Advances in African Economic, Social and Political Development

Diery Seck *Editor*

Financing Africa's Development

Paths to Sustainable Economic Growth

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Introduction[1]

Diery Seck

A commonly held view purports that capital flows to areas where rates of return are highest and through its investment, contributes to gradual convergence of productivity and income in favor of the less affluent zones. This long-held postulate sounded like a promise of growth and development in developing areas in general, and in particular in the most underdeveloped ones like Sub-Saharan Africa (SSA). However, careful examination of the statistical evidence over the last few decades reveals that SSA faced two contrasting evolutions. First, it attracted the least amount of financing, domestic or foreign, among the world regions. Second, it is still lingering at the bottom of world rankings of per capita income. How can this outcome be accounted for? Several lines of inquiry could be pursued.

Literature on development economics states that high expected return on financial capital is predicated on concomitant existence of adequate human capital, sound institutions and political governance, a healthy macroeconomic environment and political stability. It is argued that in the absence of such factors, capital may not flow to such regions even if its expected return is high. A second argument relates to the direction of causality. Does capital lead or follow economic growth? In other words, if countries show no prospects of economic development will their economies be attractive for accrual of financing? If true, I.e. financing leads economic growth, the opposite causal link would imply that if the economies of the least developed countries are financed without the caveat of the appropriateness or not of the form of funding, economic growth would ensue, thus triggering a virtuous cycle of economic prosperity.

A third attempt at explaining low financial flows to SSA could be the international specialization of world production. The argument would be that Africa is destined to be a source of primary commodities with limited requirements for finance compared to other regions that are slotted at different stages in the world production function and command more funding. A fourth line of inquiry would question whether foreign funding is a perfect substitute for domestic funding and

[1]Financing refers to (1) domestic resources such as public and private savings, (2) foreign direct investment, (3) external indebtedness, (4) foreign aid and (5) remittances.

thus economies must reach a threshold of self-financing to attract significant participation by foreign investors. This hypothesis would mean that countries need to undergo internal economic transformations in order to generate enough domestic savings to constitute a prime destination for the rest of the world.

One last view that could be investigated is that, in the absence of market-based funding, unrequited transfers such as foreign aid and remittances, could fill the gap and provide the necessary funding for SSA economies but are known to be very low in comparison to the stated needs. As a result, overall, SSA countries are markedly underfunded. These five possible lines of inquiry capture most of the explanations regarding the causes of the current and historical low level of financing for SSA.

Yet, SSA is often touted as the continent of the future with high economic growth prospects owing to its claimed demographic dividend, improving living conditions that enhance the quality of its human capital, rising education levels, emergence of a consumption spurring middle class, massive natural resources and arable land. In other words, as was the case for East Asia in the 1980s, SSA could be an economic miracle waiting to happen, adequate financing being the last piece of the puzzle. Again, some would argue that for financing to play its adequate role, some or all of the preconditions mentioned in the development economics areas mentioned earlier must be complied with.

However, the apparent good prospects of SSA countries do not necessarily translate into higher capacity to raise funding. External financing sources for the public or private sector are of limited availability especially when the foreign sources are private unless when the users of the funds are foreign themselves. The situation is more pronounced in the case of economies with an enclave and a low degree of diversification. Even domestic sources of financing are typically concentrated in very few sectors, usually the enclaves, with very little left for the rest of the economy. Considering that foreign firms are the largest ones and generate the most profits, common practices of repatriation of these profits through various means and motives make the same firms resort repeatedly to financing sources in the host country thus crowding out the home firms and raise the cost of capital for them owing to the potentially large imbalance between their demand for funds and the total amount offered to them by the financial sources. In a way, it is indicative of a segmented financing market in which local firms face scarce funding and a relatively higher cost of capital.

Considering all the challenges faced by SSA countries in their effort to seek and obtain financing, an examination of the approaches that can favor them will now be conducted. The first approach is related to regional integration, a key development strategy for most African countries. If at the regional level financial markets are integrated, they provide more breadth in investment opportunities, increased liquidity of financial assets and cross-country geographical and sectoral diversification, all possibly resulting in lower rates of return required by investors. Regional integration also paves the way for region-wide harmonization of rules, regulations and practices thus lessening institutional risk. It also makes it possible to enlarge markets for goods and services and offer better perspectives for investors not to

mention the possibility for individual countries to collectively seek financing within the region or abroad.

The second approach that could yield favorable financing is to try and lower the amount of funding needed by SSA countries. Several avenues can be considered. The first one consists in reducing economic distance, especially for land-locked countries, through infrastructure building or other means of lowering the cost of trade such as regional networks of immaterial exchange, i.e. Internet. Second, countries can organize to jointly raise funding through regional financial organizations such as the African Development Bank, that are capable of accessing markets at more favorable conditions, given their better creditworthiness. A third practice, which is common and often used, consists of benefitting from concessionary funding from institutions with a development mission. Such development windows typically give loans with a grant element that reduces the debt service burden of borrowing countries. The final approach that can be considered is for countries to ensure better selection of projects for which they seek funding and avoid the syndrome of white elephants that increase the debt service without providing adequate additional cash flows.

Three key issues are of significant importance and can only be resolved empirically. The first one concerns the cyclical character of the financing of SSA countries relative to the state of their economies. Does funding increase when the economy is in a downturn or does it decrease? If funding is pro-cyclical, then the pattern of financing tends to enhance the economic fluctuations of countries thus increasing their volatility. If the opposite is true financing helps stabilize SSA economies and may help reduce their vulnerability to shocks. The second question is: do SSA countries with a higher level of development receive more financing than the poorer ones? In this case, it can be hypothesized that developing countries in general and SSA countries in particular become more attractive funding targets as they grow. On the other hand, if the poorest countries are the prime beneficiaries of financing, the amount of funding would follow a U-shape curve along an income level axis bearing in mind that more advanced countries have historically mobilized significantly more capital. The third issue deals with the mere existence of causality between capital and growth. Does more financing cause more economic growth in SSA countries? This is of cardinal importance because in its absence the current literature and consensus on development may need to be revisited at least in the SSA region.

The book addresses many of the questions raised here and the various chapters focus on one or more issues related to the financing of development for SSA.

In a cross-section OLS estimation of the determinants of per capita income of 44 SSA countries over the period 1967–2016, Seck reports that being land-locked has a negative impact on income. He proposes the concept of economic distance to depict the cost incurred by land-locked countries for their trade to and from the sea. He argues that such a cost can be lessened with infrastructure built as part of a regional integration initiative. The lower the cost, the lower the amount of financing needed by land-locked countries in their economic activity. The same cost-saving result may also be obtained with immaterial facilities like the Internet. Ekpo

examines both traditional and innovative sources of financing for development in SSA. His panel regression results for 36 SSA countries show that while revenues, savings and remittances have a positive relationship with growth and per capita income, inflation, governance and external debt indicate a negative relationship with growth. He concludes that SSA economies must improve on governance and strive to mobilize domestic resources such as savings, tax revenues and private–public partnership arrangements to finance development.

Okah-Effogo investigates the contribution of financial development for African countries' participation in global value chains (GVCs) and examines the mechanisms through which financial development affects value-added trade. Her panel econometric analysis covering 36 African countries between 2000 and 2018 shows that financial development increases the participation of African countries in GVCs. However, some dimensions of financial development do not have a positive effect. Moreover, regional features are important in understanding the relationship between financial development and value-added trade.

Onye et al. study the effect of public external debt on a measure of infrastructure stock (fixed capital formation), and on growth (PPP-adjusted per capita income) for 14 West African economies over the period 1990–2018. They also examine alternative financing options for infrastructure development in West Africa with a view to expanding the frontier of infrastructure financing options for countries in the region. Relying on the fixed effect panel data model, they examine if external debt (given the level of concession) has impacted growth in West Africa, and whether the macroeconomic effect of external debt has worked through the investment efficiency channels rather than through capital accumulation (formation). Their study also investigates how the quality of institutions in West Africa may have interacted with external debt to impact infrastructure stock and economic growth in the region.

Nounamo Nguedie analyzes the role of economic institutions in the relationship between external debt and economic growth in the African Franc zone. He uses the Generalized Method of Moments (GMM) of Blundell and Blond (1998) for a sample of 12 countries within the period 1985–2015. He adopts the classification of economic institutions proposed by Rodrik (2005). His main conclusions are that economic institutions hinder the economic performance of the sample countries: (i) Quality of market creation institutions negatively affects the debt-growth nexus in the area. Similarly, market regulatory institutions have a negative impact. (ii) Market stabilization institutions have positive effects on the debt-growth nexus. In other words, to stimulate economic growth through debt, it is necessary to have better institutions in order to make external debt profitable for growth in the African Franc zone. (iii) For the whole zone, he obtains an optimal debt threshold which is 50.56% of GDP for the sample considered.

Omotor et al. verify the Direct Effect of Debt Hypothesis (DEDH), and based on empirical facts, develop a theoretical model that explores the impact of external debt on economic growth by taking into consideration exports and the role of institutions or quality of governance. Using country averages from 2005 to 2017 and data for 32 SSA countries, the OLS technique is used to estimate the

cross-sectional effect of external debt on governance and economic growth. Their findings indicate that exports and quality of governance stimulate output positively, while external debt burden has an adverse effect on economic growth.

Effiom (a) argues that while several initiatives have been established to frontally deal with the continent's infrastructure deficit, actual implementation has been frustrated by financial constraints. Resort to conventional financing methods has proven unsustainable. Africa must look beyond the conventional. He draws from the infrastructure finance literature and catalogs a number of infrastructure financing options that include sovereign wealth funds, pension funds as well as public private partnerships arrangements. Data from countries that have actually begun implementing these options show that there are prospects for infrastructure development if applied on a large continental scale. His key recommendation is that governments must reform the legal, regulatory and institutional frameworks across the continent to accommodate these financing sources. Regionalization of infrastructure provision may prove a speedier way of bridging Africa's infrastructure deficits.

Camara and Diallo empirically investigate the change in the relationship between economic growth and financial development for ECOWAS economies over the period 1991–2017 using quantile regression. Financial development is measured by private sector credit to GDP and liquid liabilities to GDP. Their results indicate that the impact of financial development on economic growth depends on the measure of the financial development as well as the specification of the model. Firstly, the impact of private credit to GDP increases at all levels of economic development, but decreases at higher levels of economic development when accounting for country fixed-effects. Secondly, the impact of liquid liabilities on growth decreases at lower levels of growth and increases at higher levels. However, when they account for country fixed-effects, the impact of liquid liabilities does not change significantly as economies develop.

Effiom (b) analyzes two critical infrastructure components in the ECOWAS regional community: transport, and information and communication technology (ICT). Both theoretical and empirical literature on infrastructure find evidence that infrastructure development is critical to Africa's long-term economic growth, and that without deliberate, focused policy, the infrastructure gap will widen with attendant negative consequences on growth, poverty reduction and overall development. With a financing requirement of $1464 billion annually for the next decade, for power, transport and the ICT infrastructure components, coupled with volatile income sources as well as weak institutional capacity for resource mobilization in member states, the hope of bridging this infrastructure gap looks dismal. He believes that alternative funding can be found in the public private partnership (PPP) model. Given the right policy and legal environment, the challenges inherent in the PPP framework could be attenuated to serve the needs of infrastructure financing in ECOWAS.

Bouhem and Gbetnkom compare the opportunity cost of illicit financial flows in terms of financing basic social services in the Central African Economic and Monetary Community (CAEMC) and the West African Economic and Monetary Union (WAEMU) zones using the incremental capital output ratio (ICOR)

simulation method based on the Harrod and Domar model. Their results show that based on the calculated ICOR coefficient, the estimated loss of GDP in CAEMC is 18 billion USD and 13 billion USD in WAEMU. This loss of GDP in the victim countries would make it possible to allocate additional resources for public social spending.

Adeoye et al. assess how migrant remittances can directly and/or indirectly influence industrialization using a panel data of 46 African countries from 1980 to 2017. The direct effect is evaluated through financial development channels. The study used both interactive and non-interactive empirical evidence methods for a more robust estimation, this includes (a) Fixed Effects techniques (FE) to rule out heterogeneity; (b) General Method of Moments (GMM) to rule out persistence in industrialization and (c) Instrumental Quantile Regressions (QR) to account for the previous levels of industrialization. The non-interactive stipulations give account for direct impact of migrant remittances on industrialization while the interactive stipulations account for the indirect effect. The findings show that personal remittance inflows can only drive industrialization through financial development at the early stage.

Ortsin mentions that in 2009, the Economic Community of West African States (ECOWAS) launched a vision to create a Common Investment Market (CIM) with the main objective to harmonize investment codes of all ECOWAS member states in order to boost factor movement and, ultimately, promote trade and investments. However, more than a decade after the launch, the CIM vision is yet to materialize although the region has successfully created a free trade area (with the implementation of the ECOWAS Trade Liberalization Scheme) and a customs union (with the implementation of the Common External Tariff). Some member countries still operate national investment laws that are at variance with some critical protocols of the Community. A typical example includes the fact that the three biggest economies, Nigeria, Ghana and Cote d'Ivoire continue to implement rules that are inimical to trade and investment.

This is to the extent that while Nigeria maintains a "prohibition list" that bans the importation of certain categories of goods, Ghana operates an investment regime which requires all foreigners (including ECOWAS nationals) to bring in a minimum capital of $1,000,000 before they can trade in the country's retail sector. Meanwhile, Cote d'Ivoire's national investment laws also create "exceptions" that are no-go-areas for foreigners, including ECOWAS nationals. He concludes with some recommendations based on a conceptualization of how the CIM can be attained through formulation of policy frameworks, promotion of free movement of persons and goods, development of infrastructural networks, integration of financial systems, participation of the private sector and the attraction of foreign direct investments (FDI) into the region.

A few guiding lessons can be drawn from the studies compiled in the book. It is noteworthy that, considering the current trend, SSA countries are increasingly relying on solutions based on regional integration arrangements to face their financing challenges and relatively less on unilateral options at the single country level. This may be in recognition of their weak economic power individually, and

of the strong potential of integrated solutions. One can also note the sense of urgency underlying the need to find answers to their growing challenges caused by their demographic pressure and the mounting international competition that they face, like any other region in the world. Finally, the present studies underscore the imperative for SSA countries to be the prime actors for their own development and, consequently, the need to finance it. Needless, to say that future research on the issue must focus on this class of policy solutions.

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Development and Finance

Economic Distance and Regional Integration in Africa

Diery Seck

Abstract Factors usually considered in models attempting to explain the economic growth of countries do not include geography as a determinant. One possible rationale for this omission is that geographic characteristics of a territory are considered part of its endowments, positive or negative. Furthermore, a country's geographical features are viewed as constant and unchangeable or very costly to modify. However, the resulting omission of geography from growth models can be revisited in the context of regional integration arrangements on the grounds that change could affect the geographical dimensions of a country's markets or alter its trading routes. If such transformations are sizable then they will impact economic growth and the model will require inclusion of geography in it. One avenue of inquiry, if geography matters, is the search for policy instruments related to it that are likely to help boost economic performance. A question that arises from the transformability of geography is whether it can be measured and how it would play a role in the production function and process of income formation and distribution. In such a case what would be the process leading to these changes. For a given regional integration member country, one key aspect of geography is the modification of the integrated territory in a manner that can provide benefits contributing to the welfare of its residents. Do such benefits exist and how do they motivate the decision of countries to enter into one geographical form of regional integration rather than others. The empirical model of the determinants of economic growth shows that geography affects negatively the economic performance for landlocked countries. The economic distance from seaports faced by landlocked countries translates into an economic cost that can be lessened through different strategies. Tackling economic distance gives rise to issues related to harmonization of production functions across member countries of the integrated region and to distinct economic strategies for integrated countries that are contiguous as opposed to countries that are dispersed.

Keywords Regional integration · Economic growth · Trade costs

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Table of abbreviations

AU	African Union
ASEAN	Association of Southeast Asian Nations
CEN-SAD	Community of Sahel-Saharan States
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EU	European Union
EPA	Economic Partnership Agreements
IGAD	Intergovernmental Authority on Development
MERCOSUR	Mercado Comun del Sur (Southern Common Market)
NAFTA	North America Free Trade Agreement (renamed United States-Mexico-Canada Agreement)
SADC	Southern Africa Development Community

1 Introduction

Factors usually included in models attempting to explain economic growth of countries do not include geography as a determinant. One possible rationale for this omission is that geographical characteristics of a territory are considered part of its endowments, positive or negative. Furthermore, a country's geographical features are viewed as constant and unchangeable or very costly to modify. However, the resulting omission of geography from growth models can be revisited in the context of regional integration arrangements on the grounds that change could affect the geographical dimensions of a country's markets or alter its trading routes. If such transformations are sizable then they will impact economic growth and the model will require inclusion of geography in it. One avenue of inquiry, if geography matters, is the search for policy instruments related to it that are likely to help boost economic performance.

A question that arises from the transformability of geography is whether it can be measured and how it would play a role in the production function and process of income formation and distribution. In such a case what would be the process leading to these changes. For a given regional integration member country, one key aspect of geography is the modification of the integrated territory in a manner that can provide benefits contributing to the welfare of its residents. Do such benefits exist and how do they motivate the decision of countries to enter into one geographical form of regional integration rather than others.

The remainder of the study is organized as follows. A theoretical model of economic growth of individual countries is proposed in the next section. The model is subjected to empirical verification with a variable that captures geography included. Then a number of key issues that relate regional integration and geography are discussed. They include regional integration policies and the cost of geography-related distance, gradual harmonization of production function in the geographical region and its impact on economic convergence, the characteristics of regionally integrated countries that are contiguous compared to countries that are geographically dispersed, and the impact of external geography on member countries. A summary of the main results concludes the study.

2 The Theoretical Model

Attempts to explain the causes of economic growth are made by Baldwin et al. (1999), Badwin and Venables (1995), Barro (1991), Barro and Salat -i- Martin, (1985), Brun et al. (2005), Douglas (1957), Galup et al. (1998), Grossman and Helpmasn (1991), and Radelet and Sachs (1998). Seck (2019) proposes a model of aggregate income determination for a small open economy that uses import tariffs and faces fixed international prices. It is stated as follows:

$$Y = wL + rK + X[(p+t) - a(w, r, x)] + \alpha tm \tag{1}$$

where,

Y	aggregate income
L	supply of labor
K	supply of capital
r and w	are factor prices for capital and labor respectively
X	production vector
p	level of prices
t	import tariff
$a(w, r, x)$	average cost that reflects the average cost and the production level in each sector

α diagonal matrix that captures the wedge t that creates income for domestic agents given that $\alpha = 1$ for a tariff or other barrier that generates domestic rent income, or $\alpha = 0$ where there is no rent

m net imports

The different components of total income are
$wL + rK$ is total factor income, wL is labor income and rK is capital income
$X[(p + t) - a(w, r, x)]$ is the level of profit in the economy

αtm income accruing from import rent

This model makes no mention of the geographical position of the country which means that location is not a determinant of its economic performance. As a result, if the empirical evidence shows a significant causal relationship between a variable related to geography and aggregate income, then it will support the independence between the determinants of GDP portrayed in Eq. 1 and geography on the one hand, and the impact of geography on aggregate income on the other hand. Such an augmented model would be of significant relevance for many African countries that have the peculiar situation of being landlocked for instance. Note that the surface area of a country is an ambiguous geographical indicator because some African countries are mostly covered with desert land, which reduces their useful economic area considerably, except where there are important mining resources in the desert areas.

3 The Empirical Evidence

In order to test empirically if geography is a determinant of aggregate income, Eq. 1 is estimated with a cross section regression covering 44 Sub-Saharan countries—see Appendix for the list of countries in the sample—over the 50 years covering the period 1967–2016. The 50-year averages are computed for all the variables in the model. A dummy variable is added to indicate if the country is landlocked.

The dependent variable is measured by the rate of GDP growth. The ratio of Gross Fixed Capital Formation over GDP is the proxy for capital (K) in Eq. 1 Total population measures labor (L). The variable TradeOpen is the sum of imports and exports divided by GDP and denotes the degree of openness of the economy. The level of prices is proxied by inflation. The variable Initial perCap GDP is the initial level of per capita income set in 1980 and Landlocked shows if the country is landlocked or not. These last two variables aim to capture human geography and physical geography and will help determine if the model depicted by Eq. 1 is exhaustive and rejects the hypothesis that geography is a determinant of economic growth.

Table 1 reports the result of the cross section regression of GDP growth on a number of determinants measured based on Eq. 1 and two indicators of geography. Overall, the empirical model is highly significant with an adjusted R^2 of 0.66 and a F probability equal to zero. Two results of the individual explanatory variables are

Table 1 Cross section regression of the determinants of GDP growth (period: 1967–2016)

Explanatory variable	Coefficient	*T*. value
Constant	0.9383	1.53*
GFCF	0.1248	6.36***
TradeOpen	0.1754	2.34**
Inflation	−0.0018	−1.28
Population	0.00001	1.51*
Initial perCap GDP	−0.0001	−0.50
Landlocked	−0.7702	−1.75**
Number of obs.	44	
Adjusted R^2	0.66	
Probability *F*	0.00	

Note *** denotes a significance level of 99%, ** at the 95% level and * at the 90% level
Source of data World Development Indicators, World Bank

noteworthy. First, Gross Fixed Capital Formation (GFCF) and TradeOpen (Trade Openness) are significant with the right positive sign. Inflation, Initial per Capita GDP, and Population are either not significant or weakly significant. Second, the explanatory variable Landlocked has the right negative sign although it is not included in the theoretical model depicted in Eq. 1. This result supports the view that the geographical position of a country matters and that countries that are landlocked suffer from such a position irrespective of other economic factors that affect economic growth.

While not all possible measures of geography are included in the model specification, one that is included, Landlocked, has proved to be significant. It is argued that, for the purpose of the foregoing analysis, all the geographic dimensions of a country can be subsumed under the notion of economic distance. Economic distance refers to the cost of cross-border shipping or delivery of goods and services over and above the average cost incurred if the transaction is carried out within the country's borders. For instance, a country that is landlocked would face, as part of its economic distance, the cost of transport of its imports or exports from its border to the nearest seaport. Consequently, in addition to achieving the two determinants of economic growth, namely, investment and trade openness, one of the roles of regional integration is to minimize economic distance for its member countries.

4 Regional Integration Policies and Economic Distance

A key policy issue is to identify ways to reduce economic distance through regional integration initiatives that benefit all or some member countries. Among channels of transmission economic distance can materialize through changes in the size of

consumption markets for integrated countries or in the scale of production resulting from the pooled productive capacities. For the sake of brevity, three classes of economic distance reduction are examined. The first strategy consists in selection of geographical location that facilitates pooling of production across national borders. This can be achieved if, for example, raw cotton harvest of neighboring countries is collected from either side of the border and processed in a single factory located in one of the countries, thus enhancing its volume of production. Another case could be the smelting of iron ore mined from sites located in different countries in a single steel factory. The proximity of the various sources of raw material with the single factory would result in reduction of the economic distance. In addition to reduction of economic distance, this strategy helps increase the share of the value added in the value chain that stays in the regionally integrated area.

A second regional integration strategy aimed at reducing economic distance resides in building infrastructure to minimize the cost and speed up transport of passengers and merchandise. The economic importance of infrastructure building is well documented but some key issues remain partially unresolved. First, African regional integration bodies are considerably behind in their own infrastructure building relative to the set objectives but ongoing programs do not show evidence of the will to remedy that situation which hinders the achievement of the goals that they set for themselves. Second, countries do not always agree on the right itinerary of the road and rail systems between access to the seaports, outward-oriented, and maximizing the internal exchanges between member countries, inward-oriented. Finally, most countries have not yet arrived at the right mix between public and private financing and may consider domestic infrastructure building a priority over regional programs.

The third strategy of reduction of economic distance is provision of immaterial services that do not require delivery-induced costs. The recent upsurge in Internet-based services provides large opportunities in a variety of areas such as education, financial services, and medical services. However, the easiness of service provision also exposes member states to international competition originating outside the integrated region, which may translate regional integration into integration to the word economy. One of the benefits of integration through provision of immaterial services is that it reduces the economic distance in other sectors wherever it renders movement less pressing or unnecessary as in medical services or education. However, the novelty of such exchanges underscores the need to enact cross-border rules and regulations that will help facilitate development of immaterial markets.

5 Regional Production Function and Economic Convergence

One of the arguments of Eq. 1 is $wL + rK$, the contributions of labor and capital, w and r being their respective factor prices. It can be argued that w and r will be diverse across the geographical area of the regionally integrated zone. Given free

movement of capital and labor, it is expected that, under competition, there will be a tendency over time for them to equalize in all parts of the region, a process facilitated by uniformity of education standards and the high degree of information content embedded in capital. Consequently, the productivity of capital will tend to harmonize across the geographical area faster than that of labor but the latter will also follow.

This adjustment process may take time depending on the actual degree of integration, government regulation, and the capacity of trade unions to negotiate new contracts but will, in the end, result in gradual increase in the level of wages. Considering that the unit price of labor is lower in the poorer countries where education standards are also lower, the process will benefit them first and give rise to catching up and convergence of household incomes toward those of the more advanced countries. At this stage, there will be a single production function in the geographical area of the regional integration and capital and labor will no longer seek to move from one area to another for reasons of factor price differences.

6 Geographical Contiguity or Dispersion of Regional Integration Members

There are two types of regional integration arrangements in Africa that differ in their geographical characteristics. The first one includes arrangements between countries that are contiguous, i.e., it is possible to travel to all member states on land without entering the territory of a non-member country. Examples include ECOWAS, ECCAS, EAC, SADC, and IGAD. The second type comprises geographically dispersed countries. Two notable cases are COMESA and CEN-SAD. Following is an examination of the key features of both types of arrangement.

The integration of contiguous countries implies lower economic distance and lends itself to investment in land-based infrastructure. It may facilitate a stronger sense of supra-national identity given the continuity of the landmass and the presence of people with similar ethnic affiliations in two or more countries. It is easier for contiguous countries to collectively undertake large projects such as electric power dams or transshipment seaports. Given the low economic distance around the border areas, contiguity facilitates existence of small firms and informal sector activities which are important providers of employment.

In the African context, countries that are members of a regional integration arrangement and are geographically dispersed are likely to have more pronounced differences in levels of development and technological progress. This may give rise to transfer of knowledge from richer members to poorer members. The higher cost of internal trade between members provides a stronger incentive to lessen economic distance which also promotes adoption of more modern sectoral activities such as Internet-based immaterial trade. The disparity in levels of development may reinforce altruistic behavior such as solidarity which in turn, strengthens the overall regional

integration agenda and fosters compliance of individual countries with regional policies and rules. Therefore, it may be logical for African countries to simultaneously participate in both types of arrangements to take advantage of their respective benefits which are arguably substantial and complementary and helps explain why most countries that are members of a contiguous arrangement are also members of an arrangement between geographically dispersed regional integration groupings.

7 External Geography and Regional Integration

One of the salient trends in the world economy is the formation of geographical groupings operating under a diversity of integrative arrangements. These groupings include the European Union, the ASEAN, the NAFTA, MERCOSUR, the African Regional Economic Commissions (RECs), etc. The resulting rise in agreements between groupings reduces the number of international partners which leads, to a large extent, to loss of sovereignty for individual countries in favor of the groupings. The Economic Partnership Agreements (EPA) between the European Union and African countries is one such example. One major consequence of this collaboration between geographical areas is harmonization of the standards of quality in international trade, e.g., phytosanitary rules on agricultural exports. Another consequence is the growing incidence of geographical product mandates put in place by multinational companies that integrates whole regions as a single market and enhances uniformity of product characteristics.

With respect to external trade, contiguous countries that are integrated can achieve economies of scale by saving money on shipment costs and servicing large foreign markets that would otherwise be unattainable for single exporting countries. They can also use a strategy of hub and spokes by jointly creating large seaports or container terminals with economies of scale in building infrastructure and enhanced efficiency in terminal operations. Through external trade and inbound foreign direct investment, integrated countries can better seize opportunities for technological diffusion and knowledge transfer.

8 Conclusion

The key question that is investigated is whether geography plays a role in the economic growth of Sub-Saharan African (SSA) countries. A theoretical model of growth is tested empirically with the addition of the dummy variable Landlock as a measure of geography. The underlying rationale is that if the model is accurate and exhaustive Landlock would not be a significant determinant of economic growth. The cross section regression of the 50-year average of GDP growth of 44 SSA countries on a number of variables averaged over the same period shows that the model is significant with a high degree of explanatory power with an R^2 of 0.66. However,

the variable Landlock is also significant and justifies use of the notion of economic distance as a negative determinant of growth in SSA.

A number of strategies related to regional integration are examined to lessen the cost associated with economic distance. They consist of pooling productive processing capacity near the common borders of two or more countries to source primary input from all neighboring regions. A second strategy resides in building regional infrastructure that helps reduce the cost of transport of passengers and merchandise. The third strategy seeks to avoid the cost of economic distance by developing the sector of immaterial services. One of the aspects that results from regional integration is the trend toward a homogeneous production function and growing convergence of wages and levels of incomes in all the geographical regions of the zone.

Comparison of the characteristics of contiguous regional groupings with groupings of countries that are geographically dispersed has revealed that contiguity lends itself to building of common infrastructure projects given the lower economic distance, fosters supra-national identity, and facilitates development of small business and informal sector around the border areas. Countries that are geographically dispersed are more likely to have different levels of technological development and engage in knowledge transfer from richer to poorer members of the zone. The higher cost related to economic distance will encourage emergence of immaterial trade. The disparity in levels of development will foster altruism and solidarity which reinforces compliance with regional policies and rules. Therefore, countries may find it advantageous to participate simultaneously in both types of regional integration schemes to take advantage of their respective benefits.

The recent rise in regionally integrated zones around the world has translated into a shift in sovereignty from individual countries to groupings. This is increasingly resulting in harmonization of region-wide standards of quality and an evolution toward enhanced geographical product mandates put in place by multinational companies. External geography can lead countries that are integrated to undertake large seaport infrastructure to lessen economic distance and improve port operations. Increased capacity through economies of scale may foster additional inbound foreign direct investment leading to more technological diffusion and knowledge transfer (Table 2).

Table 2 Average growth rates of SSA countries, 1967–2016

	Country name	Average growth rate
1	Angola	4.752
2	Benin	3.669
3	Botswana	8.595
4	Burkina Faso	4.591
5	Burundi	2.618
6	Cameroon	3.786
7	Cabo Verde	6.61
8	Central African Republic	1.197
9	Chad	3.976
10	Comoros	2.353
11	Congo, Dem. Rep.	1.206
12	Congo, Rep.	4.424
13	Cote d'Ivoire	3.503
14	Equatorial Guinea	15.825
15	Eritrea	3.784
16	Ethiopia	5.647
17	Gabon	3.960
18	Gambia, The	3.802
19	Ghana	3.803
20	Guinea	3.92
21	Guinea-Bissau	2.706
22	Kenya	4.663
23	Lesotho	4.764
24	Liberia	1.756
25	Madagascar	2.015
26	Malawi	4.101
27	Mali	4.143
28	Mauritius	4.56
29	Mozambique	5.61
30	Namibia	3.496
31	Niger	2.33
32	Nigeria	4.166
33	Rwanda	5.239
34	Sao Tome and Principe	4.972
35	Senegal	3.02
36	Seychelles	4.492
37	Sierra Leone	2.572

(continued)

Table 2 (continued)

	Country name	Average growth rate
38	South Africa	2.703
39	Swaziland	5.221
40	Tanzania	5.323
41	Togo	3.132
42	Uganda	5.844
43	Zambia	3.209
44	Zimbabwe	2.926

Source of data World Development Indicators, WB

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Financing Development Without Tears: An Empirical Investigation on Sub-saharan Africa

Akpan H. Ekpo

Abstract We examined both traditional and 'innovative' sources of financing development in SSA. The panel results for 36 SSA countries showed mixed results. While revenues, savings and remittances had a positive relationship with growth and per capita income, inflation, governance and external debt indicated negative relationship with growth. It is apparent that SSA economies must improve on governance and strive to mobilize domestic resources such as savings, tax revenues and private–public partnership arrangements to finance development.

1 Introduction

Most countries in Sub-Saharan Africa (SSA) are commodity-dependent. Some of the countries depend on one commodity while others have two or more commodities. The revenues earned from the exports of these commodities (minerals, agriculture) in raw form are used in importing finished goods from developed countries as well as in financing development. The revenues from export of commodities generate foreign reserves, for example, in Nigeria, oil revenues constitute about 85% of foreign exchange.

In almost all SSA, only South Africa can boast of a seemingly manufacturing sub-sector in the production chain. The prices of the export commodities are both volatile and unstable depending on the vagaries of the global economic market. In most cases, the price and output are under the control of a Cartel, for example, the Organization of Petroleum Exporting Countries (OPEC) and crude oil. However, whether it is oil, cocoa, diamond, rubber, etc., the prices are determined outside the continent of Africa.

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The volatility of prices and output implies volatility of revenues thus financing various development projects in SSA from such revenues remain a big challenge. Despite the revenues from commodities and the industrialization policies of import substitution, export promotion and more recent import-based policy, SSA remains backward and underdeveloped even within the neo-liberal economic framework. Most of the economies in SSA rely on official and other overseas development assistance (ODA) to finance the development process. Several studies have shown that ODA alone will not be adequate for financing development. In the last 40 years, ODA to several African countries has not had any significant impact on the countries of SSA (Ekpo 1992, 2011).

In SSA, both individual and national savings are generally low and efforts to generate internal revenues have been relatively difficult given the problems of tax administration. Nonetheless, tax efforts have improved and governments have pursued alternative sources of financing development. However, more often these 'new' sources are derived from fine-tuning the traditional methods of financing (Nwokoma and Akpan 2017; Senbet 2009).

SSA countries borrow from various multilateral institutions; some of the economies have established national development banks to finance their infrastructural needs. In recent times, the debt profile of most countries has been trending upwards (Ekpo 2012; Ekpo and Afangideh 2012).

The objective of this paper is to examine the sources of financing development in Sub-Saharan Africa in order to ascertain whether countries in the continent can borrow without tears. The paper is organized as follows: Sect. 2 discusses the stylized facts as regards resource mobilization while Sect. 3 briefly examines related studies, concepts and methodology. The empirical results are analyzed in Sects. 4 and 5 concludes the paper. It is expected that discussion in the paper would provide insights on the subject matter as well as guide policy.

2 Mobilizing Resources: Stylized Facts

The rate of inflation which averaged single-digit from 1980 to 2000 rose to double-digit between 2001 and 2018. Throughout the period, inflation exceeded the growth in GDP. Between 2011 and 2018, inflation stood at almost 16%. It must be noted that each country in SSA has its own inflationary threshold. There is no doubt that SSA economies were better managed from the mid-2000s (Ekpo 2016, pp. 12–23). The growth of the economy of SSA has remained not only sluggish since the global financial crises but also dependent on prices of commodity exports (Fig. 1).

The Table 1 summarizes the trend of some financial resources in SSA for the period 1980–2018. External debt which averaged about $26 billion between 1980 and 1985 rose to $31.58 billion between 1996 and 2000 and remained at the same level up to 2006–2010 but declined thereafter to about $19.54 billion between 2011 and 2018. The external debt profile remained high during the structural and post-structural adjustment period. The rising external debt is not unconnected with the

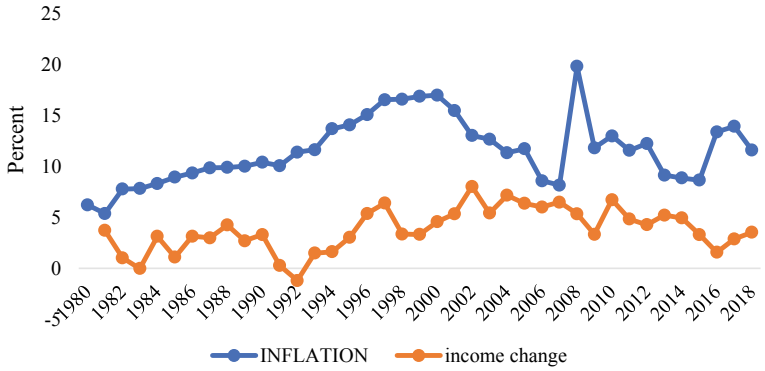

Fig. 1 Trends in inflation and growth in GDP in sub Sahara Africa

desire to mobilize funds for infrastructural development. On the other hand, savings have remained almost flat for the period 1980–2018 (see Figs. 2, 3 and Table 1). But savings/GDP which was at its lowest in 2000 rose steadily with a peak in 2008 and thereafter rending downwards as a result of the global economic recession.

Revenues mainly from commodity exports averaged $30 billion during the period 1980–2010 and declined thereafter. Remittances have become an important source of financing development in SSA. It increased steadily from 1980 to 2010. Nigeria, Ghana, Kenya and Zimbabwe and Senegal show increased remittances during the period under review.

3 Concepts, Related Studies and Methodology

Within the neo-liberal concept of the theory of[1] comparative advantage (static or dynamic) and its vent-for-surplus element, it is argued that a country would gain more by exporting commodities that it produces using its abundant factors of production most intensively while importing goods whose production needs relatively require scarce factors of production. The first implication of this position is that any economy can engage in and benefit from international trade, including the world's highest cost and lowest cost producers of any good. This is not possible because factor endowments are different among countries. The contention here is, for example, that SSA countries can export primary commodities with perhaps its labour-intensive methods and import finished goods such as computers, radios and cars. Moreover, trade between SSA and developed countries is often unequal regarding accrued benefits.

Hence, the revenue earned from exporting primary commodities is central to the development process and is the basic engine for economic growth. For example, revenues earned from exports would be used in importing capital goods (machinery,

[1]This section draws heavily from Ekpo (2012).

Table 1 Selected financial resources in SSA, 1980–2018 (averages)

Period	1980–1985	1986–1990	1991–1995	1996–2000	2001–2005	2006–2010	2011–2018
External debt ($Bn)	26.59	31.72	31.61	31.58	31.62	31.36	19.54
Savings ($Bn)	23.15	27.75	27.74	27.71	27.70	27.79	17.22
Inflation	6.15	4.66	8.12	9.05	11.98	13.66	15.81
Revenues ($Bn)	26.76	32.07	32.02	31.99	31.93	31.81	19.24
Remittances ($Bn)	2.09	2.51	2.51	2.52	2.51	2.52	1.87

Source computed from World Bank: African economic indicators and African Development Bank Statistical Yearbook, various issues

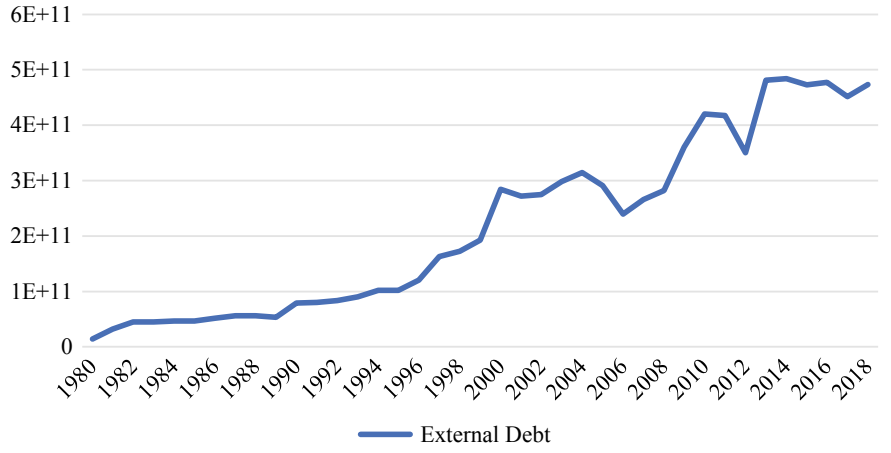

Fig. 2 Trend in external debt in sub Sahara Africa

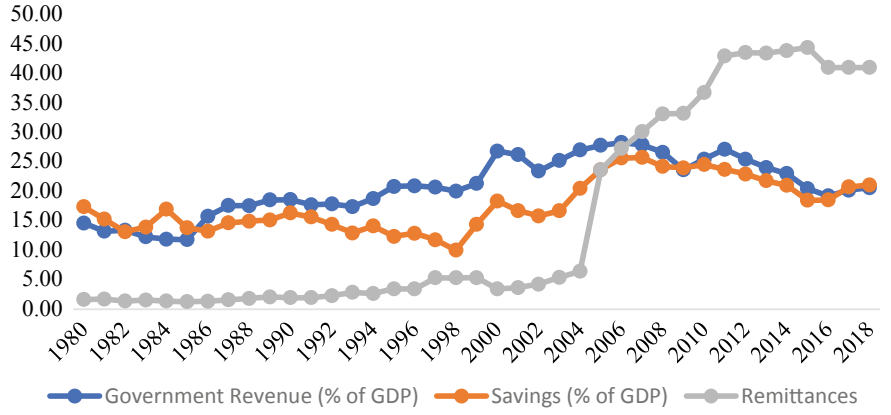

Fig. 3 Trends in government revenue, savings and remittances in sub Sahara Africa

etc.) for development resulting in structural change and income growth. The strategies meant to drive this process include import substitution and export promotion. Primary export-led growth has three broad advantages to developing countries: (i) improved utilization of existing factors of production, (ii) expanded factor endowment and (iii) linkage effects.

However, series of empirical evidence shows that except for Botswana, primary exports have not effectively transformed the economies of SSA, that is, there has been no economic development. The reasons for this include

- Sluggish demand growth.
- Declining terms of trade.
- Fluctuating export earnings.

- Ineffective linkages.
- Rent seeking and corruption.
- Dutch disease.

It seems that the situation would have been different if leaders in SSA were interested in development. Leaders in Malaysia, Indonesia, etc., exported primary products but in addition built a semi-manufactured export economy. The leadership in these countries were developmental in orientation. Revenues earned from primary exports were utilized in creating the enabling environment for the individual, public and private sectors to drive the development process. The direct participation and intervention of the public sector were qualitative. In other words, matters of development go beyond financing; there must exist good governance coupled with the commitment to positively transform an economy through comprehensive planning with space for the private sector to play its role.

The literature on the importance of finance to growth is vast and hence cannot be adequately summarized in this paper. Finance is a crucial input to growth and this assertion can be traced to the works of Schumpeter (1983) which have been supported by historical evidences, cross-country regressions, within-country studies that use variances across regions and industries as well as combinations of the various approaches (Rousseau 2003; Goldsmith 1969; Mckinnon 1973; Montiel 2003). King and Levine (1993), for example, formalized the link between finance and growth by utilizing cross-country regressions to demonstrate that higher levels of banking system development are positively linked with faster rates of physical capital accumulation and economic growth. According to their study, finance does not follow economic activity; it leads it. An excellent summary of the literature is in (Haber 2010).

Another interesting aspect of the finance–growth nexus is that it seems to also have positive effects on the distribution of income and the well-being of the poor. Financial development reduces income inequality, enhances the growth rate of the income share of the poorest quintile of the population and is associated with poverty alleviation (Honohan and Beck 2007). Consequently, "the question of the relationship between financial development and growth is now a settled matter. There is a broad consensus that finance plays a crucial role in the process of growth and that it does so through a variety of mechanisms." Our interest goes beyond growth because the latter is not development. Therefore, it would be interesting to examine the impact of sources of finance on growth and economic development using per capita income as a proxy for latter over-time, among other variables.

3.1 Sources of Financing Development

Arising from the above analysis, the conventional external sources of financing development in commodity-dependent economies of SSA include, inter alia:

- Own revenues from commodity export.

- Official aid (loans, grants).
- Private debt flows.
- FDI flows.
- Portfolio equity flows.
- Personal remittances.
- Institutional remittances.

These sources are rather unstable and therefore cannot be relied upon particularly for longer term development projects.

In order to ascertain the impact of some of these sources, we state the following relationship:

$$\Delta \text{yit} = \beta\delta + \text{Xit} + U \tag{1}$$

where:

Δy = change in GDP;

δ sources of finance;

X = control variables such as inflation and governance.

Due to paucity of data, Eq. (1) would be estimated for 36 SSA countries (the list of countries is in the appendix).

3.2 'Innovative' Sources of Financing Development

(i) Diaspora bonds.

A Diaspora bond is a debt instrument issued by a country—or, potentially by a sub-sovereign entity or by a private corporation to raise financing from its overseas diaspora (Ratha et al. 2008). These bonds are usually issued in times of crisis and often at what has been described as a 'patriotic' discount. Asian countries particularly India, Malaysia, etc., and Israel have raised billions from their diaspora abroad. It is the contention that the diaspora more often have a strong desire to assist in the development of their home countries and are thus more likely to buy diaspora bonds. Nigeria is contemplating issuing diaspora bonds to finance development.

Table in the appendix below indicates estimates of diaspora stock of SSA countries and their yearly savings. By creating the right incentive, SSA governments can tap into potential diaspora savings. These diaspora bonds can provide instrument for repatriation of Africa's flight capital which is estimated at more than $170 billion. Some challenges that SSA countries may encounter in issuing diaspora bonds include (i) weak and non-transparent legal systems for contract enforcement, (ii) a lack of national banks and other institutions in destination countries which can ease the marketing of the bonds and (iii) a lack of clarity on regulations in the host countries that either allow or restrain diaspora members from investing in the bonds.

