many SSA countries are doing similar things, each country in the group can only expand at the average SSA rates. As the figure shows, this is the experience of a majority of the countries that remained in the bottom-left corner of the graph throughout the entire period.

The trajectories of two countries, South Africa and Gabon, provide additional lessons. Although not located in the bottom-left quadrant, South Africa remained roughly at the same spot through the entire period. The country is roughly six times the average SSA country in terms of per-capita GDP but its growth has been driven by the extractive industries since the 1990s. Because its growth driver is similiar to many African countries, the rate of expansion of its economy (on per-capita basis) is not faster than the average SSA. In addition, the country's trade-weighted relative per capita GDP dropped slightly between early and late 1980s, and has not returned to its initial level. Indeed, South Africa's exports transited from a fairly diversified structure in the nineties to a mineral and resource dominated structure in the mid and late 2000s in ways that have been demonstrated to be consistent with China's demand for resources (Onyekwena and Taiwo 2013). The drop in South Africa's position on the vertical axis could be interpreted as a loss of higher rents along value chains as output and trade shifted from intra-industry nature that entailed import and export of intermediate goods compared to a more inter-industry form that entailed exporting raw materials and importing manufactured goods. On its part, Gabon started out in the early 1980s with per-capita GDP that was about nine times the average SSA and 37 percent of the per capita GDP of its trading partners. By the late 2000s, these positions have fallen to less than seven times and about 18 percent respectively. Gabon thus presents the case of a country that went backward. While this loss of advantage may be attributed to the growing diversification of trading partners[13] it is not a sufficient explanation for this experience.

A group of countries led by Benin, which includes Djibouti and Swaziland to lesser degrees, exhibited a particularly different type of progress. In the case of Benin, there was a gradual

[13] In the earliest period, 1980-1985, France, USA, Spain, UK and Korea were the top five trading partners with trading weights in descending order. During 2006-2011, the list changed to USA, China, France, Trinidad and Tobago, and Thailand.

upward movement on the vertical axis beginning in early 1990s although there was no movement on the horizontal axis through the entire period. In essence, the country seems to be doing well at capturing larger components of value chains but only expanded at the average SSA rate.[14]

A few countries emerged during the period with impressive north-east trajectories, both gaining on trading partners as well as expanding faster than the SSA average rate. The most notable success in this sense is Equatorial Guinea which expanded from just about the average SSA economy and four percent of the size of its trading partners in 1986 to nearly fourteen times the average SSA and 58 percent of its trading partners in 2011. Other notable successes are Libya and Mauritius to a large extent, and Botswana and Cape Verde to lesser degrees. While Equatorial Guinea and Libya have not been included in many competitiveness rankings, Mauritius and Botswana which progressed north-eastward, and Seychelles which remained in the north-east through the period, have received high rankings.

3.2 **Econometric Analysis**

Our task in the next sections is to use an appropraite econometric model to identify the factors, both price and non-price, that explain progress in our measure of competitiveness.

3.2.1 **Model Specification and Estimation**

The basic model to be estimated is the static panel model given as follows:

$$Y_{it} = \alpha + \beta X_{it} + u_i + \varepsilon_{it} \qquad (1)$$

where Y_{it} is the measure of competitiveness of country i in year t. X_{it} is a vector of regressors and β is a vector of coefficients. The term u_i represents individual country time-invariant specific effects while ε_{it} is the remainder (nonsystemmatic) disturbance term. We present Ordinary Least Squares (OLS), Fixed Effects (FE) and Random Effects (RE) estimates of the model.

The next step is to evaluate the contribution to competitiveness of exchange rate regimes and to observe whether there is a general underlying pattern of non-competitiveness under fixed exchange regimes conditional on other attributes. First, we test for statistical significance of

[14] There is anecdotal evidence to support this implication. The country is a notable "passage" especially for importation of goods prohibited at Nigerian ports. In addition, its agroprocessing industry is prominently located near the end of the fruit processing value chain. They are largely involved in packaging of finished fruit juices.

estimated coefficient of a dummy variable for the franc zone conditional on included regressors. The augmented model to be estimated is given by:

$$Y_{it} = \alpha + \beta X_{it} + \gamma FZ_i + \delta OIL_i + \lambda(FZ_i * OIL_i) + u_i + \varepsilon_{it} \qquad (2)$$

where $FZ_i = 1$ for franc zone economies and zero otherwise, $OIL_i = 1$ for oil exporting economies and zero otherwise, γ captures the difference in the relative competitiveness of fixed exchange economies, δ captures the difference in competitiveness between oil exporters and the other countries, and λ captures the interaction effect. We will also examine, by means of interacting the dummy variables with components of X, whether the difference depends on the included regressors.

Next, we maintain specification (2) and restrict our sample to the franc zone. We drop the FZ_i dummy variable and replace it with another dummy named CC_i for the CEMAC group of countries. The model becomes:

$$Y_{it} = \alpha + \beta X_{it} + \gamma CC_i + \delta OIL_i + \lambda(CC_i * OIL_i) + u_i + \varepsilon_{it} \qquad (3)$$

In this case, we are looking for performance constraints arising from structural differences existing within the franc zone. The differences between the blocks are unlikely to be induced by the exchange rate regime but rather by structural characteristics.

3.2.2 **Definition of Variables and Data Measurement**

Our explanatory variables reflect price and non-price factors that measure components of domestic and international diamonds in Moon et al (1998) generalized double diamond framework. Due to data completeness constraints, we are unable to include as many components of the generalized framework. Our main variables classified under the respective diamonds include:

Factor Conditions:

1. *GDP per capita relative to SSA average.* This is used to capture internal factor conditions including labor and population issues, as well as to mitigate the undue influence of resource abundance in the analysis.
2. *Net Inward Foreign Direct Investment (FDI) to GDP ratio*. This reflects external factor conditions that serve domestic industries

Demand Conditions:

3. *Domestic Demand Pressure*. This is the sum of private consumption, government consumption and gross investment divided by GDP, and measures demand conditions at home.
4. *The Real Effective Exchange Rate (REER).* Among other things, the REER captures terms-of-trade, a positive shock to which induces increase in domestic demand while the reverse encourages foreign demand.

Related and Supporting Industries:

5. *Telephones per 100 persons.* This captures communication infrastructure
6. *Air passengers per capita.* This captures the state of air travel system

Firm Strategy, Structure and Rivalry:

7. *Openness to Trade.* This captures the intensity of trade interaction with the rest of the world and is proxied by the ratio of trade volume (import and export) to GDP.

Governance and Institutions:

8. *Debt to GDP ratio or Debt service to exports ratio.* Excessively high levels of debt and debt service reflect the quality of governance institutions, and the extent to which they constrain efficient domestic resource (re)allocation.

We use a panel data of 40 African countries both in the franc zone and outside of it for the period 1980-2011. Our main sources of data include World Development Indicators (WDI) and UNCTAD Statistics.

4.0 Empirical Findings

4.1 Descriptive Statistics:

Table 1 summarizes the data used in the analysis. The sample includes 40 countries from all regions of Africa, 12 of which we classify as oil exporting countries. By coincidence, 12 of the countries in the sample also belong to the franc zone. Overall, the economies in the sample are only about 6.2 percent of their (weighted) trading partners' sizes, with the oil countries share relatively larger (6.7 percent) than the non-oil countries (5.9 percent) and economies of the franc

zone (5.8 percent) smaller than their other African counterparts (6.4 percent). Relative to the average Sub-Saharan African economy[15], the oil countries are also larger than the non-oil countries while the franc zone countries are smaller than those outside the zone.

In terms of net inward Foreign Direct Investment (FDI) relative to GDP, the oil countries achieve less (probably due to size) while the franc zone performs much worse than those outside the zone. The domestic demand index implies that oil countries are (not surprisingly) more export dependent than non-oil countries. The franc zone is similarly more export dependent than the non-franc zone economies. The REER index is higher for oil countries than non-oil countries but much lower in the franc zone compared to non-franc zone economies - a reflection of the exchange rate management system in the franc zone.

On infrastructure measures – mobile phones per 100 persons and air passenger per capita – the oil countries perform worse than the non-oil countries while the franc zone similarly performs worse than countries outside the zone. In terms of openness, the oil countries are less open than their non-oil counterparts while the franc zone is more open than the non-franc zone economies. Lastly, the oil countries have less external debt burden while the franc zone is more burdened by external debt.

In brevity, the franc zone is more dependent on exports, more open to the rest of the world, has greater external debt burden, possesses worse infrastructure and achieves smaller amounts of net inward foreign direct investment relative to its economic size than countries outside of the zone. Within the franc zone, CEMAC is more externally dependent, achieved higher net inward foreign direct investment relative to its economic size, slightly more open to the rest of the world, and has lower external debt burden than WAEMU. We are interested in examining the role that these factors play in the competitiveness analysis.

4.2 **Econometric Results**

Table 2 summarizes the results of the Ordinary Least Squares (OLS) regressions. In the estimate from the full sample presented in column VI, with the exception of foreign direct investment which had a negative sign, all the coefficients have the expected signs: domestic demand and measures of infrastructure increase competitiveness while external debt burden reduces it. The results in column VII, which is based on a reduced sample due to missing data

[15] The World Development Indicators (WDI) does not provide the African average. This explains why we use the SSA average.

on REER, sustain the results in column VI with the additions that the coefficient of REER is not different from zero, the coefficient of openness changed from zero to positive and the negative coefficient on FDI became statistically significant (plausibly evidence of the dutch disease). The R-squared from the full sample estimate is quite high at 83 percent.

The Random Effects (RE) estimates in Table 3 column VI differs from the OLS estimates in Table 2 in only two respects. FDI now has a positive effect on competitiveness and the coefficient of openness is now zero. The Fixed Effects (FE) estimates in Table 4 leads to the same conclusion. However, we notice that the constant term dropped to zero once we introduce openness into the OLS and RE models but did not change in the FE model. These results seem to suggest that countries with higher net inward FDI are less competitive compared to those with lower rates (treating the data as cross-section) but once we account for country fixed effects, increasing rates of FDI are associated with higher levels of competitiveness (treating the data as a panel of countries).

We proceed to investigate from the data whether major oil exporting countries differ from others in competitiveness. In the results presented in Table 5, oil exporters in the franc zone (CEMAC) seem to be less competitive than WAEMU and other oil exporters outside the franc zone but those findings did not hold up in the RE model.

Next, we split the sample into franc zone and non-franc economies. The results in Table 6 based on the sample of franc zone countries imply that CEMAC is more competitive relative to WAEMU on average, but external debt and openness diminishes competitiveness in CEMAC. These effects do not show up in the FE estimates.

Turning to the non-franc zone countries, the results in Table 7 (RE estimates) show that oil exporters are on average less competitive than non-oil countries, but oil exporters with better infrastructure and high FDI inflows are more competitive than those with poor infrastructure and low FDI. However, the dutch disease seems to be evident in oil exporting countries as seen in the statistically significant negative sign on the interaction term (oil x domestic demand pressure).