(ii) Reducing remittance costs.
It is believed that SSA countries have the highest share of remittances flowing through informal channels compared to other regions (Page and Plaza 2006). This is partly due to the high cost of sending remittances in SSA thus reducing remittance costs would increase remittance flows to SSA. "For example, the average cost, including foreign exchange premium, of sending $200 from London to Lagos, Nigeria in mid-2006 was 14.4% of the amount, and the cost from Cotonou, Benin to Lagos was more than 17%." Therefore, reducing remittance fees would increase the diaspora income of remitters, encouraging them to remit large amounts at greater frequencies. It may, in addition, encourage remittances to shift from informal to formal channels.

(iii) Innovative structuring.
There exists series of new guaranteed and conditionalities introduced by multilateral institutions like the Multilateral Investment Guarantee Agency (MIGA) of the World Bank, IMF, etc., to facilitate the financing of development in low-income countries—especially given the impact of the global financial crisis. For details (see Go and Page 2008).

(iv) Public–private partnership (PPP).
Industrialized countries finance their infrastructure and economic growth largely with funds from the private sector especially from capital markets. The PPP approach is suitable for large infrastructural projects. It requires the involvement of the private sector with guarantees from the public sector. This approach needs appreciable expertise such that at the end, projects are not almost fully public sector financed.

(v) Recovery of looted funds.
Another innovative way of utilizing existing resources include recovery of flight capital and stolen assets. According to the World Bank and the UN office of Drug and Crime (UNODC), the cross-border flow of the global proceeds from criminal activities, corruption and tax evasion are estimated to be more than $1 trillion yearly. About $20 billion to $40 billion in assets acquired by corrupt leaders of poor countries, mostly in Africa, are kept abroad. It is on record that Nigeria successfully recovered half a billion dollars in stolen assets from Swiss sources with the assistance of the World Bank, civil society and the Swiss authority.

3.3 Mobilizing Domestic Resources

Domestic resources seem to be preferred to volatile sources of financing development. It must be stated up front that mobilizing domestic resources in SSA can be extremely difficult given the rigidities in the African economies. There are also significant tradeoffs between domestic resource mobilization and sources of financing development as earlier—examined. For example, high levels of aid may impact

adversely on domestic resource mobilization by reducing recipient countries' tax effort. It is a challenge to mobilize domestic resources in the WAIFEM countries giving the low savings rates. Both gross national and domestic savings as ratios of GDP are quite low in all the countries. In 2007, the average GNS/GDP was 18.3% and declined steadily to 13.2% in 2009; for the ECOWAS, GDS/GDP stood at − 3.0% in 2007 and increased to 8.7% in 2008 (see appendix Tables). These rates are quite low if domestic resources are to be mobilized via the banking sector to finance development.

The data for the selected countries shows that in 2008 the GNS/GDP for Nigeria was almost 40% while that of Liberia was about 33% despite her being a post-conflict economy. All the other countries recorded very low savings rate (WAIFEM 2010, p. 167). Apart from the low savings rates, commercial lending rates remain very high in the selected countries. For the period 2001–2009, lending rates averaged almost 25% for the Gambia; about 20% in Nigeria and 23% in Sierra Leone.

These high lending rates cannot encourage growth in the real sectors of these countries. It is, therefore, not surprising that the real sectors in these countries are in comatose with essentially thriving informal sectors largely dependent on informal finance. The lending rates for both ECOWAS and the CFA zone are also high particularly between 2008 and 2009.

Nonetheless, we still argue that domestic resources are a more permanent and sure sources of financing development. Additional domestic resources could be harnessed by

- ***Increased mobilization of savings and lending***—incentives have to be put in place to enable households and their families to save by holding more financial assets. In most African countries, the return on saving deposits is very low. Millions of Africans do not have information on available financial assets. It may be necessary to take the financial institutions to the people in the rural areas. In addition, reducing the transaction costs of holding financial assets may induce household and their families to hold financial assets.
- ***Banking reforms***. It is crucial to strengthen the banking system. Aryeetey (2009) suggests that

  (1) There is a need for measures to deepen financial markets within the context of alternative institutional arrangements;
  (2) Measures to strengthen market—support financial infrastructure;
  (3) A new regulatory and incentive framework to advance market integration;
  (4) Measures to enhance the financial technology of both informal and formal finance so as to broaden the scope of their operations and
  (5) Measures to develop linkages among segments of the market.

- ***Building capital markets***—this is crucial for long-term finance. There is an absence of active capital markets in SSA. Of the 16 countries with stock markets in 2009, only Nigeria and South Africa had more than 100 firms listed; the remaining countries had about 24 firms listed. It would be useful to pool resources together

and establish regional capital markets. "Regionalization of African Stock Markets should enhance mobilization of both domestic and global financial resources both domestic and global financial resources to fund regional companies while injecting more, liquidity unto the markets" (Aryeetey 2009).

- ***Developing microfinance***—some SSA Countries have established microfinance banks but the challenge is to make them generate savings and support small-scale development projects. The operations of microfinance institutions would have to be re-examined for effectiveness. Recently, the Nigerian Apex Bank closed down hundreds of microfinance banks for inactivity and not sticking to agreed prudential guidelines.
- ***Expanding the tax base***. While this represents one of the surest ways of generating revenue for development, there is also a limit to taxation. It may be useful to consider a kind of regional **Tobin Tax** to finance regional development projects. This would involve political commitment from the African leadership. Another issue would centre on how best to tax the large informal sector.[2]
- ***Creating an effective fiscal space***. This involves a re-prioritization of spending—expenditure switching. For example, an examination of budgets of most SSA countries indicate heavy expenditure on military armaments, equipment, fighter planes rather than spending on capital projects that would stimulate growth and development. Such an exercise will free resources from spending on wasteful consumption to spending on infrastructural financing.
- ***Pension funds***. In some SSA countries, there exist large pension funds which could be used to finance development projects such as roads, water schemes and sanitation, among others.
- ***Sovereign wealth fund***. Revenues from non-renewable resources need to be managed for investment, intergenerational equity and broad economic stability.
- ***Social capital***. This aspect of financing development has not been effectively utilized by most SSA countries. Rural communities in Africa have abundant social capital that would finance micro- and even small-scale projects.
- ***Role of regional financial institutions***. It is certain that the African Development Bank, the African Export and Import Bank and other similar institutions established by African Leaders must be active in generating ideas for domestic resource mobilization. African countries ought not to face similar or strict conditionalities in order to borrow from the ADB, for example. ADB was set up to provide needed funds to finance development projects so as to accelerate economic growth and development in Africa. Is the ADB still playing that role? If not, they should be reminded of their mandate.
- ***Labour as a resource***. Countries in the zone must perceive labour as a resource particularly in rural communities. For example, using labour to build projects in the rural areas would yield positive multiplier effects on the said community and the wider economy.

[2]How Lagos State in Nigeria taxes the informal sector is worth studying.

4 Analysis of Panel Regression Results

The estimated panel results (random effect) for the period 1980–2018 for 36 SSA countries are presented in Table 2. Based on the results, remittances, revenues and savings have positive relationship with growth in GDP and are statistically significant. An increase in external debt is negatively related to growth implying that external debt has a turning point. Governance and lagged GDP have no positive relationship to growth. In addition, an increase in inflation rate reduces growth for the period under review. The R2 is robust confirming that the control variables explain the variation in the model.

Table 2 Panel regression results

Random-effects GLS regression
Number of obs = 562
Number of groups = 36
R-sq: within = 0.6598
Between = 0.5883
Overall = 0.6503

ΔY	Coef.	Std. err.	Z	$P > \|z\|$	[95% Conf.
Remit	2.786014	0.3029674	9.20	0.000	2.192209
Rev	1.119911	0.0849158	13.19	0.000	0.9534787
Infl	−2.15073	0.830396	−2.59	0.003	−0.0.07053
Savs	0.474418	0.1057248	4.49	0.000	0.2672012
Exdt	−0.3650004	0.0688446	−5.30	0.000	−0.4999334
Govern	−4.820231	1.559945	−3.09	0.000	−1.359201
$y-1$	−0.3283598	0.0130217	−25.22	0.000	−0.3538819
_cons	15.50873	13.72454	1.13	0.027	−4.080821

Random-effects GLS regression
Number of obs = 562
Number of groups = 36
R-sq: within = 0.5105
Between = 0.4775
Overall = 0.4952

y/p	Coef.	Std. err.	z	$P > \|z\|$	[95% conf.]
y-1	−1.500290	0.857309	−1.75	0.001	3.291009
Govern	−67.07002	155.9768	−0.43	0.666	−0.3730102
Exdt	−0.563393	1.198708	−0.47	0.636	−0.2789308
Savs	4.470343	1.832108	2.44	0.015	4.875931
Infl	−2.837341	5.911127	−0.48	0.613	−0.2626642
Rev	3.507043	1.397228	2.51	0.011	−6.240974
Remit	−21.55517	6.284308	−3.43	0.001	−5.380747
_cons	1923.612	464.6528	4.14	0.000	1012.91

The results on income per capita as the dependent variable appear interesting; only savings and revenues have a positive relationship with income per capita, a proxy for development. Remittances, governance and external debt have negative relationship with development. An increase in the rate of inflation reduces income per capita which is expected—a rise in inflation rate affects more the poor since the rich can draw on savings.

5 Conclusion

We examined the sources of financing development in SSA. We x-rayed traditional as well as innovative sources of financing development in the continent. The dependent on commodity exports for revenue remains a challenge for SSA based on the volatility of such exogenous source of funds. It would be prudent to mobilize domestic resources such as private and public savings, revenue from taxation, diaspora bonds, among others to finance development.

The panel regression results showed that external debt, inflation and governance reduces growth and development. But savings and revenues enhance growth and per capita income.

These results have to be interpreted with caution because paucity of data on other sources of finance such as diaspora bonds, private equity flows and domestic debts for most of the countries prevented a more robust analysis of the subject matter. Nonetheless, SSA countries must improve on governance as well as finding innovative ways of financing development without tears.

Appendix

See Tables 3 and 4.

See Figs. 4 and 5.

Table 3 Financial flows to sub-Saharan Africa and other developing countries 1990–2006

Types of flow	1990 ($ billion)	1995 ($ billion)	2000 ($ billion)	2005 ($ billion)	2006 ($ billion)	Growth rate, 2000–06%
Sub-Saharan Africa excluding south Africa official flows						
ODA	17.0	17.4	11.7	30.1	29.3	150
Official debt	4.3	3.5	0.7	−0.7	–	–
Private medium- and long-term flows	0.8	3.7	5.1	11.9	14.4	180
FDI	1.3	3.3	5.8	10.3	13.3	128
Portfolio equity	0.0	0.0	0.0	0.1	.01	–
Bond	0.0	0.1	−0.2	0.0	0.0	–
Bank lending	−0.5	0.3	−0.5	1.5	4.3	–
Private short-term debt	2.3	1.0	−1.4	1.4	1.4	–
Migrants' remittances	1.7	3.1	4.3	8.7	9.6	124
Institutional remittances	1.4	2.3	2.9	5.2	–	–
Capital outflows	3.2	5.3	6.6	6.3	–	–

Source Africa at a turning point? Growth, Aid, and External Shocks, p. 304

Table 4 Potential market for diaspora bonds

Country	Diaspora stock (thousands)	Potential diaspora savings ($ billions)
South Africa	713	2.9
Nigeria	837	2.8
Kenya	427	1.7
Ghana	907	1.7
Ethiopia	446	1.6
Somalia	441	1.6
Senegal	463	1.3
Zimbabwe	761	1.0
Sudan	587	1.0
Angola	523	1.0
Congo, Dem Rep	572	0.8
Cape Verde	181	0.7
Uganda	155	0.7
Mauritius	119	0.7
Cameroon	231	0.6
Mozambique	803	0.6
Madagascar	151	0.6
Tanzania	189	0.6
Eritrea	849	0.6
Mali	1,213	0.6
Other SSA Countries	5,285	5.5
Total	15,854	28.5

Source Ratha et al. (2008), p. 316
Note Diaspora Savings are calculated assuming migrants earned the average per capita income of the host country and saved one-fifth of their income

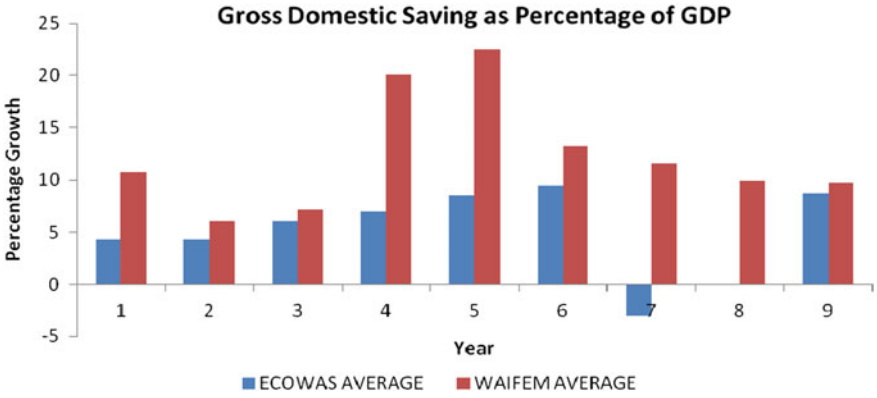

Fig. 4 Gross Domestic savings as percentage of gross domestic product in selected West African countries

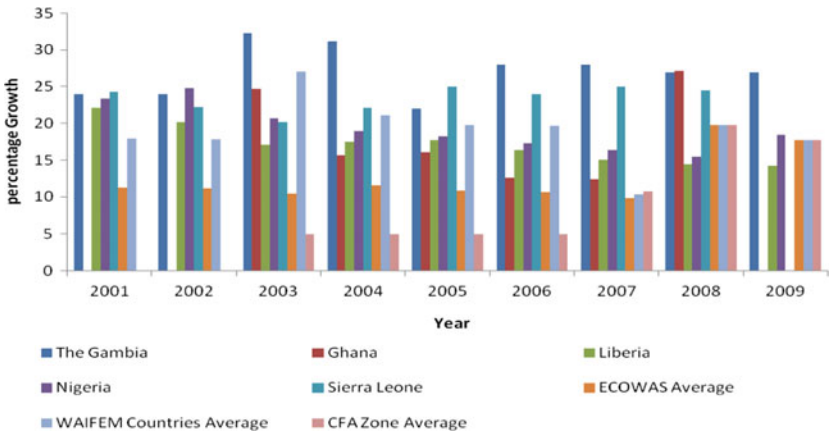

Fig. 5 Commercial bank lending rate in selected West African countries

Fixed Effect Model

```
. xtreg gdpchange remit rev infl savs exdt policy govqt gdp1, fe
note: policy omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       562
Group variable: cid                             Number of groups   =        36

R-sq:  within  = 0.6666                         Obs per group: min =         8
       between = 0.3441                                        avg =      15.6
       overall = 0.6336                                        max =        18

                                                F(7,519)           =    148.23
corr(u_i, Xb)  = -0.1299                        Prob > F           =    0.0000

------------------------------------------------------------------------------
   gdpchange |      Coef.   Std. Err.      z    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       remit |   1.787519   .4825456     3.70   0.000     .8395366    2.735502
         rev |   .9721852   .1056778     9.20   0.000     .7645763    1.179794
        infl |  -332065.3   4.47e+07    -0.01   0.994    -8.75e+07    8.82e+07
        savs |   .8191991   .1386046     5.91   0.000      .546904    1.091494
        exdt |  -.4689317   .0903715    -5.19   0.000    -.6464705   -.2913929
      policy |          0  (omitted)
       govqt |  -2.32e+08   1.22e+09    -0.19   0.849    -2.62e+09    2.16e+09
        gdp1 |  -.3392735   .0139807   -24.27   0.000    -.3667392   -.3118078
       _cons |   1.36e+09   7.99e+08     1.70   0.089    -2.08e+08    2.93e+09
-------------+----------------------------------------------------------------
     sigma_u |  3.855e+09
     sigma_e |  7.162e+09
         rho |  .22465232   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(35, 519) =     2.43                 Prob > F = 0.0000
```

Per Capita Income Model
(Fixed Effect Model is Idea Based on the Hausman Test)
Fixed Effect Model

```
. xtreg pcy gdp1 govqt policy exdt savs infl rev remit, fe
note: policy omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       562
Group variable: cid                             Number of groups   =        36

R-sq:  within  = 0.6114                         Obs per group: min =         8
       between = 0.5385                                        avg =      15.6
       overall = 0.6062                                        max =        18

                                                F(7,519)           =     49.87
corr(u_i, Xb)  = -0.1117                        Prob > F           =    0.0000

------------------------------------------------------------------------------
         pcy |      Coef.   Std. Err.      z    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        gdp1 |  -0.006578   0.00157    -4.19   0.000     2.272309    9.515319
       govqt |  -0.332389   0.29415    -1.13   0.260    -4.955581   -13.43252
      policy |          0  (omitted)
        exdt |  -4.095050   1.10082    -3.72   0.000    -2.745508   -1.953084
        savs |   0.677140   1.83011     0.37   0.918     .7440933    7.936708
        infl |  -14.56155   5.89536    -2.47   0.004    -6.182394   -2.960516
         rev |   0.594077   0.39084     1.52   0.030    -6.248109   -4.850808
       remit |  -1.130180   0.36108    -3.13   0.002    -3.241307   -7.413908
       _cons |   1865.165   105.3781    17.70   0.000     1658.145    2072.184
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |   10.51034
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(35, 519) =   109.59                 Prob > F = 0.0000
```

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Financial Development and African Participation in Global Value Chains

Françoise Okah Efogo

> *Participating in GVCs is not a given […]. Trade costs and connectivity are important, but so are worker skills, infrastructure, and technological capacity, as well as the rule of law and macro and political stability*.
> (World Development Report 2020, Concept Note, January 11, 2019, p. 13).

Abstract This paper investigates the contribution of financial development for African countries' participation in global value chains (GVCs). It relies on a review of the theoretical and empirical literature that can shed light on the mechanisms whereby financial development affects value-added trade. A panel econometric analysis covering 36 African countries between 2000 and 2018 supplements the theoretical analysis. Data used for this empirical analysis comes from the WDI (2018), UNCTAD_EORA (The Eora Multi-Region Input-Output Database, 2018) and UNDP (2018) databases. The Financial Development Index is a *multidimensional* synthetic index constructed by the IMF (2018). Theoretical analysis shows that very little work has addressed this issue, although there is considerable evidence that financial development has a positive impact on the conditions for participation in and upgrading within a GVC. As for the empirical results, they reveal that financial development increases the participation of African countries in GVCs. However, some dimensions of financial development do not have a positive effect. Moreover, regional features are important in understanding the relationship between financial development and value-added trade. This research is therefore a useful tool for decision-making in promoting financial development for deeper African countries' participation in GVCs.

Keywords Financial development · Global value chain · Backward participation · Forward participation · Africa

JEL Classification F14 · F15 · F23

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Global value chains (GVCs), fragmentation and trade in tasks are the key features of international trade today (De Backer et al. 2018). This new international trade landscape can be an opportunity for developing countries. Indeed, by definition, GVCs include various activities belonging to various sectors of the economy (primary, secondary, tertiary). This sectoral diversity opens up job opportunities for all categories of workers (skilled, unskilled, etc.). In addition, through the upgrading phenomenon, GVCs can contribute to industrialization, structural transformation and sustainable development of countries (UNCTAD 2013; AfDB et al. 2014).

For all those reasons, most countries in the world are working to integrate GVCS and/or to upgrade within GVCs. However, as the quotation indicates, it is not easy to join a GVC. Participation in GVCs is subject to a number of conditions, including the existence of adequate infrastructure, access to quality services, technology, lowering of tariff barriers, and human capital (AfDB et al., 2014; Amador and Cabral 2016; Allard et al. 2016; Gereffi and Fernandez-Stark 2016; Tinta 2017; Rodrik 2018; World Bank 2019). To these "technical" conditions, the World Bank adds institutional conditions.

Due to an insufficient availability of those prerequisites, African countries' participation in GVCs is low. African countries participate in only 3% of task exchanges (Allard et al. 2016). More precisely, Africa just adds value to 14% of its exports, compared to 27% for emerging Asian countries and 31% for developed countries. Moreover, only 15% of foreign value added is found in African exports; even if the situations are different from one region of Africa to another (Allard et al. 2016). To improve African participation in GVCs, it is important to address the barriers to the participation of companies (main actors) in GVCs. To this end, the GEM report (2016) emphasizes the importance of access to finance as a barrier to entrepreneurship in developing countries. This report also underlines that traditional financing methods still have a strong influence in developing countries.

This raises the question of the importance of financial development for African participation in GVCs. Specifically, the aim of this paper is to understand the effects of financial development on African participation in GVCs.

The concept of financial development refers to many other concepts from which analysts attempt to operationalize the concept. Kpodar (2006), who uses the definition of the Department of International Development (DIK)[1] has given the most complete definition. According to this author, there is financial development when the financial system is characterized by (i) the accumulation of financial assets, (ii) the diversification of financial assets and institutions, (iii) improving the efficiency and competitiveness of the financial system, (iv) financial inclusion.

From this definition, it appears that financial development can play an important role for at least three reasons. First, a financial system that is not well diversified both institutionally and in terms of financial instruments is highly risky. This undermines investor confidence and impedes conclusion of commercial relationships in

[1]C'est un département ministériel qui dirige les travaux du gouvernement britannique en vue de la réduction de l'extrême pauvreté (www.gov.uk/government/organisations/department-for-international-development.

the context of a GVC. Second, the financial system plays a fundamental role in facilitating international trade. Thus, to join a GVC, companies must have an account in a formal financial institution with international correspondents. Third, technological upgrading requires access to substantial financing that can be provided by the financial system, if it is sufficiently diversified in terms of financial instruments and institutions. On this subject, the theoretical and empirical literature show that financial development contributes to the implementation of some prerequisites for participation in GVCs.

The objective of this research is to assess the benefits from a developed financial system for African participation in GVCs. The originality of this paper is twofold, specifically the topic addressed and the approach adopted. In the first hand, empirical works on GVCs are recent because related data are under construction. There is therefore little or no work in Africa examining the effects of financial development on countries' participation in GVCs. In the second hand, the paper adopts both a global approach (Africa) and a comparative approach (by RECs and by financial development dimension).

The paper is organized around five sections: Sect. 1 provides a brief review of the literature. Section 2 presents a statistical analysis of the facts related to financial development and participation in GVCs. Section 3 describes the model and the econometric analysis method. Section 4 displays and discusses the results obtained. Section 5 gives the conclusions.

1 Literature Review

There is no direct literature on the effects of financial development on countries' participation in value chains. However, there is a significant literature demonstrating that financial development can be the watershed that spurts the seed of greater participation in global value chains. Specifically, Gereffi and Fernandez-Stark (2016) identify four groups of variables that can catalyze country participation in GVCs, including access to finance variables, input quality-related variables, market access variables and coordination variables. Financial development could lead to improvements in each of these groups of indicators in a number of ways. Schumpeter (1939) had previously raised this idea when he argued that "*the services provided by financial intermediaries are essential to induce, facilitate and accompany technological innovations and economic development.*"

This is even truer today, given that the dynamics of development and trade expansion require large investments in developing countries. Countries now need a variety of sources of long-term financing to enable them to set up GVCs or to scale-up within a value chain.

While there is no evidence that financial development has any effect on the establishment of GVCs, there is sufficient evidence from existing work to illustrate that financial development has an impact on the conditions for setting up a GVC, participating in a GVC, or moving up the value chain within a GVC. Indeed, financial

development can affect the quality and productivity of production factors, the access of players to appropriate financing, access to markets, technological upgrading and even coordination. To understand how these effects work, it is important to remember that the financial system is "*a part of the economy that includes all the institutions involved in transferring savings from savers (households and firms) to borrowers, as well as in transferring, sharing and insuring risks*" (Stiglitz 1997, 2005).

Based on this definition, one shows that well-functioning banks stimulate technological innovation through identification and funding of firms with a better chance of success (Schumpeter 1912). Similarly, Levine (1997) argues that the services provided by financial intermediaries stimulate capital accumulation and factor productivity. These conclusions about the positive effects of financial development in terms of innovation and factor productivity were echoed in more recent works. In particular, a number of authors indicate that financial sector reforms exert a procyclical effect by increasing the productivity of firms, leading to a better allocation of resources (McGowan et al. 2018; Arnold and Flach 2017). Similarly, Cole et al. (2016) report that financial development influences the type of technology used by firms and increases factor productivity. For Andrews and Cingano (2014), in countries where the financial system is developed and banking regulations are weak, firms' productivity is high. Taking up this idea, Midrigan and Xu (2014) show that the financial system improves productivity by crowding out low-productivity firms. Similarly, Levine and Warusawitharana (2019) conclude that the sensitivity of productivity increases with the level of shocks to the financial system. In the African context, Bokpin et al. (2018) argue that financial development has a positive effect on the productivity of firms.

From a different perspective, Buera et al. (2011) document the fact that increasing the value of bank guarantees increases productivity differentials, total factor productivity and the capital-to-GDP ratio. This leads to a misallocation of capital and creates barriers to the entry of new firms, thereby weakening total factor productivity (TFP). In this perspective of relaxing the positive results, a number of authors identify moderating variables (Levine 2005; Acemoglu et al. 2006), notably the country's financial structure ("bank-based," "market-based") and the country's technological level.

In addition to productivity and innovation, financial development can have effects on other determinants of GVC participation. To illustrate these other effects, it is necessary to restate the importance of multinational enterprises (MNEs), which are the main players in the GVCs, as well as the most important drivers of foreign direct investment (FDI).

Several studies show that by setting up in a country, a MNE can contribute to the integration of local firms into the international production network at any level of the chain (supply of raw materials, transport services, after-sales services, distribution, etc.). Thus, the country can create part of the value chain while not necessarily having all the upstream skills (Cattanéo et al. 2013; OECD 2013; Gereffi and Lee 2012). FDI can foster technology transfer (Allard et al. 2016) as well as the insertion of local SMEs in the chain of their activities (Fernandez et al. 2011; Borchert et al. 2012; Arvis et al. 2016). They can lead to the emergence of new activities and have

an inciting role on human capital quality through the demand for specific labour or through apprenticeship.

FDI then appears as an important determinant of countries' participation in GVCs. Countries must therefore create the attractiveness conditions for FDI. In this respect, financial development cannot be neglected. In fact, recent literature sufficiently documents the benefits of financial development in terms of attracting FDI and MNEs. Bilir et al. (2019) indicate that financial development is associated with relatively more entry by multinational affiliates. They identify a financing effect that induces affiliates entry and expansion by improving access to external finance; and a competition effect that reorient sales away from the local market due to participation of credit-constrained local firms. Alzaidy et al. (2017) find that well-developed financial sectors lead to further and facilitate FDI spillover. Alfaro et al. (2009) find that countries with well-developed financial markets gain significantly from FDI via TFP improvements.

At the end of this brief review of the literature, it appears that financial development has an impact on the conditions of penetration, implementation and evolution within GVCs. Specifically, a developed financial system improves factor productivity, firm productivity, technological innovation, access to finance and FDI inflows. These generally positive theoretical observations are corroborated in the Chinese context through Lu et al. (2019) study's, which states that financial constraints reduce the country's participation in the GVCs. Nevertheless, a number of works highlight the importance of contextual factors on the outcomes obtained, including the structure of the financial system, the initial technological level and even the institutional environment. Hence the value of a preliminary examination of the African context.

2 Facts in Africa

This section is devoted to a descriptive analysis of both African participation in the GVCs and financial development and mapping of the structures of African financial systems. As far as participation in GVCs is concerned, overall participation of Africa in GVCs remains low. The bulk of African exports are made up of commodities that contribute to backward integration, i.e. the weakest part of the GVC. African countries add value to only 14% of their exports, compared to emerging Asian countries (27%) and developed countries (31%). Moreover, barely 15% of foreign value added is found in African exports (Allard et al. 2016). However, it is important to note that these figures are not the same for all countries. For example, Southern African countries and some East African countries are highly integrated into GVCs.

At the same time, financial development is low in Africa. The average financial development index in Africa is 1 on a scale of 0–10 (Fig. 1). Nevertheless, there is an increasing trend in financial development. Figure 1 also indicates that financial institutions are more developed than financial markets. The development of the financial market is very low. This suggests that financial intermediaries or better yet banks, through balance sheet intermediation, dominate the African financial systems.

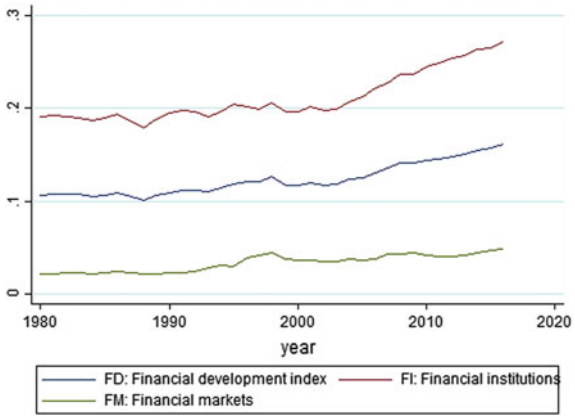

Fig. 1 Financial development in Africa (1980–2018). *Source* Financial Development Index (FMI, 2018)

Yet the evidence indicates that in Africa, there are different types of financial systems. Specifically, African countries can be grouped into three categories. The first category includes countries with a developed and active financial system. This includes countries such as South Africa, North African countries, WAEMU countries and Zimbabwe. The second category consists of countries with a poorly developed financial market. It includes countries such as Botswana, Ghana, CEMAC countries, Namibia and Zambia. The third category is made up of all countries with no financial market or with an embryonic financial market. It includes countries such as Ethiopia, Madagascar and Seychelles. This mapping shows the diversity of African realities and, certainly, the potentially different effects of financial development from one group of countries to another.

The decomposition of the Financial Institutions Development Index (FI) and the Financial Market Development Index (FM) enables us to identify the aspects on which African banks have made efforts as well as the criteria that still need further refinement. Indeed, each indicator is a synthesis of 3 dimensions, namely, access, depth and efficiency. With specific regard to Financial Institution Development (FI), Fig. 2a shows that Efficiency (FIE) is the dimension with the highest score. Access (FIA) and depth (FID) score very low. All of which indicates that financial institutions are poorly diversified and that financial inclusion is not yet achieved in Africa. However, it is important to note that situations may differ from one group of countries to another.

With regard to the development of African financial markets, it appears (Fig. 2) that the average access index (FMA), depth index (FMD) and efficiency index (FME) are low (below 1). However, the market depth indicator has been increasing since the 1990s. We also note that the situations are not the same for all African countries.

The relationship between financial development and participation in GVCs appears to be positive. Indeed, whatever the dimension of financial development considered and whatever the stage of integration (backward integration—FVA—or forward integration—DVA) assumed, a relationship with an increasing slope is observed (Fig. 3). Moreover, there seems to be no threshold effect since the quadratic

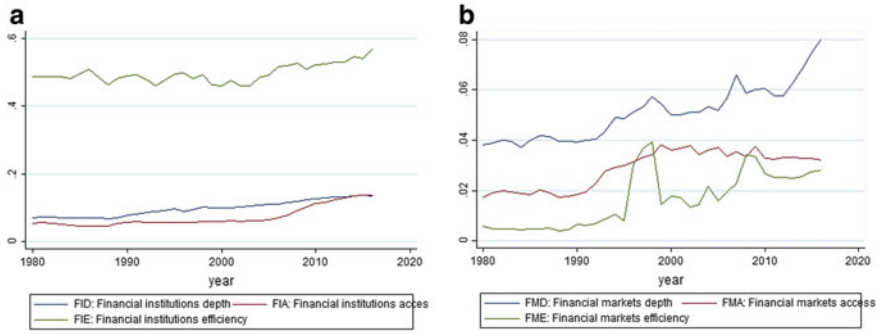

Fig. 2 **a**. Financial institutions development in Africa (1980–2018). **b**. Financial market development in Africa (1980–2018). *Source* Financial Development Index (FMI, 2018)

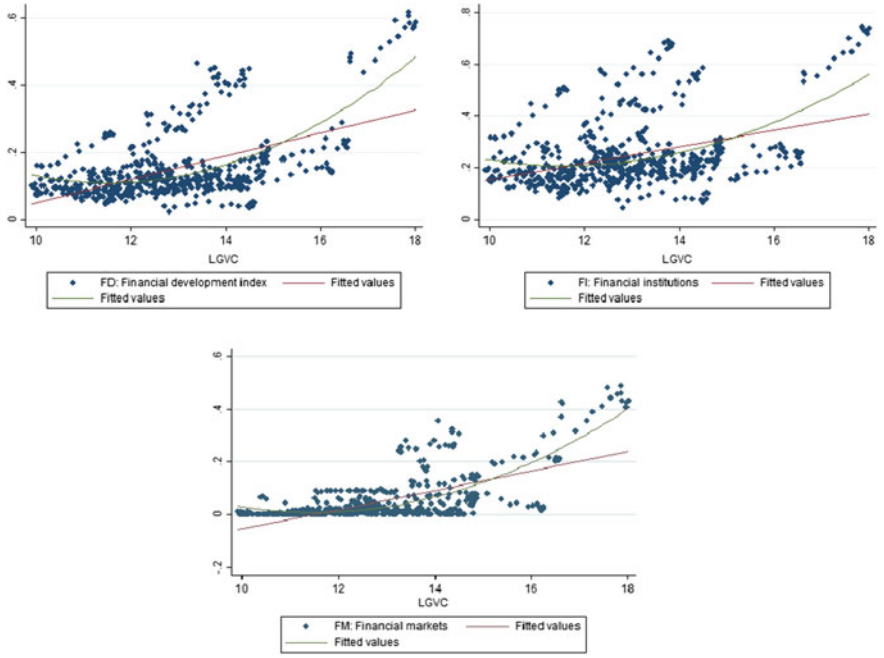

Fig. 3 **a**. GVC $= f$(FD). **b**. GVC $= f$(FI). **c**. GVC$= f$(FM). *Source* Financial Development Index (FMI, 2018)

(green) and linear (red) trends are relatively confused. Nevertheless, to ensure this, the Simonsohn (2018) test will be implemented on the variables of interest. This test verifies the existence of a U-shaped or inverted U-shaped relationship. It also calculates the threshold (minimum/maximum), when it exists.

The results of the Simonsohn test (2018) are shown in Fig. 4a, b, c. Looking

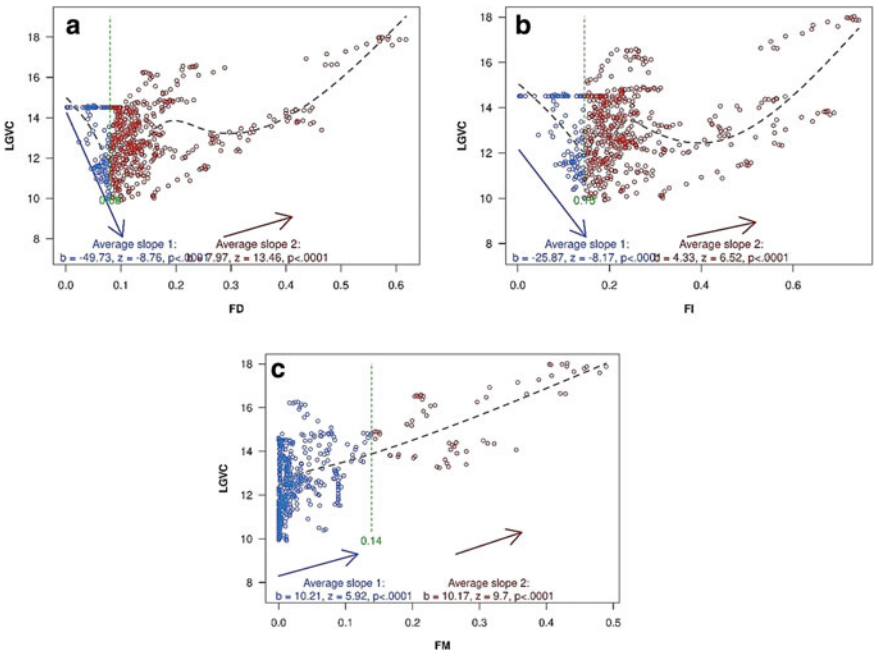

Fig. 4 **a**. Simonsohn Test GVC $= f$(FD). **b**. Simonsohn Test GVC $= f$(FI). **c**. Simonsohn Test GVC = f(FM). *Source* http://webstimate.org/twolines/

at each of these figures, one may conclude that, for African countries, there is a positive linear relationship between financial market (FM) development and country participation in GVCs. Basically, as the financial market develops, countries' participation in the GVCs deepens. On the other hand, for financial development as a whole (FD) as well as for the development of financial institutions (FI), there would be a non-linear relationship with a threshold above which the effect of financial development is positive. The minimum threshold is estimated at 0.08 for financial system development (FD) and 0.13 for financial institution development (FI). Both values are considerably lower than the average value recorded for each indicator over the study period. All of which points to the hypothesis of a positive effect of financial development on the participation of African countries in GVCs.

In brief, financial development in Africa is low in all its dimensions. Moreover, the promotion of financial development has the potential to contribute to the deepening of African countries' participation in the GVCs. The above graphical analysis supports such an assumption. Moreover, Global Enterprise Monitor (GEM 2016) identifies access to finance as one of the main constraints to private sector development and expansion in Africa. In order to check the accuracy of this hypothesis and to provide decision-makers with a decision-making tool, it would be advisable to rely on an appropriate methodology as well as a rigorous empirical approach.

3 Methodology and Data

Due to conceptual complexities, this section is of particular importance in ensuring the quality and reliability of the empirical findings obtained. The presentation of the methodology focuses on four points: description of the model, choice of estimation method, evidence of endogeneity bias and presentation of the data.

a. The Model

The empirical model draws from Osnago et al. (2016), Boffa et al. (2019) and Laget et al. (2018). It is set following existing literature on GVCs' participation determinants (Allard et al. 2016; Kowalski and Lopez-Gonzalez 2016; Aslam et al. 2017):

$$\begin{aligned}\Delta GVC_{it} =& \gamma_{0it} + \gamma_{1it}\Delta GVC_{it-1} + \gamma_{2it}\Delta FD_{it} + \gamma_{3it}X_{it} + \gamma_{4it}(FD_{it} \times I_{\text{SYSTEM}}) \\ &+ \gamma_{4it}(FD_{it} \times I_{\text{REGION}}) + \gamma^{i} + \theta_{t} + \varepsilon_{it}\end{aligned}$$

In this equation, $\boldsymbol{GVC_{it}}$ is a measure of global value chain participation, retrieved from UNCTAD/EORA database; $\boldsymbol{X_{it}}$ is a set of control variables described in Table 1, $\boldsymbol{FD_{it}}$ is financial development measured by a synthetic index developed Svirydzenka (2016). This indicator takes into account all dimensions of financial development. In addition, it also proposes an indicator of financial institution development (depth, access, efficiency) and an indicator of financial market development (depth, access, efficiency). Such an indicator allows making recommendations by identifying the most crucial aspect of financial development in terms of participation in GVCs. $\boldsymbol{FD_{it}} \times \boldsymbol{I}_{\text{SYSTEM}}$ is a variable that captures interaction between financial development and financial system structure. $\boldsymbol{FD}_{\text{it}} \times \boldsymbol{I}_{\text{REGION}}$ is a variable that captures interaction between financial development and region to which the country belongs to.

Control variables come from the work of Allard et al. (2016), Kowalski and Lopez-Gonzalez (2016) and Aslam et al. (2017). Indicators of participation in GVCs are provided by UNCTAD (UNCTAD-EORA GVC 2018). The other variables come from UNCTAD (UNCTADStat database 2018), UNDP human development database and the World Bank (WDI 2018). The analysis covers 36 African countries from 2000 to 2018. A dummy is introduced for three regions over 4, to account for regional effects (I_{AC}, I_{AO}, I_{EA}, I_{SA}).

b. The choice of the method

The choice of an estimator is the result of a step-by-step procedure. The objective of such an approach is to correct most of the biases in order to get the most efficient output estimate. The approach is based on a number of preliminary tests. First, a cross-sectional dependence test must be carried out (Pesaran 2004; Pesaran et al. 2008). This test helps to identify the appropriate stationarity test. In case of country independence, the first-generation stationarity tests (IPS, PP, and ADF) give good results. In case of dependence, the second-generation tests give better results, in particular the tests of Pesaran (2006) and the test of Hadri and Kurozumi (2008).

Table 1 Explanatory variables

Catégorie	Variables	Mesure	Signe	Source	Auteurs	Stationnarité
Market access	OPENNESS (OPEN)	Exports + imports of goods and services (% of GDP)	+	WDI (2018)	World Bank et al. (2017)	I(1)
	TARIF (TARIF)	Average rate applied (%)	–	WDI (2018)	Miroudot and Cadestin (2017); AfDB et al. (2017); Allard et al. (2016); Gereffi and Fernandez-Stark (2016)	I(1)
Finance	INCOMING FDI (FDI_IN)	Incoming foreign direct investment (% of GDP)	±	WDI (2018)	Kowalski and Lopez-Gonzalez (2016)	I(1)
	FINANCIAL DEVELOPMENT	Financial development	+	IMF (2018)		I(1)/I(2)[a]
Human capital	EDUCATION INDEX (EDUC)	Education Index	+	UNDP (2018)	Allard et al. (2016); Gereffi and Fernandez-Stark (2016)	I(2)
	LABOR PRODUCTIVITY (LABORPROD)	GDP per worker	+	ILOStat (2018)	World Bank et al. (2017)	I(2)
	K/L RATIO	Capital/labour ratio	+	WDI (2018)	Kowalski and Lopez-Gonzalez (2016)	I(1)
Coordination	GDP	Annual growth rate of the economy (%)	+	WDI (2018)	Allard et al. (2016)	I(1)
	PER CAPITA GDP (PCGDP)	National income level—GDP per capita—(millions of US dollars)	+	WDI (2018)	Allard et al. (2016)	I(2)
	Gouvernance	The six indicators of Kraay et al.	–	WGI (2018)	Dollar and Kidder (2017); Dollar et al. (2016); Allard et al. (2016); Miranda and Wagner (2015)	I(1)/I(0)[b]

[a] means that some financial development indicators are I(1) while others are I(2). [b] means that some variables are I(0) while others are I(1)
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The test reveals that some variables are dependent, notably financial development. This type of dependence stems from common shocks with heterogeneous effects on different countries or externalities related to regional membership (Eberhardt 2012; Eberhardt and Teal 2011). The Hadri and Kurozumi (2008) test is then carried out on these variables. For the others, the test of Im Pesarn and Shin is implemented.

Stationarity tests reveal that the variables are not stationary. Some variables are integrated of order 2 [I(2)] and the other variables are integrated of order 1 [I(1)].

This result calls for cointegration tests to be conducted. The cointegration test proposed by Westerlund and Edgerton (2007a, b) and Westerlund (2008) indicates that there are no cointegration relationships between the explanatory variables (including financial development indicators) and the dependent variables.

The choice process ends with tests of homogeneity (Fisher test) and endogeneity (Durbin, Wu and Hausman test). The Fisher test in three steps reveals the presence of random effects. In addition, the Durbin, Wu and Hausman test confirms the presence of the endogeneity bias explained in the next subsection. The synthesis of these tests imposes the use of two alternative estimators, namely, the system GMM estimator or the Hausman–Taylor estimator, which takes into account both the endogeneity bias (instrumental approach) and the presence of random effects.

c. Endogeneity bias in the model

Endogeneity issues arise in this model for at least 4 reasons. Firstly, we assume that participation in GVCs is a cumulative process that becomes stronger. Therefore, the level of insertion in the previous year's GVCs can explain the level of participation in the current year. The presence of the lagged dependent variable may be a source of endogeneity. Secondly, the simultaneity hypothesis is possible. Indeed, some variables such as human capital or logistics may condition participation in GVCs and, at the same time, deeper participation in GVCs may induce a specific demand for human capital or logistical development. The same is true for financial development and investments, which can be both a cause and a consequence of participation in GVCs. In line with this, Ignatenko et al. (2019) show that participation in GVCs affects economic growth, while Allard et al. (2016) show that economic growth is a determinant of participation in GVCs. Thus, there may be simultaneity between these variables and hence endogeneity bias.

Thirdly, some variables listed in existing work such as the quality of logistics are omitted, leading to a potential bias linked to the omission of relevant variables. Fourthly, Aslam et al. (2017) highlight the potential presence of measurement errors because of insufficient data available in Africa and because the use of optimization methods in measuring African participation in GVCs could alter reality. Durbin et al. endogeneity test confirms these assumptions leading to the need to use an appropriate estimator, such as the system GMM or the Hausman-Taylor estimator that addresses the presence of random effects (Koopman et al. 2014; Semykina and Wooldridge 2010; Kielyte 2008).

d. Data

Variables are selected from existing work following Gereffi and Fernandez-Stark (2016) recommendations. Accordingly, we selected four categories of variables: access to finance variables, human capital quality variables, market access variables and coordination variables. Access to finance is a determinant for a firm to import intermediate products and services (upstream integration). In addition, access to

finance enables firms to make the necessary investments to transform intermediate products and services into finished industrial products (downstream integration). Access to credit can therefore strengthen participation in GVCs and promote the move upmarket within a GVC. Market access is important not only to facilitate FDI inflows, but also to ease operations for firms already established in the country (importing inputs, labour, machinery, etc.). Human capital is important not only to attract FDI but also as an incentive to introduce local firms into the MNE production chain. The existence of appropriate human capital also supports the absorption of technology and knowledge transferred by MNEs. Adequate human capital thus contributes to improving the country's participation in GVCs. Coordination is crucial not only as a lever to attract FDI, but also as a way to promote development in its economic (GDP) and social (health, education …) dimensions. Table 1 presents the variables selected in each category and their theoretical source.