Next, we split the sample into oil and non-oil countries and present estimates for oil exporting countries in Tables 8. In the model with interaction terms, the results suggest that CEMAC does better than other oil-exporting African countries yet poor infrastructure, external debt burden and greater openness are three factors that undermine competitiveness in the CEMAC zone. For the

sampe of non-oil countries, the results for the model with interaction terms summarized in Table 9 also suggest that WAEMU performs better than other comparable African countries in general but high domestic demand pressures, inadequate infrastructure and greater openness are factors inimical to competitiveness in WAEMU.

5.0 **Discussions**

The preceding analysis underscores the role of non-price factors in the competitiveness of African states. Broadly speaking, and contrary to widely held views, the franc zone countries are not less competitive in comparison to other sub-Saharan African countries and the exchange regime peg is not necessarily the main source of uncompetitiveness of franc zone economies. Our analysis has shown that poor infrastructure, heavy external debt burden and greater openness are three factors that undermine competitiveness in the CEMAC zone while high domestic demand pressures coupled with inadequate infrastructure and greater openness have undermined competitiveness in the WAEMU zone. This result concurs with the evidence by Fagerberg (1988, 1996) and Dosi et al. (1990) which suggest that a competitive real exchange rate is a necessary but not sufficient condition to achieve international competitiveness if an economy is characterized by poor infrastructure, backward institutions, deficient technology, inefficient business environment, and low human capital. Thus, to improve the competitiveness of their economies, franc zone states must maintain a stable macroeconomic framework which has helped minimize exchange rate misalignments while vigorously striving to upgrade the quality of their infrastructure and institutions.

Further, in the case of the franc zone countries, we particularly note the negative impact of greater trade openness on competitiveness, which is not quite unsurprising given the huge influence of 'transit imports' between franc zone countries and its neighbors in the over-valuation of the CFA franc. From a policy standpoint, it thus appear that policies to curb the informal cross-border trade with franc zone neighboring countries would contribute in boosting the competitiveness of franc zone economies.

Outside of the franc zone, our results show that oil-exporting African countries are on average less competitive than non-oil exporters. However, oil exporting African countries with better infrastructure and high FDI inflows tend to be more competitive than those with poor infrastructure and low FDI.

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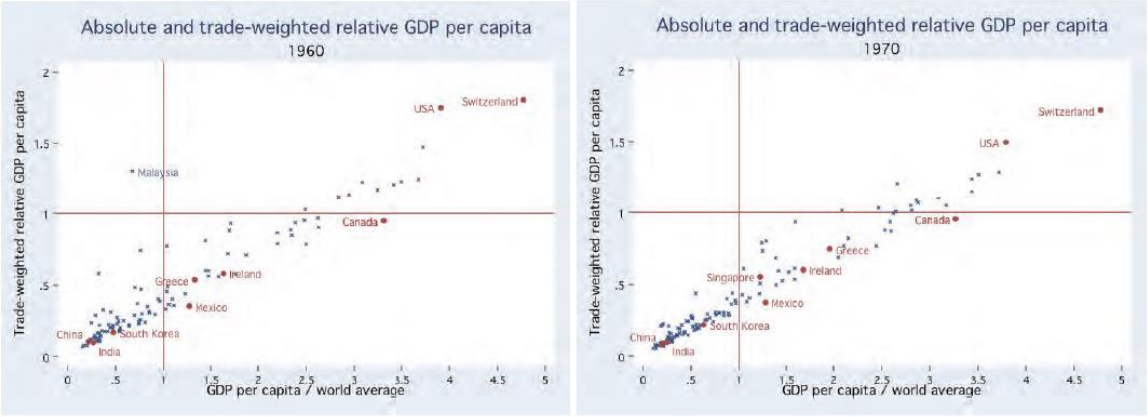
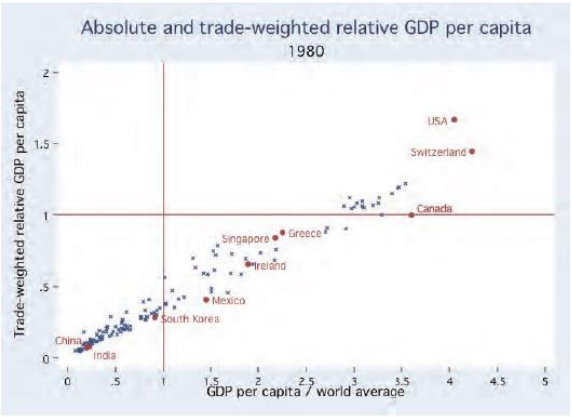
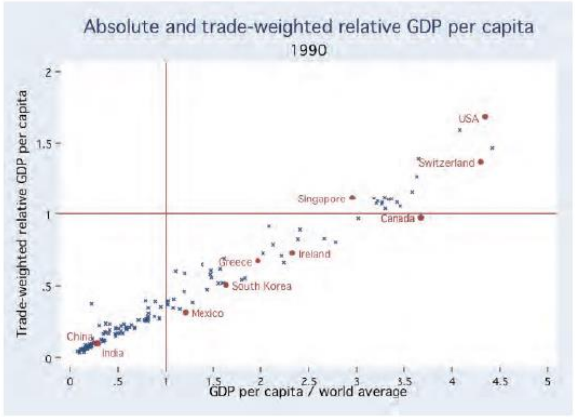
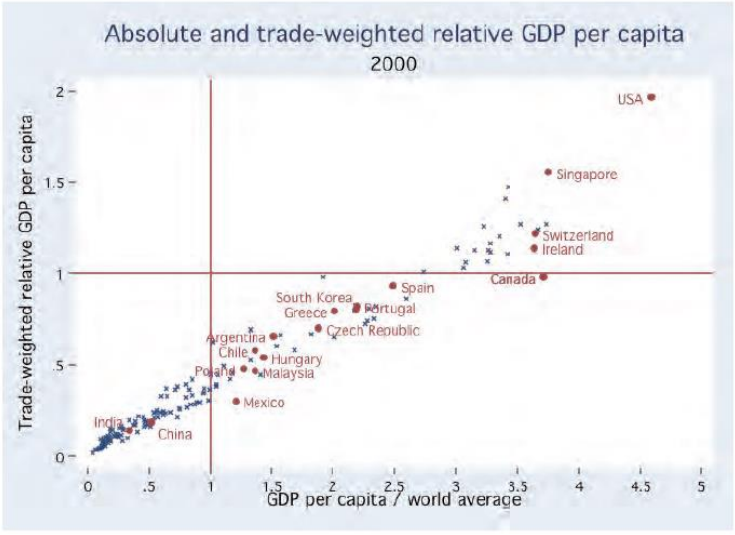
Fig 1: Absolute and Trade-weighted GDP per-capita 1960-2000: World