4 Results and Discussion

Overall, the results show that the development of financial institutions is a driving force for African participation in the GVCs. Decomposing this overall result according to the different dimensions of financial development leads to the conclusion that some dimensions of financial market development are not relevant to explain the depth of African participation in GVCs. The following subsections provide more details on each aspect.

4.1 Financial Development and African Participation in GVCs

In the Financial Development Database, the Financial Development Index (FDI) has two sub-indices, namely, the Financial Institutions Development Index (FI) and the Financial Market Development Index (FM). Estimation results (Table 2) indicates that overall financial development (FD), financial institution development (FI) and financial market development (FM) significantly increase the overall participation of African countries in the GVCs, as well as backward participation (FVA) and forward

Table 2 Financial development effect on GVCs' participation

	GVC	FVA	DVA	Obs
Financial System Development (FD)	Positive	Positive	Positive	576
Financial Institutions Development (FI)	Positive	Positive	Positive	576
Financial Market Development (FM)	Positive	Positive	Positive	576

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Table 3 Financial development effect on GVCs' participation in African regions

	GVC	FVA	DVA	Obs
Southern Africa				
Financial System Development (FD)	Positive	Positive	Positive	192
Financial Institutions Development (FI)	Positive	Positive	Positive	192
Financial Market Development (FM)	0	0	0	192
Central Africa				
Financial System Development (FD)	Positive	Positive	Positive	112
Financial Institutions Development (FI)	Positive	Positive	Positive	112
Financial Market Development (FM)	Négative	Négative	Négative	112
Western Africa				
Financial System Development (FD)	Positive	Positive	Positive	192
Financial Institutions Development (FI)	Positive	Positive	Positive	192
Financial Market Development (FM)	Positive	0	0	192

Author's construction

participation (DVA). The other control variables have the expected sign even if they are not all significant. Detailed results are available in a separate pdf file upon request to the author.

The regional analysis (Table 3) reveals a number of regional disparities, in particular for the development of the financial market. It appears that in Southern Africa, capital market development does not contribute to countries' participation in GVCs. In Central Africa, capital market development would be detrimental to the participation of countries in GVCs. In West Africa, capital market development would be beneficial for overall participation in GVCs, but not for backward integration or forward integration.

These discrepancies may be related to the efforts needed to set up an adequate financial market for industrialization needs. Indeed, the three regions represent three distinct categories in terms of financial market development, namely, developed financial markets (Southern Africa), relatively developed financial markets (West Africa) and embryonic financial markets (Central Africa). Thus, financial market development could divert industrialization efforts in Central African countries given the initial level of financial market development. On the other hand, in Southern Africa, an additional development effort will have a small marginal effect. It is therefore not a priority given the current state of development. Finally, in West Africa, any additional effort may lead to gains in GVC participation.

However, as was pointed out at the introduction of this paper, financial development is a complex concept that encompasses several realities. Among these realities are the improvement of access to financial services, reinforcement of financial efficiency and intensification of financial depth. The first aspect is to enhance the ability of individuals and companies to access financial services (adapted services, adapted

instruments, territorial coverage …). Improvement of the efficiency of financial institutions is the fact to increase institutions and market ability to provide financial services at low cost and with sustainable revenues, as well as the level of their activity. The intensification of financial depth implies enlargement of the size and liquidity of the financial system. The next two subsections look at the effect of each of these dimensions in order to make some practical suggestions.

4.2 Financial Institutions Development and African Integration in GVCs

Results in Table 4 highlight that access to financial services (financial inclusion) and the efficiency of financial institutions are the two most important dimensions for better participation in GVCs. Increasing the size and liquidity of financial institutions is found to be a non-significant variable. Thus, it seems that the problem in Africa is to promote access to financial services for enterprises inside a GVC or willing to enter a GVC. It is also important to improve the efficiency of financial institutions in all its dimensions (technical efficiency, allocative efficiency and economic efficiency).

Such a result seems to us relevant especially in the African context. It relays the result of Lu et al. (2019) who indicated that the presence of financial frictions hinders participation in GVC. The size and liquidity of the system is not a key element of participation in GVCs. This is good news for African countries, which mostly have shallow and illiquid financial systems.

The regional analysis (Table 5) allows us to qualify this result, which is fully observed only in Southern Africa, i.e. in the most integrated region into the GVCs. Indeed, in Southern Africa, the only non-significant dimension of financial institution (FI) development is the depth of financial institutions (FID). This means that in these countries there is no need to expand the financial system or increase its liquidity. On the contrary, it is important to mobilize savings and channel them to projects that promote integration into global value chains. In Central Africa, the weakest integrated African region in terms of GVCs, with the least developed financial system in Africa, the problem of institutional efficiency must be solved as a priority. In West Africa, however, all dimensions of financial development have a positive and significant effect on the participation of these countries in GVCs. Therefore, supervisory

Table 4 Effects of financial institutions development on GVCs

	GVC	FVA	DVA	Obs
Financial Institutions Access (FIA)	Positive	Positive	Positive	576
Financial Institutions Efficiency (FIE)	Positive	Positive	Positive	576
Financial Institutions Depth (FID)	0	0	0	576

Author's construction

Table 5 Regional analysis of the effects of financial institutions development on GVCs

	GVC	FVA	DVA	Obs
Southern Africa				
Financial Institutions Access (FIA)	Positive	Positive	Positive	192
Financial Institutions Efficiency (FIE)	Positive	Positive	Positive	192
Financial Institutions Depth (FID)	0	0	0	192
Central Africa				
Financial Institutions Access (FIA)	0	0	0	112
Financial Institutions Efficiency (FIE)	Positive	Positive	Positive	112
Financial Institutions Depth (FID)	0	0	0	112
Western Africa				
Financial Institutions Access (FIA)	Positive	0	0	192
Financial Institutions Efficiency (FIE)	Positive	Positive	Positive	192
Financial Institutions Depth (FID)	Positive	Positive	Positive	192

Author's construction

authorities, the States and regional institutions should provide incentives for financial inclusion and promote financial innovation that will supply GVCs' actors with relevant financial instruments in line with their needs.

4.3 Financial Market Development and Global Integration in GVCs

This last subsection looks specifically at the effect of financial market development. In the words of the World Bank (World Bank 2013), African countries have the least developed financial markets in the world. Existing data show that most African countries have a financial system dominated by banks and microfinance institutions (MFIs). Less than one-third of the sample is made up of countries with market economies. Yet the results show that improving the efficiency of financial markets is a vector for greater participation of African countries in GVCs (Table 6). This result

Table 6 Effects of financial market development on GVCs

	GVC	FVA	DVA	Obs
Financial Market Access (FMA)	Négative	Négative	Négative	576
Financial Market Efficiency (FME)	Positive	Positive	Positive	576
Financial Market Depth (FMD)	0	Positive	0	576

Author's construction

remains significant for both backward and forward participation in GVCs. Furthermore, improving the depth of capital market depth contributes to better backward participation in the value chain (FVA) even though it has no effect on other aspects of GVC participation as shown in Table 6.

However, one surprising result is the negative effect of access to the financial market. This result, at first glance puzzling, can nevertheless be rationally explained, particularly considering the costs associated with the efforts needed to establish an adequate financial market for the needs of industrialization. Indeed, taking up the explanation developed in point 4.1 of this section, the creation, stimulation and access to financial markets generate costs for the country. These costs, if they are very significant, could divert efforts to join global value chains. States have to make trade-offs in order to ensure an efficient allocation of available resources. From this perspective, it would be unwise for African countries to seek at all costs improved access to financial markets for the various stakeholders.

Table 7 provides an analysis by region, which shows that the negative effect can only be observed in Southern Africa. In Central Africa, increased access to the financial market has no effect, while in West Africa, access to the financial market has a positive effect on participation in GVCs. In Southern Africa, the focus should be on financial market efficiency (FME). In West Africa, financial market inclusion (FMA) and financial market deepening (FMD) are more conducive to deeper participation in GVCs. The aim is to increase the number of participating firms and diversify the instruments used in West African financial markets. In Central Africa, the efforts required for positive and effective contribution of financial market development to greater insertion in global value chains are still too great.

Table 7 Effects of financial market development on GVCs in African regions

	GVC	FVA	DVA	Obs
Southern Africa				
Financial Market Access (FMA)	Négative	Négative	Négative	192
Financial Market Efficiency (FME)	Positive	Positive	Positive	192
Financial Market Depth (FMD)	0	0	0	192
Central Africa				
Financial Market Access (FMA)	0	0	0	112
Financial Market Efficiency (FME)	0	0	0	112
Financial Market Depth (FMD)	Négative	Négative	Négative	112
Western Africa				
Financial Market Access (FMA)	Positive	Positive	Positive	192
Financial Market Efficiency (FME)	0	0	0	192
Financial Market Depth (FMD)	Positive	Positive	Positive	192

Author's construction

In sum, the empirical results corroborate theoretical and graphical intuitions showing that financial development has a positive and significant effect on African participation in GVCs. However, these results highlight the existence of regional specificities related to the initial levels of GVC participation and financial development. All of which allows us to identify, through the decomposition of the concept of financial development, the key aspects on which African countries and regions should focus in order to catalyze their participation in GVC.

5 Conclusion

Financial system development is an important determinant of economic development. Work on Asian economies' take-off sufficiently demonstrates this fact (Page and Tarp 2017). The purpose of this research is to identify which aspects of financial development need reform to support countries' efforts to participate in global trade characterized by the emergence of globally dispersed production chains known as GVCs. In this vein, it combines theoretical discussion with statistical and econometric analysis for a panel of 36 countries between 2000 and 2018. Three sets of results are drawn from this work. Theoretically, financial development affects fundamental conditions needed to enter, to set up and to upgrade within GVCs. In practice, African participation is weak, not all the prerequisites are available and finance access is one of the major problems for African enterprises. Empirically, financial development is a significant lever to improve African participation in global value chains. In this vein, financial institutions development (FI) should be achieved in whole Africa. Financial market development (FM) should be managed with caution in some regions of Africa. Moreover, financial institutions access (FIA) as well as financial efficiency (FIE and FME) should be the main pet subjects. This conclusion suggests the following recommendations: (1) African countries should promote financial institutions inclusion; (2) they should reduce the costs and barriers to catalyze long-term savings and borrowing; (3) they should incentivize innovation to match the proposed financial services to entrepreneurship and GVC participation needs. To achieve this, the works of Aluko et al. (2019), Zins and Weill (2016) and Cherif and Dreger (2016) could suggest a number of concrete actions at the macroeconomic and institutional levels.

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Infrastructure Development in West Africa: What Is the Role of Concessionary External Debt?

Kenneth U. Onye, Ofem O. Akpama, and Amara F. Ikegwuonu

Abstract Using two key components of Africa Infrastructure Index—energy and capital—we ask the data whether and how concessionary public external debt may have impacted infrastructure outcomes in West Africa. The study relies on the fixed effect panel data model and covers the period of 1995–2018 for 14 West African Economies. The key results are as follows: (i) we found fairly broad and robust support for a positive overall contribution of "concessionary" external debt to infrastructure endowment and economic development; (ii) the sign of the interactive factor (debt/institutions) turned out to be negative and significant—suggesting that the quality of institution is a key determinant of how external debt impact infrastructure outcome and development for countries in West Africa; (iii) external debt is found to be broadly higher in regressions that exclude investment implying that the primary contribution of external debt has been through investment efficiency. The policy import of the latter is that reduction in binding constraints to investments along with institutional reforms such as better control of corruption and improvement in government effectiveness would improve the positive contribution of concessionary external debt to infrastructure outcome and economic development in West Africa.

Keywords Access to electricity · Infrastructure development · Fixed effect · West Africa

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1 Introduction

Africa's infrastructure need is huge and, therefore, requires innovative partnership and financing options to bridge the enormous financing gap and help accelerate development in Energy, ICT, Water Supply and Sanitation (WSS), and transportation that are considered as core drivers of growth and regional integration.[1] Based on these core drivers, the African Development Bank designed Africa's Infrastructure Development Index (AIDI) to help monitor the status of progress in infrastructure development across African economies. More recently in 2015, the Global Infrastructure Facility (GIF)—a partnership platform among multilateral development banks, governments, private sector investors, and financiers—was launched to provide a new and innovative way of collaboration on the preparation, structuring, and implementation of complex infrastructure projects that no single institution can adequately handle (see Infrastructure Consortium for Africa, 2017; Lin & Monga, 2017). With the World Bank as the GIF Trustee and other technical partners such as the Asian Infrastructure Investment Bank; Asian Development Bank; European Bank for Reconstruction and Development; European Investment Bank; Inter-American Development Bank, and now the African Development Bank (AfDB) in 2018, the Global Infrastructure Facility is designed to support emerging markets to develop an infrastructure economy.[2]

In West Africa, however, the response in tackling the infrastructure gap has been lackluster particularly in terms of innovative financing options. Many emerging countries have—in recent years—began to play a growing role in the financing of infrastructure in Africa. Markedly, their combined resource flows are now comparable in scale to traditional official developments Assistant (ODA) from Organization for Economic Cooperation and Development (OECD) Countries or to the capital from private investors (FDI). Among the non-OECD financiers, namely; China, India, the Gulf states—China is the largest player. In fact, Chinese players have now become Africa's key partners in the infrastructure sector—including water supply projects—providing about two-thirds of the investment in the sector (see AfDB Infrastructure Consortium for Africa Report, 2017). As seen in the work of Foster and Briceno-Germendia (2009) entitled "Africa's Infrastructure: A Time for Transformation" which is part of The World Bank and Infrastructure Consortium for Africa (ICA) co-sponsored project on Africa Infrastructure Country Diagnostic (AICD), Africa requires $93 billion per year to fill her infrastructure gap. Currently, about 35 African countries are engaging with China with the biggest recipients being Nigeria, Angola,

[1] According to the IMF's definition in the Government Financial Statistics Manual, infrastructure include all major long-lived capital assets (systems of public facilities, sets of fixed assets or structures) that supports economic and social activity—particularly those associated with water, power, sanitation, ICT, and transport (road, railways, maritime, and air). It is generally measured with gross fixed capital formation and/or other indexes capturing access/quality of various components of infrastructure such as ICT, transport, water, electricity (see Kodongo and Ojah 2016).

[2] GIF Technical Partners are entities who have signed the financial procedure agreement (FPA) with the GIF Trustee (The World Bank Group) in order to lead or participate in implementing GIF activities.

Ethiopia, and Sudan. In some cases, Chinese infrastructure finance—often channeled through the China Export–Import (EX-IM) bank—is packaged with natural resource development—making use of the so-called "Angola mode." It, therefore, remains debated whether this could hold promises for real material contributions to Africa's infrastructure need.

Notwithstanding this, endeavoring to address the question of alternative financing options appears in order. In this regard, it is remarkable to note that if the real resources for financing Africa's infrastructure development are to come from the export surplus that is met through the running down of a country's foreign reserves, then any such proposal would have two clear flaws. First, the country would be using short-term finance that mainly accounts for the accumulated reserve to fund long-term infrastructure investment. This would imply borrowing short to invest long. Second, the country would be using loans repayable in foreign exchange for infrastructure projects which are not foreign exchange-earners. And as in Patnaik and Ajay (2004), the duo could potentially brew a future liquidity crisis for the economy; and this is exactly what happened to the east and south-east Asian countries in the 1990s. These countries were caught in massive exchange overflow which created liquidity crisis as they borrowed short (in foreign exchange) to invest long and more so in projects that do not generate the needed foreign exchange. Thus, using (short-term) foreign exchange to increase (long-term) investment is apparently imprudent. It is not a good option for Africa Infrastructure's finance need. The worst case would be when an increase in export surplus is used to replace domestically produced consumption goods by imported ones since that amount to borrowing short to finance the ruin of one's own economy via "deindustrialization" (Lin & Wang, 2014).

A major line of argument often advanced as a panacea to the problem of appropriate financing option is that the government could simply engage in infrastructure spending through borrowing (AfDB African Economic Outlook, 2018; Ndikumana, 2001). The idea is that such spending on infrastructure (generated via government borrowing) could increase the demand for domestic goods and would also generate (for other sectors within the economy) an equivalent excess of savings over investment (excess savings)—partly within the private sector and partly within the public sector without causing any inflationary pressure through excess demand.

Regrettably, however, there is a major flaw in the global growth engine because the excess saving in the developed countries is not being put into profitable investment in developing (African) economies. The fact that the excess savings (which are widely documented to be rife in many advanced countries) are not adequately channeled into financing profitable infrastructure projects in Africa is one of the biggest paradoxes of the contemporary era (see African Economic Outlook, 2018; Gutman, Sy, & Chattopadhyay, 2015; Abbas, 2005).

According to the same source, over 100 trillion dollars are managed by institutional investors and commercial banks globally—implying that African countries seeking financial resources for infrastructural development now have a variety of options well beyond foreign aid (ODA). By taking into account the specific economic circumstances and productive structures of their national economies, African countries can leverage concessionary external loans for infrastructure development.

It is against this background that this study seeks to estimate the relative effect of public external debt on two key components of infrastructure (now refined as components of the AfDB-designed African Infrastructure Development Index, AIDI), namely: energy (defined by access to electricity) and capital stock (defined by fixed capital formation) and to investigate how these components interact with institutions to impact development in African economies. Thus, we are interested in addressing the following testable hypotheses:

(i) **Hypothesis 1**: Public external debt could have a negative net effect on infrastructure outcomes. Such a negative effect could particularly be sizeable the lower the level of concessionary debt involved, i.e., depending on the nature of concession involved in IDA, Blend, IBRD loan.
(ii) **Hypothesis 2**: The macroeconomic effect of public external debt may work mainly through investment efficiency channels rather than capital accumulation.
(iii) **Hypothesis 3**: The institutional quality (such as the degree of government effectiveness and control of corruption) could have a complex interaction with the public external debt. As in Abbas and Christensen (2010), improvement in institutional quality could imply a competent policy framework which may entail better use of fiscal resources for the provision of public services, infrastructure development, property right protection and maintenance of law and order.

The balance of the paper is as follows. Section 1.1 dwells on the overview of Africa's infrastructure Development index and financing trend in history. In particular, it discusses the need to conceive Africa's infrastructure financing well beyond national policy and how this can help to expand the frontier of infrastructure financing options. Section 1.3 deals with a brief review of the literature on infrastructure, infrastructure financing, and growth nexus. Section 2 lays out the empirical methodology that will be used to analyze the relative impact of the current structure public external debt on growth (PPP-adjusted GDP per capita) and key measures of infrastructure in West Africa. Section 3 will discuss the result of the empirical isometrics while Sect. 4 concludes the paper.

1.1 Overview of Africa's Infrastructure Development Index (AIDI) and Financing Trend

The traditional measure of infrastructure development relies on the gross fixed capital formation (GFCF) and other key measures of the quality/access to the components of infrastructure such as electricity, water/sanitation, ICT, and transport. Markedly, on the basis of these four key components of infrastructure, the African Development Bank (AfDB) designed an index of infrastructure known as the Africa Infrastructure Development Index (AIDI). The motivation is to assist the bank to achieve three major objectives, namely, to (i) monitor and evaluate the status and progress of infrastructure

development across the African continent; (ii) assist in resource allocation within the framework of African Development Bank replenishment; and (iii) contribute to policy dialog within and outside of the bank.

To produce a single index (AIDI), the bank disaggregates the four basic components of infrastructure into nine indicators that have a direct bearing on productivity/growth and, through a data reduction method, generates a single index that is normalized to lie between 0 and 100. The higher the value of the AIDI, the better a country's readiness in meeting its infrastructure needs for development.

Figure 1 shows the horizontal bar chart that reports the scorecard of 53 African countries on the Infrastructure Development Index. As can be easily seen from Fig. 1, there is wide variation among African countries in their infrastructure gap with countries such as Seychelles (with good infrastructure stock) coming top among all other Africa countries (more than 90%) and a country such as Somalia occupying the furrow with less than 5% AIDI score. In general, the North African countries such as Egypt, Seychelles, Mauritius, Morocco, and Tunisia came top on the list in the Infrastructure Index scoreboard with few countries from Southern Africa. The rest of the Africa countries, comprising mostly West African countries such as Togo, Liberia, Mali, Guinea, Benin, Burkina Faso, Cote d'Ivoire, and Nigeria are in bad shape with an AIDI score of less than 25%.

Akin to the profile of Infrastructure Development Index for West Africa, access to electricity (another proxy for infrastructure outcome) declined, particularly in West Africa compared to other World regions such as Asia and Latin America even though Africa and these regions started at similar levels in the 1960s. The West African economies are in worse shape relative to the counterpart in North Africa (Fig. 2).

Overall, Fig. 2 shows that (i) some North African countries such as Seychelles, Tunisia, and Algeria have attained nearly 100% access to electricity in recent time; (ii) access to electricity in West Africa is abysmally poor at an average of 25%; and (iii) In the contemporaneous period in WAMZ countries, Ghana topped the list in 2017 with 79% access to electricity while for the WAEMU countries, Cote d'Ivoire and Senegal ranked highest with 67% access to electricity in the same year.

Turning to the trend of Gross Fixed Capital formation—which has been the traditional measure of infrastructure outcome before the AfDB-designed AIDI that started in 2003—Fig. 3 indicates the regional average for the 14 West Africa countries vis-à-vis some selected North African Countries for which we are able to find consistent data.

1.2 Financing Africa's Infrastructure-Conceiving Policies Beyond National Boundaries

To harness the benefit of excess saving in high-income countries for profitable investment in infrastructure projects in low-income countries, economic policymaking

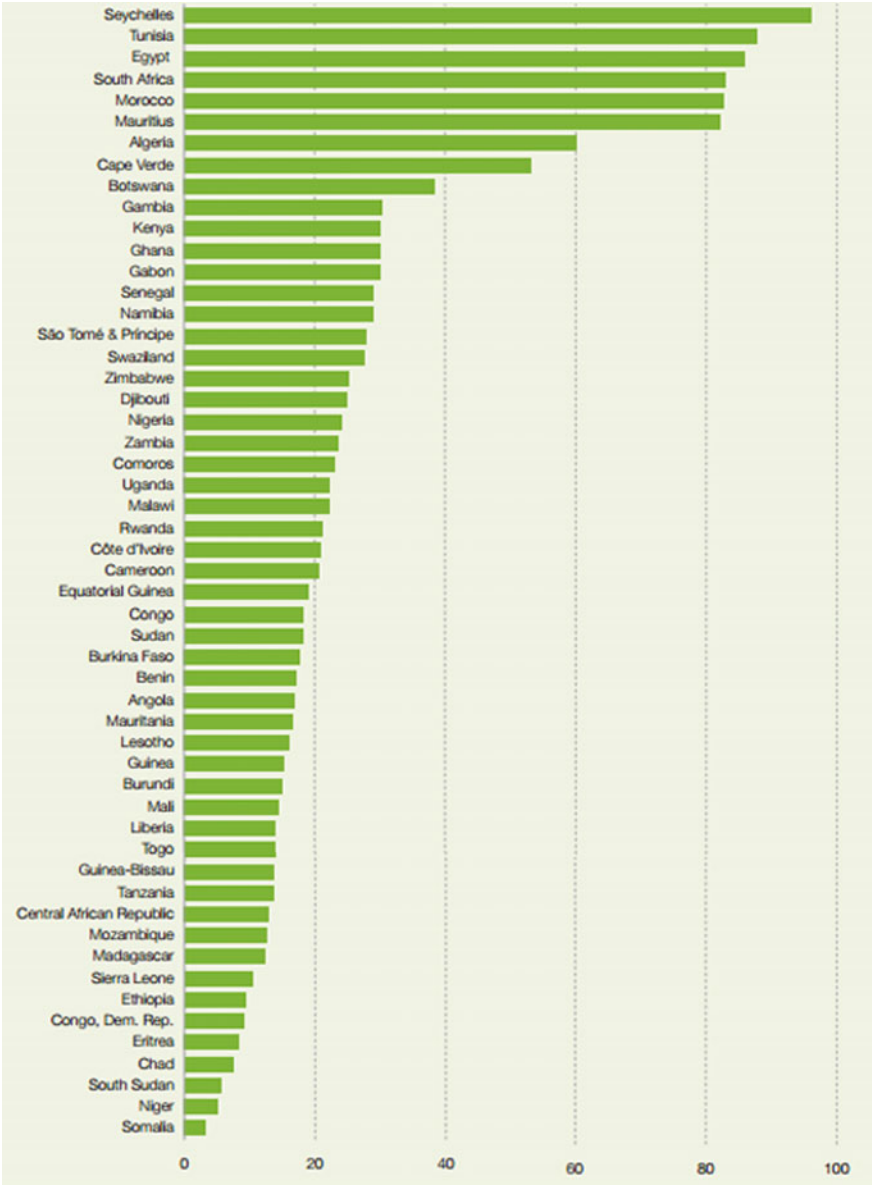

Fig. 1 Africa Infrastructure Development Index in 2018 *Source* AfDB Statistical Database (2018). *Note* Before her civil and political crisis since 2011, Libya (not listed) used to rank top among African Countries in terms of infrastructure

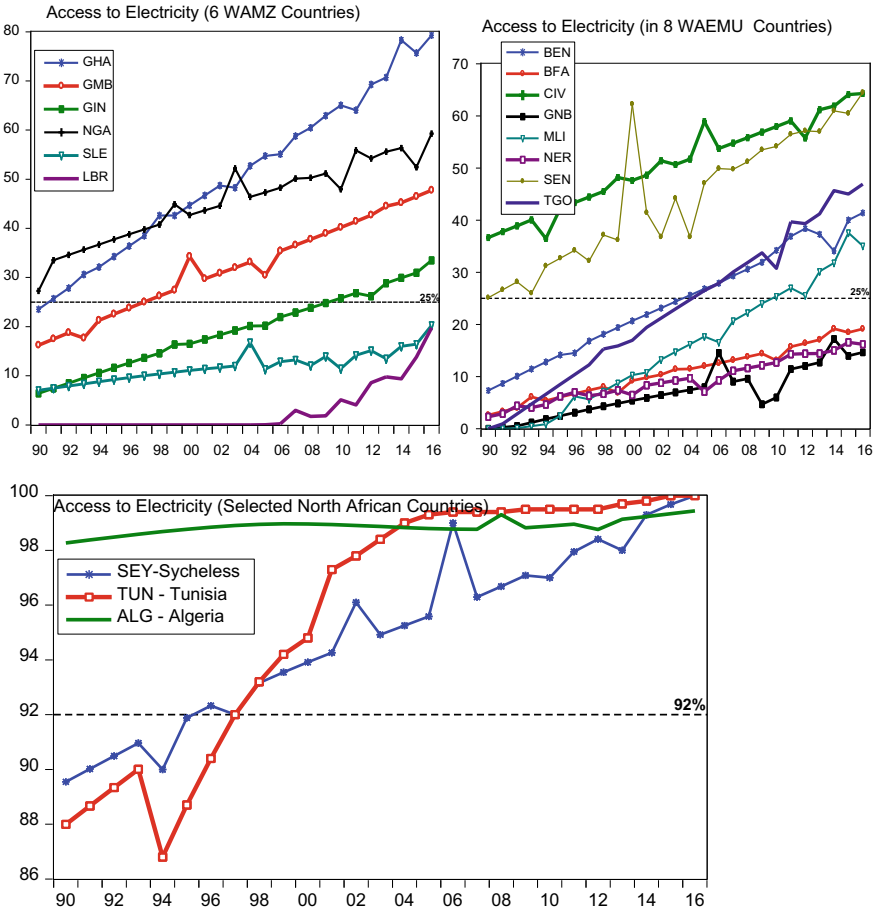

Fig. 2 Profile of infrastructure (access to electricity) in selected West and North African countries (1990–2017). *Source* WDI (2018). The benchmark (horizontal line) is 25% for the 14 West African Countries in our Sample and 92% for the 3 North African countries reported here as control. Each benchmark is calculated as the average (covering 1990–2017)

has to be conceived well beyond national boundaries. In fact, because most economic policymaking is still conceived and implemented within national borders, the world economy is not reaping the benefit of international cooperation and regional economic integration.

Some of the world's major economic problems such as slow growth, global unemployment, climate change, and uncontrolled migration can be solved only if Africa becomes economically prosperous and regionally integrated. Whereas rich countries have excess savings, poor countries have investment deficit that could be closed by the abundant financial resources and knowledge from rich countries. This mismatch

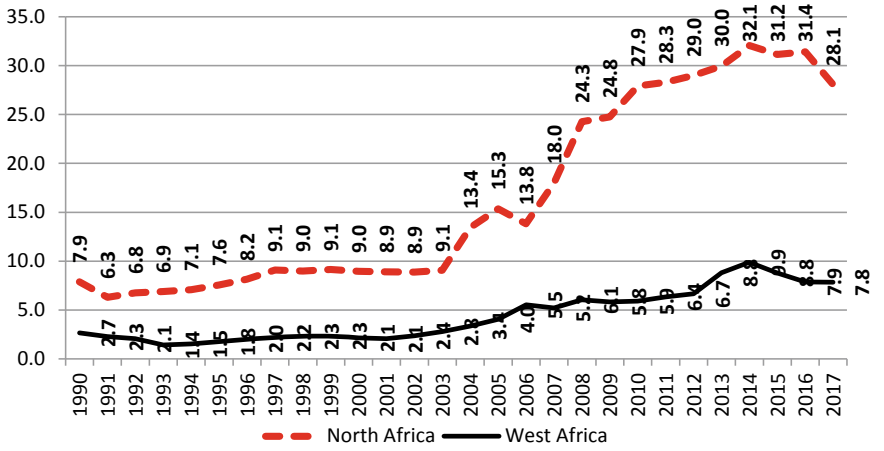

Fig. 3 Regional (average) Gross fixed capital formation of selected West and North African Countries, 1990–2017 ('bil of current US$). *Source* WDI (2018)
Note the average GFCF is computed based on GFCF ('billion current US$) of the 14 West African countries while that of North Africa covers four countries, namely: Seychelles, Egypt, Tunisia and Algeria—for which we were able to find consistent data

is a major flaw in the worldwide growth engine that has perpetuated misery in developing countries and created a persistent low-interest rate in advanced countries (see Fig. 4). In particular, the excess saving in advanced countries is creating financial and economic problems (such as inordinately low-interest rate) just as an investment deficit in developing countries are weakening growth and perpetuating misery.

It is this mismatch in the global growth engine that the former Chair of the U.S Federal Reserve once referred to as the global "savings glut" or " investment dearth." Arguably, low-interest rate in many advanced countries is an evidence of this savings

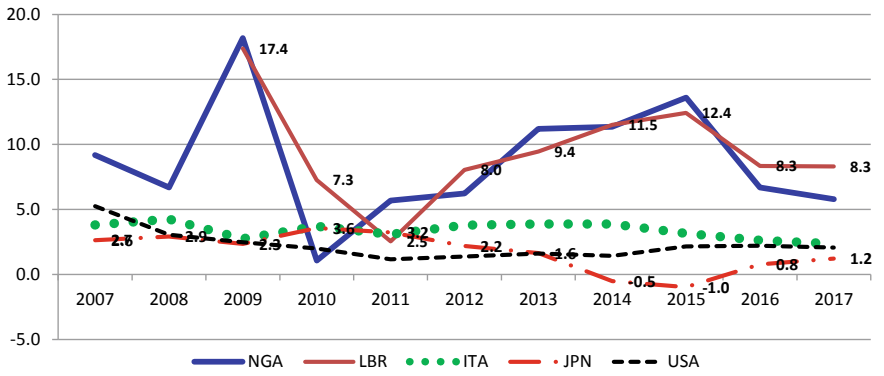

Fig. 4 Real Interest Rate (%) Trend in selected West Africa and OECD countries. *Source* World Bank WDI (2018)

glut as there are obviously more savings searching for yield than there are profitable investment opportunities in major advanced countries.

As Fig. 4 shows, the real interest rate is lowest in advanced countries such as Japan, the United States, and Italy but relatively higher in less developed African countries such as Nigeria and Liberia—suggesting saving glut in advanced countries. However, there was apparent convergence in real interest rates between developed and developing countries of the world around 2010 and 2011. This was the period following the 2008/09 global economic and financial crisis. In the decade that followed, divergence interest rate divergence emerged and has persisted—thereby perpetuating saving glut in advanced economies.

One obvious solution for the international financial community to resolve the savings glut is to facilitate the flow of capital to developing countries where there are many profitable investment opportunities that would require the use of capital equipment from industrialized economies. As we see in the IMF (2018), with every G7 countries committed to long period of low-interest rate, the organization for global governance such as the G20 as well as the World Association of Investment Promotion Agencies (WAIPA) can advance this course by making two major points. (i) that investment, particularly, in infrastructure projects should be promoted in low-income countries where the needs are enormous using capital from high- and middle-income countries; and (ii) that the current era of low-interest rate in high-income countries (HICs) is ideal for investment in competitive venture in low-income counties (LICs) as well as HIPC. Indeed, despite the uncertainty, the potential benefits appear to exceed the potential cost.

1.3 Brief Literature

Infrastructure constitutes an input in the production function of any sector and, therefore, affects productivity, output, and economic well-being. High-quality infrastructure is key for Africa to achieve the sustainable development goals of the United Nations, Agenda 2063 of the African Union, and the high five goals of the African Development Bank (AfDB). Quality infrastructure impacts growth and development by affecting total factor productivity (TFP) directly and indirectly. It increases total factor productivity because infrastructure enters the production function as an input (Abbas and Christensen, 2010; Christensen, 2004).

Good infrastructure also raises total factor productivity indirectly by reducing the transaction cost, thus, allowing for more efficient use of the conventional productive inputs. Epileptic power and poor energy quality, for instance, can create an additional cost on firms through lost production and damaged equipment. Conversely, a modern and functional transportation system can foster the competitiveness of manufacturing firms by easily moving raw material to producers and manufactured goods to consumers.

The economic benefits that Africa could draw from improved infrastructure are potentially higher than those of other regions based on the underlying logic of diminishing returns to capital. This is particularly because the continent is a latecomer to the economic development process and many of its countries fall into the low- and lower middle-income economies. It is thus argued that supplying critical exogenous factors to low-income countries (that typifies most African countries) would draw exceptionally high returns to the capital as the countries catch up (African Economic Outlook, 2018).

A tectonic shift has occurred in global commerce that has now made infrastructure a more important factor—than the traditional tariff reduction approach—for global trade and economic growth. Recent empirical studies by the OECD and the WTO (complemented by recent WEF Report) show that tariff reduction and market access are now much less relevant for economic growth than a generation ago. Value chain (the network of activities that spans manufacturing process, transport, and distribution services)—which is directly driven by the state of infrastructure—has become the dominant framework of trade. And so, international trade is no longer just about manufacturing a product in one country and selling it in another but more about cooperating across boundaries and time zones to minimize production and transaction costs which is what good infrastructure does. According to the 2018 African Economic Outlook (AEO) estimates, reducing supply chain barriers via quality infrastructure could raise global GDP up to six times more than removing all import tariffs. According to the same source, in Madagascar for instance, supply chain barriers can account for about 4% of total revenues of a textile producer (through higher freight cost and increased inventories)—eroding the benefits of duty-free access to the export market. It is projected that if all countries of the world could reduce the two major constraints to supply chain, namely, border administration and transport and communication infrastructure gap, by halfway to those in Singapore, global GDP would increase by about 2.7 trillion dollars (4.7%) and global export by 1.6 trillion dollars (14.5%). This massive gain from reducing bottlenecks associated with poor infrastructure when compared with the gains from merely tariff reduction show that the latter would only raise global GDP by $400 billion (0.7%) and global export by $1.1 trillion (10.1%) (Table 1).

2 Methodology

The empirical model we employ for the current study is closely related in spirit to those of Salim and Ngara (2018) and Abbas and Christiensen (2010) which were used to assess the effect of debt on infrastructure stock and on development. This study relies on the fixed effect panel data model. We first outline the general specification of the fixed effect model (Eq. 1) for clarity.

$$Y_{it} = \alpha_i + \beta_1 X_{it} + \mu_{it} \tag{1}$$

Table 1 Growth benefit of infrastructure (selected studies)

Coverage	Study period	Sectorfs	Infrastructure indicator	Growth-effects	Source
Global	Meta-analysis ot studies up to 2006	Multiple	1% increase in public investment	Direct increase of at least 0.06% in GDP excluding mJtiplier eFfects	Bom and Lighthart (2008)
Global	Meta-evaluat ion ot studies conducted between 1999 and 2009	Multiple	1% increase in public investment	Direct increases of between 0.05 and 0.45%	Estache et al. (2005), Calderón and Serven (2004), Hurlin (2006)
Africa	1988–2007	ICT	ID percentage poinl increase in telephone subscriptions	16% point increase in real GDP growth	Andrianaivo and Kpodar (2011)
39 African countries	1960–2005	ICT, roads, electricity	Infrastructure stock.accumulation and quality improvement	0.99% point increase in GDP growth	Calderon (2009)

Source African Development Bank (2018)

where Y_{it} is the dependent variable with i and t being the entity/country and time subscripts, respectively; X_{it} is a vector of independent variables (IVs); α_i $(i = 1 \ldots n)$ is the unknown intercept for each entity (n entity-specific intercepts) while μ_{it} is the error term; β_1 is the coefficient of a vector of independent variables which captures each individual characteristics.

Given that the main objective of the current paper is to estimate the relative effect of public external debt on infrastructure (measured by access to electricity, and capital formation) and to investigate how external debt interact with institutional variables (control of corruption and government effectiveness) to impact infrastructure stock and development in West African economies, we specify three estimable fixed effect equations. Our baseline model is specified thus

$$\mathrm{INFR}_{it} = a_0 + a_1 \mathrm{EXD}_{t-1} + a_2 \log M2Y_{i,t} + a_3 \mathrm{RIR}_{i,t} + a_5 \mathrm{INF}_{i,t} + Ui \quad (2)$$

$$\mathrm{GDPCG}_{it} = \beta_0 + \beta_1 \mathrm{EXD}_{t-1} + \beta_2 \log M2Y_{i,t} + \beta_3 \mathrm{RIR}_{i,t} + \beta_4 \mathrm{INF}_{i,t-1} + Ui \quad (3)$$

$$\mathrm{GDPCG}_{it} = \Pi_0 + \Pi_1 \mathrm{EXIN}_{t-1} + \Pi_2 \log M_2 Y_{i,t} + \Pi_3 \log \mathrm{RIR}_{i,t} + \Pi_4 \mathrm{INF}_{i,t-1} + Ui \quad (4)$$

where $INFR_{it}$ stands for infrastructure measured gross fixed capital formation (a component of AIDI); $ELECT_{t-1}$ is another component of African Infrastructure Development Index (AIDI) captured by access to electricity; $EXD_{i,t-1}$ is the lagged (total) external debt stock (% GNI); $M2Y_{i,t}$ is the broad money supply (in % GDP); and INF is the consumer price index-based inflation rate; RIR is a real interest rate; EXIN is the interaction factor capturing the net effect of (debt and institutional quality); and $GDPCG_{it}$ stands for development (measured as PPP-adjusted growth rate of per capita GDP).

Equations 2–4 is our baseline (estimable), fixed effect model.

The actual implementation of Eq. 4 comprises three alternative versions distinguishable only by the measure used as the dependent variable, namely, Eq. 4 with (i) GDPCG as the dependent variable; (ii) access to electricity (ELECT) as the dependent variable; and (iii) infrastructure stock (INFRA) as the dependent variable. Similarly, Eq. 3 is estimated in 2 alternative versions distinguishable only by whether investment is included as a regressor or not (see Table 3). The motivation for the latter is to enable us address the second hypothesis specified in the study, namely, "that the macroeconomic effect of external debt may work mainly through the investment efficiency channels rather than capital accumulation."

The a priori expectations about the sign, size, and magnitude of the regression variables follow from the large body of literature in this area. For instance, robust empirical evidence by Elbadawi, Ndulu, and Ndung'u (1997), Sachs (1989), Pattillo, Poirson, and Recci (2002), and Bond, Hoeffler, and Temple (2002) suggest that external debt impacts growth negatively. Of course, this is particularly so where external debt is non-concessionary and/or where the right institutional factors are not available. Theoretically, concessionary external public debt such as *special-purpose loans* (e.g., from International Development Association, IDA, designed for poor income countries in West Africa) may instead have a positive effect on infrastructure and growth particularly with better institutions in place.

On the strength of Smith's (1776) submission that government is Slow, Inefficient and Corrupt (SIC), it seems plausible to argue that with better control of corruption and improvement in government effectiveness, concessionary public external debt is likely to impact infrastructure and growth positively. Similarly, gross fixed capital formation is known to impact growth positively. High inflation rate and the high-interest rate are expected to impact growth negatively. But a moderate level of inflation could be growth-inducing. Importantly, the interaction factor (debt, control of corruption, and government effectiveness) may have either a net negative or positive effect on infrastructure stock and development depending on the quality of available institutional factors.

Considering the estimation technique for our model, the primary attraction of the panel data method in this study rest on its ability to deal with the time-invariant individual (country or entity) effect (α_i). If the entity effects are random, we can rely on the random effect (RE) estimator for unbiased and efficient estimation. However, if the entity effects are fixed or if they are correlated with the regressors, the FE methods—which eliminates the entity/individual heterogeneity altogether—would be the more appropriate method since the RE estimator would be inconsistent. Thus,

we rely on the Hausman's specification test for the choice of either the random or fixed effect technique (Hausman 1978, 1985).

3 Results and Discussions

As noted, implementing the Hausman specification test which helps us in deciding whether to use the random effect model or fixed effect model for this study is in order. The Hausman's results for the different specifications of our empirical model is presented in Table 2. Column 2, column 3, and column 4 indicate the results for the three specifications corresponding to the three hypotheses, (H1, H2, and H3) earlier stated.

The null hypothesis for the Hausman's test assumes that the difference in the coefficients is not systematic. Therefore, the decision rule is that a $P > 0.05$ indicates that the random effect model is more appropriate. Beginning with H1, the probability value of 0.0001 indicates that the fixed effect model is a more appropriate estimation technique. In other words, we rely on the fixed effect model in estimating the effect of contemporaneous and lagged debt on infrastructure stock for countries in the West African region. Similarly, the probability values of 0.01 and 0.035 for the H2 and H3, respectively, indicate that the fixed effect model is the more appropriate estimation technique for both specifications (Eqs. 3 and 4).

Table 2 Hausman specification test: fixed effect versus random effect

	Dependent variable		
	Infrastructure stock (Infra) H1	Access to electricity (Elect) H2	GDP Per Capita Growth Rate (GDPCG): H3
C1	C3	C4	C2
Regressor	(b-B)	(b-B)	(b-B)
Log (debt)	0.0056	0.002	1.29
Log (debt_1)	0.04	–	–
Log (EXIN)	–	–	−0.65
log *M*2Y	0.011	−0.49	1.05
RIR	0.002	0.04	0.72
INF	−0.0006	−0.02	−0.001
logInfra	–	1.65	–
chi2(1)	122	18.1	11.97
Prob_chi2	0.0001	0.01	0.0352

Note b-B stands for Coefficient Difference, i.e., Fixed-Random; *CC* stands for convergence criteria. *H0* Difference in Coefficient is not systematic. *Decision* if *Prob_chi2* is <0.05, then FE is appropriate
Decision: if *Prob_chi2* is >0.05, then the RE model is the more appropriate estimation technique

Next, we present the result of the fixed effect model. Table 3 shows the result of the fixed effect panel data regression for Eqs. 2–4. The result of Eq. 2 is reported in column 2. Columns 3 and 4 report the result of Eq. 3. In columns 5, 6, and 7, we report the results of Eq. 4. As is clear from Table 3, C5 indicates the result of Eq. 4 when per capita GDP growth rate is used as the dependent variable. On the other hand, C6 and C7 returned the result when infrastructure stock (INFRA) and access to electricity (ELECT) are used as the dependent variables in Eq. 4, respectively. Conversely, C3 and C4 show the result of alternative versions of Eq. 3 distinguishable only by the fact that while C4 includes investment, C3 does not.

The results in Table 3, the effect of public external debt, is broadly in line with a theoretical a priori expectations to the extent that the sign of the interactive factor (debt/ institution) are all negative and significant (see C5, C6 and C7). Yet the results provide broad support for a positive overall contribution of "concessionary" debt to infrastructure stock and to economic development.

We set out our specific discussions with the three alternative specifications of Eq. 4 which is meant to address H3, namely, that the institutional quality could have a complex interaction with the external debt and thereby influence the net effect of debt on infrastructure stock and other macroeconomic outcomes. In order words, the control of corruption and government effectiveness could determine whether or not external debt promotes infrastructure and/or development.