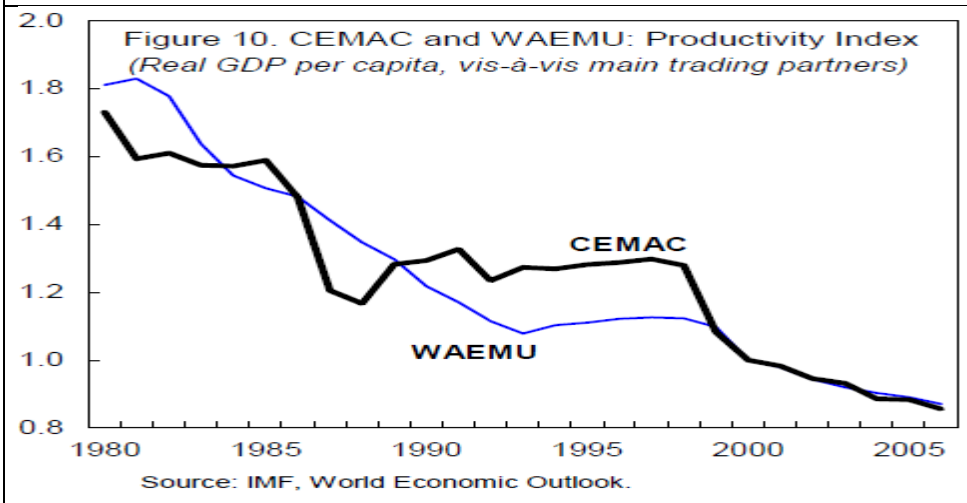


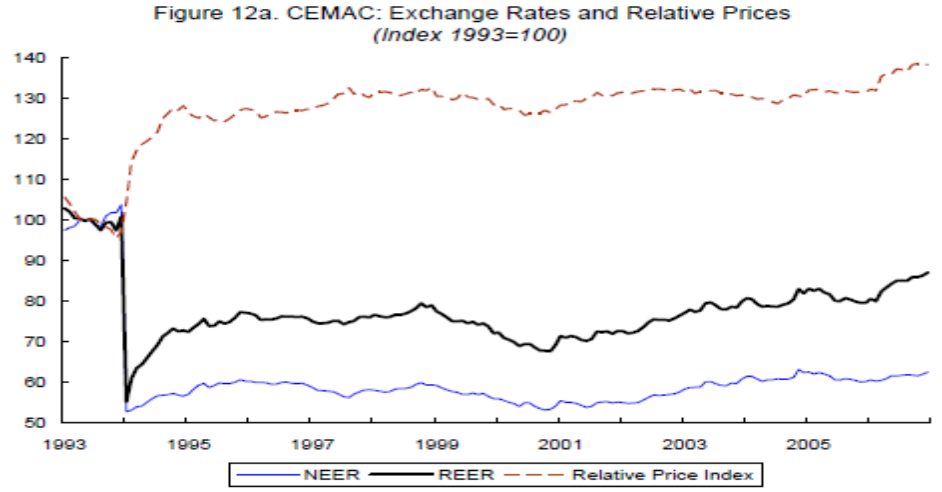




Source: Wagner and Zeckhauser (2006)

Fig 2: Real per-capita GDP relative to trading partners & REER





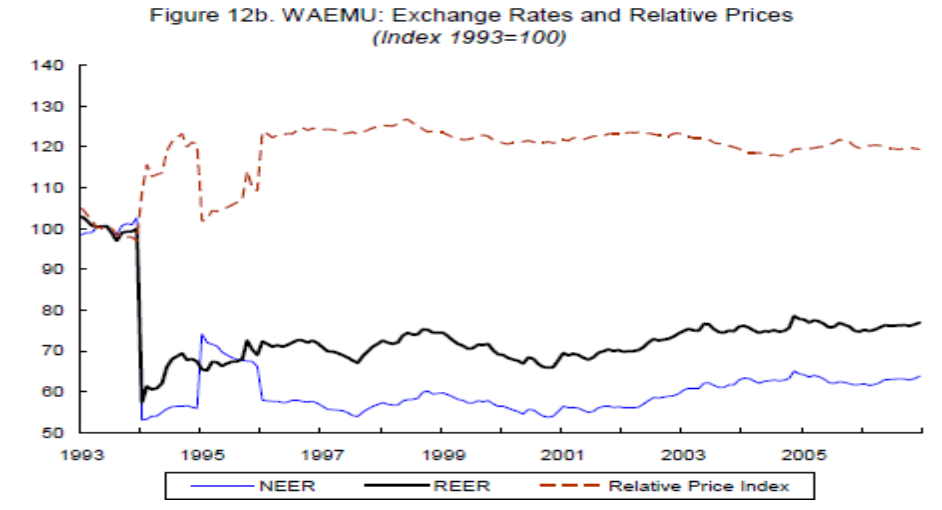


Figure 3: Trade Weighted Relative GDP per capita versus Relative GDP per capita of African countries

Note: The periods are: 1(1980-1985); 2(1986-1990); 3(1991-1995); 4(1996-2000); 5(2001-2005); 6(2006-2011)

TABLE 1: DESCRIPTIVE STATISTICS							
VARIABLE	ALL	OIL COUNTRIES	OTHERS	FRANC ZONE	OTHERS	CEMAC	WAEMU
Trade Weighted Relative GDP per c	0.061912	0.067153	0.059471	0.057897	0.063596	0.089931	0.039995
GDP Per capita/SSA Average	1.609705	1.847560	1.498939	1.466732	1.669654	2.951110	0.637226
Net Inward FDI/GDP	0.018099	0.015799	0.019171	0.010016	0.021489	0.010541	0.009723
Log Domestic Demand Pressure	0.087707	0.063430	0.099013	0.078086	0.091741	0.045919	0.096061
Real Effective Exchange Rate Index	1.708505	1.828617	1.619232	1.280931	1.898361	1.375645	1.119485
Mobile Phone per 100 persons	6.967390	5.589894	7.608872	1.815977	9.127397	2.515174	1.425250
Air Passengers per capita	0.091191	0.071550	0.100338	0.060330	0.104131	0.138962	0.016388
Log of Openness Index	1.729322	1.671047	1.756460	1.731972	1.728211	1.734088	1.730789
External Debt to GDP ratio	0.792963	0.783565	0.797340	0.841770	0.772498	0.589712	0.982625
Observations	897	285	612	265	632	95	170
Observations for REER	387	165	222	119	268	75	44
List of countries included (on the basis of completeness of data)							
		Algeria	Benin	Benin	Algeria	Cameroon	Benin
		Angola	Botswana	Burkina Fa	Angola	Central Afr	Burkina F
		Cameroon	Burkina Fa	Cameroon	Botswana	Chad	Cote d'Ivo
		Central Afr	Burundi	Central Afr	Burundi	Gabon	Guinea-B
		Chad	Cape Verde	Chad	Cape Verde		Mali
		Congo, Der	Cote d'Ivoi	Cote d'Ivoi	Congo, Dem. Rep.		Niger
		Egypt, Arat	Ethiopia	Gabon	Egypt, Arab Rep.		Senegal
		Gabon	Ghana	Guinea-Bis	Ethiopia		Togo
		Mozambiq	Guinea	Mali	Ghana		
		Sierra Leor	Guinea-Bis	Niger	Guinea		
		Sudan	Kenya	Senegal	Kenya		
		Uganda	Lesotho	Togo	Lesotho		
			Madagascar		Madagascar		
			Malawi		Malawi		
			Mali		Mauritania		
			Mauritania		Mauritius		
			Mauritius		Morocco		
			Morocco		Mozambique		
			Niger		Rwanda		
			Rwanda		Sierra Leone		
			Senegal		South Africa		
			South Africa		Sudan		
			Swaziland		Swaziland		
			Tanzania		Tanzania		
			Togo		Tunisia		
			Tunisia		Uganda		
			Zambia		Zambia		
			Zimbabwe		Zimbabwe		
TOTAL		12	28	12	28	4	8

TABLE 2: ORDINARY LEAST SQUARE (OLS) REGRESSION							
EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL							
Dependent Variable is GDP per capita relative to Trade Weighted GDP per capita of Trading Partners							
	I	II	III	IV	V	VI	VII
GDP Per capita/SSA Average	0.02872***	0.02805***	0.02761***	0.02735***	0.02704***	0.02705***	0.02344***
	[0.00046]	[0.00050]	[0.00065]	[0.00066]	[0.00068]	[0.00068]	[0.00176]
Log of Domestic Demand Pressure	0.08455***	0.07897***	0.07153***	0.07368***	0.06750***	0.06926***	0.11619***
	[0.01799]	[0.01795]	[0.01933]	[0.01928]	[0.01966]	[0.02134]	[0.02841]
Mobile Phone per 100 persons		0.00018***	0.00018***	0.00014***	0.00013**	0.00014**	0.00014**
		[0.00005]	[0.00005]	[0.00005]	[0.00005]	[0.00005]	[0.00007]
Air Passengers per capita			0.0065	0.00626	0.0054	0.0053	0.12895***
			[0.00628]	[0.00626]	[0.00628]	[0.00629]	[0.03285]
External Debt to GDP ratio				-0.00430***	-0.00421***	-0.00421***	-0.00877***
				[0.00162]	[0.00162]	[0.00162]	[0.00288]
Log of Openness Index					0.00789	0.00813	0.01411*
					[0.00504]	[0.00517]	[0.00853]
Net Inward Foreign Direct Investment						-0.00572	-0.07120*
						[0.02675]	[0.03692]
Real Effective Exchange Rate Index							-0.00055
							[0.00054]
Constant	0.00826***	0.00857***	0.00937***	0.01325***	0.00074	0.00026	-0.00985
	[0.00214]	[0.00213]	[0.00227]	[0.00269]	[0.00843]	[0.00873]	[0.01449]
Observations	897	897	897	897	897	897	387
R-squared	0.82	0.83	0.83	0.83	0.83	0.83	0.91
Standard errors in brackets							
* significant at 10%; ** significant at 5%; *** significant at 1%							