From C5, C6, and C7 of Table 3, it can be seen that except for access to electricity, the effect of debt on other dependent variables (infrastructure stock and development) in Eq. 4 turned out to be positive. Although mainstream economic theory postulates a negative effect of debt on growth and infrastructure, exceptions are possible at a moderate level of debt and/or where the structure of debt is designed to be concessionary. Under this scenario, a potential sign switch such as evidenced in C5, C6, C7 might not be too surprising. This appears to be the case for the 14 West African Countries in our sample. In particular, except for Nigeria, the balance of 13 West African countries (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Gambia, Guinea, Guinea Bissau, Niger, Liberia, Sierra Leone, Senegal, Mali, Togo) belong to poor income countries and, therefore, belong to the International Development Association (IDA) lending category which is the lending arm of the World Bank that helps the world's poorest countries[3]. The IDA lends money on concessional terms, i.e., the credits have a zero or very low-interest charge and repayments are stretched over 30–38 years, including a 5-year to 10-year grace period. Therefore, it is not too surprising that the (concessionary) external debt turned out to exert a positive effect on infrastructure and development in the context of the 14 West African countries in our sample. In fact, except Nigeria, the other 13 countries in our sample are heavily Indebted Poor Countries (HIPC) and some of them have got debt relief through the

[3]Economies are divided into IDA, IBRD, and Blend countries based on the operational policies of the World Bank. International Development Association (IDA) countries are those with low per capita incomes that lack the financial ability to borrow from the International Bank for Reconstruction and Development (IBRD).

Table 3 Fixed effect result for Eqs. 2–4

				Full sample (14 ECOWAS countries): 1995–2018		
Eqt/Dep. Var	Equation 2/(INFRA)	Equation 3/(GDPCG) without INV	Equation 3/(GDPCG) with INV	Equation 4/GDPCG	Equation 4/(INFRA as DV)	Equation 4/(ELECT as DV)
Regressor	C2	C3	C4	C5	C6	C7
Log (debt)	0.104 (0.26)	*1.72* (0.01)**	*1.003* (0.7)	*0.43* (0.5)	*1.076* (0.12)	*−0.47* (0.56)
Log (debt_1)	−0.04 (0.59)	–	–	–	–	–
Log (EXIN)	–	–	–	−0.75 (0.012)**	−0.93 (0.0001)**	−0.31 (0.001)**
Log (*M2Y*)	0.46 (0.001)**	1.6 (0.75)	0.42 (0.124)	*0.99* (0.47)	*0.05* (0.001)**	*0.74* (0.001)**
RIR	−0.005 (0.19)	*−0.108* (0.09)*	*−0.106* (0.075)*	*0.12* (0.05)**	*−0.004* (0.3)	*0.002* (0.78)
INF	−0.0025 (0.74)	*0.07* (0.47)	*0.04* (0.6)	*0.07* (0.46)	*−0.002* (0.76)	*−0.017* (0.16)
Log (INV)	–	–	3.7 (0.003)	–	–	–
corr(u_i, Xb)	−0.23	−0.6	−0.62	−0.66	−0.22	0.002
F value	7.05	3.19	2.07	2.79	9.43	49
Prob > F	0.001	0.0056	0.05	0.019	0.0001	0.0001

Note values in bracket are the prob of t values, $P > |t|$; Significant coefficient are italicized and their corresponding probability value flagged with **. *corr(u_i, Xb)* of −0.469 and −0.4744 indicates that, overall, the error term is negatively correlated with the regressors in the Fixed effect model. DV stands for the dependent variable

IDA's Heavily Indebted Poor Countries (HIPC) Initiative (since 1996 when it was first introduced) as well as through the Multilateral Debt Relief Initiative (MDRI).

This notwithstanding, the HIPC's definition of debt sustainability has recently been frontally attached. As Onye and Umoh (2020) documents, debt-to-export and debt-to-government revenues criteria were arbitrary and too restrictive. More so, the use of debt-GDP ratio for debt sustainability assessment could be misleading because external debts are generally not repaid with GDP but with revenue in foreign currency.

From the result of Eq. 4 too, the interaction factor (EXIN) has a first-order negative effect on development (C5). Similarly, the net effect of the interaction factor on infrastructure stock (C6) and the effect on access to electricity (C7) is also negative. This suggests that institutional quality is a key determinant of how external debt impacts infrastructure stock and development for countries in the region.

Zooming in more perceptively on the effect on interaction factor on the balance of the dependent variables and beginning with the specific effect on infrastructure stock, EXIN has a first-order negative effect on infrastructure stock. The effect on infrastructure stock is also found to be highly significant as with the effect on economic development. Looking at the effect of the interaction variable on the second component of AfDB's Infrastructure Development Index, namely, access to electricity (ELECT), our findings closely mimic the result obtained when infrastructure stock is used as the dependent variable. In particular, the effect of the interaction factor on ELECT is negative and highly significant as with the effect of the interaction factor on infrastructure stock (INFRA) and development (GDPCG).

Overall, our finding of a combination of a positive effect of (concessionary) external debt on infrastructure stock on the one hand, and a negative (and significant) effect of the interactive factors on infrastructure stock (and on development) suggest that a key factor that has limited the role of (concessionary) external debt in addressing infrastructure problem in West Africa is "institutional" such as the weakness of the government and poor control of corruption. This is coupled with the problem associated with HIPC's definition and application of the debt sustainability criteria—namely, their use of debt-to-export and debt-to-government revenues criteria—that are based on arbitrary and rather restrictive benchmarks. This has limited the ability of HIPC to access debt relief and has made the HIPC initiative to be seen as a program designed by creditors to protect creditor interests, leaving countries with unsustainable debt burdens even upon reaching the decision point. Inadequate debt relief and poor concession for such countries mean that they will need to spend more on servicing debts, rather than on actively investing in infrastructure and poverty-reduction programs.

The Channels of Influence: Investment Volume Verus Efficiency of External Debt (H2)

A fallout of the foregoing discussion is the important question about the channels through which external debt might affect growth. As far as growth is concerned, these channels could feature both volume effects that work primarily through the quantity of investment, and efficiency (quality of investment) effects that work through total factor productivity. We endeavor to understand the efficiency contribution of external

debt by including both investment and external debt in our growth specifications. Thereafter, we focus on the investment volume effect by running regressions that excludes investment as a regressor and study the difference.

As can be seen from Table 3, the external debt coefficient is broadly higher in regressions that exclude investment suggesting that that the primary contribution of external debt is through investment efficiency. This result mirrors the conclusions of Pattillo et al. (2002) on external debt and further suggests that should other determinants that constrain the quality of investment improve such as the quality of institutions, the contribution of domestic debt to growth will increase.

4 Conclusions

In this study, we investigate the part that concessionary external debt has played in addressing the infrastructure gap and underdevelopment in 14 West African economies over the period of 1995–2018. Relying on the fixed effect panel data model, we ask the data whether and how IDA's concessionary external debt may have exerted a direct or indirect (via interaction with institutional quality) effect on infrastructure stock and development in the region. Some interesting results were found: (i) the result shows broad support for a positive overall contribution of "concessionary" external debt to infrastructure outcome and to economic development in West African economies; (ii) the sign of the interactive factor (debt with institutions) are all negative and significant—suggesting that the quality of institution is a key determinant of how external debt impact infrastructure stock and development for the economies; and (iii) external debt coefficient is found to be broadly higher in regressions that exclude investment implying that the primary contribution of external debt is essential via investment efficiency.

The policy import is the need to re-evaluate the current definition of HIPC's debt sustainability criteria so as to create a better opportunity for West African countries to benefit from debt relief and other concessions available from the HIPC initiative as well as to undertake institutional reform that would ensure better control of corruption and improvement in government operations.

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Does the Quality of Economic Institutions Influence the Link Between External Debt and Growth? Evidence from the African Franc Zone

Yann Nounamo

Abstract The aim of this paper is to analyse the role of economic institutions in the relationship between external debt and economic growth in the African Franc zone. The methodology focuses on generalized moment method (GMM) of Blundell and Blond (1998). The sample includes 12 countries within the period 1985–2015. We adopted the classification of economic institutions proposed by Rodrik (2005) from the empirical analysis. We derive the following conclusions. Economic institutions are a brake on the economic performance of those countries: (i) Quality of market creation institutions negatively affect the debt–growth nexus in the area. Similarly, market regulatory institutions have a negative impact. (ii) Market stabilization institutions have positive effects on debt–growth nexus. In other words, to stimulate economic growth through debt, it is necessary to have better institutions in order to make external debt profitable for growth in the African Franc zone. (iii) For the whole zone, we obtain an optimal debt threshold which is 50.56% of GDP for the sample considered.

Keywords External debt · Economic institutions · Growth · African Franc zone

1 Introduction

The idea that accumulable factors in the broad sense, such as physical and human capital, are no longer the only important determinants of economic performance and that other factors such as institutions are relevant for long-term economic development, is certainly the most important proposal emerging from the current economic literature. A substantial literature in economics argues institutions are one of the fundamental explanations for the differences between countries in terms of growth rates. The origin of this idea can be found in the pioneering work of Smith (1776) taken up by North (1981), which show that effective protection of property and civil rights are associated with a high level of economic development.

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In parallel with this literature on institutions, there was a broad consensus that, consistent with the thesis of sustainable debt and the assumption of a virtual debt burden, the growth of debt could have adverse effects on growth above a certain threshold (Mensah et al. 2018). However, studies on institutional factors as determinants of debt effectiveness on growth are rare, particularly in countries of the African Franc zone.

This paper attempts to complement the existing literature by focusing on the impact of economic institutions on the external debt–growth relation in the African Franc zone. We propose a comprehensive analysis of the quality of economic institutions by adopting the classification of economic institutions proposed by Rodrik (2005), which distinguishes: market creation institutions, market stabilization institutions, market regulation institutions and market legitimization institutions. Our empirical analysis shows that the direct effect of economic institutions on growth is negative. In addition, we find that the quality of economics institutions modulates the effects of external debt on economic growth. In this vein, the growth effect of debt is negative for low quality of institutions and positive for a high quality of institutions. The rest of the paper is organized as follows. Section 2 describes the theoretical model and variables. Section 3 exposes the results. Section 4 concludes and gives some policy implications.

2 Presentation of the Theoretical Model and Variables of the Study

The work of Mankiw et al. (1992) forms the basis for the theoretical analysis in accordance with the criticisms mentioned concerning the Solow residue. In order to assess the non-linearity of the impact of debt on growth based on the approach adopted, we estimate a quadratic model that takes into account the debt-to-GDP squared ratio in the regression equation. To meet the objectives of the study, four models are estimated:

- The model (1) below provides a general analysis of the relation between debt and economic growth in the countries of the African Franc zone. This dynamic panel model is specified as follows:

$$\begin{aligned} GDP_{it} = {} & \beta_0 + \beta_1 GDP_{it-1} + \beta_2 Debt_{it} + \beta_3 Debt_{it}^2 + \beta_4 expenses_{it} + \beta_5 Invest_{it} \\ & + \beta_6 Popu_{it} + \beta_7 Educ_{it} + \beta_8 Term_{it} + \beta_9 InstitEco_{it} + v_i + \epsilon_{it} \end{aligned} \quad (1)$$

GDP_{it} is the growth rate of GDP. The other variables are defined in Table 1 (See Appendices).

Table 1 Description of the study variables

Variable code	Variable labels	Sources	Expected sign
Log GDP initial	Logarithm of initial GDP	WDI (2017)	–
Debt	External debt	WDI (2017)	+
$Debt^2$	External debt squared	WDI (2017)	–
ICM	Market creation institution	Fraser Institute	–
MRI	Market regulation institution	Fraser Institute	–
ISM	Market stabilization institution	Fraser Institute	+
ILM	Market legitimization institution	Freedom House	–
Term	Terms of trade	WDI (2017)	+
Invest	Total investment	WDI (2017)	+
Taux Popul	Population growth rate	WDI (2017)	–
Educ	Secondary school enrolment rate	WDI (2017)	+
expenses	Public expenditure	WDI (2017)	–

- The model (2) below, which starts from the model (1) to which the quality of economic institutions is introduced, measured by the composite index built for this purpose:

$$\begin{aligned} \mathrm{PIB}_{it} = {} & \beta_0 + \beta_1 \mathrm{PIB}_{it-1} + \beta_2 \mathrm{Debt}_{it} + \beta_3 \mathrm{Debt}_{it}^2 + \beta_4 \mathrm{expenses}_{it} + \beta_5 \mathrm{Invest}_{it} \\ & + \beta_6 \mathrm{Popu\ ratel}_{it} + \beta_7 \mathrm{Educ}_{it} + \beta_8 \mathrm{Term}_{it} + \beta_9 \mathrm{InstitEco}_{it} + \mathrm{v}_i + \epsilon_{it} \end{aligned} \quad (2)$$

- The model (3) is also based on the model (1) and takes as an additional variable the product of $\mathrm{Dette}_{it} \times \mathrm{InstitEco}_{it}$ in order to measure the joint influence of debt and economic institutions:

$$\begin{aligned} \mathrm{GDP} = {} & \beta_0 + \beta_1 \mathrm{GDP}_{it-1} + \beta_2 (\mathrm{InstitEco}_{it} \times \mathrm{Debt}_{it}) + \beta_3 \mathrm{debt} \\ & + \beta_4 \mathrm{expenses}_{it} + \beta_5 \mathrm{Invest}_{it} + \beta_6 \mathrm{Pop}_{it} \\ & + \beta_7 \mathrm{Educ}_{it} + \beta_8 \mathrm{Term}_{it} + \beta_9 \mathrm{InstitEco}_{it} + \mathrm{v}_i + \epsilon_{it} \end{aligned} \quad (3)$$

- Both the model (4) and the model (3) seek to measure the influence of the quality of each type of economic institution. We thus obtain a series of estimates of four models, each taking into account the quality of a given economic institution:

$$\begin{aligned} \mathrm{GDP} = {} & \beta_0 + \beta_1 \mathrm{GDP} + \beta_2 (\mathrm{Inst} \times \mathit{Debt}) + \beta_3 \mathit{Debt} \\ & + \beta_4 \mathrm{expenses}_{it} + \beta_5 \mathrm{Invest}_{it} + \beta_6 \mathrm{Pop}_{it} \end{aligned}$$

$$+ \beta_7 \text{Educ}_{it} + \beta_8 \text{Term}_{it} + \beta_9 \text{Instit}_{it} + v_i + \epsilon_{it} \quad (4)$$

where Inst = {ICM, IRM, ISM, ILM, ILM}.

Estimates are made using a composite indicator of economic institutions obtained from a principal component analysis (PCA) of the sub-indicators of economic institutions. In this context, a dynamic panel model using the generalized moment method (*GMM*) seems appropriate.

3 Presentation and Interpretation of Results

A prerequisite is to study their stationarity to avoid problems of false regression. To test the stationarity of variables generally in panel data, we use the tests of Levin, Lin and Chu (2002) or those of Im, Pesaran and Shin (2002). In this study, the analysis of stationarity is based on these two tests (see Appendices). In order to assess the effect of institutions on the debt–growth nexus, our estimate is made in two steps. We first identify the singular effect of debt on growth, then we assess the interaction of these institutions with debt, which allows us to measure the joint effect. All estimates were subjected to an Arellano–Bond autocorrelation test that allowed us not to reject the null hypothesis of no second-order autocorrelation.

3.1 Relation Between External Debt and Economic Growth in the African Franc Zone

The results for our interest variables seem individually interesting. For all African countries in the Franc zone, the external debt ratio is positive and significant, while the external debt squared ratio is negative and significant, which corresponds to the expected signs (Table 2). This reflects a non-linear relation between external debt and economic growth. A one-unit increase in the external debt ratio leads to an increase in economic growth of 0.2427 units. But a over-indebtedness, illustrated by the square of the external debt ratio which increases by one unit, leads to a decline of 0.0024 units in growth. There is a threshold at which external debt is less and less profitable for African countries in the Franc zone. Thus, in a small proportion, external debt stimulates economic growth, but above a certain threshold, it leads to a slowdown in the area's economies. This result is consistent with the Laffer debt curve of Pattillo et al. (2002). The optimal debt threshold resulting from this method is 50.56%. It is obtained by deriving the GDP per capita growth rate from the weight of debt in Eq. (1). In the second model, we introduced the composite indicator of economic institutions to assess its effect on economic growth. Our investigations reveal that, overall, economic institutions have a statistically significant but negative effect on economic growth. Mainly, an increase in the scoring index of economic institutions

Table 2 Non-linear relation between debt and growth in African Franc zone countries

Variable	Model (1)	Model (2)
GDP (t − 1)	−0.9203*** (0.1695)	−1.1478*** (0.1651)
Debt	**0.2427**** (0.1037)	**0.2852***** (0.1036)
Debt squared	**−0.0024**** (0.0004)	**−0.0011**** (0.0004)
Public expenditure	−0.6497*** (0.2107)	−0.5334** (0.2553)
Investment	0.4158*** (0.1507)	0.3655*** (0.1250)
Population growth rate	−2.2322** (1.0441)	−1.3078 (2.6652)
Education	0.1170 (0.1921)	0.3870* (0.2343)
Terms of trade	3.5750*** (7.3681)	3.2182*** (1.067)
Index of economic institutions		**−0.5219* (0.27)**
Constant	−7.900 (7.3681)	−18.5204 (12.986)
Number of countries	12	12
AR(1)	0.003	0.011
AR(2)	0.348	0.276
Sargan test	0.101	0.176
Robust standard deviation in brackets $***p < 0.01$, $**p < 0.05$, $*p < 0.1$		

Source The author from stata 15

of a unit leads to a decrease of 0.52 economic growth unit in the African Franc zone. This conclusion is explained in line with the work of Barro and Sala-i-Martin (1995), which already showed that there is a possibility that economic institutions may have a negative impact on growth.

3.2 Interactions Between Economic Institutions and External Debt on Economic Growth

Model (3) assesses the joint interaction of economic institutions and external debt on economic growth. In this model, the debt ratio coefficient alone is no longer sufficient to assess the effects of external debt on economic growth (Table 3). In fact, the results of the model's estimates (3) show that a one-unit increase in the external

Table 3 Role of economic institutions in the external debt–growth relation (composite index)

Variable	Model (3)
GDP (t − 1)	−0.9392*** (0.1481)
External debt	**0.4781***** (0.1298)
Debt squared	**−0.0015***** (0.0005)
Public expenditure	−0.3668* (0.2124)
Investment	0.1259** (0.0615)
Population growth rate	3.0441 (1.968)
Education	0.1679 (0.2767)
Term of the exchange	2.9528*** (0.9321)
Index × external debt	**−0.0029**** (0.0013)
Constant	−22.867*** (7.574)
Number of countries	12
AR(1)	0.004
AR(2)	0.274
Sargan test	0.280
Robust standard deviation in brackets ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$	

Source The author from stata 15

debt ratio impacts growth by 0.4737 percentage points.[1] Therefore, if the institutional composite index is low in value, the overall effect of external debt on growth will be small. In other words, in order to stimulate economic growth through external debt, it is necessary to have better economic institutions so that external debt can be used for growth in the countries of the region. In addition, it creates a business environment that is favourable to investment, which in turn strengthens economic growth.

3.3 Relation Between the Quality of Each Type of Economic Institutions and Growth

The results of the estimates reveal that the combined coefficients of debt and quality indices of market creation and regulation institutions are statistically significant and negative at 5% and 10%, respectively (−0.0363 and −0.0239). It is recognized in the economic literature that secures property rights contribute significantly to the prosperity of economies (Chavance 2007). Unfortunately, African Franc zone countries are characterized by weak property rights protection due to complex and costly administrative procedures, weak contract enforcement resulting in high transaction costs. State intervention in the implementation of property rights is not very effective. With regard specifically to market regulation institutions (Table 4), in the presence

[1] Let's say: 0.4737 = 0.4781 − 0.0015 − 0.0029.

Table 4 Role of economic institutions (specific indicator)

Variable	(1) ICM	(2) ISM	(3) MRI	(4) ILM
GDP (t − 1)	−0.9590*** (0.1489)	−−0.8724*** (0.1609)	−0.9765*** (0.1539)	−1.013*** (0.1753)
External debt	**0.4631**** (0.1285)	**0.2004*** (0.1212)	**0.2846**** (0.1109)	**0.2402**** (0.095)
Debt squared	**−0.0022***** (0.0006)	**−0. 0013**** (0.0006)	**−0.0016***** (0.0005)	**−0.0014***** (0.0005)
Public expenditure	−0.3155 (0. 2150)	−0.3430 (0.2136)	−0.3925 (0.2584)	−0.2055 (0.2499)
Investment	0.1458** (0.0621)	0.1606** (0.0661)	0.1321** (0.0582)	0.1697** (0.0704)
Population growth rate	2.3136 (1.8735)	1.839 (1.635)	1.3501 (1.7417)	−0.8455 (1.7088)
Education	0.2124 (0.2823)	−0.0768 (0.4048)	0.6322 (0.2514)	0.0736 (0.3651)
Term of the exchange	3.3242*** (0.9491)	2.7542*** (0.9944)	2.5769** (1.0298)	3.251*** (1.130)
Creation × debt	**−0.0311**** (0.0128)			
Stabilization × debt		**0.0111*** (0.0065)		
Regulation × debt			**−0.0239*** (0.0144)	
Legitimation × debt				**−0.0114** (0.0103)
Constant	−23.314*** (7.709)	−19.8175*** (6.7406)	−17.153** (8.3197)	**−10**.526 (7.4271)
Number of countries	12	12	12	12
AR(1)	0.002	0.002	0.001	0.005
AR(2)	0.707	0.609	0.709	0.712
Sargan test	0.190	0.221	0.113	0.130
Robust standard deviation in brackets $***p < 0.01$, $**p < 0.05$, $*p < 0.1$				

Source The author from stata 15

of economies such as those of the African Franc zone, where the majority of which are suffering from corruption, which creates uncertainty and insecurity, and in which policies to combat this scourge are not sufficiently effective, then market regulation institutions cannot stimulate economic performance. On the other hand, the coefficient of market stabilization institutions is positive and significant. These institutions play a beneficial role on growth in the African Franc zone. It should be noted that the investment rate has a positive and significant effect on growth in market creation and

legitimization models. Therefore, these countries should seek to improve the quality of both types of institutions (creation and legitimization) in order to stimulate growth directly or indirectly through investment.

However, the results of the estimation of the model (4) reveal that the coefficient of the quality measurement index of market legitimization institutions is negative but not significant (column 4). An improvement in the quality of market legitimization institutions that results in a low score on the political rights scale would stimulate economic growth in the area. With regard to the control variables, we note that their effects differ depending on the introduction of the interest variables. In all models, in accordance with economic theory, education and gross capital formation (investment rate) have a positive influence on economic growth.

In the fourth model, with the introduction of economic institutions, the education coefficient is insignificant and the estimated population growth rate coefficient has a negative sign. All these effects show the importance of economic institutions in a country, corroborating the idea of Acemoglu et al. (2004) that these institutions have an influence on human capital. In the various regressions, the coefficient of the lagged endogenous variable (GDP_{t-1}) is statistically significant and has a negative sign. This confirms Barro's (2003) conditional convergence assumption for countries in the African Franc zone.

4 Conclusion

The objective of this paper was to analyse the role of economic institutions in the relation between external debt and economic growth in the African Franc zone. We have adopted the classification of economic institutions proposed by Rodrik (2005) which distinguishes four categories of economic institutions. We carried out empirical investigations to determine the overall effect (composite indicator) and the effect of each category of economic institutions on the links between external debt and growth in the African Franc zone. The results obtained generally indicate that the influence of the quality of economic institutions on the relation between external debt and growth differs according to the economic–institutional component considered. First, the quality of market creation institutions negatively affects the debt–growth nexus in the zone. Similarly, the coefficient of the quality measurement index of market regulatory institutions is negative and significant. On the other hand, market stabilization institutions have positive effects. These institutions therefore play a beneficial role on growth in the zone. It should be noted that the investment rate has a positive and significant effect on growth in models of market creation and legitimization. When we look at all the proxies collectively through the composite indicator of economic institutions, we notice that the interaction of these institutions with debt, reveals that economic institutions constitute a brake on economic performance in this zone. To stimulate growth through debt, it is necessary to have strong institutions. For the whole area, we obtain an optimal debt threshold which is 50.56% of GDP for the sample considered.

Appendices: Stationary Tests

Variables	Stats-IPS	Trend or cste	P-value	Decision	Stat-Levin lin	Trend or cste	P-value	Decision
GDP	−1.22	Trend	0.10	Stationary	−4.85	None	0.0000	Stationary
debt	−0.28	Trend	0.38	No stationary	−4.47	Trend	0.0000	Stationary
debtsq	−0.43	Trend	0.33	No stationary	−4.88	Trend	0.0000	Stationary
Gov	−3.24	Trend	0.0006	Stationary	−2.92	Trend	0.0017	Stationary
Invest	−2.39	Trend	0.008	Stationary	1.030	None	0.848	No stationary
Pop	−0.34	Trend	0.365	No stationary	0.440	Trend	0.6703	No stationary
Edu	−1.55	Trend	0.059	Stationary	−5.015	Trend	0.0000	Stationary
Term	−2.99	Trend	0.0014	Stationary	−3.07	None	0.0011	Stationary
IntEco_compo	0.33	Trend	0.62	No stationary	−4.45	Trend	0.000	Stationary

List of countries: Senegal, Benin, Mali, Niger, Burkina Faso, Ivory Coast, Guinea-Bissau, Togo, Cameroon, Gabon, the Central African Republic, Chad, the Republic of Congo.

Quality of economic institutions in African Franc zone (WAEMU and CEMAC)

(i) **Situation of market creation institutions (Fraser Institute)**

- In the WAEMU

From 2000 to 2015, the situation of market creation institutions improved significantly. Although we have a decline in the quality of these institutions from 2010 to 2015, in countries such as Benin, Burkina Faso, Mali and Niger, their quality has improved remarkably compared to 2000. In 2015, Côte d'Ivoire and Senegal lead the way in the WAEMU zone; while countries such as Benin, Burkina Faso and Mali had a better situation in previous years (2005, 2010).

- In CEMAC

Gabon, in addition to being the country with the best situation as a market creation institution, is the only country in the region that has kept a virtually constant evolution from 2000 to 2015. In 2015, it is followed by the Republic of Congo, which has made much more effort in recent years, and Cameroon. Unlike other countries, the Central African Republic saw the quality of its market creation institutions deteriorate from 2000 to 2015.

(ii) **Situation of market stabilization institutions (Fraser Institute)**

- In the WAEMU

In 2000, Mali and Niger were the two countries in the area with very good market stabilization institutions, while Guinea-Bissau lagged behind. But in the following years, the latter improved the quality of its institutions to a level almost similar to that of the area. In 2015, Burkina Faso, Senegal, followed by Côte d'Ivoire and Togo succeeded in achieving a better situation for stabilization institutions in the WAEMU. In addition, it should be noted that market stabilization institutions in Senegal experienced a very slight deterioration in their situation over the period. Indeed, from a score of 7.28 in 2000, Senegal is down to 7.06 in 2015.

- In CEMAC

From 2000 to 2010, the Central African Republic and Cameroon led the ranking in terms of the good quality of market stabilization institutions in CEMAC. However, RCA lost its place to Cameroon and Chad in 2015. The Republic of Congo is last in the ranking, but efforts are to be noted during the period; from 4.29 in 2000, it rises to 5.74 in 2015.

(iii) **Situation of market regulation institutions (Fraser Institute)**

- In the WAEMU

In 2000, Benin had the best market regulation institutions in the Union, but in 2015, it gave way to Niger. In 2015, all WAEMU countries have a relatively similar rating for market regulation institutions (around 6.5). Even though countries such as Benin and Burkina-Faso have tried to remain at the peak of the 2000–2015 ranking, there has been a significant improvement in regulatory institutions in countries such as Mali, Niger and Senegal, which were at the bottom of the scale in 2000.

- In CEMAC

From 2005 to 2015, Gabon reached the top of the ranking, it has the best market regulation institutions in CEMAC. However, in 2000, Cameroon was first in the zone. The quality of institutions in Chad, declining from 2000 to 2005, seems stagnant until 2015. In Central Africa, the situation of market regulation institutions improved very slightly from 2000 to 2015.

(iv) **Situation of market legitimization institutions (Freedom House)**

- In the WAEMU

Benin and Mali have a fairly good score in the area in terms of market legitimization institutions, but Mali stands out in 2015 with a poor score, as does Guinea-Bissau. From 2000 to 2010, Côte d'Ivoire had poor ratings from WAEMU market legitimization institutions.

- In CEMAC

In CEMAC, countries have practically the same situation regarding their market legitimization institutions; moreover, these ratings are on average higher than those of WAEMU countries. Tchad and the Central African Republic have the highest CEMAC scores in 2015.

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External Debt, Governance, and Economic Growth: The African Case

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Abstract This paper is motivated by the Direct Effect of Debt Hypothesis (DEDH), and based on empirical facts, develops a theoretical model that explores the impact of external debt on economic growth by taking into consideration exports and the role of institutions or quality of governance. Using country averages from 2005 to 2017 and data set for 32 SSA countries, OLS technique is used to estimate cross-sectional effect of external debt on governance and economic growth. The findings indicate that exports and quality of governance stimulate output positively, while external debt burden has adverse effect on economic growth.

Keywords External debt · Governance · Economic growth · SSA countries

JEL Classification H630 · O430

1 Introduction

A number of studies have examined the role that foreign capital plays in the development process of less developed countries (LDCs). These investigations are usually verified along three different strands or hypotheses: Liquidity Constraint Hypothesis (LCH), Debt Overhang Hypothesis (DOH), and Direct Effect of Debt Hypothesis (DEDH). According to the LCH, debt service payments of highly indebted countries are proportionately high and this erodes the funds that would have been used to

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augment investment and slows down economic development process (see Hoffman & Reisen, 1991; Qayyum & Haider, 2012; Mhlaba & Phiri, 2019). Thus, a binding liquidity constraint would lead to a negative effect on investment (Fosu, 1999).

The DOH is the second strand and it examines how debt induces a behavior where positive net present value projects do not get undertaken due to the fact that parts of future earnings from projects goes to creditors in the form of promised payments (see Myers, 1977; Cordella, Ricci, & Arranz, 2005; Sundell & Lemdal, 2011; Shah, Ullah, Rahman, & Jan, 2016). The literature on DOH, thus, focuses on the problem from a creditor's perspective even though it tends to suggest that if in the future, external debt is larger than a country's repayment ability, the expected debt service costs would crowd out domestic and foreign investment, and this will limit economic growth (Pattillo, Poirson, & Ricci, 2002; Sen, Kasibhatla, & Stewart, 2007). This implies a negative relationship between the rate of investment and the outstanding debt.

The third type of studies examines the DEDH. The "DEDH states that even if the debt service payment does not adversely affect investment and saving, it may decline the output growth directly through diminishing productivity due to adverse change in investment mix" (Qayyum, Din, & Haider, 2013: 7). Some other studies which have tested the DEDH framework are Fosu (1999), Qayyum and Haider (2012), Okonkwo and Odularu (2013). The DEDH builds on the premise that both the DOH and LCH imply an "indirect" adverse impact of debt on economic growth through reductions in investment levels (Fosu, 1999: 309).

This paper is motivated by the latter type and based on empirical facts, develops a theoretical model in which attention is paid to explore the impact of external debt on economic growth by taking into consideration the role of institutions or governance quality (see Qayyum, Din, & Haider, 2013: 7); just as we also try to extend the Ramsey–Cass–Koopman neoclassical growth model in an open economy framework that incorporates exports, governance quality and external debt. For instance, Imbs and Ranciere (2005) find that countries with good policies and good institutions have lower debt overhang.

The above scenario is relevant to LDCs and particularly, since the adoption of the *Heavily Indebted Poor Countries (HIPC) Initiative* in 1996 by major industrialized countries to help poor countries with their debt burdens and with a goal of reducing the debt to sustainable levels (The World Bank, 2018). Following the HIPC and Multilateral Debt Relief Initiative (MDRI) debt relief, SSA's debt levels sharply reduced from a peak of about 100% of GDP in the early 2000s to 35% of GDP in the early 2010s. In the last 10 years, however, public debt has started rising again, reaching an average of about 55% of GDP in 2016 (Agou et al., 2019).

As at 2018, for instance, total debt in emerging and developing economies (EMDEs) has climbed to a record US$55 trillion, while capital flows to EMDEs have been volatile since 2010, with episodes of substantial outflows in 2013, 2015, and 2018 (Kose, Nagle, Ohnsorge, and Sugawara, 2020). Available data indicate that commercial borrowing, including domestic debt and Eurobonds, accounted for nearly 70% increase of SSA's nominal debt stock between 2010–18 (about 55% and

15%, respectively), while multilateral debt and official bilateral debt, mainly from China, each made up 12% of that rise (Agou et al., 2019: 13).

The inability to finance the development needs due to the large infrastructural deficit contributed considerably to the rising public external debt of SSA countries. Specifically for oil-exporting SSA countries, the collapse of government revenue and output due to the oil price shock were the main causes of their debt increases, whereas for other resource-intensive and non-resource-intensive SSA countries, the debt increase was attenuated to by the adverse impact of the output loss observed in advanced economies in the aftermath of the global financial crisis, which affected exports, and significant decline in official development assistance (ODA), respectively. Other drivers of the rise in SSA's public debt are increased interest payments, exchange rate movements, conflicts and epidemics, and weak institutions (Agou et al. 2019).

It is apt to note that new concerns that have been raised in the upsurge of new debt accumulation by SSA countries is the unprecedented debt buildup in terms of size, speed, and reach; debt transparency which includes revelation of hidden debts and consciousness of contingent liabilities comprising collateralized lending or other explicit and implicit lending guarantees, etc. (Kose, Nagle, Ohnsorge, & Sugawara, 2020).

In this paper, therefore, we shall estimate the augmented production function to examine the impact of external debt and quality of governance on the economic growth of SSA countries over the period 2010–2018 period following the adoption of the HIPC and MDRI initiatives. The theoretical framework of export, external debt and quality of governance in the growth process is discussed in Sect. 2. Based on this simple framework, Sect. 3 estimates the empirical model followed by statistical tests of the specification in Sect. 4. Section 5 concludes the paper.

2 Theoretical Framework

Many studies conducted in recent years examine the relationship between (a) economic growth and external debt; (b) external debt-servicing constraint and public expenditure; (c) impact of foreign aid on governance and institutional quality; and (d) implications of the external debt servicing constraint for public health expenditure; but little attention has been paid to explore the interlinkages among external debt, quality of governance, and economic growth, while controlling for exports in a unified augmented production function framework. For extensive discussion of these issues in the economic development literature, see Greene, 1989; Fosu, 1996, 1999, 2007, 2008, 2010; Sen, Kasibhatla, & Stewart, 2007; Qayyum & Haider, 2012; Okonkwo & Odularu, 2013; Qayyum, Din, & Haider, 2013; Senadza, Fiagbe, & Quartey, 2018; Mhlaba & Phiri, 2019. These authors in varied forms included either of external debt, governance, or exports as additional arguments in the production function.

This section which draws substantially from Qayyum and Haider (2012) presents a simple static theoretical model in support of the empirical estimation of the external debt–governance, cum export–economic growth relationship. First, the export-led growth route lends support to the idea that export promotion is an effective strategy in the economic development process and treated as injections into the economy (Krueger, 1990). Correlation between exports and economic growth via other economic growth-determining fundamentals such as labor and capital in a production-type function with investment, manufacturing, and total exports have also been investigated (Feder, 1982; Balassa, 1988; Krueger, 1990; Ahmed, Butt, & Alam, 2000).

Second, is the growth impact of debt on output, which is attributable in part among other routes, to debt-induced liquidity constraints. For instance, high debt acts as a tax on future output and this erodes domestic saving and investment (Krugman, 1988; Fosu, 1999). Finally, while it has been argued that external capital inflow alone is not enough to stimulate economic growth, it requires the existence of good governance to promote impartial, reliable, and consistent enforcement of rules in the form of strong institutions; and this is crucial for the sustained economic growth (North, 1990a, 1990b, 1992a, 1992b, 2016; Qayyum & Haide, 2012). Countries with good institutions have been reported to experience positive growth rates and production efficiency, whenever the stock of capital increases, whereas for countries with weak institutions, increase in capital investment may not drive positive growth rates due to rent seeking behavior, state capture, and nepotism, etc. (Hall et al., 2010; Qayyum & Haide, 2012). In this context, North (1992a, 1992b) argues that the institutions as well as the ideology, shape economic performance, and in summary, strong institutions reduce the economic costs of governance, stimulate economic growth directly by raising total factor productivity, and indirectly by enhancing investment (Qayyum & Haide, 2012).

We propose that in a country's production function by following the extended neo-classical growth model of Solow-Swan

$$Q_t = A_t F[(K_t, L_t)] \tag{1}$$

where Q is the real aggregate output; L and K denote, respectively, labor and capital inputs at time t. A_t is the total factor productivity or Solow's residual at time t.

Further consider an economy wide production function (Eq. 1), represented by the standard Cobb–Douglas production function form as:

$$Q_t = A_t K_t^{\emptyset} L_t^{1-\emptyset} \tag{2}$$

where $0 < \emptyset < 1$, is capital share and $(1 - \emptyset)$ is labor share. A rigorous representation or form of Eq. 2 is:

$$q_t = A_t k_t^{\emptyset} \tag{3}$$

$$f'k_t = A_t \emptyset k_t^{\emptyset-1} > 0, \; and f''\emptyset(1-\emptyset)k_t^{\emptyset-2} < 0,$$

By standard Inada conditions which guarantee the stability of an economic growth path in a neoclassical growth model, based on assumptions about the shape of a production function:

$$\lim_{k\to\infty} f'(k_t) = 0, and \lim_{k\to\infty} f''(k_t) = \infty.$$

This connotes that the Cobb–Douglas form satisfies the properties of neoclassical production function. Capital stock equation is given as:

$$k_t^* = s \cdot f(k_t) - (n-\delta) \cdot k_t \tag{4}$$

Substituting $q_t = f(k_t) = Ak_t^{\emptyset}$ in Eq. (4), we get

$$k_t^* = s \cdot A_t \cdot k_t^{\theta} - (n+\delta) \cdot k_t \tag{5}$$

The term $(n+\delta)$ on the right-hand side of Eq. (5) is the effective depreciation rate for capital–labor ratio, $\equiv {}^{K_t}/_{L_t}$. Rearranging Eq. (5) will result in

$${}^{k_t^*}/_{k_t} = sA_t K_t^{\emptyset-1} - (n+\delta)$$

But we know from Eq. (3) that $q_t = A_t k_t^{\emptyset}$ or $q_t^* = A_t \emptyset k_t^{\emptyset-1}$ and rearranging again gives us:

$${}^{q_t^*}/_{q_t} = s \cdot f'(k_t) - (n-\delta)\theta \tag{6}$$

where,

$$f'(k_t) = A\emptyset k_t^{\emptyset-1}$$

The above generally states the following form of growth rate per capita which depends on the parameters of the model as:

$${}^{q_t^*}/_{q_t} = g(s, \emptyset, \delta, A_t, n) \tag{7}$$

In addition, and following standard literature, it is assumed that aggregate productivity or total factor productivity A_t by reasons which are previously detailed above, depends positively on export, X; good governance, G and negatively related external debt, D^e. We can therefore assume the following:

$$A_t = g\left(X_t, G_t, D_t^e\right) \tag{8}$$

Therefore,

$$q_t^*/_{q_t} = g\left(s, \emptyset, \delta, X_t, G_t, D_t^e\right) \tag{9}$$

Equation (9) is the reduced form version of the behavioral relationship between economic growth, export, and external debt, which enables us to estimate the empirical version of the model in a more flexible form as follows:

$$q_{it} = \alpha + \emptyset K_{it} + \delta L_{it} + \beta X_{it} + \gamma D_{it}^e + \vartheta G_{it} + \sum_{it} \omega_j W_{jit} + kq_{it-1} + \mu_{it} \tag{10}$$

where W is a vector of control variables.

3 Data Description and Sources

The available data consist of country averages from 2005 to 2017 of 32 sub-Saharan Africa (SSA) countries with complete dataset. The data was mainly sourced from the World Development Indicators (WDI). Other sources are the World Integrated Trade Solutions (WITS) and Worldwide Governance Indicators (WGI). The detailed description of the variables and list of countries are presented in Tables 1 and 2, respectively.

Table 1 Description of variables

S/N	Variable	Description/Source
1	Economic growth (EG)	GDP growth (annual %)/WDI. Annual mean percent growth rate of GDP
2	Labor (L)	Average yearly percent growth of the labor force, computed from Total Labor force/WDI
3	Capital (K)	Gross capital formation (% of GDP)/WDI Mean annual gross domestic investment
4	Export (X)	Exports of goods and services (annual % growth)/WDI and WITS Average yearly growth rate of exports of goods and services
5	GQ	Governance quality/Reflects perceptions of the extent public power is exercised for private gain, forms of corruption and state capture; (ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance)/WGI
6	D^e	Total debt service (% of GNI)/WDI
7	Trade openness	Trade (% of GDP)/WDI
8	Inflation	GDP deflator/WDI

World Development Indicators (WDI), World Integrated Trade Solutions (WITS), and Worldwide Governance Indicators (WGI).

Table 2 List of Sub-Saharan African countries

Angola	Cameroon	Guinea	Mozambique	Rwanda	South Africa
Burundi	Congo, Dem. Rep.	Guinea-Bissau	Mauritania	Senegal	Zimbabwe
Benin	Congo, Rep.	Kenya	Mauritius	Sierra Leone	
Burkina Faso	Cape Verde	Lesotho	Malawi	Togo	
Botswana	Gabon	Madagascar	Niger	Tanzania	
Côte d'Ivoire	Ghana	Mali	Nigeria	Uganda	

3.1 Summary Statistics

The correlation, covariance matrices, and summary statistics are reported in Tables 3, 4, and 5, respectively. The correlation matrix shows that exports are strongly and positively correlated with economic growth, suggesting that increased exports enhances growth. Very evident from the summary statistics Table is the fact that debt, domestic investment and corruption are adversely correlated with economic growth. While this may denote a burden on the growth of the economy, the negative sign of domestic investment (though weakly correlated) is worrisome. Reason may be a likelihood of

Table 3 Correlation matrix

Variable	CRT	D^e	X	K	EG	INF	L
CRT	1.000000						
D^e	−0.300416	1.000000					
X	−0.316914	−0.135497	1.000000				
K	−0.445562	−0.20467	0.051052	1.000000			
EG	−0.208816	−0.395781	0.769537	−0.007361	1.000000		
INF	0.293479	−0.21756	0.278582	−0.611023	0.406339	1.000000	
L	−0.46652	0.030950	0.059954	0.186744	0.006241	−0.079597	1.000000

Table 4 Covariance matrix

Variable	CRT	D^e	X	K	EG	INF	L
CRT	0.000330						
D^e	−0.002353	0.185754					
X	−0.023613	−0.239389	16.80382				
K	−0.01312	−0.142901	0.339024	2.624357			
EG	−0.003868	−0.173826	3.214571	−0.012152	1.038434		
INF	0.016106	−0.283112	3.447999	−2.988676	1.250224	9.116331	
L	−0.000809	0.001273	0.023461	0.028879	0.000607	−0.022942	0.009112

Table 5 Descriptive statistics

	CRT	D^e	X	K	EG	INF	L
Mean	−0.641326	2.625475	8.552275	24.79677	5.111128	8.169783	3.100816
Median	−0.636646	2.525306	9.864781	25.02650	5.225837	7.513885	3.092079
Std. Dev.	0.018919	0.448591	4.266631	1.686136	1.060646	3.142614	0.099357
Kurtosis	1.963660	1.749892	3.432533	1.747696	1.955301	2.291008	2.426890
J-B *stat*	1.391950	0.868011	0.342093	1.179874	1.238216	0.586095	0.520586
J-B p*rob*	0.498588	0.647909	0.842782	0.554362	0.538424	0.745987	0.770826
Sum	−8.337242	34.13118	111.1796	322.3580	66.44467	106.2072	40.31061
Sum Sq. Dev.	0.004295	2.414802	218.4496	34.11664	13.49964	118.5123	0.118462

low interest rates combined with relatively high inflation rates, gross dissaving in these economies or a reflection of crowding out effect from initial domestic public debt and lack of robust data availability (a matter of further empirical work). The covariance matrix from Table 4 similarly depicts similar results as presented in the correlation matrix.

3.2 Empirical Findings

The basic empirical model based on Eq. 10 was estimated cross-sectionally using the country averages from 2005 to 2017 complete data set for 32 SSA countries. The choice of the sample period was influenced by consistent complete data availability and currency.

Economic growth has been taken as the dependent variable; labor, capital, and external debt are the foremost variables, while quality of governance is the control variable. Inflation and trade openness variable initially thought of as control variables were dropped in the analyses due to problem of multicollinearity, redundancy, or their inclusion produced unsatisfactory results. Precisely, the goodness of fit of such Equations was considerably weak. Following assumption of simple parsimony, the "best" results are reported in Table 6 as Eqs. A–D.

From results of the estimated equations, we note that most of the main variables of interest (labour and capital) were not statistically significant, even as capital in most instances was wrongly signed a priori. Interestingly, export-augmented growth reveals a statistically significant positive impact of exports on economic growth. A 10% increase in exports resulted in over 14% increase in economic growth on average.

The external debt burden measured as Total Debt Service as percentage of Gross National Income in Eqs. C and D exhibit a statistically significant negative coefficient, with a modest improvement on the goodness of fit. The signs of the external debt coefficients in Eqs. C and D agree with the hypothesis of a negative direct effect of debt; as this is same conclusion reached by Fosu (1999). This may imply that increased external debt burden had adverse effect the economic growth of SSA countries in the last three quinquennials. In addition, the results of Eqs. B and C; precisely, their goodness of fit percentage results, are not too far apart with the inclusion of debt service to the exported-augmented growth specification. However, the adverse effect of external debt burden on the economic growth of SSA countries, would have been direct and not through investment (as investment is not statistically significant in all the estimated Equations) as suggested by the DEDH.

The partial elasticities associated with the coefficients of the debt service variables in Eqs. C and D of Table 6 and the means reported in Table 5 are computed as 0.047 and 0.050 respectively. This implies that on the average, a 10% rise in debt service would reduce GDP growth by 0.5%, all things being equal. Apparently, SSA's growth would have averaged nearly 0.26%, or 5% higher during the period 2005–2017, if there was no servicing of external debt.

Table 6 Empirical findings dependent variable (Economic Growth, EG), 2005–2017

Equations	Constant	K	L	X	D^e	CRT	R^{-2}	Prob (F-Stat)	D-W stat
A	4.988	−0.006	0.084				0.002	0.994	1.462
	0.458	0.027	0.025						
B	5.179^{***}	−0.026	0.347	0.192^{**}			0.383	0.036	1.729
	2.706	0.189	0.151	3.639					
C	2.131^{**}	−0.051	0.7523	0.182^{**}	-0.092^{***}		0.416	0.035	1.824
	1.986	0.188	0.396	2.936	1.89				
D	0.113^{**}	0.057	0.008	0.139^{**}	-0.098^{***}	0.072^{***}	0.462	0.048	2.014
	1.887	1.132	0.025	2.551	1.912	1.932			

Table shows coefficients for OLS regressions. All specifications include a constant term. T-statistics in parentheses. $*\rho < 0.01$, $**\rho < 0.05$, $***\rho < 0.10$

The most important control variable of interest is the quality of governance; which reflects the perceptions of the extent public power is exercised for private gain, forms of corruption and state capture. The variable entered the analysis with values ranging from approximately −2.5 (weak) to 2.5 (strong governance performance). The coefficient of the quality of governance is positive but weakly significant at 10% level. The positive sign of the coefficient as expected a priori, suggests that good governance promotes growth. It thus implies that as corruption reduces and with less state capture, red tape among other factors, economic cost of transaction will decline, and this would create favorable investment climate and enhanced economic growth in SSA region.

4 Statistical Tests of Specification

The application of the OLS estimating technique invokes two major concerns: first, model assumptions made in order to obtain consistent OLS parameter estimation and asymptotically valid results. These assumptions among others, include the assumption that the estimators of the linear regression model are the best linear unbiased estimators (BLUE), that is they have the smallest variance of all linear and unbiased estimators. And second, the error term μ denotes the stochastic disturbance term that implies the existence and possibility of omitted variable bias.

The simple route chosen to check for robustness of the estimated results and sensitivity analysis is by comparing the different regressions reported in Table 6. From Eqs. B–D, the results of the key variables of interest did not change as new variables were added. Export has positive and debt has negative impact on economic growth. The relevant coefficients of these variables are also statistically significant and remain consistent, coupled with an increasing coefficient of determination as number of explanatory variables increases. This simple sensitivity analysis confirms the robustness of the results.

5 Conclusion

This paper investigates the impact of exports, debt, and quality of governance on economic growth of SSA. Empirical model using OLS for data set of 32 SSA countries (1995–2017) is estimated and all results of the variables of interest are appropriately signed and significant as a priori expected. Exports and quality of governance stimulate output positively, while external debt burden has adverse effect on economic growth. It is apt to note that there has been growing concern about the upsurge in current wave of global external debt accumulation, management, and debt transparency. Apparently, this is more worrisome for SSA countries given their weak economies and fragility. Against this backdrop, SSA policymakers must be wary and vigilant about the associated debt risks by developing better economic policy

frameworks that strengthen institutional arrangements to prevent, or build resilience against, politically driven unproductive debt buildups.

The different functional specifications applied for the sensitivity tests and robustness provide confidence in the findings. However, the usual caveat in the interpretation of the findings applies. For instance, not all SSA countries are represented in the sample due to data gaps and availability. The cross-sectional nature of the averaged data used for the analysis may have relatively influenced the outcome of the results as against the use of panel data which examine changes in variables over time and differences in variables between subjects. As a result, the findings should not be overgeneralized.

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Financing Alternatives

Infrastructure and Africa's Development: The Imperative of Alternative Funding Options

Lionel Effiom and Friday Agala

Abstract From an estimated funding gap of $93 billion a year up to 2020, Africa's infrastructure financing needs were further revised to $130–$170 billion annually. The Program for Infrastructure Development in Africa Priority Action Plan projects were estimated to gulp $68 billion and an estimated $300 billion for other projects up to 2040. Given the rate of urbanization due to population growth, migration, and other demographic factors, these estimates would likely increase as pressures are put on existing infrastructure with marginal or zero net investments in infrastructure. While several initiatives have been established to frontally deal with the continent's infrastructure deficit, actual implementation has been frustrated by financial constraints. Resort to conventional financing methods has proven unsustainable. Africa must look beyond the conventional. This paper draws heavily from the infrastructure finance literature and catalogues a number of infrastructure-financing options to include Sovereign wealth funds, pension funds, as well as public–private partnerships arrangements. Data from countries who have actually begun implementing these options show that there are prospects for infrastructure development if applied in a large continental scale. A key recommendation of the paper is that governments must reform the legal, regulatory, and institutional frameworks across the continent to accommodate these financing sources. Regionalization of infrastructure provision may prove a speedier way of bridging Africa's infrastructure deficits.

Keywords **I**nfrastructure · Sovereign wealth funds · Pension funds · Public–private partnership

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1 Introduction

Africa still remains one of the poorest and least developed continents in the world. It plays host to many negative indices of development, including high unemployment, high levels of infant and maternal mortality, illiteracy, low productivity, deepening poverty and inequality, etc. Yet Africa is a continent of profound potentials in human, material, and natural resources, which lie prostrate and are largely untapped and underemployed because the critical, physical man-made resource systems, or infrastructure, that should catalyze their productive deployment are lacking.

Infrastructure is a precursor to the development of the private sector and is a crucial enabler of integration, both at the country and continental levels. On infrastructure rests the prospects of unlocking the huge potentials in human development and agriculture which is a crucial pivot in the transformation of Africa's economy. Indeed, there are streams of research which indicate firmly that "increasing the stock of infrastructure investments in core sectors by 1% can increase gross domestic product (GDP) growth by up to one percentage point" (AfDB, 2014 ; Estache & Goicoechea, 2005; Calderon & Serven, 2004). For instance, Bom and Lighthart (2014) show that a 1% increase in public investment in infrastructure increases GDP by 0.08% with other multiplier benefits; Andrianalvo and Kpodar (2011) document that a 10% increase in telephone subscriptions leads to 16% growth in real GDP, while Calderón (2009) find evidence to the effect that increases in the stock of ICT, electricity, and roads increase GDP growth rate by 0.99%.

Besides its direct relation to national income growth, it also indirectly affects GDP by mitigating transaction costs, thereby ensuring that productive inputs are used more efficiently (Barro & Sala-i-Martin, 2004). For instance, lack of or poor quality of electric power may inflict extra expenditures on firms in the form of output loss, due to idle workers, or malfunctioning equipment. Additional costs are borne by firms as they seek alternative means of power supply, thus compromising on the durability of private investments and adaptation to new and efficient technologies (Dethier, 2015). Studies show that inadequate infrastructure is accountable for the erosion of more than 2% of per capita growth rates in Africa (Foster & Briceno-Garmendia, 2010). Indeed, firms making profit in Africa are those who operate in highly regulated markets, e.g., those in extractive industries, principally mining and oil production. Unfortunately, firms with pervasive sectoral connections and wide job opportunities encounter real challenges, with high mortality rates in the first few years of operation (AfDB, 2014). On the whole, "evidence from enterprise surveys suggests that infrastructure constraints are responsible for about 40% of the productivity handicap faced by African firms" (Calderon & Serven, 2004). On the other hand, the value chain in the production process can be more efficient in the presence of modern transportation and communication systems (Aschauer, 1993; Gramlich, 1994).

Infrastructure deficit, both in quantity and quality, has been identified as a significant constraint to the development of the African continent. Profound deficits abound

in areas of roads, railways, telecommunications, airways, and electricity. Public services in critical sectors like education and health are grossly in short supply, thus constraining improvements in total factor productivity. For instance, conservative estimates show that the number of Africans who cannot access energy exceed 640 million (AfDB, 2018b). This means that African countries have the lowest electricity access rate which is marginally in excess of 40%. A comparative evaluation shows that per capita energy consumption in sub-Saharan Africa, minus South Africa, is 180 kWh compared to 6,500 KWh for Europe and 13,000 kWh for the United States of America (Dethier, 2015). Current data indicate that over 30 countries in Africa face consistent power shortages. Even with its huge reserves of hydropower, biomass, solar, wind, and geothermal energy, only an insignificant fraction is utilized.

With regards to transportation, Agenor (2013) notes that Africa's transportation costs are the highest in the world, significantly restraining trade expansion. Less than 50% of the rural population has access to paved roads, while 5% of agriculture is under irrigation. Social infrastructure has not fared any better, as less than 34% of the population has access to quality sanitation but with a healthy 65% of the population having access to clean water (Mafusire, Brixiova, & Anyanwu, 2017). While there are profound improvements in the information and communications technology (ICT) sector, diversities in cost and efficiency exist across countries and in particular services. Specifically, in 2014, 70% of Africans could access mobile phones. Africa also boast of ICT penetration rates growing at a pace exceeding the global average. Regrettably, internet density is a little above 200 persons per thousand.

The picture painted above, though gloomy, offers great opportunity for investments to be made in Africa's infrastructure for accelerated economic development. Because of the underlying assumption of diminishing marginal returns to investment, the low quantum of infrastructure in Africa in all sectors suggest that investors would gain more returns on their infrastructure investments in Africa with a low infrastructure stock than in rich developed countries with high stock of infrastructure. This theoretical incentive and many more is what is needed to contain the financial burden of infrastructure provision in Africa.

The challenge of infrastructure financing in Africa is a profound one, generally due to resource constraints and the fact that other significant development issues in other sectors are concurrently begging for attention with the same minimal resource at national governments' disposal. Based on Foster and Briceno-Garmendia (2010), the Africa Infrastructure Country Diagnostic (AICD, 2010) report estimates that bridging the infrastructure gap in Africa would gulp a whopping $93 billion investment each year (Pottas, 2012) up to 2020. Two thirds ($60 billion) of this amount is needed for new infrastructure, while $30 billion is envisaged for maintenance of existing ones. However, the new revised estimate by the AfDB puts the funding requirement at $130 billion–$170 billion a year to narrow the infrastructure breach and bring it to universal levels obtainable in developed countries. But can national governments muster significant financial resources to address this issue? In this paper, we explore alternative funding options available to individual national governments in Africa. It

offers policy and financing panaceas away from the conventional and much restricted budgetary mechanisms cast within the framework of domestic resource mobilization.

The rest of the paper proceeds as follows. In Sect. 2, we analyze the theoretical issues underpinning infrastructure financing and development. A more detailed empirics of Africa's state of infrastructure is also offered. Section 3 evaluates constraints to infrastructure development in Africa, while Sect. 4 discusses the financial requirements for Africa's infrastructure. Section 5 catalogues and analyses funding options for infrastructure, while the last section concludes with some recommendations for policy.

2 Literature Review

2.1 Theoretical Literature

There has been few confluence of definitions to the concept of infrastructure, partly because of its heterogeneous and composite nature. Infrastructure was historically and broadly defined as expenditure on consumption by either the private sector or the government. However, both current theoretical and empirical literature see it as a capital good, which possesses some features of a public good. Akinwale (2010) and Frischmann (2007) recognize infrastructure as the resource systems that have been harnessed for the development of the society. These include: (1) transportation systems, such as highway systems, railways, airline systems, and ports; communication systems, such as telephone networks and postal services; governance systems, such as court systems; and basic public services and facilities, such as schools, sewers, and water systems. In the Frischmann terminology, they are referred to as traditional infrastructure, as distinct from non-traditional resources like environmental resources, such as lakes, the atmosphere, and ecosystems; (2) information resources, such as basic research, abstract ideas, and operating systems; and (3) Internet resources, such as interconnected computer networks and protocols that enable interconnection, interoperability, and data transfer. Infrastructure is the underlying amount of physical and financial capital embodied in roads, railways, waterways, airways, and other forms of transportation and communication, plus water supplies, financial institutions, electricity, and public services such as health and education (Todaro & Smith, 2009).

Economic theory specifies that infrastructure can directly affect economic growth through five channels, namely: as a factor of production, complement to other factors, stimulus to factor accumulation, stimulus to aggregate demand, and as a tool of industrial policy. As a factor of production that is akin to physical capital, infrastructure directly enters into the production function, and so aggregate income becomes an increasing function of the quantity of infrastructure deployed in production (Fedderke & Garlick, 2008; Gramlich, 1994). A classic example is the effect of energy generation, distribution, and consumption in the production of goods and services in the

economy. As a complement to other factors of production, infrastructure improvements may decrease production cost, while concurrently raising the productivity of other inputs in the course of production. For example, the productivity of factory plants, machinery, computers and other physical capital is significantly boosted when there is adequate power supply. Similarly, labour productivity is greatly enhanced if it is complemented by a healthy dose of healthcare and education infrastructure. In other words, investment in human capital considerably improves the work force; capital and labour become more efficient in the presence of good infrastructure. In the absence of quality infrastructure, TFP diminishes and output growth is strictly a function of crude labour and capital (Fedderke & Bogetic, 2006; Barro, 1998). In effect, without infrastructure, output growth is limited even in the presence of large quantities of labour.

Third, infrastructure stimulates the mobilization and accumulation of other factor inputs. Each factor input is itself a derivative of a production process. For instance, in the accumulation of human capital, other factors must necessarily enter into the production function, e.g. educational facilities, teachers' qualifications, teaching and learning environment, roads, etc. Thus, by its indirect effect on growth, infrastructure enhances the accumulation of other factor inputs. Fourth, infrastructure is a catalyst to aggregate demand. By providing infrastructure basically through infrastructure projects, considerable expenditure outlays are involved, both at the construction, maintenance and operation stages. This undoubtedly increases aggregate demand through its interaction with the investment multiplier. It must be noted that the effect of this fourth channel on output is debatable. Many have argued that the effect of infrastructure on output via the demand side is always short-lived, durable only in the short run as the productive capacity of the economy remains unaffected. In the long run, an open economy, for instance, stands the risk of rising inflation and imports with a huge possibility of a trade deficit (Fedderke & Garlick, 2008). Finally, by acting as a tool of industrial policy, infrastructure provision may be specifically targeted by the government to strategic sectors in the economy that might sway investment decisions of the private sector positively to those sectors. For instance, government might embark on a rural road construction project with the belief it will incentivize private sector investment into those areas. The Maputo Corridor is a classic example of this sentiment. However, like the fourth channel, the industrial policy channel has been debatable, with many arguing that such public sector interventions do not actually generate a commensurate level of investment and growth envisaged, and therefore constitute a waste of resources.

A strand of the theoretical literature documents a two-way causation between growth and infrastructure. The above analysis emphasized the functional relationship and dependence of growth on infrastructure. However, theory and empirical evidence equally suggest the functional dependence of infrastructure on growth. In effect, growth in aggregate income may stimulate demand for infrastructure. Because output has increased, it may be necessary, for instance, to procure improved infrastructure to transport this output to their consumption destinations or even to communicate with agents of the production chain about the concerns of consumers as well as the market dynamics.

2.2 Empirical Literature

It was Arrow and Kurz (1970) which provided a significant seminal study of the growth impact of infrastructure. By modeling aggregate output as a function of infrastructure stock or the flow of infrastructure services, they found that increasing the volume of infrastructure services raises output both directly and indirectly, the latter by crowding in other factor inputs because of the consequential increase in their marginal productivity. Besides the above, other lines of research like Barro (1990), using an endogenous growth model, highlight the fact that infrastructure expansion, potentially financed by increased taxation crowds out the deployment of other inputs. An extension of the Barro (1990) study is found in Futagami, Morita, and Shibata (1993) who incorporated both private and public capital into the model. They found that the productivity of public investment is somewhat delayed and therefore results in the tradeoff of current consumption for future consumption.

It should be emphasized that investment in infrastructure demands both recurrent and capital expenditure, for instance, the building and maintenance of roads. Tsoukis and Miller (2003) as well as Ghosh and Roy (2004) investigate how these two components affect output when public capital stock and non-investment spending flow are factored in at the same time. Their findings show that "the welfare and growth-maximizing levels of recurrent expenditure coincide, but they differ in the case of investment expenditure, for which growth maximization implies public investment in excess of the welfare-maximizing level."

Infrastructure enters the production function as a key determinant of TFP. Theory shows that TFP is an "unpaid factor" (a residual productivity not accounted for by the key factors in the production function) which distributes positive multiplier effects on the efficiency of other factor inputs. Thus Bougheas, Demetriades, and Mamuneas (2000) as well as Agenor (2013) find evidence for this theoretical perspective when they submit that telecommunication and transport services stimulate innovation and technological progress by mitigating the fixed cost of new intermediate goods production. In the long run, this leads to increases in aggregate income.

Besides affecting aggregate production function, empirical literature also emphasizes its role in helping mobilize other productive inputs. Turnovsky (1996) show that good quality transport systems may lead to decreases in costs of instaling new capital, while Agenor (2011) submit that increased access to electricity would most likely enhance educational attainment and decrease the cost of acquiring human capital.

A controversy in the literature exists about the exact nature of infrastructure, i.e., whether it is strictly a public or private good. Evidence seems to suggest that there are few infrastructure services that can be categorized as pure public goods. In certain instances, the presence of congestion and scarcity may impute the feature of rivalry into some infrastructure services, thus making them look private. A classic example of this is road transportation services where toll gates are mounted and which effectively excludes other users. Infrastructure also embodies network effects, resulting in non-linear marginal productivities. For instance, there may be limited benefits and effects

of a road until it is marginally developed, whereupon the marginal productivity of the additional road construction rises sharply. Diminishing output effect may result with additional road construction (Fernald, 1999). It is very likely that multiple equilibria may result from these non-linearities, given the right conditions (Calderón & Servén, 2014). In effect, a condition of inadequate stock of infrastructure may persistently result in very low marginal productivity of existing infrastructure, but an expansion of infrastructure systems would increase productivity, possibly reaching output-maximizing levels (Agenor 2013).

While there is almost universal unanimity on the growth-stimulating effect of infrastructure, there is, however, little agreement on the actual magnitude of the effect and the factors that induce it. It was Aschauer (1989) who investigated the size effect of infrastructure and found that "the stock of public infrastructure capital is a significant determinant of U.S. aggregate TFP." This study, though, was bedeviled with estimation issues, which probably led to an estimated elasticity of output in relation to infrastructure that was unreasonably high (about 0.40). Other studies that latter followed investigated on the same issue using different data, estimation techniques and methodologies. For instance, many studies employed either national, subnational, or panel data in estimating the elasticity of GDP in relation to infrastructure. See Calderón, Moral-Benito, and Servén (2014), Calderón and Servén (2003) and Canning (1999) which use monetary measures of public capital. These studies report a significant effect of infrastructure on GDP.

Unfortunately, in the Cobb–Douglas model employed by the majority of these studies, it is impossible to evaluate the degree to which infrastructure influences TPF. It is thus in apparent response to this challenge that Hulten and Schwab (2000), employing a growth decomposition methodology, investigate the contribution of government expenditure to TFP in the manufacturing sector growth in the United States. Non-significant effects were found. Hulten, Bennathan, and Srinivasan (2006) replicate this methodology, employing data from states in India with physical measures of infrastructure like power and transport. Their results indicate that infrastructure development had a significant impact on close to 50% of TFP growth. While Duggal, Saltzman, and Klein (1999), employing aggregate data from the United States, find a significant effect of infrastructure on TFP, Duggal, Saltzman, and Klein (2007) conclude that IT infrastructure provided by the private sector significantly influences aggregate productivity.

A similar line of research is pursued by Berndt and Hansson (1991). The study adopts a dual approach by focusing on the estimation of cost and profit functions augmented either by stock of public capital or infrastructure measures. The study finds that infrastructure either decreases costs of production or raises profits. Other streams of research in this area investigate the impact of infrastructure on growth in the long term, employing a reduced form growth regression model. It is, however, difficult to compare these studies because of the heterogeneous nature of infrastructure measures used. Comparisons, though, exist for those papers which use monetary measures of public infrastructure. For instance, Crihfield and Panggabean (1995) as well as Holtz-Eakin and Schwartz (1995) find insignificant effects of infrastructure on growth in United States and other cosmopolitan areas. Yet, Easterly and Rebelo

(1993) conclude that government expenditure in transport and communications have a significant positive effect on growth across countries. While Devarajan et al. (1996) document an inverse relationship between infrastructure share in aggregate total public expenditure and economic growth in a panel data for developing countries in their study, Gupta et al. (2005) find contrasting evidence using panel data of a different set of countries.

The growth regression empirical literature on infrastructure explored shows that there is always a significant effect of infrastructure on growth when physical measures of infrastructure stock are used. Some of these indicators are number of telephone lines (Easterly, 2001), synthetic measures of physical stocks of infrastructure across different sectors like telecommunications, power, and transport. Calderón and Servén (2004, 2010a, b) and Sanchez-Robles (1998) find robust evidence to the effect that these infrastructure proxies are positively related to the growth rate of per capita GDP in a mixed data set of both developing and developed countries. These studies also conclude that the size of infrastructure effects on per capita income is significant.

Besides the economy-wide level of infrastructure reviewed above, there are other disaggregated level studies on the growth effect of infrastructure. Rud (2012) evaluates the effect of electricity availability on the manufacturing sector of Indian states. With several assumptions underlying the empirical model, the study finds that on the average "a one-standard deviation increase in the measure of electrification is associated with a 14% expansion in state manufacturing output." Similarly, Datta (2012) investigates the effect on firms' performance of a major road rehabilitation project in India called the Golden Quadrilateral Programme. The study finds proof of a significant improvement in the performance of firms (proxied by their inventory management and input costs-effectiveness) those firms located on the highways where this programme is executed.

The empirical literature reviewed so far says little or nothing regarding the cost of acquisition and operation of infrastructure assets. Albeit, a comparison of the social marginal costs and benefits is relevant in determining if infrastructure provision is adequate or not. In this connection, Canning and Pedroni (2008), using a panel of countries with a simple empirical model and drawing inspiration from Barro (1990), relate the stock of physical infrastructure with their optimum growth levels. Their study finds that while infrastructure is in short supply in some countries, their supply is in excess of current demand in others. This finding, however, does not indicate any concrete correlation with per capita incomes of these countries. Other studies in this mould include Kamps (2005) who surmises that EU countries do not have any deficiency or inadequacy in public infrastructure, as well as Eden and Kraay (2014) who submit that public investment or infrastructure is under-provided in low-income countries.

There are several limitations to the foregoing empirical literature on the growth and development effect of infrastructure, namely the problems of heterogeneity, measurement, and identification. In the first case, few studies take into account in their estimation procedures and empirical models the heterogeneous nature of infrastructure projects. Yet it is evident that the growth impact of infrastructure varies across countries and spreads over the long run. This view is supported by Hulten (1996)

who finds that about 25% of differences in output growth between East Asia and Africa and about 40% between developed and industrial countries are attributable to efficiency in the use of infrastructure assets. Similar findings by Rioja (2003) show that poor quality of infrastructure is responsible for huge welfare and output cost in countries in Latin America. See also Seneviratne and Sun (2013). Discounting infrastructure quality, several other sources account for this heterogeneity, for instance, the presence of network effects which results in non-linearities in the contribution of output as infrastructure increases, as well as the perennial problem of weak institutions which compromise efficiency in the use of infrastructure.

A precise measurement of infrastructure is another great limitation of most findings and conclusions in empirical literature. Because of the multi-faceted concept of infrastructure which ranges from transportation, to education, to health and even clean water, many studies decide to stay simple by adopting a single indicator to establish the growth impact of infrastructure on the economy. This apparently leads to faulty and often exaggerated conclusions, especially with regards to policy issues. On the other hand, conflating or aggregating different infrastructure types into regression model specifications might equally yield spurious results. In another breath, the use of public or private expenditure as proxy for infrastructure does not seem a panacea to the measurement problem. Two concurrent challenges are ever present. One, private capital expenditure may even exceed the public's as evidenced in some countries, and two, public capital may be deployed to investments and projects that are not typically infrastructural. A third problem with this is that there may be no correlation between real government expenditure and actual infrastructure provision because of institutional weaknesses evidenced in procurement constraints, leakages, and corruption (Pritchett, 2000; Keefer & Knack, 2007). Kilby (2013) notes a fourth problem, namely that public expenditure may not materialize into a proportionate increase in infrastructure supply because of bottlenecks in the choice and execution of projects. Clearly, these constraints or limitations do not hold for physical indicators of infrastructure, a reason why most studies using them are definitive compared to those relying on monetary indicators. Fedderke and Garlick (2008) therefore surmise that "inappropriate aggregation renders it difficult or impossible to make judgments about the relative importance to growth of different types of infrastructure."

The third and final challenge in empirical literature is that of identification, especially for those studies which investigate the effect of infrastructure on welfare or income inequality and on growth. Regression estimates on the impact of infrastructure may be mixed-up with rising infrastructure demand, stimulated by increasing levels of aggregate income (Canning & Pedroni, 2008). In effect, while infrastructure may stimulate growth, a reverse causality is strongly possible where growth can also induce infrastructure demand. Or consider a situation where infrastructure may help mitigate inequality, while simultaneously restraining the poor from having access to infrastructure services. Alesina, Baqir, and Easterly (1999) find evidence to the fact that as societies become more unequal, with rising poverty and fewer access to productive resources, fewer resources are devoted to provide for infrastructure and public goods generally. Regrettably, these issues of simultaneity or endogeneity have

mostly not been taken into account in most empirical studies, which apparently leads to an over-exaggeration of the impact of infrastructure on growth.

2.3 Infrastructure in Africa: The Extent of the Deficit

Four principal areas are of real concern in relation to infrastructure development in Africa. These are transportation, electricity, information, and communications technology, as well as water and sanitation. A clear picture of infrastructure challenges facing Africa is provided by the AfDB's Africa Infrastructure Development Index (AIDI). The AIDI, among other purposes, monitors, and evaluates the condition and progress of infrastructure development in the continent. It also serves the purpose of resource allocation, and also contributes to policy engagements within and without the AfDB. Because of the composite and heterogeneous nature of infrastructure, the index is normalized and gradated between 0 and 100, with higher values denoting higher infrastructure endowment. Table 1 shows the top 10 as well as the least 10 countries on the continent with composite Africa Infrastructure Development Index for 2016–2018.

The table shows wide disparities in the infrastructure gap of African countries. Clearly, there is an extensive range exceeding 90% between Seychelles, the country with the best infrastructure stock and Somalia, the one with the least. Again, the table cursorily reveals that North African countries seem to have a higher infrastructure endowment than other regions (See Table 2), though a few countries from Southern Africa made the list. Besides the glaring regional differences, infrastructure stock and access also varies within countries. For instance, in 2014 rural consumers were worse off than their urban counterparts who had an average access to electricity of about 72% compared to 33% for rural consumers. These differentials in electric infrastructure access were greatest in East Africa, with an urban access of 73% compared with the rural's 11%. Generally, the state of infrastructure in Africa is very dismal and despicable.

These disparities are more glaring when comparison is made in relation to other continents of the world on different infrastructure subgroups. For instance, in 2014, the African population with access to electricity was estimated at 47%, almost half the 97% in Latin American countries and 89% in Asia. Access to quality sanitation was 36% in 2015 compared to Latin America's 83% and Asia's 62%. Furthermore, the proportion of the population having access to improved sources of water was 70% as against 90% in Latin America and Asia (AfDB, 2018a).

When these comparisons are made in relation to income levels, a despicable picture emerges for Africa. Mafusire et al. (2017) concludes that low-income African countries are four times worse off than their counterparts from other continents in terms of paved road density. Similarly, African middle-income countries are less than twice disadvantaged relative to their counterparts in other regions of the world.

Table 1 Composite Africa Infrastructure Development Index (2016–2018) for Some Selected African Countries

Rank	Country	2016	Rank	Country	2017	Rank	Country	2018
1	Seychelles	93.927	1	Seychelles	94.109	1	Seychelles	94.324
2	Egypt	85.663	2	Egypt	83.350	2	Egypt	85.847
3	Libya	77.793	3	South Africa	79.635	3	Libya	81.413
4	South Africa	75.515	4	Libya	79.271	4	South Africa	78.527
5	Mauritius	74.076	5	Mauritius	75.493	5	Mauritius	76.787
6	Tunisia	66.262	6	Tunisia	66.974	6	Tunisia	68.982
7	Morocco	62.408	7	Morocco	61.998	7	Morocco	64.884
8	Algeria	53.393	8	Algeria	54.039	8	Algeria	55.793
9	Cabo Verde	49.431	9	Cabo Verde	50.431	9	Cabo Verde	47.955
10	Botswana	35.631	10	Botswana	36.607	10	Botswana	36.793
45	Mozambique	11.606	45	Central A.R	11.830	45	Central A.R.	11.951
46	Sierra Leone	9.388	46	Sierra Leone	9.975	46	Madagascar	10.734
47	Madagascar	8.448	47	Ethiopia	8.561	47	Sierra Leone	9.943
48	Eritrea	8.266	48	Madagascar	8.474	48	Ethiopia	9.699
49	DRC	8.163	49	Eritrea	8.265	49	Eritrea	8.217
50	Ethiopia	7.567	50	DRC	8.165	50	DRC	8.148
51	Chad	6.638	51	Chad	6.808	51	Chad	7.239
52	Niger	5.336	52	Niger	5.762	52	Niger	5.508
53	South Sudan	4.940	53	South Sudan	4.549	53	South Sudan	4.603
54	Somalia	3.365	54	Somalia	3.404	54	Somalia	3.362

Source AfDB (2018b)—The Africa Infrastructure Development Index

Table 2 Africa infrastructure development index (2015–2018) by sub-region

Rank	Country	2016	Rank	Country	2017	Rank	Country	2018
1	North Africa	71.63	1	North Africa	71.62	1	North Africa	72.96
2	Southern Africa	33.47	2	Southern Africa	34.97	2	Southern Africa	35.46
3	West Africa	18.92	3	West Africa	19.76	3	West Africa	20.47
4	East Africa	13.52	4	East Africa	14.00	4	East Africa	14.60
5	Central Africa	10.69	5	Central Africa	10.78	5	Central Africa	11.04
	Africa	27.12		Africa	27.75		Africa	28.44

Source AfDB (2018b)—Africa Infrastructure Development Index

3 Constraints to Infrastructure Development in Africa

Having executed a fair diagnosis of Africa's infrastructure challenges, it is pertinent to evaluate what is militating against the provision of infrastructure in Africa, besides capital. This is relevant because a holistic management of the infrastructure crises must go beyond throwing money at the problem. Several constraints have been identified in the literature.

First, the regulatory, legal and institutional framework in Africa is weak, acting as a disincentive for private sector participation in infrastructure financing. Private sector confidence in government institutions and their ability to deliver based on existing legal structures and policy is either low or non-existent. This is partly due to the preponderance of unstable governments across Africa, policy summersaults even in those states that have some semblance of stability, persistent corruption, poor and inefficient implementation of privatization programs, and many more. These limit the involvement of private sector in infrastructure funding. A classic example is the inability, brought about by legal constraints, of pension funds administrators (PFAs) to deploy the billions of dollars in pension funds to financing infrastructure in the continent. The reality is that most of these funds are domiciled in small economies with restrictive markets, whereas the infrastructure projects cut across national boundaries with potential for scale economies. Thus, only liberal investment policies that take into account the cross-border nature of infrastructure investment can obviate these constraints against the private sector. Besides, most pension funds across the continent are bereft of the technical expertise to evaluate complex infrastructure investment, coupled with the lack of incentive to motivate them to take on additional risk of investing in infrastructure. Consequently, it has been estimated that a resolution of these unwieldy policy environment might induce pension funds infrastructure investment in Africa of almost $4.6 billion a year (Sy, 2017).

As a corollary to the above, institutional intervention is also needed in the area of public–private partnership (PPP) framework. Evidence shows that PPP contracts are frequently poorly drafted and structured because of apparent lack of skills on the part of government personnel. Government bureaucracy often adds to uncertainty and often entails delays in project preparation, procurement, and completion time (AfDB, 2018a).

Second, infrastructure development in Africa also suffers from weak infrastructure planning and project preparation. Because of the inherent costs associated in developing, preparing, and assessing infrastructure projects, coupled with the long gestation periods for such investments, the private sector is often averse to assuming such risk. It must be noted that for entrepreneurs, the preparation phase of projects is all too risky, with the risk rising if the project does not reach the financial completion stage where the entrepreneur is not likely to be compensated. Indeed, project preparation cost gulps between 10 and 12% of aggregate project cost (NEPAD, 2017)—a scary rate for private entrepreneurs who may not be guaranteed compensation for these funds, given the weakness of institutions and low confidence ratings of government identified above. This burden therefore must be borne by international financial

institutions, donors, and governments, who must factor into their planning matrix the rising population of Africa and the peculiar development objectives of regions and countries. Furthermore, in the process of project preparation, external expertise may be required because of the weakness of human capital in most African countries. Poor coordination and red tape in government ministries may also be a discouraging factor to investors.

Finally, the political economy of infrastructure investments in Africa is also a major snag in the development of infrastructure. In particular, because of the complex nature of infrastructure projects, corruption, rent-seeking behavior, and other governance issues conspire to frustrate infrastructure development. Since infrastructure are long term and extremely capital intensive, with huge sunk costs and highly elastic to political considerations, private investors would naturally perceive them to be too risky and not want to be associated with the often politicized process of bidding, contract award, etc. Frequently, political considerations outweigh the economic in the execution of infrastructure projects in Africa. Roads, airports, power plants, and rail systems turn out to be white elephant projects because of political bias in favor of politicians. Projects are abandoned or discontinued because of vested interests of the party in power, while new ones with short completion time but with very marginal social benefit are executed to score political capital. With political considerations come rent-seeking as well as corruption. All these lower the quantity and quality of productive public investments. Project costs become prohibitively high with very little value for money to show, maintenance of existing projects is undermined even as projects are allowed to deteriorate so that in the process of redevelopment and renovation, more funds could be appropriated to be ultimately embezzled.

Paradoxically, the panacea to the identified constraints still lies within the domain of political economy of governments in Africa generally. A strong political will on the part of government, the political class, technocrats, bureaucrats, etc., is needed to address these issues.

4 Financial Requirements for Africa's Infrastructure

The extent of Africa's infrastructure needs and gap can be discerned by the amount of funding necessary to close the infrastructure gap, defined as the difference between supply and demand for infrastructure services. It is also conceptualized as the target level of infrastructure development and the actual level. By infrastructure deficit is meant the amount of investment needed to bridge the gap. For instance in the power sector, it is the quantum of investment required to attain global access for electricity from the actual level access (AfDB, 2018a).

The Africa Infrastructure Country Diagnostics (AICD) report of 2010 estimated that Africa's infrastructure financial requirements would gulp $93 billion each year for the next 10 years, with 75% of this budgeted for capital expenditure while the remainder would be applied to maintenance and operation requirements. Under the AICD, the following were some of the objectives underpinned by this capital outlay:

the development of additional 7,000 MW of new power generation capacity a year, completion of interregional fiber-optic backbone network and continental submarine cable loop, interconnection of border crossings, capitals, ports, and cities with qualitative road network, provision of road access to Africa's high-value agricultural land in all season, attainment of the Millennium development goals (MDGs) for water and sanitation, as well as raising household electrification rates by 10%.

However, as AfDB (2018a) avers, these estimates were "not meant to bring Africa to the path of universal access in the power sector or in the water and sanitation sectors. It was the best to reduce the gap between Africa and developed countries." For instance, in the power sector, while access rate for developed countries was about 75%, Africa was estimated to be around 40%. Indeed, for Africa generally and in all sectors, the infrastructure financing gap widened because many national governments reduced their financial commitments to infrastructure provision because of neoliberal policies adopted during the economic adjustment period of the 1980s and 1990s, espoused mainly by the Washington Consensus (Dethier, 2015). Thus, a revised estimate of the financing gap was necessary in view of widening of the gap due to long years of neglect and scaling down on infrastructure financing in Africa. According to the AfDB, Africa infrastructure needs are projected to be in the region of $130–$170 billion annually up to 2025. Table 3 depicts preliminary figures of Africa Infrastructure investment needs.

Several initiatives at the continental and global levels have been established to deal with Africa's infrastructure challenges, the most recent being the Dakar Financing Summit where, investors were not keen committing themselves to infrastructure financing despite the availability of projects. Table 4 catalogues these efforts and sadly notes that the financing phase have not been successful, hence the need to think out of the box for alternative funding sources.

5 Funding Options for Africa Infrastructure Needs

The very nature of infrastructure and its pervasive deficit across all sectors in Africa demands a radical approach away from conventional financing methods. Because infrastructure is inherently imbued with public good characteristics, the market must be sufficiently incentivized to commit funds to its development. Presently, national governments across Africa shoulder the burden of financing infrastructure. But with investment needs estimated at $130–$170 billion annually, and aggregate financial commitments at $62.5 billion as at 2016, resulting in an infrastructure financing gap of $67–$107.5 billion, it becomes apparent that national governments [though in recent years have increased infrastructure spending to between 5 and 6% of GDP (Arezki & Sy, 2016)] alone are incapable of taking on the full financial responsibility of narrowing the gap. Bearing also in mind that these figures are flow variables, it is certain that they will increase with the lapse of time (due to rapidly rising population, urbanization, and pressure on existing infrastructure), and that economic and fiscal

Table 3 Preliminary figures on investment needs ($ billions)

Infrastructure subsector	Target by 2025	Annual cost	Notes
Power	100% urban electrification. 95% rural electrification	30–50	New Deal on Energy target by 2025
Water supply and Sanitation	100% access in urban area 100% access in rural area	55–66	Water access includes: Piped water, public tap/stand post, safe wells/boreholes Sanitation access includes: Improved latrines, safe pit latrines, septic tank, sewer
Information and communication technology	Mobile universal coverage 50% of population within 25 km of a fibre backbone Fibre to home/premises Internet penetration rate (10%)	4–7	
Road and other transport sectors (air, rail, and port)	80% preservation; 20% Development	35–47	Preservation: Maintenance and rehabilitation. Development: Upgrading and new Construction
Total		130–170	Preliminary figures

Source AfDB (2018a)

constraints on the part of governments would further alienate the hope of achieving financial stability in infrastructure financing and development.

For instance, national governments allocations for infrastructure development was on the rise until 2014, but took a sharp decline in 2015 and 2016 (AfDB, 2018b). With pessimistic economic forecasts for most African countries arising basically from dwindling oil revenues and export commodity prices, narrow tax base as well as a fiscal space consumed by unsustainable recurrent expenditures, the hope of national governments committing funds for infrastructure development is further dampened. Table 5 shows current sources of infrastructure in Africa. Clearly, national governments are the main sources of infrastructure financing, followed by donor (ICA members) and thirdly by China. In particular, Chinese infrastructure investment in Africa has increased significantly to above $30 billion in 2014 from a paltry $1 billion in 2003. As it stands, financial commitments from major donors fell by $16.4 billion between 2015 and 2016. Private sector investment also fell by $4.9 billion. (AfDB, 2018a). The hope is that the private sector, which currently contributes insignificant

Table 4 Selected initiatives on Africa's infrastructure challenge

Infrastructure initiative	Sponsor	Objectives	Remarks
Programme for Infrastructure Development in Africa (PIDA)—2001	African Union	To identify and evaluate core cross-border infrastructure investments over the period 2012–2040	PIDA's infrastructure development is expected to decrease transport cost in 16 African Countries. Estimated Total cost is $360 billion
Infrastructure Consortium for Africa (ICA)—2005	The G-8	Generation of greater financial commitment from member countries and other development finance institutions	
Africa Infrastructure Country Diagnostic (AICD)—2011	World Bank	Evaluates in detail the infrastructure needs in Africa per sub-region	
Africa50 Infrastructure Fund—2013	AfDB	The mobilization of resources in support of infrastructure development	It's a development mechanism but also commercially inclined
Private Infrastructure Development Group (PIDG)—2002		Develops commercially viable projects and provision of long term finance to private sector infrastructure projects	Entities involved include partners from Europe and Australia, World Bank
Power Africa—2013	United States	Provision of electricity and mobilization of investment	
Global Infrastructure Fund (GIF)—2014	World Bank	Mechanism for identifying, preparing, and financing large complex infrastructure projects"	
African Infrastructure Development Fund (Africa 50 Fund)		To leverage and exploit co-financing from pension funds and other investors	Regional based
Infrastructure Project Preparation Fund (IPPF)	African Union		

Source Author's Survey of the Literature

Table 5 Source and trends in infrastructure finance in Africa ($billion)

Source	2012	2013	2014	2015	2016	Average
African governments	26.3	30.5	43.6	24	26.3	30.1
Donors (ICA members)	18.7	25.3	18.8	19.8	18.6	20.2
MDBs and other bilaterals	1.7	2	3.6	2.4	3.1	2.5
China	13.7	13.4	3.1	20.9	6.4	11.5
Arab countries	5.2	3.3	3.4	4.4	5.5	4.4
Private sector	9.5	8.8	2.9	7.4	2.6	6.2
Total	75.1	83.3	75.4	78.9	62.6	75.0

Source Infrastructure Consortium of Africa (2017)

amounts, would exploit the many advantages of investing in infrastructure in Africa and become a major player.

In the subsections that follow, we set forth alternative funding options besides national governments and aid. Indeed, the latter is projected not to increase in tandem with public capital spending (Mafusire et al., 2017; Redifer, 2010). It therefore becomes imperative to seek ways of broadening the sources of infrastructure finance and developing a better template of allocating scarce resources to different projects. Already middle-income African countries are better placed to attracting and securing infrastructure financing because their financial markets are relatively more developed than their low-income counterpart. Equally frustrating to potential investors is the inflexible regulatory environment that is highly restrictive and monopolistic compared to the OECD countries. In Table 6, a profile of selected infrastructure financing sources are given, while a detailed analysis of the prospects of three of these identified funding options for infrastructure—Sovereign Wealth Funds, Pension Funds, and PPPs are provided in the subsections that follow.

5.1 Sovereign Wealth Funds (SWFs)

These are investment funds owned by national governments dedicated to meet several macroeconomic objectives. It was the nation of Kuwait who blazed the trail when it established a SWF in 1953 to manage its foreign reserves. SWFs are broadly classified into two: saving funds and stabilization funds. While the latter is largely associated with nations who are excessively dependent on oil or commodity exports, with volatile revenues arising therefrom, the former is a conventional reserve fund established by most nations irrespective of the status of resource endowment. They are deployed for investment in natural resources and in infrastructure projects, though the rate of their utilization by countries remains marginal. Zoellick (2010) concludes that if "SWFs could invest only 1% of their assets in Africa, this would amount to about $420 billion over the period 2010–2020, which would broadly correspond to

Table 6 Profile of selected infrastructure financing sources

Infrastructure financing instruments	Selected case study	Drawbacks	Prospects
Infrastructure/project bonds	Kenya raised close to $370 million. Widely used with great success in Latin America	Narrow and underdeveloped financial markets in Africa	Huge prospects but precedent upon regulatory and legal reforms
Sovereign wealth funds	Libyan Arab African investment company makes $800 million worth of Investments in 13 African countries	African SWFs are small, with poor governance structure, and limited to stabilizing local economies (Triki, & Faye, 2011) Macroeconomic Risk, high volatility of returns, absence of technological knowledge, in-house expertise and risk management skills, limited size, and liquidity of African economies (Diallo et al., 2016) Disparate and dissimilar risk in relation to different kinds of infrastructure projects between countries and sectors Lack of standardization of infrastructure projects	A 1% investment of SWFs in Africa may lead to $420 billion over the period 2010–2020, corresponding to over 50% of infrastructure needs (Zoellick, 2010)
Public Private Partnership	Dakar-Diamniadio toll motorway, Senegal	Dearth of technical expertise in government bureaucracy. Lack of transparency, etc.	Success stories indicate bright future for PPPs models in Africa
Pension funds	South Africa, Cape Verde, Uganda, Mozambique, Kenya, Senegal, and Ghana have used Pension funds for infrastructure investment	African Pension Assets relatively small Dominated by Inefficient Schemes mostly in the Public Sector Governance and regulatory obstacles Dearth of appropriate financial instruments dedicated to infrastructure	With one of the youngest populations in the world, Africa's PFs can be leveraged to finance infrastructure
Domestic Sources	Govts.' main source of infrastructure Finance	Low tax mobilization rate; institutional leakages; narrow tax base, high marginal tax rate	Low prospects due to government inefficiencies

Source: Authors' Review of Literature

the missing half of required investments in infrastructure needed to meet the Millennium Development Goals (MDGs)." With about $6 trillion accumulated in assets (Arezki & Sy, 2016), SWFs could ameliorate Africa's infrastructure financing constraints at the same time allowing investors to reap from the benefits of portfolio diversification. The low interest rate in the global financial market as well as volatility in stock markets makes SWFs a compelling alternative to traditional sources of financing. Infrastructure investments can provide SWFs the safe-haven against vulnerability to inflation, characteristic of other financing sources. Indeed since most infrastructure projects are inherently monopolistic with high demand in elasticities, they are least likely to be affected by price adjustments to correct for inflation (Triki & Faye, 2011; Morgan, 2007).