TABLE 3: RANDOM EFFECTS (RE) REGRESSION							
EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL							
Dependent Variable is GDP per capita relative to Trade Weighted GDP per capita of Trading Partners							
	I	II	III	IV	V	VI	VII
GDP Per capita/SSA Average	0.02732***	0.02570***	0.02377***	0.02322***	0.02315***	0.02350***	0.01544***
	[0.00111]	[0.00118]	[0.00140]	[0.00141]	[0.00141]	[0.00138]	[0.00186]
Log of Domestic Demand Pressure	0.05783***	0.05954***	0.05273***	0.05691***	0.05486***	0.04587**	0.03063
	[0.01954]	[0.01940]	[0.01954]	[0.01947]	[0.01967]	[0.02008]	[0.02643]
Mobile Phone per 100 persons		0.00016***	0.00014***	0.00010**	0.00009**	0.00008*	-0.00016***
		[0.00004]	[0.00004]	[0.00004]	[0.00004]	[0.00004]	[0.00006]
Air Passengers per capita			0.01856**	0.02061***	0.02067***	0.01865**	0.32452***
			[0.00734]	[0.00733]	[0.00733]	[0.00735]	[0.02972]
External Debt to GDP ratio				-0.00566***	-0.00562***	-0.00528***	-0.00663***
				[0.00167]	[0.00167]	[0.00167]	[0.00256]
Log of Openness Index					0.00423	0.00179	-0.00483
					[0.00553]	[0.00566]	[0.00938]
Net Inward Foreign Direct Investment						0.04558**	0.0431
						[0.02275]	[0.03317]
Real Effective Exchange Rate Index							-0.00029
							[0.00043]
Constant	0.01199***	0.01331***	0.01557***	0.02069***	0.01367	0.01709	0.02626
	[0.00429]	[0.00433]	[0.00445]	[0.00472]	[0.01033]	[0.01041]	[0.01616]
Observations	897	897	897	897	897	897	387
Number of CNUM	40	40	40	40	40	40	17
Standard errors in brackets							
* significant at 10%; ** significant at 5%; *** significant at 1%							

TABLE 4: FIXED EFFECTS (FE) REGRESSION							
EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL							
Dependent Variable is GDP per capita relative to Trade Weighted GDP per capita of Trading Partners							
	I	II	III	IV	V	VI	VII
GDP Per capita/SSA Average	0.02637***	0.02387***	0.02051***	0.01999***	0.02001***	0.02024***	0.01301***
	[0.00143]	[0.00152]	[0.00186]	[0.00185]	[0.00186]	[0.00185]	[0.00304]
Log of Domestic Demand Pressure	0.05975***	0.06322***	0.05621***	0.06083***	0.06010***	0.05168**	0.02775
	[0.02051]	[0.02032]	[0.02034]	[0.02026]	[0.02042]	[0.02065]	[0.02848]
Mobile Phone per 100 persons		0.00018***	0.00016***	0.00012***	0.00011**	0.00010**	-0.00024***
		[0.00004]	[0.00004]	[0.00004]	[0.00004]	[0.00004]	[0.00006]
Air Passengers per capita			0.02460***	0.02675***	0.02670***	0.02426***	0.36391***
			[0.00786]	[0.00784]	[0.00785]	[0.00789]	[0.02957]
External Debt to GDP ratio				-0.00578***	-0.00577***	-0.00533***	-0.00549**
				[0.00171]	[0.00171]	[0.00172]	[0.00249]
Log of Openness Index					0.0017	-0.00143	-0.00157
					[0.00576]	[0.00588]	[0.01001]
Net Inward Foreign Direct Investment						0.05702**	0.10240***
						[0.02337]	[0.03647]
Real Effective Exchange Rate Index							-0.00011
							[0.00041]
Constant	0.01423***	0.01672***	0.02063***	0.02573***	0.02284**	0.02753***	0.02189
	[0.00301]	[0.00304]	[0.00327]	[0.00358]	[0.01041]	[0.01056]	[0.01752]
Observations	897	897	897	897	897	897	387
R-squared	0.29	0.3	0.31	0.32	0.32	0.33	0.51
Number of countries	40	40	40	40	40	40	17
Standard errors in brackets							
* significant at 10%; ** significant at 5%; *** significant at 1%							

TABLE 5

EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL

SAMPLE OF ALL COUNTRIES

	OLS	RE
GDP Per capita/SSA Average	0.02759***	0.02362***
	[0.00069]	[0.00142]
Log of Domestic Demand Pressure	0.07407***	0.04627**
	[0.02204]	[0.02021]
Mobile Phone per 100 persons	0.00011**	0.00008*
	[0.00005]	[0.00004]
Air Passengers per capita	0.00825	0.01856**
	[0.00623]	[0.00738]
External Debt to GDP ratio	-0.00540***	-0.00536***
	[0.00161]	[0.00168]
Log of Openness Index	0.00809	0.00176
	[0.00526]	[0.00568]
Net Inward Foreign Direct Investment	-0.00021	0.04660**
	[0.02692]	[0.02280]
Oil Exporter	0.00859***	0.00319
	[0.00237]	[0.00923]
Franc Zone	0.00986***	0.00682
	[0.00242]	[0.00930]
Franc Zone x Oil Exporter	-0.02205***	-0.01162
	[0.00422]	[0.01657]
Constant	-0.00356	0.01514
	[0.00914]	[0.01124]
Observations	897	897
R-squared	0.83	
Number of countries		40
Standard errors in brackets		
* significant at 10%; ** significant at 5%; *** significant at 1%		

TABLE 6
EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL
SAMPLE OF FRANC ZONE COUNTRIES