The above prospects for SWFs investment in Africa notwithstanding, the continent attracts the least volume of investments arising from SWFs (Diallo, Tchana, & Zeufack, 2016). Several reasons account for this. First, Triki and Faye (2011) show that African SWFs are small and are afflicted with the menace of weak governance structures. Second, their narrow objectives of domestic economy stabilization limit their deployment into other more significant areas of need. A third, fourth, fifth, and sixth constraints identified by Diallo et al. (2016) are macroeconomic risks, volatility of returns, deficient, or outright lack of technological knowledge on the part of the bureaucracy who fashion infrastructure policy on behalf of the government, as well as the liquidity and size of African economies, respectively. Thus, for SWFs to be deployed to fund infrastructure projects in Africa, these constraints must be eliminated. In particular, a framework must be established to deal with the critical factors which influence investment of SWFs in Africa: networks, risk, and return. In their study, Diallo et al. (2016) show that the expected return rate positively and significantly influences SWFs investment in the continent. On the contrary, SWFs are averse to risk, and only a paltry 10% of SWFs' investment is channeled to infrastructure. Table 7 presents a menu of African SWFs, which lie presently prostrate but could be a potential source of infrastructure finance in the continent if the appropriate legal framework is established.

As at 2015, African SWFs was estimated to be about US$159 billion of the global aggregate of US$7.2 trillion, and this increase from US$5.38 trillion was in spite of acute drops in commodity prices and general global economic instability. Indeed, the table shows that Africa plays host to one of the most dynamic SWFs in the world, with about 19 SWFs at the end of 2014. Prior to 2010, only 10 SWFs existed in Africa, with additional 9 established in the last 9 years. Roughly 77.2% of SWF assets are domiciled in North African countries, with Libya topping the list in the continent in an estimated US$67 billion in assets (Hove, 2016).

A major highlight from Table 7 is that SWFs in Africa are primarily sourced from commodity revenues, with a significant number (14) from oil and gas. This represents close to 83% of African SWF assets, while the remaining 17% are from minerals and sundry sources. Data show, however, that in spite of the dynamic SWF environment, African SWFs score low on transparency, as measured by the Linaburg–Maduell Transparency Index. This is in stark contrast with SWFs in other regions of the world.

Table 7 Sovereign wealth funds in Africa

S/No	Country	Name of SWF	Date of establishment	Assets Under management (US$ Billion)	Source of funding
1	Libya	Libyan Investment Authority	2006	67	Oil
2	Algeria	Fonds de Regulation des Recettes	2000	56.7	Oil
3	Botswana	Pula Fund	1994	6.9	Diamonds
4	Angola	Fundo Soberano de Angola	2012	5	Oil
5	Congo Republic	Fonds de Stabilisation de Recettes Budgetaries	2005	1.64	Oil
6	Nigeria	Nigeria Sovereign Investment Authority	2012	1.4	Oil
7	Senegal	Senegal Fonsis	2012	1	Non-commodity
8	Gabon	Gabon Sovereign Wealth Fund	1998	0.4	Oil
9	Ghana	Ghana petroleum Funds	2011	0.54	Oil
10	Mauritania	National Funds for Hydrocarbon Reserves	2006	0.3	Oil and Gas
11	Equatorial Guinea	Future Funds for Generations	2002	0.08	Oil
12	Chad	Fonds de Stabilisation de Recettes Budgetaries	2006	0.03	Oil
13	Sao Tome and Prince	National Oil Account	2004	0.01	Oil
14	Sudan	Oil Revenue Stabilisation Fundnon-commodities	2008	0.2	Oil
15	Rwanda	Agaciro Development Fund	2013	0.041	Non-commodities
16	Tanzania	Natural Gas Reserve	2013		Gas
17	Kenya	Kenya Sovereign Wealth Fund	2014	0.12	Minerals
18	South Sudan	Oil Revenue Stabilization and Future Generations Fund	2013	–	Oil
19	Zimbabwe	Zimbabwe Sovereign Wealth Fund	2014	–	Minerals

Source: SWFI (2015), ESADE Geo (2015)

Several disparate objectives underpin the creation and management of African SWFs. These include domestic investment in infrastructure, wealth diversification, economic stabilization, hedge against economic shocks, as well as intergenerational savings mobilization. Thus, the amount of funds dedicated to meeting these objectives depend on the relative importance or weight of these national objectives. For instance, about US$1.1 billion of Angola's US$5 billion sovereign wealth asset is apportioned to the development of infrastructure, covering industrial development, transport and energy (ESADE, 2015; Hove, 2016). A significant portion of Libya's SWF of US$67 billion is dedicated to investment in infrastructure (LIA, 2015), while Nigeria's SWF asset of US$1 billion is apportioned among three priority areas of infrastructure (40%), stabilization fund (20%), and Future Generations Fund of 40%. Equally worth noting is that Ghana which recently discovered oil in commercial quantities established her own SWF worth over US$540 million in 2011, and further created the Infrastructure Investment Fund in 2014 for the purpose of developing critical infrastructure with partnership with the private sector. Other SWFs with strategic mandate to develop domestic infrastructure include Kenya's sovereign fund, Senegal's Fonds Souverain d'Investissements Stratégiques (FONSIS) established in 2012 as well as Rwanda's Agaciro Development Fund (AGDF) established in 2012.

Despite the above noble objectives biased in favor of using SWFs for infrastructure financing, the reality is that only 33% of African SWFs are invested in infrastructure, with many countries on the average preferring to invest their funds in fixed income assets. This is evidence of risk aversion as well as the tendency to use SWFs for stabilization purposes (Hove, 2016). Two categories of risk have been identified by Hove (2016). First, there is political risk which encompasses project cancellation, unilateral modification of contract terms, political instability, regime change, nationalization or expropriation of assets, insecurity, etc. Second, is economic risk arising from currency fluctuations in most African countries. Fluctuations in currency negatively affect project financing, especially those financed by external loans while revenues are generated in the domestic currency. There could also be volatility in commodity prices which are the primary sources of SWFs. This could in turn affect infrastructure financing, especially in the construction phase.

Apparently, the fear of risk is overblown. The truth is that there are several justifiable reasons to deploy SWFs for infrastructure financing (See Box 1).

Box 1: Justification for the use of SWFs for Infrastructure Financing

SWFs by their creation have natural long-term investment space with non-existent explicit liabilities. This is in sync with infrastructure investment which provides significant higher and inflation-protected yields in relation to other financial assets, implying lower risks and thus ideal for SWF investments Croce and Yermo (2013). Cash flows arising from infrastructure projects like airports and roads are more stable and predictable and span long investment horizon

(continued)

(continued)

Use of SWFs for infrastructure financing increases private investors' confidence of government's solvency and its ability to meet its investment obligations as they fall due
Dearth of long-term finance, low liquidity of financial markets in Africa, and acute infrastructure financing demand affords a veritable opportunity for SWFs to fill the gap
The risk adjusted returns on investment with SWFs in infrastructure can be maximized to amass resources for future generations. This is because infrastructure, once constructed, is less susceptible to economic volatility compared to other class of assets. This could be a strong incentive for investors in search for alternative diversification sources as a hedge against future economic downturns
Cost of capital from SWFs may be potentially low because of its source—from the pool of public resource. There is also a strong likelihood for the cost of capital to further decrease when SWFs are used, because they enhance the credit ratings of countries, as was witnessed in the case of Nigeria and Angola. These countries had their credit ratings raised with the establishment of their respective SWFs. And low cost of capital is a huge economic booster for investment in infrastructure projects
SWFs support the objective of economic diversification of nations because of their long term investment perspective, given their ownership structures and size. For instance, Saudi Arabia, China, and the United Arab Emirates provide strong evidence of the successful use of SWFs to support long-term economic development and diversification of their economies

Source Authors' Review of the Literature

5.2 Pension Funds

Pension funds (PFs) is poised to constitute another major source of infrastructure financing in Africa. However, discounting a few southern African countries like South Africa whose pension assets as a proportion of GDP is 87.1%, Namibia with 76.6%, and Botswana with 47.3%, and others like Nigeria (7.8%) and Kenya (18.3), pension assets as a proportion of GDP are small. This is because, in absolute terms, African pension funds are insignificant compared to the size of the economy and are mostly dominated by inefficient public sector schemes like pay-as-you-go (PAYG). Indeed, the relative small size of Nigeria's pension assets, for instance, could be compared with that of other emerging economies like India whose pension assets as a share of GDP is a paltry 0.3%. Even with reforms and assets availability, pension schemes in Africa are bedevilled with regulatory and governance obstacles, official graft, and scarcity of appropriate financial instrument. All these constrain the capacity of pension funds to be deployed for infrastructure financing.

In advocating for the use of pension funds for financing infrastructure in Africa, we note that PFs in the Organization for Economic Cooperation and Development (OECD) countries are by far larger than those in Africa, recording a significant asset base of over 36.6% of GDP (Sy, 2017). Even as at 2013, PFs in the United Kingdom, Australia, Switzerland, Iceland, and the Netherlands exceeded 100% of their GDP. In aggregate, PFs in OECD countries held US$10.4 trillion in assets

compared to US$380 billion of 10 African countries PFs assets under management. Their robustness notwithstanding, a very small proportion of OECD pension funds is allocated to infrastructure projects, preferring rather to dedicate a substantial share of their assets to long-term liquid instruments in the form of bonds and stocks in order to meet their future obligations and liabilities. Specifically, OECD PFs invest more than 50% of their assets in cash and fixed income and close to one-third in listed equity, while the rest are devoted to alternative investments including hedge funds, unlisted infrastructure, real estate, and private equity. Sy (2017) notes that, on the average, the direct investment of OECD countries in infrastructure has been stable over time at only about 1% of their aggregate pension assets. As at 2013, this amounted to US$80 billion for 70 funds, with US$7.8 trillion of assets. There are however isolated instances where individual PFs directly invest in infrastructure, with commitments rising to over 20% of total PF assets.

But the tide is indeed changing in favor of increased allocation of PF assets directly to infrastructure in the OECD countries and in Africa, thanks to reforms and adjustments made by investment managers in regards to fees and other conditions precedent for investing in unlisted infrastructure. Prohibitive costs and other stringent conditions were seen as huge disincentives to investments in Greenfield projects. Reforms have also been undertaken in enhancing capacity and expertise of the bureaucracy in negotiating on these projects.

The use of PFs assets for infrastructure purposes is gradually gaining momentum because, like SWFs, they have long-term investment perspective coupled with their devotion to the development of the domestic economy. The OECD (2013) documents that 33 PFs in emerging and developed markets committed an average of 3.0% of their capital in unlisted infrastructure, with the South African PF investing about 1.2% of aggregate assets in roads and power sector infrastructure projects. While there is considerable difficulty in obtaining data on the actual proportion of African PFs investment in infrastructure, Stewart and Yermo (2009) submit (without any specific figures) that PFs in a few African countries like Swaziland, Uganda, Tanzania, Cape Verde, South Africa, and Kenya are investing in infrastructure. To overcome this difficulty of gaining a fair and direct estimate of the involvement of African PFs in infrastructure development, Sy (2017) uses a simple simulation to evaluate the prospects and possibility of PFs in Africa to commit their resources to infrastructure financing. Table 8 presents a summary of these simulations. Using South African PF as a baseline, the simulations show two extreme scenarios of pessimism and optimism as well as the mean potential of PFs investments in infrastructure.

In the pessimistic case, African PFs, discounting South Africa, is projected to invest an aggregate of $380 million in infrastructure and a paltry $58 million each year. Conversely, the optimistic scenario shows that African PFs would devote an aggregate sum of $77 billion per annum, discounting South Africa. Indeed, there are significant divergences in the present and potential investment of African PFs in infrastructure. This disparity may be partly due to differences in the nature of pension schemes in each country. In particular, countries with pay-as-you-go pension programs have strong propensity to investing in fluid investments like fixed deposits as against "illiquid investments in infrastructure such as unlisted equity" (Sy, 2017).

Table 8 African pension funds and potential assets available for infrastructure

Country	Total assets (US$ million)	Baseline (South Africa)	Pessimistic	Optimistic	Average
Botswana	6,000	72	6	1,218	318
Ghana	2,600	31	3	528	138
Kenya	7,280	87	7	1,478	386
Namibia	9,960	120	10	2,022	528
Nigeria	25,000	300	25	5,075	1,327
Rwanda	482	6	0	98	26
South Africa	322,000	3,864	322	65,366	17,086
Tanzania	3,100	37	3	629	164
Uganda	1,500	18	2	305	80
Zambia	1,800	22	2	365	96
Total	379,722	4,557	380	77,084	20,148
Total ex-South Africa	57,722	693	58	11,718	3,063

Source Sy (2017)

Dreams are not always real; potentials do not always translate to reality, i.e., real investments in infrastructure. This is aptly typified in Nigeria's PFs which have not invested in infrastructure even with the enactment of the Pension Reform Act since 2014. Its pension funds environment has been bedevilled with policy summersault, corruption, and the lack of infrastructure projects that are bankable and adequately structured (OECD, 2014). Equally inhibiting African PFs is the dearth of appropriate mechanisms for investing in infrastructure. It must be noted that PFs can only invest in infrastructure if there are assets within the pension system. Availability of assets itself is a function of several factors: design, performance, and the pension system environment. Box 2 presents a menu of obstacles to PFs investment in infrastructure.

Box 2: Obstacles to investment of Pension Funds in infrastructure

Low level of pension coverage in Africa, due largely to the existence of a large informal sector. For instance in SSA, only 8.4% of the labour force contributes to pension insurance, relative to 47.4% in North Africa
Palpable risk of infrastructure projects vis-à-vis the need to meet pension funds' long-term obligations to retirees
Lack of a clear, transparent and predictable policy, governance and regulatory framework to invest in infrastructure assets
Lack and inadequacy of appropriate capital and financial market instruments to execute investment decisions

Source Authors' Survey of the literature

Overcoming these obstacles is the key to an effective utilization of PFs assets for infrastructure development. Thus, investment of PFs in infrastructure could take one of the following options: (1) through debt financing, by lending to operators or owners of infrastructure via general obligation bonds or project bonds; (2) via direct investment in the equity of a project company or a portfolio of infrastructure assets with potential for diversification across sectors and regions; (3) by investing in infrastructure funds of publicly quoted equity instruments on a stock exchange, and finally by investing in listed infrastructure companies through their equities.

It is in light of the potential benefits of using both SWFs and PFs for infrastructure development purposes that Arezki and Sy (2016) propose a mix of financing options basically between conventional development banking and long-term investment, i.e., between informed versus arm's length debt. Their proposal for this hybrid but healthy mix of infrastructure finance is borne out of apparent differences in the preferences of investors. Greenfield infrastructure projects are naturally risky, especially in their first phase which embodies the elements of conception, planning, and development. They therefore produce less incentive to institutional investors like PFs and SWFs whose existential objective is to preserve wealth.[1] However the second phase, which comprises elements of operation and maintenance, is less risky, with potential incentives for institutional investors. Consequently, Arezki and Sy (2016) argue that since development banks possess the expertise and flexibility, they should be propped to finance the riskier phase of infrastructure projects. Subsequently, in the second phase, as these investments mature into brownfield projects that are characteristically less risky, this burden can be offloaded to long-term institutional investors like SWFs and PFs. Institutional investors would be induced to take up this burden because in the second stage, these projects would have begun to generate cash flows. A caveat, however, is that adequate investment tools must be available. Equally relevant is a reforming of Africa's legal and regulatory framework.

A benefiting corollary of a reformed institutional, legal and regulatory environment in Africa would be a strong evolution of an African infrastructure bond market. Already, there are encouraging signs of growth in domestic bond markets in the continent (IMF, 2015), propelled largely by improved institutions and fiscal prudence on the part of national governments (Mu et. al., 2013). Indeed, the issuance of debt in West African Economic and Monetary Union (WAEMU) has grown because of the rapid growth in Treasury bills, promoted mainly by the scaling down or outright termination of central banks' financing role of governments and sustained by surplus liquidity within the banking system (Sy, 2010). Indeed, African countries can learn from Latin American countries who have greatly utilized their Project Bond market to develop infrastructure. For instance, between 2010 and 2017, the Latin American Project Bond market dominated by Brazil, Chile, Peru, and Mexico has accounted for over $50 billion in issuance and representing close to 16% of global capacity (Credit Agricole, 2018).

[1] It must be recalled, that PFs, even in OECD countries are averse to investing in unlisted equities and infrastructure; their investment preference is in long term liquid instruments.

5.3 Public–Private Partnerships (PPPs)

Another significant benefit to be derived in the proposed regulatory and legal reforms in Africa in relation to infrastructure financing would be in the area of PPP. PPPs are tools of procurement that involves four phases of design, finance, construction, and operation. They are cost-effective because it is structured in such a way as to transfer risk and ensure performance and profitability, especially in the operation stage. Its twin advantages of funding and efficiency makes it an attractive alternative model for infrastructure development. However, despite the symbiotic benefits to be derived by both the private sector and governments in adopting the PPP model, the market for PPPs in sub-Saharan Africa still remains narrow. Only a few countries have embraced this model: Uganda, Kenya, Nigeria, and South Africa. These countries constitute 48% of the 335 PPP projects in Africa in the last 25 years. Even at that, the involvement of the PPP model in infrastructure financing is uneven across sectors, with the greatest concentration of 48% in the energy sector (mostly renewable energy); water and transportation, 0.5%, while transportation is 22%.

The success rate of the PPP model in Africa and other developing regions is unclear, giving rise to doubts and lack of enthusiasm on the part of national governments. For instance, the International Finance Corporation (IFC) evaluation of PPPs suggests a significant improvement in access to social services and infrastructure between 2002 and 2012. However, this assessment is with a caveat that "the extent to which PPPs benefited the poor cannot be assessed in a systemic manner, as large data gaps exist".[2] This lack of solid evidence coupled with the fact that several African countries are still in the embryonic stage of establishing PPPs models frustrates an objective assessment of the effectiveness of using PPP models for infrastructure development in Africa.

Besides, there are social concerns in Africa about accessibility and affordability of social services developed with the PPP model. Entrenched and widespread inequality and poverty on the continent may frustrate the ability of Africans to have any advantage accruing from this financing framework, because while infrastructure and its accompanying services may be made accessible via the PPP model, they might not translate to affordability. Yet access to and enjoyment of transportation services, education, clean water and sanitation, medical care, etc. for instance, are seen as human rights that enhance the dignity and development of the individual. Thus, the PPP model may provide accessibility to social services, but may not guarantee affordability because private investors must have a fair return on their investments. And this can only be guaranteed if social services are priced within the market framework.

A third criticism of PPPs is the inadequacy of transparency of PPPs. This lack of transparency may translate to limited public participation and scrutiny, which is why the OECD advocates the need for PPPs to engage widely with end-users and stakeholders of projects. Equally constraining for PPPs is that contracts need to be carefully drafted to ensure that operator cannot avoid obligations nor benefit

[2]World Bank Group: World Bank Group Support to Public-Private Partnerships: Lessons from experiences in client countries, FY02-12, p. 68.

excessively from the agreement. This calls for expertise on the part of government agency charged with monitoring. These criticisms notwithstanding, there is a birthing of infrastructure revolution through the instrumentality of PPPs. The Bangladeshi and Pakistani PPP models suggest that PPPs can be successful in both accessibility and affordability criteria if they a structured to start small with the capacity for enlargement as lessons are learnt along the way. Equally, PPPs could be structured in such a way that the government bears higher risk initially, with the private sector assuming greater role in the next phase. These may serve as encouraging signs that with the proper legal and institutional environment, PPPs can work.

This optimism is concretized when it is realized that between 2004 and 2017, about 30 countries in Africa enacted PPP laws. The tally rises when those countries who have actually implemented PPP policies are included, meaning that less than 10 countries in the continent are absolutely bereft of any PPP framework. This, however, has not actually translated into PPP projects across the continent. Available data from the World Bank's Private Participation in Infrastructure Database show that only 14 PPP projects in Africa have reached the stage of financial closure. This represents over $8 billion since 2013, and indicates a far cry from the 400 infrastructure projects proposed by the PIDA[3] (Vallee, 2018).

Challenges exist in the actual implementation of PPP models despite the adoption of enabling laws in most sub-Saharan African countries. These include absence of expertise on the part of contracting parties, weak intergovernmental synergy, undue priority and preference of private commercial interests over the social interests, absence of knowledge concerning best practices, as well as influences and pressures from external domains to conclude transactions. Other teething challenges includes.

6 Concluding Remarks and Recommendations

From an estimated funding gap of $93 billion a year up to 2020, Africa's infrastructure financing gap was further revised to $130–$170 billion annually. The PIDA Priority Action Plan projects were estimated to gulp $68 billion and an estimated $300 billion for other projects up to 2040. Given the rate of urbanization due to population growth, migration, and other demographic factors, these estimates would likely increase as pressures are put on existing infrastructure with marginal or zero net investments in infrastructure. While several initiatives have been established to frontally deal with the continent's infrastructure deficit, generally regarded as a significant factor retarding Africa's economic growth and development, these initiatives leaves much to be desired in terms of actual implementation, the latter being a function of finance. Efforts by the AfDB to raise capital for infrastructure have not been fruitful compared to the menu of programs and mechanisms so far established. Resort to conventional financing methods has proven unsustainable. The crucial question

[3]Maude Vallee: PPP laws in Africa: Confusing or Clarifying?

then is: from which pool of financial resources can African national governments draw to fund infrastructure projects?

This paper catalogues a number of infrastructure financing options open to Africa, besides the conventional annual budgetary allocations due from taxes and other income sources. With the narrowing of the fiscal space due to the need to maintain fiscal balance, debt overhang, volatility in commodity prices, and income which constitute a considerable portion of the GDP of most countries in sub-Saharan Africa, as well as other macroeconomic constraints, we emphasized the imperatives of looking elsewhere for infrastructure funding. Several funding sources were identified from the literature. Data from countries who have actually begun implementing these options show that there are prospects for infrastructure development if applied in a large continental scale. We gave some detailed traction of SWFs, PFs, and PPPs, identifying their potentials and challenges.

In general terms we note that because of the cross border nature of infrastructure, most of which straddles and traverses many countries within the many sub-regions of the continent, there is the need for the regionalization of infrastructure in Africa. This need is further buttressed by the reality of the smallness of many of the 54 countries of Africa, most of which have populations of less than 20 million and aggregate GDP of less than $10 billion. This unfortunate economic geography mandates a regional integrated approach to infrastructure provision. Several advantages are likely to accrue from this approach. First, there is the possibility of creating vast, competitive markets to replace the current assemblage of isolated, inefficient and small ones. Second, it could serve as a panacea to the challenge of scale diseconomies and adverse selection. Third, a shared collective burden of infrastructure provision on a regional level would have salutary effects on intra African trade. This is because the woeful infrastructure deficiencies on the continent frustrates integration objectives and saps national resources. Finally, regional efforts at infrastructure financing might advance and exploit synergies across sectors.

Our recommendations, in the first instance, address all the recommended funding options; in the second, we particularize to address specific financing alternatives.

a. The domestic financial and capital markets instruments for investment in infrastructure need to be developed. Pension assets, SWFs, and even PPPs can only be fully deployed in the financing of infrastructure if there are adequate domestic financial instruments in the capital market to act as vehicles for infrastructure investments. This will require capital market reforms to ensure transparency, liquidity, and unrestricted information to attract institutional investors to make informed decisions on available infrastructure investments. Reforms in the infrastructure sector might be necessary to relax existing identified constraints regarding infrastructure financing.
b. There is an urgent need to strengthen institutional capacities across Africa. This would inevitably translate to transparency, property rights protection, zero tolerance to corruption, good governance, ease of doing business, and the shoring up of private investors' confidence in the government.

c. Equally important is the need for regulatory, legal and institutional reforms in most of the sectors to allow institutional investors to take up the challenge of infrastructure financing. Weak and ineffective institutions have constituted a considerable challenge to the development of infrastructure in Africa. For instance, pension funds administration in Nigeria has been subjected to institutional sleaze. Similarly, the privatization of the power sector and its aftermath has left a sour taste of inefficiency that continue to frustrate economic growth, while the management of Nigeria's Excess Crude Account (ECA) is steeped in opaqueness as there is presently no law governing its management.

In particular, we recommend the following in respect of these alternative funding sources.

Pension Funds

a. Strengthening Pension Funds management: There is need to strengthen the capacity of trustees of pension funds and managers to be able to carry out their fiduciary responsibilities. Improvement of internal expertise of pension fund managers to evaluate the risk and benefits inherent in any infrastructure financing instruments will ensure a delicate balancing of the long term objectives of the fund as well as the social benefits of infrastructure development. There is need for pension funds to critically evaluate the governance, environmental, and social issues prior to undertaking any infrastructure project.
b. Improving the macroeconomic environment: African governments and their policymakers might need to initiate and implement policies to strengthen the pension fund environment. Because of a large informal sector, many workers are not captured under the formal pension system, thus effectively denying the mobilization of funds into the pension scheme. Monetary policies might help address the volatility in price levels and interest rates that complicates the management of pension funds. Policies should be aimed at increasing formal employment so as to enhance the performance of the pension system. Relevant fiscal policy should be initiated to curb pension systems that are unsustainable. These would help free up financial resources for deployment into infrastructure development and other purposes.

Sovereign Wealth Funds

Generally, we had established that SWFs in Africa are small with objectives limited to economic stabilization. They are also bedevilled with weak governance structures, and therefore not likely to play any significant role in long term institutional investments such as infrastructure development. But there exist best practices even in other developing regions where SWFs are helping in long term economic development. To help in infrastructure financing:

a. There is need for national governments to clarify the responsibilities, objectives and roles of their SWFs, by ensuring that investment strategies (including infrastructure investments) are in sync with their basis objectives. A recourse could be made to the fiscal transparency and reserve management guidelines developed by the IMF.

b. Governments might consider establishing limits on the contribution of SWFs to fiscal deficits. Thus a proportion of SWFs can be devoted as permanent endowment to the financing and development of infrastructure and other long-term illiquid investments.
c. There is need to enthrone strong governance and institutional structures in the management of SWFs to guarantee transparency and accountability. Policies of national governments should be targeted at enhancing investors' confidence and protection. By showcasing successfully completed infrastructure projects, a good reference point can be created with the advantage of erasing the negative perception of Africa as an unfriendly destination for investment.
d. In order to attract foreign SWFs into Africa, national governments might need to relax regulations in some sectors that need private capital inflow for investments. A delicate balance needs to be struck between protecting domestic interests and providing a regulatory mechanism to attract SWFs into investing in infrastructure in strategic sectors of the economy.
e. The general structural objective of most African SWFs is that of macroeconomic stabilization, with little or no emphasis on infrastructure development. There is need therefore for SWFs in Africa to go beyond cyclical and stabilization functions to a more robust role of infrastructure financing and intergenerational resource transfer.

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Financial Sector Development and Economic Growth: The Case of ECOWAS Countries

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Abstract This paper empirically investigates the change in the relationship between economic growth and financial development as ECOWAS economies grow over the period 1991–2017. The methodology of analysis is the quantile regression, which allows determining the impact of financial development at different levels of economic growth. Financial development is measured by private sector credit to GDP and liquid liabilities to GDP. The results indicate that financial development plays a positive and significant role in economic growth process regardless of the level of economic development. The size of the impact of financial development depends on its measure as well as the specification of the model. Our findings also indicate that the impact of finance increases with the level of economic growth between the 10th and the 90th percentile. Moreover, when country fixed effects are taken into consideration, the impact of finance rises significantly at the lowest percentiles of economic development, while it remains relatively stable at medium and high levels of economic development. Finally, the findings point out the absence of linearity in the linkage between finance and economic growth.

Keywords Financial development · Growth · Quantile regression

JEL Classifications G21 · O4 · C11

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1 Introduction

The financial sector development and economic growth nexus has received considerable attention in the economic literature since the late 1960s (Goldsmith 1969, McKinnon 1973, Shaw 1973, etc.). At the theoretical level, models based on the theory of endogenous growth have highlighted a positive link between the two variables due essentially to the intermediary role played by financial sector. In fact, financial sector fosters economic growth by accumulating more capital and increasing total factor productivity as it reduces information asymmetries, facilitates trade, investments and diversification of risk, eases the mobilization and pooling of savings (Levine, 1997). At the empirical level, there are numerous researches that support the positive relationship between financial development and economic growth, among them, De Gregorio and Guidotti (1995), Deidda and Fattouh (2002), Rioja and Valev (2004), who empirically found that financial development has a positive impact on growth. In addition, they argued that the impact is significant in intermediate and high financial development regions, but insignificant in low financial development countries.

While most theoretical and empirical studies support the important role of financial development in the growth process, other researches have nuanced the presence of positive links between financial development and long-term economic growth during the last decades (Cecchetti and Kharroubi, 2012; Arcand et al., 2012). These researches highlight the existence of a threshold beyond which, financial development becomes harmful for economic growth. They conclude that the impact of financial development to long-term growth depends on the level of financial development.

Hence, there have been vital debates on whether financial development has a positive impact on growth and the existence of a threshold beyond which, financial development becomes a drag for economic growth. However, one point arisen from recent literatures on the impact of finance on growth is the evolving role of the financial sector to economic growth. Up to now, empirical research, has been largely unsuccessful at clarifying this evolving role of financial sector during the process of economic development (Demirguc-Kunt et al., 2011). Demirguc-Kunt et al. (2011) found that as countries grow, the economic development becomes less sensitive to changes in bank development. In other words, as economies develop, the marginal increase in economic activity associated with an increase in bank development falls.

This paper builds on Demirguc-Kunt et al. (2011) to shed light on the evolving role of the financial sector development on economic growth in 13 countries of the Economic Community Organization of West African States (ECOWAS).[1] The study empirically assesses the change in the relationship between economic growth and

[1]The 13 countries of ECOWAS are: Benin, Burkina-Faso, Cote d'Ivoire, Gambia Rep., Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. Liberia is excluded from the sample for lack of data. Mauritania and Cabo-Verde are also excluded for lack of data and for their exclusion in the ECOWAS' future monetary area.

financial development as economies grow. The focus will be on banks only as they dominate the financial sector in ECOWAS.

The choice of ECOWAS countries is not fortuitous in the sense that banking sector is expected to play an important role in their regional integration as it facilitates trade, investments and infrastructure financing. However, there is not a clear-cut evidence on the role of banks in the economic development, especially in this region.

The findings of this paper can be useful to policymakers. If it is empirically proven that the more an economy grows, the less sensitive it is to bank development, policymakers would have additional evidence on the importance of diversifying the financial structure by, for instance, developing securities markets in ECOWAS countries. Indeed, as mentioned in Demirguc-Kunt et al., (2011), as economies grow, the demand for the services provided by securities markets relative to those provided by banks increases.

The rest of this paper is organized as follows: Sect. 2 provides a theoretical literature review and a selective main empirical finding regarding the financial development–economic growth nexus; Sect. 3 outlines the methodology and describes the data; Sect. 4 discusses the empirical findings on the role of banks in the economic growth process; and Sect. 5 provides conclusions and policy implications.

2 Literature Review

In this section, we present both theoretical and empirical literatures.

2.1 Theoretical Literature

As mentioned above, finance and real activity nexus have been a long-debated issue in the literature. The role of finance in promoting economic growth, in a theoretical perspective, has been initially developed by Pagano (1993) who identified two channels through which finance affects growth: total factor productivity (TFP) accumulation and improvement of productive factors. Financial intermediation, thus, is seen to play a crucial role in fuelling resources to real activity resulting to a well-functioning supply side through the accumulation of more capital and an improved technological innovation (Levine, 1997). This impact can be explained by three (3) mechanisms (Montiel, 1996):

i. financial intermediaries allocate the more efficient funds among competing investment projects (including to lumpy, illiquid, high-return projects) resulting to a greater capital productivity and ultimately a greater TFP;
ii. the smaller the cost of intermediation, the greater is the amount of investment corresponding to a given amount of saving (as savers and investors jointly have to bear the costs of intermediation);

iii. the greater the return of investment, the lower the cost of intermediation. Hence, the greater the net return to saving, and thus there is a greater is incentive to save.

In order to theoretically illustrate this mechanism, we follow Montiel (1996) who developed a simple endogenous growth model which takes into account a role for the allocative functions of the financial system as well as the resources absorbed in the process of financial intermediation.

The model assumes that aggregate output is produced using two (2) types of capital, namely K_1 and K_2, under conditions of constant returns to scale. Thus, the aggregate production function, Y, can be written as follows:

$$Y = F(K_1, K_2) \tag{1}$$

With the total capital available (K) to the economy corresponding to:

$$K = K_1 + K_2 \tag{2}$$

And the change in capital each period equivalent to the amount of investment (I).

$$\Delta K = I \tag{3}$$

which is equal to effective saving (the portion of aggregate saving not absorbed by the process of financial intermediation). This aggregate saving is proportional to the level of output:

$$I = \sigma s Y \tag{4}$$

With $(1 - \sigma)$ corresponding to the cost of financial intermediation per unit of saving or the resources absorbed in producing intermediation services such as spreads between borrowing and lending rates, commissions, etc.

By choosing: $\theta = K_1/K_2$, Eq. (1) can be written as follow:

$$Y = F(\theta, 1)K_2 = F(\theta, 1)K/(1 + \theta) = A(\theta)K \tag{5}$$

With $A(\theta) = F(\theta, 1)K/(1 + \theta)$

With A being the productivity of the capital stock.

Then the change in Y over time (ΔY) will be given by:

$$\Delta Y = A(\theta)\Delta K = A(\theta)\sigma s Y$$

And finally, the growth equation obtained as:

$$\Delta Y/Y = A(\theta)\sigma s. \tag{6}$$

Equation (6) explains how financial development can affect economic growth through its impact on (i) the productivity of the capital stock A., (ii) the efficiency of financial intermediation σ and (iii) the rate of saving s, as follows:

- Through improving A, as financial intermediates would be ae to identify the marginal product of capital in alternative uses and channel funds by giving priority to high productive projects. Financial institutions would be able to do so given that they have large portfolios and information in their possession. Hence, they are able to share risks as well as selecting the most appropriate technology that enhances productivity and ultimately fter economic growth (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991).
- Through increasing σ, by operating more efficiently. This chael refers to the ability of financial institutions to improve the portion of saving directed to investment. In other words, $(1 - \sigma)$ which corresponds to the resources absorbed in producing intermediation services constitutes an inefficiency of the market (Pagano, 1993). This inefficiency is significantly reduced over time with the development of financial markets which are accompanied by a reduction of liquidity risks (Bencivenga and Smith, 1991), transactions costs, enforcement and easing information (Levine, 2004), thus increasing the fraction that is directed to investment and growth.
- Through rising s given that high return on investment and more efficient intermediation would positively affect saving rate. Another canal through which the saving rate would be improved is via the risks sharing channel as financial institutions allow savers to share risks with them during the process of intermediation. The saving rate channel would work, however, only under perfect capital markets as during financial repression and imperfect competition banks and other financial institutions would reduce the interest rate paid to savers, thus lowering the saving rate (Pagano, 1993).

2.2 Empirical Literature

Despite the fact that there are different views on the positive nexus between banks (more generally finance) and economic growth in the theoretical literature, the empirical literature remains debated as there is not a strict consensus, empirically, regarding the nature of the relationship. Among the divergences, the direction of the relationship is still debated, whether it is finance that causes growth or the reverse, or even if there exists a bidirectional relationship between finance and growth (Levine, 1997). More precisely, some findings (*supply-leading* view) argue that a better well-functioning financial system promotes economic growths through mobilizing saving and expending liquidity to growth inducing sectors (Moore, 1986; Levine et al., 1997); while other studies (*demand-leading* proponents) claim that it is rather real economy growth that results in rising for financial services demand and thus financial

depth (Demetriades and Hussein, 1996; Darrat, 1999). Finally, others observed a bidirectional linkage between finance and growth (Greenwood and Smith, 1997) while an absence of significant relationship was concluded in some literature (Williams, 2018; Chandavarkar, 1992) casting doubt the role of finance on economic growth.

On the other hand, on the role of financial development on economic growth, a growing body from the empirical literature has been focusing the debate mostly on the existence of linear relationship (or otherwise) between finance and growth (Levine, 2011). In other words, empirical literature argues that financial development, measured by change in bank's size, has a positive effect on economic growth but up to a certain level of economic development, beyond which it has a less impact in economic growth (Demirguc-Kunt, Feyen, and Levine, 2011; Cecchetti and Kharroubi, 2012) or even a negative impact (Arcand et al., 2012). Demirguc-Kunt et al., 2011, using quantile regression for a sample of 72 countries for the period 1980–2008, conclude that economic development becomes less sensitive to change in bank development, unlike securities market development, as services provided by banks rise less that those provided by securities market over time. The same evidence has been found by Gambacorta and Yang (2014) using a panel of 41 countries for the period 1989–2011 as results indicate an absence of a linear relationship between financial development, measured by bank credit to GDP, and economic growth beyond a threshold of 40% of credit to GDP ratio. The authors conclude that banks development have a significant impact on economic development for countries at their early stage of development such as low-income countries unlike advanced economies that could rely more on other financial markets such as securities markets. Their results are consistent with Laeven et al. (2013) who find that financial innovation boosts the rate of economic growth for a poor country more than an advanced economy. On the other hand, other studies indicate that finance affects growth positively up to a certain level beyond which it became harmful for growth as it might be source of economic booms and asset price bubbles followed by economic and financial volatility and crisis (Gambacorta and Yang, 2014; Arcand et al., 2012; Allen et al., 2014). The threshold limiting the positive impact of finance on growth also varies largely across findings as for instance Gambacorta and Yang, (2014) reported that bank credit to GDP exceeding 40% has a negative impact on growth while Arcand et al. (2012) argues that bank credit to GDP above 80–100% is harmful for growth.

In Africa, Mathenge and Nikolaidou (2018), using a dynamic panel method, analyses the impact of financial structure on economic growth over the period 1980–2014 for 14 African countries, and finds that financial depth, measured by banks credit to GDP ratio, does not matter to long-run economic growth in the region, regardless the level of financial development of countries. Their conclusion is consistent with the one obtained by Demetriades and James (2011) who analysed the role of finance on economic growth for 18 Southern Saharan African (SSA) countries using non-stationary panel techniques. They findings indicate that financial development, proxy bank credit to GDP and liquid liabilities to GDP, have no impact on long run growth in SSA.

On the other hand, other papers find that finance matters for growth in Africa. For instance, Ibrahim and Alagidede (2018), using the system of generalized methods of

moments (GMM) for the period 1980–2014, conclude a significant role of finance, proxied by credit provided by financial sector to GDP, for economic growth for 29 SSA. The paper further illustrates a non-linear relationship between finance and growth with a threshold of 29% of credit to GDP beyond which finance becomes harmful for growth.

In West Africa, several studies find a significant role of financial development, measured by credit to private sector and liquid liabilities, in economic growth in ECOWAS (Abubakar et al., 2014; Esso, 2010) while other obtain similar conclusion for the WAEMU (Agbélénko and Kibet, 2015; Afawubo and Fromentin, 2013; Aka, 2010). As regarding the WAMZ, Diallo and Mendy (2017), using a Heterogeneous Panel Data Approach from 1990 to 2015, conclude that liquid liabilities exerts long-run positive impact on economic growth in the WAMZ, while credit to private sector does also affect economic growth but not in the long run.

On individual countries within the sub-region, several studies on finance and growth nexus have been conducted mostly in Nigeria and Ghana with divergent findings. Some papers conclude on the existence of significant impact of finance on growth in Nigeria (Osuji, 2015; Yakubu and Affoi, 2013; Okechukwu and Agu, 2009) and in Ghana (Abebrese et al., 2017; Adu et al., 2013), as well as in Sierra Leone (Kargbo and Adamu, 2009). Others studies show that it is rather growth that promotes finance in Nigeria (Emecheta and Ibe, 2014) or even an absence of any significant nexus between finance and growth in Nigeria (Okereke, 2009) while finance is found undermining growth in Ghana (Mickel and Nkrumah, 2013). Ayinde and Yinusa (2016), using the quantile regression technique for the period 1980–2013, find a positive impact of financial deepening on inclusive growth irrespective of the quantile, and up to a threshold level of 90th percentile in Nigeria, when financial deepening is measured by ratio of credit to GDP and ratio of money supply to GDP, respectively.

3 Data and Methodology

3.1 Data and Descriptive Statistics

In the empirical literature, various indicators of banking sector development are used as financial indicators, namely, private credit, domestic credit and liquid liabilities. These banking sector development indicators are used since bank credits are the major sources of finances for the majority of the developing countries in the sample.

In this paper, we make use of the private sector credit and liquid liabilities, both expressed as a share of GDP, to measure banking sector development. The private credit is the credits issued to the private sector while liquid liabilities measure the ability of banks to mobilize funds or the size of the banking system relative to the economy.

As in several empirical studies (Demirguc et al., 2000; King and Levine, 1993; Cecchetti and Kharroubi, 2012, etc.), we use real GDP per capita as a measure of economic activity. We take the logarithmic of real GDP per capita (lgdppc). Other factors affecting economic growth are used in order to assess the independent relationship between finance and economic growth. These factors include: inflation (inf), general government consumption to GDP (gexp_g), investment to GDP (inv_g), exports of goods and services to GDP (exp_g), population growth rates (pop_gr), openness to trade (open). We also include dummy variables for the years of the analysis. However, due to the unavailability of time series data on human capital for the countries of the sample, this variable is not included in this study.

The datasets are annual and collected from World Development Indicators (WDI), World Bank Financial Development and Structure Database and International Financial Statistics (IFS). Some data are completed from national sources. Finally, the dataset consists of 13 countries in ECOWAS over the period 1991–2017. We limit to this time period due to the availability of time series data on all the variables used in this study.

Table 1 provides a summary statistics for the variables of the study. For succinctness reason, we limit the comments to three key variables, namely log of real GDP per capita, private credit and liquid liabilities. In ECOWAS zone, over the sample period of 1991–2017, the average of private credit was 12.60% of GDP with a standard deviation of 7.57%. Over the same period, the mean value of liquid liabilities was 22.80% of GDP with a standard deviation of 10.52%.

Table 1 Descriptive statistic

			Percentile					
Variable	Unit of Measurement	Mean	10	50	90	Std. Dev.	Min	Max
lgdppc	Log of real GDP per capita (constant 2010 USD)	6.54	5.87	6.42	7.23	0.51	5.61	7.85
cps_g	% of GDP	12.60	3.86	12.12	22.81	7.57	0.40	41.40
liquid_g	% of GDP	22.80	9.93	21.94	38.15	10.52	2.29	57.89
inf	%	8.63	−0.71	4.25	21.19	14.36	−7.90	115.38
gexp_g	% of GDP	12.47	7.12	12.57	17.51	4.63	0.91	26.06
open	% of GDP	59.23	38.26	56.74	83.69	18.41	20.72	146.77
exp_g	% of GDP	24.84	13.95	23.78	38.18	9.28	4.90	53.82
inv_g	% of GDP	19.66	9.16	20.10	28.57	8.84	−2.42	73.78
pop_gr	%	2.78	2.16	2.73	3.56	0.72	−0.55	6.03

Source Authors' calculations
N = 13 cross-countries. T = 1991–2017

However, there is cross-country variation in these financial development indicators. For example, private credit to GDP was averaged less than 10% of GDP in Gambia, Guinea, Guinea-Bissau, Niger and Sierra Leone while it averaged over 15% of GDP in Burkina Faso, Côte d'Ivoire, Mali, Senegal and Togo. As for liquid liabilities, the mean value was less than 15% of GDP in Guinea, Nigeria and Sierra Leone while it was more than 30% of GDP in Gambia, Senegal and Togo.

Unlike financial development indicators, there are few cross-country variations in log of real GDP per capita in ECOWAS. In average, over the period 1991–2017, log of real GDP per capita across ECOWAS was 6.54 with a standard deviation of 0.51 for the entire zone. The lower mean value of log of real GDP per capita is 5.85 in Niger, while the higher mean value is 7.50 in Nigeria.

Table 2 displays correlations among variables. It shows a positive correlation between economic activity and financial development indicators. Log of real GDP per capita is indeed positively correlated with private credit to GDP and liquid liabilities to GDP. This result suggests that economies grow with financial sector. Except inflation, log of real GDP per capita is significantly correlated with most of the control variables.

We also plot a simple histogram in graph 1 constructed from our dataset. We compute the average private credit to GDP and liquid liabilities to GDP conditional on the quartiles of the log of real GDP per capita. As shown in graph 1, private credit to GDP increases from the first to the fourth log of real GDP per capita quartile, meaning that as economies grow, private credit to GDP tends to grow as well. The result is significantly different when we use liquid liabilities as financial indicator. In fact, Chart 1 shows that liquid liabilities to GDP increases from the first to the second log of real GDP per capita quartile, before declining in the third quartile and increasing again in the four quartile but at a level almost equal to the level in the second quartile.

These results suggest that the demand of financial services, mainly provided by banks in ECOWAS, increases as economies grow.