	OLS	RE	FE
GDP Per capita/SSA Average	0.00997**	0.00997**	0.01536
	[0.00471]	[0.00471]	[0.00933]
Log of Domestic Demand Pressure	-0.00774	-0.00774	-0.10703
	[0.07969]	[0.07969]	[0.10461]
Mobile Phone per 100 persons	-0.00001	-0.00001	0.00044
	[0.00045]	[0.00045]	[0.00038]
Air Passengers per capita	0.28235	0.28235	-0.34097
	[0.35589]	[0.35589]	[0.35794]
External Debt to GDP ratio	-0.00123	-0.00123	-0.00529
	[0.00391]	[0.00391]	[0.00771]
Log of Openness Index	0.02474	0.02474	-0.03416
	[0.01850]	[0.01850]	[0.02988]
Net Inward Foreign Direct Investment	0.56360***	0.56360***	0.22058
	[0.18503]	[0.18503]	[0.16271]
CEMAC	0.15901*	0.15901*	
	[0.08806]	[0.08806]	
CEMAC x Log of Domestic Demand Pressure	-0.14477	-0.14477	0.02964
	[0.10908]	[0.10908]	[0.12804]
CEMAC x Mobile Phone per 100 persons	-0.00099	-0.00099	-0.00044
	[0.00067]	[0.00067]	[0.00067]
CEMAC x Air Passengers per capita	0.10009	0.10009	0.91200**
	[0.34956]	[0.34956]	[0.36381]
CEMAC x External Debt to GDP ratio	-0.03430**	-0.03430**	-0.01739
	[0.01375]	[0.01375]	[0.01468]
CEMAC x Log of Openness Index	-0.08635*	-0.08635*	0.01551
	[0.05219]	[0.05219]	[0.05168]
CEMAC x Net Inward FDI (% of GDP)	-0.28081	-0.28081	-0.01742
	[0.21021]	[0.21021]	[0.18528]
Constant	-0.01732	-0.01732	0.07349*
	[0.03631]	[0.03631]	[0.04116]
Observations	265	265	265
R-squared	0.84		0.47
Number of countries		12	12
Standard errors in brackets			
* significant at 10%; ** significant at 5%; *** significant at 1%			

TABLE 7

EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL

SAMPLE OF NON-FRANC ZONE COUNTRIES

	OLS	RE	FE
GDP Per capita/SSA Average	0.02632***	0.01633***	0.01521***
	[0.00080]	[0.00094]	[0.00097]
Log of Domestic Demand Pressure	0.11485***	0.03956**	0.04204**
	[0.02647]	[0.01627]	[0.01629]
Mobile Phone per 100 persons	0.00015***	0.00018***	0.00019***
	[0.00005]	[0.00003]	[0.00003]
Air Passengers per capita	0.00419	0.01930***	0.02108***
	[0.00531]	[0.00390]	[0.00392]
External Debt to GDP ratio	-0.00412*	-0.0006	-0.00028
	[0.00229]	[0.00131]	[0.00130]
Log of Openness Index	0.01923***	0.00293	0.00069
	[0.00667]	[0.00428]	[0.00428]
Net Inward Foreign Direct Investment	-0.11356***	-0.00147	0.00365
	[0.02854]	[0.01571]	[0.01572]
Oil	0.03766**	-0.03212**	
	[0.01629]	[0.01485]	
Oil x Log of Domestic Demand Pressure	-0.05183	-0.11335***	-0.12058***
	[0.04823]	[0.02665]	[0.02662]
Oil x Mobile Phone per 100 persons	0.00021*	0.00020***	0.00020***
	[0.00012]	[0.00005]	[0.00005]
Oil x Air Passengers per capita	0.24359***	0.54790***	0.56003***
	[0.04201]	[0.05161]	[0.05255]
Oil x External Debt to GDP ratio	0.00014	0.00162	0.00127
	[0.00367]	[0.00187]	[0.00185]
Oil x Log of Openness Index	-0.02414**	0.00831	0.01081*
	[0.00986]	[0.00613]	[0.00611]
Oil x Net Inward FDI (% of GDP)	0.23189***	0.08328***	0.07899***
	[0.05736]	[0.02661]	[0.02644]
Constant	-0.02312**	0.02457***	0.01911***
	[0.01069]	[0.00929]	[0.00587]
Observations	632	632	632
	0.87		0.71
Number of countries	28		28
Standard errors in brackets			
* significant at 10%; ** significant at 5%; *** significant at 1%			

TABLE 8

EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL

SAMPLE OF OIL EXPORTING AFRICAN COUNTRIES

Dep Var is GDP per capita relative to Trade Weighted GDP per capita of Trading Partners