3.2 Methodology

To assess the change in the relationship between economic growth and financial sector as economies develop, we estimate a growth equation using a panel dataset consisting of 13 ECOWAS countries over the period 1991–2017. Our empirical model builds on the linear growth model used in Cecchetti and Kharroubi (2012) to investigate the relationship between financial sector and economic growth. The model is specified as follows:

$$lgdppc_{it} = \beta * fin_{it} + \delta * X_{it} + \varepsilon_{it}$$

where $lgdppc_{it}$ is the log of real GDP, fin_{it} is the country's level of financial sector development, X_{it} is the vector of control factors (inflation, investment to

Table 2 Correlation coefficients

	lgdppc	cps_g	liquid_g	inf	gexp_g	open	exp_g	inv_g	pop_gr
lgdppc	1.000								
cps_g	0.353[a]	1.000							
liquid_g	0.174[a]	0.696[a]	1.000						
inf	0.074	−0.272[a]	−0.377[a]	1.000					
gexp_g	−0.288[a]	0.339[a]	0.258[a]	−0.334[a]	1.000				
open	0.160[a]	0.335[a]	0.359[a]	−0.069	−0.020	1.000			
exp_g	0.404[a]	0.355[a]	0.309[a]	−0.059	−0.149[a]	0.842[a]	1.000		
inv_g	0.221[a]	0.137[a]	0.023	0.163[a]	−0.038	0.141[a]	−0.037	1.000	
pop_gr	−0.145[a]	0.092	0.090	−0.285[a]	0.198[a]	−0.134[a]	−0.175[a]	0.143[a]	1.000

Source Authors' calculation

[a]*indicates a significant correlation coefficient at the 5% level or more*

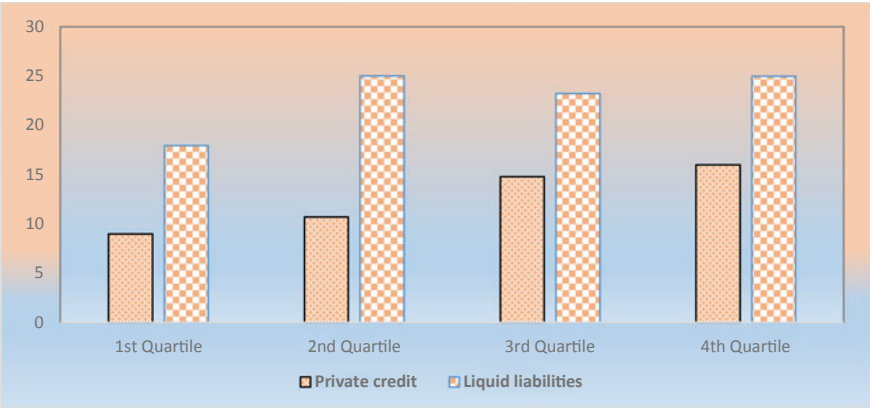

Chart 1 Average financial indicators by log of real GDP per capita quartiles. *Source* Authors' calculation

GDP, openness, government consumpion to GDP, exports to GDP and population growth rate and country fixed effects[2]), ε_{it} is the error term, i = 1, …, N represents the country and t = 1, …, T represents the year.

Two models are estimated, the first using private credit to GDP as financial development indicator and the second using liquid liabilities to GDP as financial development indicator.

Standard ordinary least squares method provides estimates based on the average effect of the independent variable on the dependent variable. Therefore, it does not provide estimates how the relationship between economic activity and financial development changes across different stages of economic activity.

In this analysis, we use quantile regression method to estimate our linear model. Many empirical works have used this method when the variables of interest potentially have varying effects at different stage in the conditional distribution of the outcome variable. Thus, quantile regression can result in distinct estimated coefficient of financial development indicators for each specific quantile of log of real GDP per capita. According to Koenker and Bassett (1978), the quantile regression model is specified as follows:

$$Y_{it} = X_{it}^{'}\beta_{\delta} + \mu_{\delta it}$$

with

$$Quantile_{\delta}(Y_{it}|X_{it}) = X_{it}^{'}\beta_{\delta}$$

[2]We add dummy variables for countries of the sample to control for country fixed effects, let's say, all time-invariant national characteristics.

where Y represents the dependent variable, X is a vector of independent variables, β is the vector of parameters to be estimated and associated with the δ^{th} quantile and μ is a vector of error term. $Quantile_{\delta}(Y_{it}|X_{it})$ identifies the δ^{th} conditional quantile of Y given X.

In order to assess the change in the relationship between economic activity and financial development across different levels of log of real GDP per capita, we will apply quantile regression method for each of the 10th to the 90th quantiles.

4 Empirical Findings

As mentioned above, two models are estimated using the quantile regression method. The first model uses private credit to GDP as financial indicator while the second model considers liquid liabilities to GDP as financial indicator. Each of the two (2) models is, first, estimated with some standard control variables only. Then, we estimate them by accounting for country fixed effects. The results of the different estimations are depicted in Chart 2.

In Chart 2, the upper-left hand graph depicts the coefficients from quantile regressions of the model with private credit to GDP and standard controls only. The upper-right hand graph plots the coefficients of the model with liquid liabilities to GDP and standard controls only.

Similarly, the lower-left hand and the lower-right hand graphs show the coefficients from the models with private credit to GDP and liquid liabilities credit to GDP, respectively. Both models include standard controls and country fixed effects (Table 3).

The full results of the quantile regressions are displayed in Tables 4 and 5 (see Appendix).

– **Model with private credit to GDP**

The impact of private credit to GDP obtained from the model without country fixed effects is positive and significant irrespective of the quantile level of log of real GDP per capita (Table 4a). Importantly, the effect of private credit to GDP rises with the quantiles of log to real GDP per capita, meaning that as an economy grows, the impact of private credit to GDP on log of real GDP per capita increases.

In addition to standard controls, we account for country fixed effects (Table 4b). The effect of private credit to GDP is still positive and significant irrespective of the specified quantile level of log of real GDP per capita. However, the effect increases at lower quantiles of log of real GDP per capita and decreases at higher quantiles.

We also test the equivalence of the quantile of the coefficients of private credit to GDP across the three quartiles (0.25, 0.50 and 0.75) of log of real GDP per capita. The results clearly reject the null hypothesis of equality of the coefficients for the three quartiles in each case.

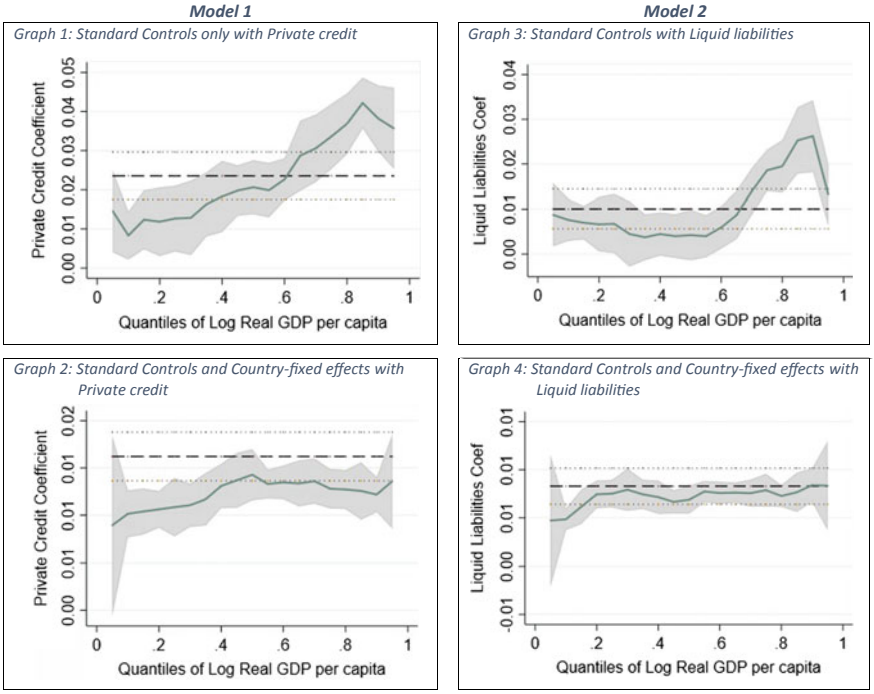

Chart 2 Quantile regression estimates *Source* Authors' calculations
Note the horizontal dashed line is the OLS estimate of the coefficient on the financial development indicator. The two horizontal dotted lines represent the confidence bands of the OLS coefficient. The solid line is the coefficients of the financial indicators on the quantiles of log of real GDP per capita. The area around this solid line is the confidence band of the estimated coefficients

– **Model with liquid liabilities to GDP**

The coefficients of liquid liabilities to GDP without country fixed effects are positive and significant for all the selected quantile levels except the median of log of real GDP per capita (Table 4). In addition, the coefficient associated with liquid liabilities to GDP decreases at lower levels of log of real GDP per capita, and increases at its higher level up to a certain level before dropping again.

Similarly, we account for country fixed effects. The effect of liquid liabilities to GDP in this case is positive and significant irrespective of the quantile level of log of real GDP per capita. However, this effect does not statistically differ across quantiles log of real GDP per capita. Indeed, the equivalence test of the quantile estimates of the coefficients of liquid liabilities to GDP across the quantiles of log of real GDP per capita rejects equality of the estimated coefficients in each case.

Overall, the findings have some useful implications for the region. While the results indicate that, regardless of the measures and specifications of the model, finance matters for economic growth in ECOWAS, they also point out the absence of linearity nexus between finance and growth. These results are consistent with findings

Table 3 Average values of key indicators by country

	Log of real GDP per capita	Private credit to GDP	Liquid liabilities to GDP
Benin	6.58	14.51	28.79
Burkina Faso	6.19	15.59	24.19
Côte d'Ivoire	7.18	19.09	27.71
Gambia	6.26	8.95	31.60
Ghana	7.03	11.65	19.26
Guinea	6.42	5.21	13.31
Guinea-Bissau	6.33	7.44	20.51
Mali	6.42	16.01	21.69
Niger	5.85	9.16	16.28
Nigeria	7.50	10.89	14.96
Senegal	7.06	18.28	30.83
Sierra Leone	5.92	4.11	13.53
Togo	6.27	22.96	33.72
Average	6.54	12.60	22.80

Source Authors' calculation

in the literature (Ayinde and Yinusa, 2016; Gambacorta and Yang, 2014; Cecchetti and Kharroubi, 2012; Demirguc-Kunt et al., 2011) which indicate that financial depth has an increasing effect on economic growth but up to a certain level of economic development, beyond which, its impact starts decreasing. In addition, the size of the impact depends on the specification of the model and the measure of financial development. On the one hand, the findings imply that (Graphs 1 and 3 of Chart 1), the impact of financial depth first decreases at low level of economic growth (up to 10th and 30th percentiles for credit to private sector and liquid liabilities, respectively). Then, the impact of finance rises with the level of economic development up to the 80th and 90th percentiles after which the impact decelerates regardless of the measure of financial depth. On the other hand, when country fixed effects are considered into the model (Graphs 2 and 4), the impact of financial development rises significantly at low level of development up to the median and the 30th percentile, depending on the measure of financial development (credit to private sector and liquid liabilities, respectively). After that level, the impact decreases as economy grows. These results are consistent with Laeven et al. (2013) who also found that financial innovation boosts economic growth for a developing country more than an advanced economy.

Table 4 Estimates of the model with private credit to GDP as financial indicator
Table 4a Models of log of real GDP per capita via OLS and QR: Standard controls only

	OLS	Q(0.10)	Q(0.25)	Q(0.50)	Q(0.75)	Q(0.90)
cps_g	0.0236[c]	0.00832[a]	0.0127[a]	0.0207[c]	0.0336[c]	0.0382[c]
	(7.65)	(2.48)	(2.50)	(6.23)	(7.83)	(6.96)
inf	−0.000190	−0.00266	0.00000128	0.00177	0.00166	−0.0000395
	(−0.13)	(−1.61)	(0.00)	(1.08)	(0.79)	(−0.01)
gexp_g	−0.0283[c]	−0.0160[b]	−0.0187[a]	−0.0172[b]	−0.0344[c]	−0.0468[c]
	(−5.79)	(−3.00)	(−2.33)	(−3.26)	(−5.05)	(−5.37)
open	−0.0208[c]	−0.0209[c]	−0.0210[c]	−0.0168[c]	−0.0180[c]	−0.0168[c]
	(−10.00)	(−9.21)	(−6.14)	(−7.49)	(−6.20)	(−4.53)
exp_g	0.0477[c]	0.0554[c]	0.0522[c]	0.0451[c]	0.0453[c]	0.0343[c]
	(10.95)	(11.67)	(7.30)	(9.62)	(7.45)	(4.42)
inv_g	0.0184[c]	0.0126[c]	0.0200[c]	0.0164[c]	0.0174[c]	0.0182[c]
	(7.55)	(4.77)	(5.01)	(6.29)	(5.13)	(4.20)
pop_gr	−0.0867[b]	−0.0194	−0.0757	−0.123[c]	−0.170[c]	−0.220[c]
	(−3.02)	(−0.62)	(−1.61)	(−3.99)	(−4.25)	(−4.31)
_cons	6.526[c]	5.881[c]	6.124[c]	6.359[c]	6.844[c]	7.505[c]
	(50.85)	(42.06)	(29.11)	(46.08)	(38.25)	(32.86)
N	351	351	351	351	351	351
		0.2784	0.2492	0.3293	0.3974	0.3734

t statistics in parentheses
[a]$p < 0.05$, [b]$p < 0.01$, [c]$p < 0.001$

5 Conclusion and Policy Implications

This paper contributes to the empirical literature by investigating the change in the impact of financial development as an economy grows. Using the quantile regression method, we found that finance maters for economic growth in ECOWAS while the linkage is non-linear. As regards the size of the impact, the results point out that it depends on the specification of the model and the measure of financial development used. The findings indicate that the impact of finance increases with the level of economic growth between the 10th and the 90th percentiles. By accounting for country fixed effects, our findings show that the impact of financial development rises significantly at low level of development up to the median at maximum beyond which finance has a less impact on economic growth.

In terms of policy recommendations, the findings indicate that finance positively contributes to economic growth regardless the measures of financial development. They exclude that finance undermines growth at any level of economic development in ECOWAS, although we found an absence of linearity on the relationship. This means that authorities should encourage the development of sound banking system

Table 4b Models of log of real GDP per capita via OLS and QR: Standard controls and Country fixed effects

	OLS	Q(0.10)	Q(0.25)	Q(0.50)	Q(0.75)	Q(0.90)
cps_g	0.0162[c]	0.0101[c]	0.0108[c]	0.0143[c]	0.0128[c]	0.0122[c]
	(12.39)	(8.06)	(6.57)	(9.04)	(6.70)	(6.24)
inf	−0.000639	−0.000126	−0.0000772	−0.000664	−0.0000220	−0.000272
	(−1.23)	(−0.25)	(−0.12)	(−1.06)	(−0.03)	(−0.35)
gexp_g	−0.00263	0.00209	0.00339	0.000838	−0.0000176	−0.000365
	(−0.92)	(0.76)	(0.94)	(0.24)	(−0.00)	(−0.09)
open	0.00357[b]	0.00115	0.00197	0.00382[b]	0.00337[a]	0.00380[a]
	(3.10)	(1.04)	(1.35)	(2.75)	(2.00)	(2.21)
exp_g	−0.00374	−0.000746	−0.00178	−0.00718[b]	−0.00401	−0.00617
	(−1.67)	(−0.35)	(−0.63)	(−2.66)	(−1.23)	(−1.85)
inv_g	−0.00181	0.0000572	0.00105	−0.000943	−0.000143	−0.0000435
	(−1.53)	(0.05)	(0.70)	(−0.66)	(−0.08)	(−0.02)
pop_gr	−0.00851	−0.0256[a]	−0.0189	−0.00851	−0.0252	−0.0262
	(−0.80)	(−2.49)	(−1.40)	(−0.66)	(−1.62)	(−1.64)
_cons	6.332[c]	6.341[c]	6.299[c]	6.364[c]	6.406[c]	6.474[c]
	(99.39)	(103.41)	(78.29)	(82.71)	(68.84)	(68.04)
N	351	351	351	351	351	351
		0.7949	0.7825	0.7981	0.8227	0.8280

t statistics in parentheses
[a]$p < 0.05$, [b]$p < 0.01$, [c]$p < 0.001$

(and other financial institutions) particularly for countries at low level of economic development, i.e. ranked as Low-Income Countries (LIC). The financial development might concern both the size of financial institutions (liabilities) as well as the improvement of financial services and products in favour of private sector. Given the importance of the impact for the LIC in the zone, policymakers should encourage banks lengthening the tenure of credits to private sector from short to medium run, and geared such credits towards productive and growth-driving sectors of the economy.

Appendix

See (Tables 3, 4a, 4b, 5a, 5b).

Table 5 Estimates of the model with liquid liabilities to GDP as financial indicator

Table 5a Models of log of real GDP per capita via OLS and QR: Standard controls only

	OLS	Q(0.10)	Q(0.25)	Q(0.50)	Q(0.75)	Q(0.90)
liquid_g	0.0100[c]	0.00761[c]	0.00676[a]	0.00424	0.0186[c]	0.0262[c]
	(4.48)	(3.40)	(2.14)	(1.68)	(4.66)	(5.80)
inf	0.0000188	−0.00278	−0.00194	0.000764	0.00368	0.00823[a]
	(0.01)	(−1.69)	(−0.84)	(0.41)	(1.26)	(2.48)
gexp_g	−0.0183[c]	−0.00903	−0.0131	−0.00781	−0.0189[a]	−0.0423[c]
	(−3.78)	(−1.86)	(−1.92)	(−1.43)	(−2.19)	(−4.32)
open	−0.0235[c]	−0.0236[c]	−0.0231[c]	−0.0189[c]	−0.0225[c]	−0.0219[c]
	(−10.69)	(−10.74)	(−7.44)	(−7.66)	(−5.75)	(−4.94)
exp_g	0.0565[c]	0.0598[c]	0.0581[c]	0.0523[c]	0.0581[c]	0.0474[c]
	(12.92)	(13.69)	(9.43)	(10.65)	(7.45)	(5.38)
inv_g	0.0221[c]	0.0139[c]	0.0212[c]	0.0225[c]	0.0252[c]	0.0150[b]
	(8.88)	(5.57)	(6.04)	(8.04)	(5.67)	(2.98)
pop_gr	−0.0847[b]	−0.0400	−0.0571	−0.126[c]	−0.156[b]	−0.197[b]
	(−2.80)	(−1.33)	(−1.34)	(−3.73)	(−2.90)	(−3.23)
_cons	6.330[c]	5.826[c]	5.957[c]	6.231[c]	6.377[c]	7.284[c]
	(47.07)	(43.38)	(31.43)	(41.24)	(26.62)	(26.85)
N	351	351	351	351	351	351
		0.2933	0.2467	0.2943	0.3413	0.2866

t statistics in parentheses

[a]$p < 0.05$, [b]$p < 0.01$, [c]$p < 0.001$

Table 5b Models of log of real GDP per capita via OLS and QR: Standard controls and Country fixed effects

	OLS	Q(0.10)	Q(0.25)	Q(0.50)	Q(0.75)	Q(0.90)
liquid_g	0.00828[c]	0.00483[c]	0.00750[c]	0.00687[c]	0.00786[c]	0.00838[c]
	(8.64)	(7.87)	(6.86)	(5.26)	(5.78)	(7.13)
inf	0.0000151	−0.000342	−0.000419	−0.000696	0.000943	0.000342
	(0.03)	(−0.91)	(−0.63)	(−0.87)	(1.14)	(0.48)
gexp_g	0.00241	−0.000780	0.00289	0.00485	0.00229	0.00164
	(0.79)	(−0.40)	(0.83)	(1.16)	(0.53)	(0.44)
open	0.00329[b]	0.00216[b]	0.00170	0.00223	0.00215	0.00173
	(2.61)	(2.68)	(1.18)	(1.30)	(1.20)	(1.12)
exp_g	−0.00366	−0.00146	−0.00150	−0.00287	−0.00319	−0.00346
	(−1.50)	(−0.94)	(−0.54)	(−0.86)	(−0.92)	(−1.16)
inv_g	−0.000726	0.000144	0.00253	0.000800	0.00172	0.00220
	(−0.57)	(0.17)	(1.73)	(0.46)	(0.95)	(1.40)
pop_gr	−0.00298	−0.0279[c]	−0.0120	−0.00850	−0.0139	−0.0175
	(−0.26)	(−3.73)	(−0.90)	(−0.54)	(−0.84)	(−1.23)
_cons	6.227[c]	6.324[c]	6.217[c]	6.271[c]	6.319[c]	6.373[c]
	(88.60)	(140.51)	(77.60)	(65.53)	(63.40)	(73.96)
N	351	351	351	351	351	351
		0.7904	0.7698	0.7795	0.8086	0.8150

t statistics in parentheses
[a]$p < 0.05$, [b]$p < 0.01$, [c]$p < 0.001$

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Transport and ICT Infrastructure Development in the ECOWAS Sub-Region: The PPP Funding Alternative

Lionel Effiom

Abstract The challenge of decrepit and deficit infrastructure across all sectors in the ECOWAS sub-region is symptomatic of the problems faced by sub-Saharan African countries and indeed the developing world. This paper analyses two critical infrastructure components in the regional community: transport and information and communication technology (ICT). Both theoretical and empirical literature on infrastructure find evidence that infrastructure development is critical to Africa's long-term economic growth, and that without deliberate, focused policy, the infrastructure gap will widen with attendant negative consequences on growth, poverty reduction and overall development. With a financing requirement of $1464 billion annually for the next decade, for power, transport and the ICT infrastructure components, coupled with volatile income sources as well as weak institutional capacity for resource mobilization in member states, the hope of bridging this infrastructure gap looks dismal. The paper believes that alternative funding can be found in the public–private partnership (PPP) model. Given the right policy and legal environment, the challenges inherent in the PPP *framework could be attenuated to serve the needs of infrastructure financing in ECOWAS*.

Keywords Infrastructure · ECOWAS · Information and communications technology · Public–private partnerships

1 Introduction

Global growth dynamics have made the development of key infrastructure, such as airports, ports, roads, railways, highways, as well as information and communication technologies (ICT) in the Economic Community of West African States (ECOWAS) imperative. This is because the development and sustainability of infrastructure are pivotal to fostering interconnectivity and greater economic integration. The sub-region's development hinges on its capacity to strategically mobilize and invest funds

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in productive infrastructure assets. Therefore, the streamlining of various financing options essential for building, operating and maintaining such critical transport and ICT infrastructure in ECOWAS has become compelling.

ECOWAS member states have prioritized the development of transport and ICT infrastructure to boost connectivity. These efforts have helped reduce transit cost and improved access to submarine cables in the sub-region (AfDB, 2018b). It has also accelerated the adoption of a synchronized law concerning the right of way to encourage transit and ameliorate the costs of access to broadband infrastructure, especially by landlocked countries such as Burkina Faso, Mali and Niger Republic. The harmonized law also provides a blueprint on the taxation of telecommunication and other ICT services. An integral component of the drive towards making the sub-region ICT compliant is the development of a modern and reliable telecom broadband infrastructure and the entrenchment of a common liberalized market in the ECOWAS sub-region. Similarly, The Transportation Masterplan envisages the development of trans-coastal Dakar–Lagos Corridor missing links, trans-Sahelian–Dakar–Niamey–N'Djamena multimodal Corridor, Cotonou–Niamey–Ouagadougou and Dosso–Nigeria railway links, Sambagalou Dam and interconnection lines, Fomi multipurpose Dam, Air Transport Legal Framework, Aviation Safety and Security, viable Airline industry, aeronautical cooperation and others in the region.

But does the sub-region have the financial resources to meet these lofty objectives, especially given the revised infrastructure financing gap of $130–$170 billion (ICA, 2018)? Can it rely solely on its domestic resources, with its perennially weak mobilization capacity, to fund such huge capital investments in transport and ICT? Can the sub-region's national governments find solace in other alternative financing options like the public–private partnership (PPP) model? Given that the commitments of national governments have failed to revolutionize infrastructure in the sub-region, how would the PPP model aid in this regard? What are the advantages and downside of this framework? Are there legal and policy options open to ECOWAS member states to address potential challenges of the PPP financing model? Are there success stories of the PPP model elsewhere with credible good practices which ECOWAS can draw from, taking into consideration the peculiarity of the sub region? The rest of the paper seeks answers to these questions. In Sect. 2, we provide the theoretical building blocks through a review of both empirical and theoretical literature. Its subsections provide reviews of extant transport and ICT infrastructure in ECOWAS. In Sect. 3, the paper discusses the regional community's infrastructure's funding needs, while Sects. 4 and 5 evaluate the PPP model, and analyse its benefits and costs. Section 6 concludes with some recommendations.

2 Literature Review

2.1 Theoretical Issues

Economic theory specifies that infrastructure can directly affect economic growth through five channels, namely: as a factor of production, complement to other factors, stimulus to factor accumulation, stimulus to aggregate demand and as a tool of industrial policy. As a factor of production that is akin to physical capital, infrastructure directly enters into the production function, and so aggregate income becomes an increasing function of the quantity of infrastructure deployed in production (Fedderke and Garlick, 2008; Gramlich, 1994). A classic example is the effect of energy generation, distribution and consumption in the production of goods and services in the economy. As a complement to other factors of production, infrastructure improvements may decrease production cost, while concurrently raising the productivity of other inputs in the course of production. For example, the productivity of factory plants, machinery, computers and other physical capital is significantly boosted when there is adequate power supply. Similarly, labour productivity is greatly enhanced if it is complemented by a healthy dose of healthcare and education infrastructure. In other words, investment in human capital considerably improves the work force; capital and labour become more efficient in the presence of good infrastructure. In the absence of quality infrastructure, total factor productivity (TFP) diminishes and output growth becomes strictly a function of crude labour and capital (Fedderke and Bogetic, 2006; Barro, 1998). In effect, without infrastructure, output growth is limited even in the presence of large quantities of labour.

Third, infrastructure stimulates the mobilization and accumulation of other factor inputs. Each factor input is itself a derivative of a production process. For instance, in the accumulation of human capital, other factors must necessarily enter into the production function, e.g. educational facilities, teachers' qualifications, teaching and learning environment, roads, etc. Thus, by its indirect effect on growth, infrastructure enhances the accumulation of other factor inputs. Fourth, infrastructure is a catalyst to aggregate demand. By providing infrastructure basically through infrastructure projects, considerable expenditure outlays are involved, both at the construction, maintenance and operation stages. This undoubtedly increases aggregate demand through its interaction with the investment multiplier. It must be noted that the effect of this fourth channel on output is debatable. Many have argued that the effect of infrastructure on output via the demand side is always short-lived, durable only in the short run as the productive capacity of the economy remains unaffected. In the long run, an open economy, for instance, stands the risk of rising inflation and imports with a huge possibility of a trade deficit (Fedderke and Garlick, 2008).

Finally, by acting as a tool of industrial policy, infrastructure provision may be specifically targeted by the government to strategic sectors in the economy that might sway investment decisions of the private sector positively to those sectors. For instance, government might embark on a rural road construction project with the belief it will incentivize private sector investment into those areas. The Maputo

Corridor is a classic example of this sentiment. However, like the fourth channel, the industrial policy channel has been debatable, with many arguing that such public sector interventions do not actually generate a commensurate level of investment and growth envisaged, and therefore constitute a waste of resources (Agénor, 2013).

2.2 Overview of Infrastructure in Africa

Four principal areas are of real concern in relation to infrastructure development in Africa. These are transportation, electricity, information and communications technology, as well as water and sanitation. A clear picture of infrastructure challenges facing Africa is provided by the AfDB's Africa Infrastructure Development Index (AIDI). The AIDI, among other purposes, monitors and evaluates the condition and progress of infrastructure development in the continent. It also serves the purpose of resource allocation, and also contributes to policy engagements within and without the AfDB.

Because of the composite and heterogeneous nature of infrastructure, the index is normalized and gradated between 0 and 100, with higher values denoting higher infrastructure endowment. Table 1 shows the top 10 as well as the least ten countries on the continent with composite Africa Infrastructure Development Index for 2016 2018. The table also indicates wide disparities in the infrastructure gap of African countries. Clearly, there is an extensive range exceeding 90% between Seychelles, the country with the best infrastructure stock and Somalia, the one with the least.

When these comparisons are made in relation to income levels, a sad picture emerges for Africa. Mafusire et al. (2017) concludes that low-income African countries are four times worse off than their counterparts from other continents in terms of paved road density. Similarly, African middle-income countries are less than twice disadvantaged relative to their counterparts in other regions of the world.

These disparities are more glaring when comparison is made in relation to other continents of the world on different infrastructure subgroups. For instance, in 2014, the African population with access to electricity was estimated at 47%, almost half the 97% in Latin American countries and 89% in Asia. Access to quality sanitation was 36% in 2015 compared to Latin America's 83% and Asia's 62%. Furthermore, the proportion of the population having access to improved sources of water was 70% as against 90% in Latin America and Asia (AfDB, 2018a).

2.3 Overview of Infrastructure in ECOWAS

The state of infrastructure in the ECOWAS sub-region is symptomatic of what prevails in the general socio-economic and geographical space of Africa. Put succinctly, infrastructure in Africa is in a terribly bad state, with acute shortages in key infrastructure elements critical for development. Table 2 shows the sub-regional disaggregation

Table 1 Africa infrastructure development Index for selected countries

Rank	Country	2016	Rank	Country	2017	Rank	Country	2018
1	Seychelles	93.927	1	Seychelles	94.109	1	Seychelles	94.324
2	Egypt	85.663	2	Egypt	83.350	2	Egypt	85.847
3	Libya	77.793	3	South Africa	79.635	3	Libya	81.413
4	South Africa	75.515	4	Libya	79.271	4	South Africa	78.527
5	Mauritius	74.076	5	Mauritius	75.493	5	Mauritius	76.787
6	Tunisia	66.262	6	Tunisia	66.974	6	Tunisia	68.982
7	Morocco	62.408	7	Morocco	61.998	7	Morocco	64.884
8	Algeria	53.393	8	Algeria	54.039	8	Algeria	55.793
9	Cabo Verde	49.431	9	Cabo Verde	50.431	9	Cabo Verde	47.955
10	Botswana	35.631	10	Botswana	36.607	10	Botswana	36.793
45	Mozambique	11.606	45	Central A.R	11.830	45	Central A.R.	11.951
46	Sierra Leone	9.388	46	Sierra Leone	9.975	46	Madagascar	10.734
47	Madagascar	8.448	47	Ethiopia	8.561	47	Sierra Leone	9.943
48	Eritrea	8.266	48	Madagascar	8.474	48	Ethiopia	9.699
49	DRC	8.163	49	Eritrea	8.265	49	Eritrea	8.217
50	Ethiopia	7.567	50	DRC	8.165	50	DRC	8.148
51	Chad	6.638	51	Chad	6.808	51	Chad	7.239
52	Niger	5.336	52	Niger	5.762	52	Niger	5.508
53	South Sudan	4.940	53	South Sudan	4.549	53	South Sudan	4.603
54	Somalia	3.365	54	Somalia	3.404	54	Somalia	3.362

Source AfDB (2018b)—Africa Infrastructure Development Index

Table 2 Africa infrastructure development index (2015–2018) by sub-region

Rank	Sub-region	2016	Rank	Sub-region	2017	Rank	Sub-region	2018
1	North Africa	71.63	1	North Africa	71.62	1	North Africa	72.96
2	Southern Africa	33.47	2	Southern Africa	34.97	2	Southern Africa	35.46
3	West Africa	18.92	3	West Africa	19.76	3	West Africa	20.47
4	East Africa	13.52	4	East Africa	14.00	4	East Africa	14.60
5	Central Africa	10.69	5	Central Africa	10.78	5	Central Africa	11.04
	Africa	**27.12**		**Africa**	**27.75**		**Africa**	**28.44**

Source AfDB (2018b)—The Africa Infrastructure Development Index

Table 3 Selected subregional infrastructure indicator index

Infrastructure indicators	EWOWAS	EAC	SADC	Central
Paved road density	38	29	92	4
Mainline density	28	6	80	13
Mobile density	72	46	133	84
Internet density	2	2	4	1
Generation capacity	31	16	176	47
Electricity coverage	18	6	24	21
Improved water	63	71	68	53
Improved sanitation	35	42	46	28

Source AICD (2015)

of Africa Infrastructure Development Index (2015–2018), with evidence that consistently for the review period, West Africa ranked a distant third to North Africa. Not only that, the sub-region ranks behind the SADC region with marginal increases in the index from 18.92 to 19.76 and 20.47 for 2016, 2017 and 2018, respectively.

Besides the glaring sub-regional differences, infrastructure stock and access also varies within countries. For instance, in 2014 rural consumers were worse off than their urban counterparts who had an average access to electricity of about 72% compared to 33% for rural consumers. These differentials in electric infrastructure access was greatest in East Africa, with an urban access of 73% compared with the rural's 11%.

Table 3 shows data on specific infrastructure indicators and highlights the fact that ECOWAS, however, has performed fairly on some indicators than some subregions. In particular, while there are substantial regional differences between ECOWAS and the sub-Saharan leader (SADC) in the areas of paved road density, mobile telephone density and electricity generation capacity, other infrastructure indicators were not so significant. In the areas of improved water and sanitation as well as internet density, the ECOWAS compared fairly with SADC and even out-performed other sub-regions.

It must be noted that aggregative nature of the data for the respective subregions inevitably conceals significant disparities that exist between countries within each sub-region, especially ECOWAS.

2.3.1 The State of Transport Infrastructure in the ECOWAS Subregion

Transport infrastructure encompasses all the facilities and systems that define and facilitate the functioning of the major modes of transportation, namely, road, railways, airport, water (ports) as well as surface transport. Here, our analysis of only the road transport (with tangential reference to other modes) component reveals that the West African transit corridors are significantly worse compared to those in Eastern and Southern Africa, with the latter having the lowest road freight tariffs as well as the

fastest movement of goods. (Ranganathan and Foster, 2011). Christ and Ferrantino (2009) note that the slowness of freight in West Africa can be attributed to many road blocks and an unending administrative delays at border crossings and ports. While port processing times are lengthy, formal and informal roadblocks are regular features on major highways of West Africa transit corridors, resulting in red tape, corruption and several unofficial payment requirements. These indices aggregately lead to a considerable level of uncertainty in land transport.

For landlocked ECOWAS countries of Mali, Niger and Burkina Faso who have multiple gateways to the sea as against landlocked countries of other regions, such unique terrain confers them with competitive advantage and risk diversification over others. Several studies document that with these unique risks and competitive advantage, clearance time is shorter in West African ports than in many others parts of Africa. For instance, in Ouagadougou, it takes 10–15 days from the time a ship arrives for it to be cleared; a period lower when compared to other parts of the world (Arvis, Raballand, and Marteau 2009). This good record is partly due to the existence of competition between ports on the Gulf of Guinea to capture trade in ports as well as the presence of multiple corridors which helps to diversify risk.

In part, the presence of a large number of small countries within ECOWAS gives room for many borders within the region. This in turn helps to facilitate intraregional trade. Thus, two significant trade corridors are relevant here: the coastal corridor from Abidjan in Cote d'Ivoire to Lagos in Nigeria, as well as the Sahelian corridor stretching from Nouakchott in Mauritania to N'Djamena in Chad. There is, however, a future potential of stretching this corridor to Dakar in Senegal. These regional corridors, seven in number, are paved and in good condition. There is, however, a looming risk that critical hinterland trade routes in coastal countries may be left unattended to. Table 4 presents the fact that over 95% of the length of the major regional corridors is paved and is in good condition. There are however a few corridors with a bad range condition of between 30 and 40%. These are Cotonou to Niamey, Abidjan to Ouagadougou and Dakar to Bamako. Interestingly these bad and neglected portions are all located in coastal countries. In specific terms, 78% of the Ivorian axis, within the Abidjan–Ouagadougou corridor is in a poor state as well as 60% of the Beninois axis, lying within the Cotonou-to-Niamey corridor. The apparent neglect of these roads may be because the economies of these countries are concentrated along the coastal areas, and consequently there is little or no incentive to maintain roads in the hinterland, far away from the locus of economic power.

With moderate to heavy traffic along the strategic regional routes, and the poorest portions of these corridors being the ones most heavily used, the cost of maintenance of these dilapidated roads are guaranteed to increase astronomically. According to Ranganathan and Foster (2011), the most heavily used routes are the dual gateways into Burkina Faso, as well as the Cotonou–Niamey corridor. On a daily basis, a minimum of 300 vehicles ply these regional routes, with more than 1,000 vehicles plying at least 20% of its length.

The relative competitiveness of ECOWAS regional routes can be evaluated based on the aggregation of three cost components, namely travel costs of movement of goods, which is calculated by computing the road and rail freight tariffs; cost of

Table 4 Road condition in ECOWAS major transit corridors

	Percentage in condition				Percentage in traffic band		
	Good	Fair	Poor	% Paved	<300	300–1000	>1000
Gateways to the sea							
Tema–Ouagadougou–Bamako	67.1	30.7	2.2	100.0	3.8	25.7	25.4
Burkina–Faso	52.4	47.6	0.0	100.0	8.3	31.0	60.7
Ghana	62.8	32.5	4.8	100.0	0.0	0.0	0.0
Mali	100.0	0.0	0.0	100.0	4.7	72.0	23.2
Daka–Bamako	48.0	19.8	32.1	100.0	24.9	55.6	19.5
Mali	75.6	24.4	0,0	100.0	46.7	47.2	6.1
Senegal	16.6	14.6	68.8	100.0	0.0	65.2	34.8
Abidjan–Ouagadougou	33.1	23.0	43.9	100.0	3.5	23.3	73.1
Burkina–Faso	68.6	27.3	4.1	100.0	4.1	27.6	68.3
Cote d'Ivoire	3.1	19.5	77.5	100.0	3.1	19.7	77.2
Lome–Niamey	50.2	30.1	19.8	100.0	0.0	82.6	17.4
Burkina–Faso	35.4	38.9	25.8	100.0	0.0	77.3	22.7
Niger	99.0	1.0	0.0	100.0	0.0	100.0	0.0
Togo	51.7	0.0	48.3	100.0	0.0	37.2	62.8
Cotonou–Niamey	49.5	7.9	42.6	98.5	1.5	26.4	70.0
Benin	38.1	2.2	59.7	97.8	2.2	15.8	81.5
Niger	77.7	22.3	0.0	100.0	0.0	52.8	41.4
Intra-regional corridors							
Abidjan–Lagos	50.7	28.0	20.6	98.8	0.0	0.4	43.6
Benin	26.9	0.0	68.0	92.4	0.0	2.5	90.3
Cote d'Ivoire	0.0	100.0	0.0	100.0	0.0	0.0	100.0
Ghana	75.0	14.5	10.5	100.0	–	–	–
Nigeria	50.0	50.0	0.0	100.0	0.0	0.0	100.0
Togo	0.0	0.0	100.	100.0	0.0	0.0	100.0
Nouakchott–Ndjamena	63.4	21.1	10.2	97.3	9.9	46.2	43.4
Burkina–Faso	70.7	29.3	0.0	100.0	6.2	37.6	56.3
Cameroun	84.8	15.2	0.0	100.0	31.0	56.5	12.5
Mali	62.9	31.3	0.0	94.2	5.8	75.8	16.4
Mauritania	50.6	23.8	25.6	100.0	0.0	21.5	78.5
Niger	66.4	4.4	29.1	99.1	3.8	46.8	48.5
Nigeria	–	–	–	100.0	0.0	0.0	100.0
Senegal	10.9	26.5	62.6	28.6	0.0	100.0	0.0

Source Ranganathan and Foster (2011)

delay in time acquired by waiting at gridlock, border crossing and ports; as well as administrative costs of conveying goods across borders.

However, even with the fairly good condition of ECOWAS regional routes, competitive advantage actually resides with the railway alternative. There are presently only two railways connecting landlocked countries in West Africa, namely the Transrail corridor connecting Dakar to Bamako and the Sitarail corridor connecting Abidjan to Ouagadougou. A comparative evaluation of these parallel rail and road corridors indicates a preference for railway, frequently having a cost advantage within the range of 10–25% and mainly driven by lesser tariff freight of $0.08 per tonne kilometre by road as against $0.06 per tonne kilometre by rail.

Table 5 presents comparative regional road conditions in member states of ECOWAS. By regional road network is meant "the network needed to connect all the national capitals with each other and with the major deep sea ports". We glean that most regional road networks hosted by member countries are in good condition. Generally, the percentage of road falling within the good condition range is 45.1%, followed by fair condition (28.4%), while 92.5% of the roads are paved. Specific country comparisons show that Ghana has the highest per cent of roads in good condition (70%), followed by Mali. Benin has the highest percentage of roads in poor condition (61.5%), followed by Guinea. Ranganathan and Foster (2011) are of the opinion that the vast swathe of unpaved regional roads are hosted by The Gambia and post conflict countries like Sierra Leone and Liberia.

Table 5 Regional Road network condition of ECOWAS member countries

	Condition				Type		
	Good	Fair	Poor	Unknown	Paved	Unpaved	Unknown
Benin	35.8	1.8	61.5		96.8	3.2	0.0
Burkina–Faso	58.2	33.6	8.2	1	100.0	0.0	0.0
Cote d'Ivoire	16.1	47.1	35.4	0	90.3	9.7	0.0
Gambia	0.0	89.4	10.6	1	47.4	34.4	18.2
Ghana	70.3	23.6	6.1	0	100.0	0.0	0.0
Guinea	22.2	20.7	57.1	0	89.1	10.9	0.0
Guinea–Bissau	0.0	0.0	0.0	0	0.0	0.0	100.0
Liberia	39.4	55.9	2.7	100	47.5	52.5	0.0
Mali	66.6	21.7	0.0	2.1	99.6	0.4	0.0
Niger	31.2	31.0	0.0	11.7	88.0	12.0	0.0
Nigeria	55.6	29.7	14.7	37.7	100	0.0	0.0
Senegal	39.8	15.1	45.1	0.0	99.8	0.2	0.0
Sierra Leone	19.5	58.4	22.1	0.0	33.6	66.4	0.0
Togo	49.7	0.0	50.3	0.0	100.0	0.0	0.0
EWOWAS	45.1	28.4	22.5	4.0	92.5	7.4	0.1

Source Ranganathan and Foster (2011)

2.3.2 State of ICT Infrastructure in ECOWAS

In comparison to other infrastructure components such as transport and power, the ICT sector in West Africa can be evaluated to be an above average performance. Its performance in terms of accessibility to information compares favourably with other regional economic blocs. For instance, 16 bits per capita of international bandwidth and 25 per 100 inhabitants are the second highest in sub-Saharan; the South African Development Community (SADC) takes the first position. However, there is the criticism of exorbitant prices charged for crucial ICT services, as well as the fact that internet subscriptions and broadband access rates in the region are despicably low relative to the SADC. A justification of this may be partly due to high tariffs. Within the sub-region, the price of a monthly prepaid mobile exceeds that of other regions, except CEMAC. The average price for monthly internet access is $80. Table 6 shows that the prices of international telephone calls and fixed line telephone services are low in West Africa when compared with similar charges across other regional economic communities. Figure 1 shows that it is relatively cheaper to call within West Africa than to other parts of Africa, though it is still exorbitant in absolute terms. Within ECOWAS, international fixed line calls cost $0.73 per minute. This is much cheaper than calls from ECOWAS member states to other countries in sub-Saharan

Table 6 ICT infrastructure across regional economic communities

	ECOWAS	CEMAC	COMESA	EAC	SADC
Broadband subscribers (per 100 inhabitants)	0.03	0.01	0.04	0.02	0.36
International Internet bandwidth (per capita)	16	11	9	11	19
Internet subscribers (per 100 inhabitants)	0.24	0.06	0.09	0.05	0.53
Main telephone lines outside largest city (per 100 inhabitants)	0.39	0.20	0.53	0.24	1.89
Mobile telephone subscribers (per 100 inhabitants)	25	22	12	21	31
Prepaid mobile price basket (US$ per month)	14.04	15.11	9.09	12.18	11.32
Price of a 3 min call to United States (US$)	0.83	5.68	2.20	1.37	1.50
Price of 20 h Internet basket (US$ per month)	79.98	67.97	50.91	95.70	75.60
Price of fixed telephone price basket (US$ per month)	9.35	12.59	6.85	13.33	13.27

Source Ranganathan and Foster (2011); Ampah et al. (2009)
Note CEMAC = Economic and Monetary Community of Central Africa; COMESA = Common Market for Eastern and Southern Africa; EAC = East African Community; SADC = Southern African Development Community

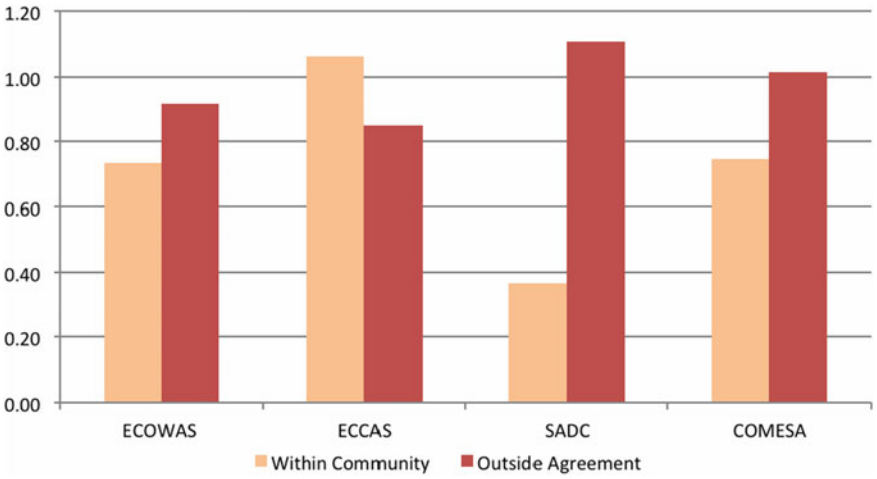

Fig. 1 Price of 1-minute peak-rate call within and outside regional community (US$) *Source* Ranganathan and Foster (2011); Ampah et al. (2009)
Note ECCAS = Economic Community of Central African States; COMESA = Common Market for Eastern and Southern Africa; SADC = Southern African Development Community

Africa, which cost about $0.92 per minute. The only exception is calls to Economic Community of Central African States (ECCAS).