	OLS	RE	FE	OLS	RE	FE
	I	II	III	IV	V	VI
GDP Per capita/SSA Average	0.01904***	0.00374	0.01590***	0.01990***	0.01990***	0.01762***
	[0.00286]	[0.00278]	[0.00376]	[0.00307]	[0.00307]	[0.00448]
Log of Domestic Demand Pressure	0.08127**	-0.04082	-0.06898**	0.03779	0.03779	-0.07269*
	[0.03991]	[0.03153]	[0.02966]	[0.04664]	[0.04664]	[0.03995]
Mobile Phone per 100 persons	0.00027**	0.00036***	0.00037***	0.00038***	0.00038***	0.00037***
	[0.00012]	[0.00009]	[0.00008]	[0.00012]	[0.00012]	[0.00008]
Air Passengers per capita	0.22518***	0.59095***	0.62955***	0.39165***	0.39165***	0.56744***
	[0.05176]	[0.04284]	[0.04028]	[0.08094]	[0.08094]	[0.09891]
External Debt to GDP ratio	-0.01417***	-0.00479**	-0.0007	-0.00473	-0.00473	0.0012
	[0.00300]	[0.00239]	[0.00231]	[0.00320]	[0.00320]	[0.00244]
Log of Openness Index	-0.00205	0.00533	0.00793	-0.00046	-0.00046	0.0117
	[0.00905]	[0.00793]	[0.00752]	[0.00846]	[0.00846]	[0.00797]
Net Inward FDI (% of GDP)	0.12343***	0.10537***	0.11309***	0.12758**	0.12758**	0.08059**
	[0.04749]	[0.03394]	[0.03155]	[0.05487]	[0.05487]	[0.03895]
CEMAC	-0.01972***	-0.02943***		0.17138***	0.17138***	
	[0.00379]	[0.00906]		[0.06318]	[0.06318]	
CEMAC x Log of Domestic Demand Pressure				-0.12532	-0.12532	-0.00255
				[0.07629]	[0.07629]	[0.06180]
CEMAC x Mobile Phone per 100 persons				-0.00144***	-0.00144***	-0.0003
				[0.00041]	[0.00041]	[0.00036]
CEMAC x Air Passengers per capita				-0.16279***	-0.16279***	-0.00309
				[0.05401]	[0.05401]	[0.10703]
CEMAC x External Debt to GDP ratio				-0.03857***	-0.03857***	-0.02331***
				[0.01080]	[0.01080]	[0.00842]
CEMAC x Log of Openness Index				-0.08914**	-0.08914**	-0.03342
				[0.03854]	[0.03854]	[0.02822]
CEMAC x Net Inward FDI (% of GDP)				0.18768*	0.18768*	0.12652*
				[0.09600]	[0.09600]	[0.06913]
Constant	0.02836**	0.01979	-0.01944	0.01229	0.01229	-0.00135
	[0.01432]	[0.01412]	[0.01399]	[0.01360]	[0.01360]	[0.01845]
Observations	285	285	285	285	285	285
R-squared	0.89		0.68	0.91		0.7
Number of countries		12	12		12	12
Standard errors in brackets						
* significant at 10%; ** significant at 5%; *** significant at 1%						

TABLE 9

EMPIRICAL ESTIMATE OF THE DOUBLE DIAMOND MODEL

SAMPLE OF NON OIL AFRICAN COUNTRIES

Dep Var is GDP per capita relative to Trade Weighted GDP per capita of Trading Partners

	OLS	RE	FE	OLS	RE	FE
	I	II	III	IV	V	VI
GDP Per capita/SSA Average	0.02585***	0.01796***	0.01454***	0.02591***	0.01809***	0.01482***
	[0.00087]	[0.00151]	[0.00171]	[0.00093]	[0.00149]	[0.00169]
Log of Domestic Demand Pressure	0.07622***	-0.00347	0.00165	0.10960***	0.03605	0.04158
	[0.02650]	[0.02393]	[0.02443]	[0.03073]	[0.02669]	[0.02720]
Mobile Phone per 100 persons	0.00016**	0.00018***	0.00021***	0.00015**	0.00016***	0.00019***
	[0.00006]	[0.00004]	[0.00004]	[0.00006]	[0.00004]	[0.00004]
Air Passengers per capita	0.00692	0.01493**	0.02041***	0.0053	0.01663***	0.02198***
	[0.00618]	[0.00650]	[0.00672]	[0.00616]	[0.00641]	[0.00663]
External Debt to GDP ratio	-0.00211	-0.00034	0.0005	-0.00450*	-0.00117	-0.00029
	[0.00186]	[0.00191]	[0.00194]	[0.00265]	[0.00217]	[0.00216]
Log of Openness Index	0.02111***	0.00173	-0.00471	0.02067***	0.00675	0.0006
	[0.00633]	[0.00655]	[0.00672]	[0.00774]	[0.00704]	[0.00715]
Net Inward FDI (% of GDP)	-0.07299**	0.02337	0.03638	-0.11346***	-0.01066	0.00349
	[0.03168]	[0.02481]	[0.02534]	[0.03307]	[0.02577]	[0.02626]
FRANC	0.00668***	-0.00292		0.00171	0.08059**	
	[0.00238]	[0.00981]		[0.03244]	[0.03305]	
FRANC x Log of Domestic Demand Pressure				-0.0363	-0.14580**	-0.14859**
				[0.06920]	[0.06607]	[0.06825]
FRANCx Mobile Phone per 100 persons				-0.00014	0.00027	0.00025
				[0.00037]	[0.00024]	[0.00023]
FRANC x Air Passengers per capita				0.02549	-0.35025*	-0.36125*
				[0.28760]	[0.21290]	[0.21354]
FRANC x External Debt to GDP ratio				0.00291	-0.00405	-0.00501
				[0.00418]	[0.00472]	[0.00510]
FRANC x Log of Openness Index				-0.00073	-0.03587**	-0.03477*
				[0.01703]	[0.01817]	[0.01925]
FRANC x Net Inward FDI (% of GDP)				0.68733***	0.23287**	0.21754**
				[0.15625]	[0.10069]	[0.10075]
Constant	-0.02458**	0.02781**	0.04104***	-0.02431*	0.01607	0.05161***
	[0.01094]	[0.01254]	[0.01176]	[0.01239]	[0.01321]	[0.01245]
Observations	612	612	612	612	612	612
R-squared	0.81		0.38	0.82		0.41
Number of countries		28	28		28	28
Standard errors in brackets						
* significant at 10%; ** significant at 5%; *** significant at 1%						