Despite this modest record of performance in the ECOWAS ICT sector, challenges still persist. For instance, a few countries are still unconnected to submarine fibre optic cables that ensure substantial reduction in call rates. Currently, the major international cable in West Africa is the South Atlantic 3 (SAT-3)/WASC. This extends from Malaysia to South Africa and then upward to the West Coast of Africa through Spain and Portugal. Furthermore, the Atlantis-2 submarine cable runs from South America to Cape Verde through Senegal and then proceeds to Spain and Portugal. The 9,800-kilometre Glo-1 cable has a landing station in Nigeria. The lack of submarine cables in some countries and the lack of competition in the international gateways help to increase call rates significantly for the affected countries. For instance, the cost of calling countries within Africa is cheaper in countries connected to submarine cable, while those countries with competitive international gateways pay considerably less to call the United States and within Africa than those with monopolistic international gateway structures.

According to Ranganathan and Foster (2011), for ECOWAS capital cities to achieve connectivity, there has to be an additional 1905 kilometres of new fibre optic links. This minimal level of regional connectivity will demand investments by member states. Table 7 shows gaps in intraregional connectivity and the aggregate investment needed to achieve minimal levels of regional connectivity.

Table 7 Investment gaps in intraregional connectivity

Country	Gaps (km)	Cost ($m)
Burkina Faso	218	6
Côte d'Ivoire	93	3
Ghana	210	6
Guinea	288	8
Guinea Bissau	113	3
Liberia	382	10
Niger	75	2
Nigeria	200	5
Sierra Leone	326	9
Total	1905	51

Source Ranganathan and Foster (2011)

3 Sub-regional Funding Needs for Transport and ICT Infrastructure

The Africa Infrastructure Country Diagnostics (AICD) report of 2010 estimated that Africa's infrastructure financial requirements would gulp $93 billion each year for the next 10 years, with 75% of this budgeted for capital expenditure, while the remainder would be applied to maintenance and operation requirements. This estimate no doubt is expected to increase significantly with rising population, urbanization pressures, as well as calculation variations due to inflation and existing infrastructure maintenance costs. Under the AICD, the following were some of the objectives underpinned by this capital outlay: the development of additional 7,000 megawatts of new power generation capacity a year, completion of interregional fiberoptic backbone network and continental submarine cable loop, interconnection of border crossings, capitals, ports and cities with qualitative road network, etc. For ECOWAS, however, and with specific reference to transport and ICT infrastructure, Table 8 highlights the comparative funding needs of the two subsectors in relation to the overall infrastructure financing requirements.

A comparative assessment of the funding needs of selected infrastructure components shows that the power sector will gulp over $1 billion annually for the next ten years, closely followed by the transport sector with a proposed expenditure of $375 million. The ICT will, however, consume the least. On a national level Guinea bears the greatest proportion of the aggregate burden ($919 million). This represents close to 63% of total financing needs for the three sectors. Nigeria, however, comes a distant second in the proportion of financing needs to total proposed expenditure.

Given the frightening annual capital outlay of $1464 billion necessary for these key sectors (excluding water and sanitation) for the next 10 years, it is apparent that for several reasons, ECOWAS governments would not be able to shoulder the burden of bridging the infrastructure gap in ICT and transportation sectors. With member

Table 8 Selected infrastructure financing requirements in ECOWAS

Country	Power		Transport		ICT			Total	
	Investment ($m)	O&M ($m)	Investment ($m)	O&M ($m)	Investment ($m)	O&M ($m)	Total Investment ($m)	Total O&M ($m)	Total (Inv + O&M) ($m)
Benin			2	8			2	8	10
Burkina Faso			3	15	0.59	0.03	4	15	19
Cote d'Ivoire	27		3	18	0.25	0.01	31	18	48
Gambia, The		7	1	1			1	8	9
Ghana	5		9	20	0.31	0.02	14	20	34
Guinea	786	80	28	24	0.78	0.04	815	104	919
Guinea-Bissau	5		2	5	0.55	0.03	7	5	12
Liberia	2		10	6	1.03	0.05	13	6	19
Mali	26		24	16			50	16	66
Mauritania	1		14	5	2.36		15	5	20
Niger	1		9	18	0.24	0.12	12	18	30
Nigeria	2	137	21	72		0.01	23	209	232
Senegal	3		8	19			11	19	30
Sierra Leone			7	5	0.88	0.04	8	5	13
Togo			0	2			0	2	2
ECOWAS	858	224	141	234	7	0.35	1,006	458	1,464
Total	$1082b		$375 m		$7,35 m		$1464b		

Source Ranganathan and Foster (2011)

states relying almost exclusively on export commodity revenues (e.g. oil, cocoa, etc.), characterized by price fluctuations in the international market, stable income flows are not guaranteed. Besides, other sectors of comparative priority are also begging for immediate attention, coupled with unsustainable recurrent expenditures, dwindling tax revenues due to poor resource mobilization and a narrow tax base. These huge funding gaps inevitably provide room for external sources of finance which includes borrowing, of which the private sector is a significant potential player. According to the Infrastructure Consortium of Africa (ICA, 2017) the structure of infrastructure finance is skewed heavily on the part of African governments who, between 2012 and 2016 have borne 30% of infrastructure funding, followed by donor members of the ICA, and thirdly by China. With the private sector contributing only 6.2%, the financing structure can be made more incentivizing for the market to play a greater role. In this regard, the public private partnership (PPP) model may offer such hope.

4 The PPP Model

A PPP denotes a contractual arrangement between a government and a private firm which stipulates that the latter finances, builds and operates some components of a public service and which the private firm receives payment over a range of years either through user charges or the firm is paid directly from the public treasury, or a combination of both sources of payment. PPPs are tools of procurement that involves four phases of design, finance, construction and operation. They are forms of cooperation between the business world and the government, which aims at funding, construction, management, renovation and maintenance of an infrastructure or the procurement of a service. PPPs are cost-effective because it is structured in such a way as to transfer risk and ensure performance and profitability especially in the operation stage. Its twin advantages of funding and efficiency makes it an attractive alternative model for infrastructure development. However, despite the symbiotic benefits to be derived (See Box 1) by both the private sector and governments in adopting the PPP model, the market for PPPs in sub-Saharan Africa still remains narrow (ICA, 2017). Only a few countries have embraced this model: Uganda, Kenya, Nigeria and South Africa. These countries constitute 48% of the 335 PPP projects in Africa in the last 25 years. Even at that, the involvement of the PPP model in infrastructure financing is uneven across sectors, with the greatest concentration of 48% in the energy sector (mostly renewable energy); water and transportation, 0.5%, while transportation is 22% (ICA, 2017).

Box 1: Merits of PPPs

1	PPPs are off-balance sheet and so create fiscal space for the government agency to implement infrastructure programme without financing constrain
2	Since the private sector is paid to make profit, it will likely do what it is paid to do
3	Private sector brings expertise and good practice
4	Promotes efficiency, since it is private sector driven
5	New options for public sector finances
6	The projects are conducted in a fully competitive bidding situation and are thus completed at the lowest possible cos

The success rate of the PPP model in Africa and other developing regions is somewhat unclear, giving rise to doubts and lack of enthusiasm on the part of national governments. For instance, the International Finance Corporation (IFC) evaluation of PPPs suggests a significant improvement in access to social services and infrastructure between 2002 and 2012. However, this assessment is with a caveat that "the extent to which PPPs benefited the poor cannot be assessed in a systemic manner, as large data gaps exist".[1] This lack of solid evidence coupled with the fact that several African countries are still in the embryonic stage of establishing PPP models frustrates an objective assessment of the effectiveness of using PPP models for infrastructure development in Africa.

Besides, there are social concerns in Africa about accessibility and affordability of social services developed with the PPP framework. Entrenched and widespread inequality and poverty on the continent may frustrate the ability of Africans to have any advantage accruing from this financing framework, because while infrastructure and its accompanying services may be made accessible via the PPP model, they might not translate to affordability. Yet access to and enjoyment of transportation services, education, clean water and sanitation, medical care, etc., for instance, are seen as human rights that enhance the dignity and development of the individual. Thus, as Hall (2015) argues, the PPP model may provide accessibility to social services, but may not guarantee affordability because private investors must have a fair return on their investments. And this can only be guaranteed if social services are priced within the market framework.

A third criticism of PPPs is the inadequacy of transparency. This lack of transparency may translate to limited public participation and scrutiny, which is why the OECD advocates the need for PPPs to engage widely with end-users and stakeholders of projects. Equally constraining for PPPs is that contracts need to be carefully drafted to ensure that operator cannot avoid obligations nor benefit excessively from the agreement. This calls for expertise on the part of government agency charged with drafting of PPP contracts as well as project monitoring.

[1]World Bank Group: World Bank Group Support to Public-Private Partnerships: Lessons from experiences in client countries, FY02-12, p. 68.

The avalanche of criticisms against PPPs has so far been sternly countered by robust arguments in its favour. For instance, when it is argued that public finance is usually less costly than private finance, evidence suggest that though this is so by a margin of 1–3%, the gap has been narrowing (Kong, 2012). On the argument of lack of transparency of PPPs, it has been disputed that in many climes, the political economy environment has established an array of scrutiny mechanisms to reduce opaqueness in PPP transactions. While PPPs are accused of allowing governments to conceal open-ended liabilities, with the consequence that it lacks control over them, it has also been rebutted that the government's exposure to liabilities becomes less open-ended because payments and PPP agreements are comparatively predictable and the true cost of project finance and operation are fully exposed.

Challenges exist in the actual implementation of PPP models despite the adoption of enabling laws in most sub-Saharan African countries. These include absence of expertise on the part of contracting parties, weak intergovernmental synergy, undue priority and preference of private commercial interests over the social interests, absence of knowledge concerning best practices, as well as influences and pressures from external domains to conclude transactions. Box 2 presents different types of financing options embodied in the PPPs framework which governments can draw from in financing infrastructure.

Box 2: Types of PPPs Financing options

1	Service Contracts: conventionally, these are short-term agreements in which a private firm shoulders the burden for a particular task such as collecting bills, repairing pipes or installing meters
2	Management contract: here, the government transfers the responsibility for the operation and maintenance of a facility or service to a private firm
3	Affermage contract: similar to a management contract; however, the private company takes responsibility for the entire operations and maintenance functions, both technical and commercial
4	Lease Contract: this is similar to affermage contract, except that the revenue is determined solely by tariffs
5	Joint venture: This is an arrangement whereby a private group forms a company with the public sector and private investors
6	Multi-utility contracts: This occurs where a private company runs more than one type of utility
7	Concession contracts: here the private contractor manages the whole utility at its own commercial risk. Build–operate–transfer contracts (BOT) are similar to concession contracts with the difference that the private contractor is responsible for constructing the infrastructure from scratch
8	Full Privatization: In this arrangement, the private firm buys the assets from government and assumes ownership of their operation and maintenance on purely commercial principles

It should be noted that the type of financing option depends on whether it is public, private or mixed. Concession is a financing option that is fully delegated to the private sector while BOT and BOOT are joint venture financing options involving both the public and private sectors.

As with different financing options for PPPs, there are also different types of PPP relationships, with varying strengths and weaknesses, open to parties to deploy. Table 9 catalogues these models.

5 Success Stories of PPPs

PPPs have a long history of successful implementation. Its role is as old as recorded history. Witters, Marom and Steinert (2012) document that prominent Athenian nationals in the fourth century made significant contributions for the staging of public religious events, public festivals and construction of public projects and monuments. Centuries later when the Roman military overran large parts of the Mediterranean region and Europe, civilians worked together with the army to build new infrastructure in the new territories. PPPs also have a successful story in the United States, where in 1742 Benjamin Franklin, a private entrepreneur, founded the America Philosophical Society of Philadelphia. This society worked in concert with the Pennsylvania House of Representatives to sponsor the establishment of the University of Pennsylvania which was the first medical school in the British colonies. More recently, the PPP model was used in the building of the Paris metro. This synergy ensured that the tunnels were built by the government, while the energy, tracks, rolling stock and signalling were provided by a private firm. In Nigeria, PPP has been used successfully in the construction of Terminal 2 of the Murtala Mohammed International Airport. In this partnership arrangement, Bi-Courtney Limited was awarded the concession by the Nigerian government to develop, finance, manage, and operate the terminal under a BOT model. Table 10 further shows other successful PPP projects in other climes.

There is indeed a birthing of infrastructure revolution through the instrumentality of PPPs. The Bangladeshi and Pakistani PPP models suggest that PPPs can be successful in both accessibility and affordability criteria if they a structured to start small with the capacity for enlargement as lessons are learnt along the way. Equally, PPPs could be structured in such a way that the government bears higher risk initially, with the private sector assuming greater role in the next phase. These may serve as encouraging signs that with the proper legal and institutional environment, PPPs can work.

This optimism is affirmed when it is realized that between 2004 and 2017, about 30 countries in Africa enacted PPP laws. The tally rises when those countries who have actually implemented PPP policies are included, meaning that less than ten countries in the continent are bereft of any PPP framework. This however has not actually translated into PPP projects across the continent. Available data from the World Bank's Private Participation in Infrastructure Database show that only 14 PPP

Table 9 Models of PPPs

PPP type	Main features	Strengths	Weaknesses	Application
Contracting	• Contract with private party to design and build public facility • Facility financed and owned by Government • Key driver is the transfer of design and construction risk	• Transfer of design and construction risk • Potential to accelerate construction programme	• Possible conflict between planning and environmental considerations. • May increase operational risk • Commissioning stage is critical • Limited incentive for whole life costing approach to design • Does not attract private finance	• Suited to capital projects with small operating requirement • Suited to capital projects where the public sector wishes to retain operating responsibility
Build, operate and Transfer (BOT)	• Agreement with a private firm to design, build and operate a project for a definite period, to be handed over to the public sector • The facility is financed by the public sector & remains in public ownership throughout the contract • Critical incentive is the transfer of operating risk in addition to design & construction risk	• Transfer of design, construction & operating risk • Potential to accelerate construction • Risk transfer provides incentive for adoption of whole life costing approach • Promotes private sector innovation & improved value for money • Improved quality of operation & maintenance • Contracts can be holistic • Government able to focus on core public sector responsibilities	• Possible conflict between planning & environmental considerations • Contracts are more complex & tendering process can take longer • Contract management & performance monitoring systems required • Cost of re-entering the business if operator proves unsatisfactory • Does not attract private finance & commits public sector to providing long-term finance	• Suited to projects that involve a significant operating content • Particularly suited to water & waste projects

(continued)

Table 9 (continued)

PPP type	Main features	Strengths	Weaknesses	Application
Design, build finance and Operate (DBFO)	• Contract with a private party to design, build, operate & finance a facility for a defined period, after which the facility reverts to the public sector • The facility is owned by the private sector for the contract period and it recovers costs through public subvention • Key driver is the utilization of private finance & transfer of design, construction & operating risk • Variant forms involve different combinations of the principle responsibilities	• Includes all that of BOT plus: • Attracts private sector finance; • Delivers more predictable & consistent cost profile • Increased risk transfer provides greater incentive for private sector contractor to adopt a whole life costing approach to design • Greater potential for accelerated construction programme • Attracts debt finance and discipline	• Possible conflict between planning & environmental considerations • Contracts can be more complex & tendering process can take longer than for BOT • Contract management & performance monitoring systems required • Cost of re-entering the business if operator proves unsatisfactory • Funding guarantees may be required • Change management system required	• Suited to projects that involve a significant operating content • Particularly suited to roads, water and waste projects
concession	• Same as for DBFO except that the private firm recovers costs from user charges • Driven by the Incentive of the polluter pays principle and utilising private finance and transferring design, construction and operating risk	• Same as for DBFO plus: • Facilitates implementation of the polluter pays principle; & • Increases level of demand risk transfer & encourages generation of third party revenue	• As for DBFO plus: • May not be politically acceptable • Requires effective management of alternatives/substitutes, e.g. alternative transport routes; alternative waste disposal options	• Suited to projects that provide an opportunity for the introduction of user charging • Particularly suited to roads, water (non-domestic) & waste projects

Source Kong (2012)

Table 10 Selected successful PPP projects

Name of program	Established	Government role	Private sector role	Risk sharing
IL&FS Education (India)	Via a government tender process in 2010. There was substantial negotiation around costing and pricing	Provides school infrastructure, human resources (school principals, teachers) and state education Systems, and performance payments to private partners when milestones are achieved	Mobilize capital, procure hardware, set up computer laboratories in schools, provide specialized teachers, produce multimedia content, train teachers on using content and managing the laboratory, and conduct overall project monitoring and management	Private sector carries most of the risk—provides initial capital investment and running costs; takes time for reimbursement; risk of obsolete technology. Government's risk is around choice of partner
SchoolNet (Samoa)	Responded to a request for proposal to a tender to provide telecommunication infrastructure to schools in Samoa	Provides funding (through ADB grant) for the equipment and installation costs Provides access to schools to set up requisite infrastructure	Ensure that the network is set up and functional, and provide operational maintenance and internet access at noncommercial rate	Government takes the risk that the technology does not work Private sector takes the risk that the character of the network may change

(continued)

Table 10 (continued)

Name of program	Established	Government role	Private sector role	Risk sharing
Virtual University Pakistan (Pakistan)	Government established as not-for-profit institution to provide affordable quality education to students all over the country Partnerships with the private sector (to establish private virtual campuses) are via an application process based on demand	Provides program and TV-based teaching resources, online tuition support, administer and monitor examinations	Provides learning space, computer laboratories, uninterrupted power supply and broadband internet access, and good TV connections	Private sector carries most of the risk
NSDC and Talentsprint (India)	NSDC was established in 2008 under the Ministry of Finance. Private partners are solicited and invited to submit proposals outlining their value as technical and vocational education and training (TVET) partners	A catalyst for skills development and training by providing loans with favorable terms; provide the national framework for skills development and demand analysis	Provides infrastructure and equipment; develops training material for identified programs. Train the required number of people as per agreement with NSDC	NSDC's risk is that partner may be unsuccessful due to local contextual issues; inability to mobilize resources to deliver the services. Private partner's risks: taking on debt to set up training centers; dealing with local mind-sets to create TVET demand; and retaining students who may not want to study and join the work force

Source Sarvi, Balaji and Pillay (2015)

projects in Africa have reached the stage of financial closure. This represents over $8 billion since 2013, and indicates a far cry from the 400 infrastructure projects proposed by the PIDA[2] (Vallee, 2018).

6 Conclusion and Recommendation

The challenge of decrepit and deficit infrastructure across all sectors in the ECOWAS subregion is symptomatic of the challenges faced by sub-Saharan African economies and indeed the developing world. This chapter analysed two critical infrastructure components in the regional community: transport and information and communication technology (ICT). Both theoretical and empirical literature on infrastructure find evidence that infrastructure development is critical to Africa's long-term economic growth, and that without deliberate, focused policy, the infrastructure gap will widen with attendant negative consequences on growth, poverty reduction and overall development.

While a proper articulation of the state of infrastructure in ECOWAS is in place, the financial burden of bridging the infrastructure gap through financing of critical infrastructure projects in transport (roads, rail, ports, airports, etc.), power, ICT, water and sanitation, is however, posing a major constraint. This is because ECOWAS member states, with volatile national revenues, cannot afford to shoulder the burden of regional infrastructure financing, currently estimated at $1464 billion annually for power, transport and the ICT infrastructure components. It was against this backdrop of financing constraints that this chapter analysed the possibility of adopting the PPP framework, which is an evolving financing model in other developing countries.

There are definite merits derivable from the PPP model, notably that of risk sharing between the government and the private sector. A key attraction of the PPP mechanism is that it frees public resources, and thus allows funds to be deployed in other sectors. Depending on the type of PPP, the government might not commit any resources to financing a project, and so the design, construction, and operation risks fall on the private sector, who must operate the facility efficiently in order to recoup capital and consequently make profit. Efficiency and sustainability are thus guaranteed as the private operator is sufficiently incentivized by the profit motive. With PPPs, the payments structure is such that no payments are made until facilities are ready; payments are based on use as well as on availability.

In advocating for the PPP model, we also noted copiously some of the stern criticisms of the approach, and the counter arguments in its defence. In all, we believe that PPPs can still offer a credible and sustainable financing alternative for infrastructure projects in the ECOWAS if the right legal and institutional framework is established to address the above identified constraints. Existing legal arrangements across ECOWAS countries need to be harmonized and streamlined to global best practices. Furthermore, capacity building and expertise from the two strategic divides must

[2]Maude Vallee: PPP laws in Africa: Confusing or Clarifying?

be constantly enhanced, as well as project prioritization with the aim of improving success rates of PPPs. Not the least, there is need for a clarification of concepts and terminologies in the PPP model. As suggested by July (2018), PPPs should be classified based on the entity that bears the burden of repayment of project or service cost. Thus, if it is paid by users, it should be called User-Paid PPPs, instead of concession PPP; and it could be termed Availability-based PPPs if the government makes the payment to the private firm upon provision of the public asset or service. There is also need for well-established mechanisms to aid transparency and objectivity of the process, as well as an objective and quantifiable bid evaluation and award criteria.

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Illicit Financial Flows and Financing of Basic Social Services: A Comparative Study of Opportunity Cost Between CAEMC and WAEMU Zone

François Colin Bouhem and Daniel Gbetnkom

Abstract This study aims to compare the opportunity cost of illicit financial flows in terms of financing basic social services in CAEMC and WAEMU zone. For this, we use the ICOR simulation method based on the Harrod and Domar model and recently applied by Nkurunziza (2015) and Moulemvo (African Economic Review 28:113–123, 2016). The results of these simulations show that based on the calculated ICOR coefficient, we estimate the loss of GDP in CAEMC at 18 billion USD and that of WAEMU at 13 billion USD. This loss of GDP in the victim countries would make it possible to allocate additional resources for public social spending.

Keywords Basic social services · CAEMC · ICOR · Illicit financial flows · WAEMU

JEL Classification F21 · H26 · C67 · O11

1 Introduction

Today, investing in human capital is one of the major concerns of public policy around the world. Its funding could provide solutions to several problems that governments have faced in recent decades. These include slower economic growth, rising unemployment and income polarization.

Focusing on the determinants of the wealth of nations, Smith emphasizes the importance of human determinants in economic growth. As a result, many economists (Lucas 1988; Romer 1990; Barro 1990) have shown that skills are paramount. These are the arguments that constituted what she today calls "the human capital theory".

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It suggests that individuals have improved their productivity through investments in education and health. In addition, if we move to the macroeconomic level, the human capital theory assumes that it is good, that we can improve its economic growth, basic social services such as education and health. However, in the context of developing economies, we are witnessing the Lucas paradox.

This is why social services funding remains very low in poor countries in Africa, yet Africa is losing out in the form of illicit financial flows. Many countries have experienced economic growth over the last decade despite a slowdown. Paradoxically, this continent remains the least developed in the world.

In a context of crisis, we must rationalize the resources of the State. Add to that, there are the FFIs which reduce state revenues. Thus, the implementation of structural adjustment programs from the 1980s enabled African governments to get out of the productive system with negative impacts on education and health.

On the theoretical level, the relationship between the IFFs and the financing of social services has remained under-documented. The link between the two variables is essentially attributed to the effect on government expenditures. Low-income governments face funding constraints and are unable to provide basic social services. If the IFFs were reinvested in the economies, the governments in question will mobilize more domestic resources into the lever of this constraint.

Among the main constraints related to the development of Africa, one can quote the insufficiency of the capital to finance the investment and the public expenditure. Although remittances from the diaspora and state aid have occurred over the past year, this is the financial gap for development in large-scale Africa. The paradox is that Africa is a "net creditor" of the rest of the world.

Tax evasion, the diversion of state wealth by political elites and the transfer of legitimately unlimited resources lower tax revenues. This drop in tax revenues has fewer resources allocated to government spending. From all of the foregoing, it appears that IFFs have social consequences in terms of public service delivery. Therefore, the purpose of this article is to provide an illustration of the social scale of the problem as the financial scale.

The rest of the article is organized as follows. The first part of the economic literature is on the IFFs relationship and the financing of basic social services. Before that, we determine the indicators of social services. The second section is reserved for the empirical presentation of the African case. This is to present the simulation model first and present the results of these simulations thereafter.

2 IFFs and Funding of Basic Social Services: Let's Talk About the Data

It is recognized in the economic literature that IFFs files have been used for funding basic social services. We need public services for the development of the region, but it is also possible to display them.

In the case of the African economies of CAEMC and WAEMU, outward capital flows are steadily increasing. The following graph shows the evolution of finance in the African economies of the Franc zone (Fig. 1).

Two major facts emerge from this graph. First, and as mentioned above, the volume of outward FFIs from the African economies of the Franc zone is constantly increasing. Indeed, these flows went from less than 10 billion dollars in 2004 to almost 15 billion in 2013, with a peak of 17 billion in 2008. Thus, between 2004 and 2013, the IFFs out of the Franc zone experienced a growth of around 50%.

The second fact relates to the growth rate of these flows over the period considered. They experienced different growth rates over the period studied. Over the subperiod 2004–2008, they grew at an exponential rate, while over the 2009–2013 subperiod, the growth of these flows is more moderate (with even phases of declines).

However, since the Franc zone is not a uniform zone, a comparative analysis of the inventory of IFFs in the two regions making up the zone, namely CAEMC and WAEMU, should be made. The following graph thus shows the comparative evolution of the outgoing IFFs of these two regions over the period 2004–2013 (Fig. 2).

Overall, the evolution of the outgoing IFFs of these two regions of Africa presents a similar trajectory and in conformity with the previous chart which presented the evolution of these flows in the Franc zone in the sense that they are increasing over the considered period. However, in comparison with the case of the Franc zone in its entirety, they are experiencing more ups and downs.

In 2004, the volume of outgoing WAEMU IFFs was larger than that of CAEMC. This state of affairs lasted until the beginning of the 2010 decade. However, since 2010, the outgoing FFIs of CAEMC have grown faster than those leaving the WAEMU. As a result, since 2013, the outgoing FFIs of CAEMC have become more important than those leaving WAEMU. This phenomenon, which is more or less counterintuitive, can be explained by the political evolution in these regions. Indeed,

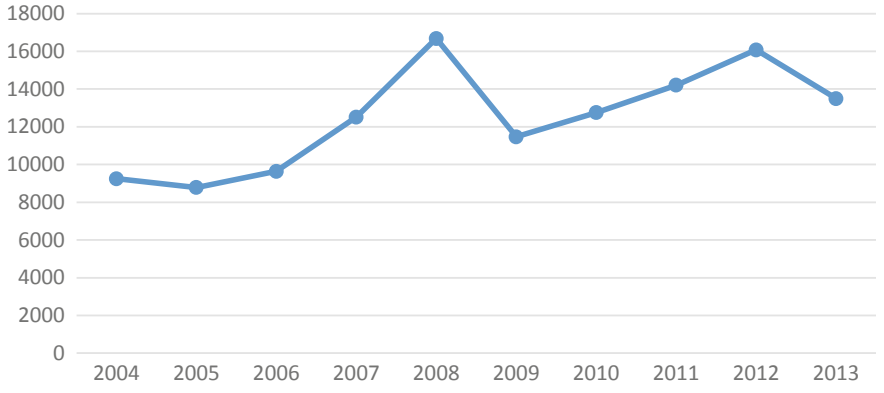

Fig. 1 Evolution of IFFs in CAEMC and WAEMU Source: authors, based on data from WDI (2017)

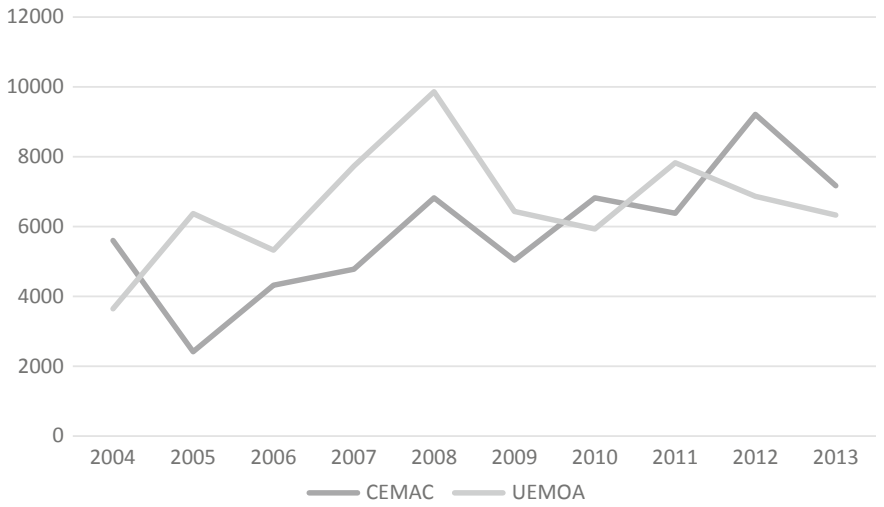

Fig. 2 Comparative evolution of IFFs in CAEMC and WAEMU Source: authors, based on data from WDI (2017)

since the beginning of the decade 2010, almost all WAEMU countries have experienced a strong wave of democratic change of political leaders, compared to the CAEMC economies, which experienced very little political change in the said period. This phenomenon of democratization, often driven by popular demands, may explain the relative decline of corruption in the case of WAEMU and hence the decline of IFFs in the same period.

The magnitude of these flows has a direct impact on the development of these economies. The graph below shows the comparative evolution of public spending on education in WAEMU and CAEMC. Between 2004 and 2013, the share of education in GDP increased from 3.8 to 3.3%. At the same time, Illicit Financial Flows increased from 5.8 to 4.4%. We note a higher rate of decline for FFIs compared to public spending on education. This is a decrease rate of 0.5 points for public education spending and 1.4% for IFFs. In the 2007–2009 subperiod, there are two peaks (2007, 2009) in the evolution of the IFFs, which correspond to the pre- and post-crisis periods. But also a dip that corresponds to the global economic crisis. All this contributes to reducing domestic resources allocated to education. As an illustration, from 2004–2005 and 2012–2013, the increase in FFIs is accompanied by a decrease in the share of education expenditures in Sub-Saharan GDP. Looking at the graph, we can say that funding for education remains low in Africa. In fact, in Sub-Saharan Africa, education expenditures are steadily decreasing (Fig. 3).

In addition, the problem of financing the health of a state is crucial for economic policies, not only for developing countries, but also for emerging and even developed countries. It is important in international development policies, like the sustainable development goals. Several studies postulate that improving health conditions in developing economies should be put forward in development policies. This is not

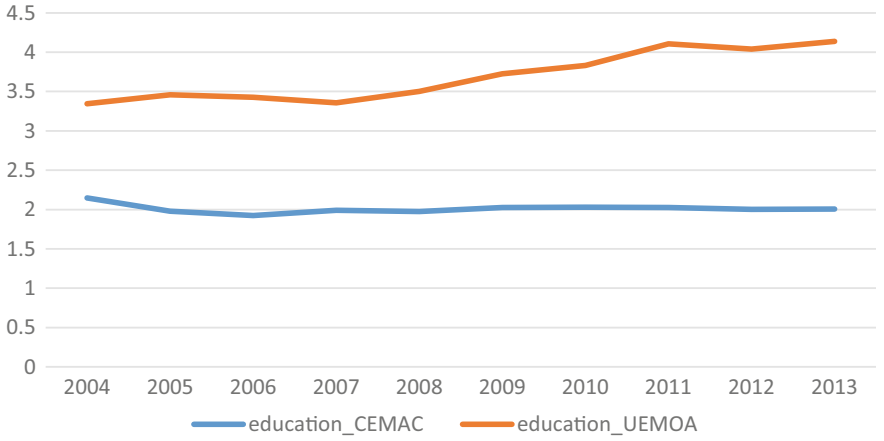

Fig. 3 Evolution of public education expenditure in CAEMC and WAEMU Source: authors, based on data from WDI (2017)

only because health issues are a dimension of poverty, but also because poor health conditions allow the aggregate level to keep poor economies underdeveloped. These findings helped to focus some of the attention of researchers on the problem of mobilizing domestic resources available to finance health.

These are the relevant findings that can be made by questioning African data on the evolution of health status and IFFs in the Franc zone during the period 2004–2013 (Fig. 4).

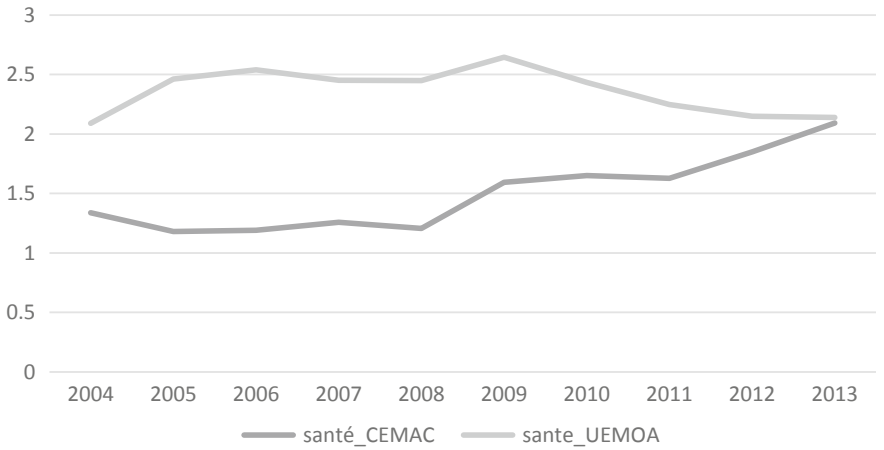

Fig. 4 Evolution of public health expenditure in CAEMC and WAEMU Source: authors, based on data from WDI (2017)

3 Channels Transmissions of the Effect of IFFs on the Financing of Basic Social Services

The consequences of IFFs in developing countries are a major concern. This subject has not been sufficiently addressed in the literature. However, some aspects have been the subject of theoretical and empirical studies while taking into account the consequences on investment, economic growth and public revenues. These studies indicate that IFFs pose many challenges for domestic resource mobilization in developing countries.

From this literature, it is possible to identify the main channels through which IFFs affect the funding of basic social services such as education and health.

The corruption channel

In the relationship between IFFs and funding for basic social services, corruption reflects the lack of public resources that is reflected in the gap between the actual infrastructure forecast and the level of resources committed. Thus, corruption distorts the structure of public spending in the sense that corrupt officials tend to favor investment projects that generate higher bribes (Shleifer and Vishny 1993, Mauro 1998). In addition, IFFs reduce funding for basic social services by diverting resources and transferring resources away from the country of origin (Ndikumana, 2015). Similarly, Delavallade (2006) finds that a significant portion of public spending can be diverted by corrupt officials and thereby it reduces the financing of social services that benefit the community.

The public revenue channel

Outflows could affect public social spending through the reduction of the basic tax (Khodaei 2012; Saheed and Ayodeji 2012). Since government revenues depend on income and economic conditions, a massive outflow of capital would reduce government revenues and its ability to fund basic social services. With this in mind, IFFs are a burden on the budget of African countries. Two mechanisms can be mentioned at this level. First, at the household level, a higher GDP induces higher resources and thus an improvement in the living conditions of households. Second, at the state level, higher GDP leads to higher tax revenues. Following this increase in tax revenues, if the government is effective and controls corruption, there will be an increase in public social spending. This idea is justified by the fact that all units of GDP are not taxable yet a unit of IFFs is likely to be taxable because the IFFs are mainly motivated by the desire to escape the tax.

The government's debt channel

The government debt is two-sided. On the one hand, it aggravates the living conditions of the populations. On the other hand, debt repayment forces the government to make massive cuts to its budget. It shows that debt repayment reduces a country's ability to allocate resources for education, health and other services that enhance the well-being of the population. According to Ndikumana and Boyce (2013), each additional dollar in debt service leads to less than 29 cents in terms of public health expenditure and induces additional infant mortality.

4 FFI and Financing of Basic Social Services: Empirical Validation

The empirical presentation consists of presenting in turn the modeling of the IFFs financing of basic social services and discussing the results.

4.1 Modeling the IFFs Relationship and Basic Social Services in Africa

Analyzing the opportunity cost of IFFs in terms of financing education and health is to assess the shortfall in terms of financing social services. Indeed, if illegally released capital were reinvested in African economies, there will be benefits in terms of basic social services and achieving the SDGs. To this end, following Nkurunziza (2015) and Moulemvo (2016), the study uses a methodology based on the ICOR (Incremental Capital Output Ratio) derived from the Harrod–Domar model.

4.2 Presentation of Economic Simulations Model

Simulations in terms of GDP loss: ICOR

We start from the ICOR estimate. This coefficient represents the number of units needed to create an additional unit of GDP. This simulation method is based on the Harrod–Domar model. The ICOR coefficient is calculated by dividing the investment ration by the GDP growth rate.

$$ICOR_t = \frac{(I/GDP)_t}{g_t}$$

where I/GDP is the investment ratio on GDP, g is the growth rate and t is the time.

Given the fact that the growth rate is highly volatile and the investment rate is high, this leads to the wide variations in the ICOR. It is for this reason that we use the median of the ICOR in this work.

Under the assumption that the additional productivity of an individual would be at least equal to the productivity of the current investment, the ICOR method generates the additional GDP that would be induced by the investment of IFF in the domestic economy.

The following equation conveys this idea:

$$PGDP_{it} = \frac{IFF_{it}}{ICOR_t}$$

Subsequently, we can simulate the opportunity cost of IFFs in terms of basic social services that were not funded because of the loss of this capital (PGDP). It is a question of dividing the IFFs by the median of the ICOR coefficient obtained.

The impact of IFFs on financing education and health

To this end, it is important to determine the impact of IFFs on the potential increase in GDP per capita associated with the additional GDP resulting from IFFs investment in the domestic economy. Three steps allow us to achieve this goal.

The potential level of GDP in the case where IFFs are invested domestically is given by

$$\boldsymbol{GDP_t^* = GDP_t + PGDP_{it}}$$

According to this expression, the potential GDP ($\boldsymbol{GDP_t^*}$) is obtained by summing the GDP observed in period t ($\boldsymbol{GDP_t}$) and the loss of GDP related to illicit financial flows ($\boldsymbol{PGDP_{it}}$).

From this equation, GDP per capita growth is obtained as follows:

$$\boldsymbol{\Delta GDP/hbt_t^* = \frac{GDP_t^* - GDP_t}{POP}}$$

More explicitly, per capita GDP growth is calculated by dividing the GDP loss relative to illicit outflows ($\boldsymbol{PGDP_{it}}$) by the total population (**POP**).

The growth rate of GDP per capita for a period of n years is given by

$$\boldsymbol{g^*_{t=\frac{1}{n}} \sum_{t=0}^{n} \frac{GDP/hbt_t^* - GDP/hbt_t}{GDP/hbt_t}}$$

Thus, the growth rate is obtained in two stages. First, divide the loss of potential GDP per capita ($\boldsymbol{PGDP_{it}}$)) by GDP per capita ($\boldsymbol{GDP/hbt_t}$) and then divide the result by the number of years n. We then have the average growth rate over n years.

So, the potential impact of FFIs on financing of basic social services is given by

$$\boldsymbol{\Delta I_t = g^*_{t.} a_t}$$

where $\boldsymbol{\Delta I_t}$ is the opportunity cost of illicit financial flows as an indicator associated with the SDGs;

and $\boldsymbol{a_t}$ is the growing elasticity of the SDG indicator such as the growing elasticity of poverty.

Finally, the opportunity cost is given by the product of the potential growth rate ($\boldsymbol{g^*_{t.}}$) and the increasing elasticity of the indicator associated with the corresponding social services ($\boldsymbol{a_t}$).

5 Simulation Results

In this subsection, two simulations are performed. The first is on GDP to see how much the GDP varies if the IFFs were reinvested in the countries of origin. The second and the third relate to simulations in terms of public social spending.

5.1 Opportunity Cost in Terms of Growth

Table 1 below provides statistics on ICOR and the loss of GDP related to illicit financial flows. In addition, it provides information on the additional GDP that Africa loses in the form of illicit financial flows.

It can be seen from this table that between 2004 and 2013, the CAEMC average ICOR is 4,344 and the WAEMU average is 4,578. In addition, the volume of IFFs recorded in the two communities has caused the CAEMC to lose approximately $ 18.5 billion in GDP between 2004 and 2013 (with an IFF volume of approximately $59 billion). During the same period, WAEMU lost about $13.15 billion of its GDP due to these IFFs ($66 billion in WAEMU), which shows that the IFFs represent a greater burden in the CAEMC than in the WAEMU in the sense that the loss of GDP

Table 1 Calculation of ICOR and GDP loss in Africa

Countries	Period	ICOR	Loss GDP
1-Cameroon	2004–2013	5,94	1 264 570 416
2-Congo	2004–2013	3,321	4 585 040 154
3-Gabon	2004–2013	4,85	646 548 825
4-Chad	2004–2013	5,77	1 862 354 478
5-CAR	2004–2013	4,033	40 101 432,7
6-Equatorial Guinea	2004–2013	2,15	10 074 315 803
		4,344	18 472 931 109
Countries	Period	ICOR	Loss GDP
1-Togo	2004–2013	5,58	3 991 497 575
2-Mali	2004–2013	4,59	1 021 044 641
3-Niger	2004–2013	4,703	334 180 332,4
4-Bissau-Guinea	2004–2013	1,77	349 762 578,7
5-Ivory Coast	2004–2013	4,81	4 849 527 156
6-Benin	2004–2013	4,705	317 247 619,1
7-Burkina Faso	2004–2013	4,16	1 023 638 124
8-Senegal	2004–2013	6,31	1 272 982 869
		4,5785	13 159 880 895

Source author's calculations

related to IFFs in CAEMC is greater than that in WAEMU, yet the latter subregion has more FFIs, i.e., if the illicit capital out of the continent were reinvested at the local level, the GDP in both communities would increase to the level of these losses.

Moreover, this loss of GDP could make it possible to finance basic social services.

5.2 Opportunity Cost in Terms of Public Expenditure on Education

According to our results (Table 2), two patterns are to be distinguished from the loss of public funding of education.

– The minimum scenario

This is to memorize the minimum expenditure of public expenditure in the GDP of two subregions between 2004 and 2013. Thus, during the study period, the loss of GDP generated an average minimum allocation of $30.5 million in CAEMC and $45 million in WAEMU.

– The maximum scenario

This is the maximum part of education spending in African GDP over the period 2004–2013. The results reported in Table 2 average $63.7 million compared to $66 million in WAEMU. This result can be explained by the fact that the WAEMU countries have a significant share of their GDP in education compared to those of CAEMC.

5.3 Operating Cost in Terms of Public Health Expenditure

Two schemas in the analysis are also considered at this level.

– The minimum scenario

Table 3 shows that CAEMC has lost an average of at least $30.6 million of GDP in terms of public health spending while WAEMU has lost $59 million in terms of health financing.

– The maximum scenario

When the same analysis was made, the maximum GDP that could be allocated to health services on average would be $63 million in the CAEMC countries and 78 in the WAEMU countries.

CAEMC and WAEMU, the cost of the potential impact of compensation in terms of public expenditure is therefore very important for the increase of the living conditions of the populations.

Table 2 Opportunity cost in terms of public education expenditure

Countries	Period	Min education	Loss min education	Max education	Loss max education
1-Cameroon	2004–2013	2,51	31 740 717,44	2,96	37 431 284,32
2-Congo	2004–2013	2,52	11 554 301,19	3,33	152 681 837,1
3-Gabon	2004–2013	3,06	19 784 394,05	3,06	60 540 245,8
4-Chad	2004–2013	1,01	18 809 780,23	1,62	30 170 142,55
5-CAR	2004–2013	1,15	461 166,4755	1,61	645 633,0658
6-Equatorial Guinea	2004–2013	1	100 743 158	1	100 743 158
CAEMC (Mean)	**2004–2013**		**30 515 586**		**63 702 050**
7-Togo	2004–2013	1,28	130 921 120,5	5,09	203 167 226,6
8-Mali	2004–2013	3,35	34 204 995,46	4,44	45 334 382,04
9-Niger	2004–2013	2,635	8 805 651,757	4,16	13 901 901,83
10-Bissau-Guinea	2004–2013	1,165	4 057 245,913	1,87	6 562 817,841
11-Ivory Coast	2004–2013	4,04	195 920 897,1	4,507	218 575 116,8
12-Benin	2004–2013	3,23	10 247 098,1	4,79	15 196 160,96
13-Burkina Faso	2004–2013	2,96	30 384 961,34	4,31	44 118 803,14
24-Senegal	2004–2013	3,56	18 912 542	3,19	16 925 642
WAEMU (Mean)			**45 318 190,14**		**66 067 810,91**

Source author's calculations

6 Conclusion

Illicit financial flows are a crucial obstacle in mobilizing domestic resources to finance development. Thus, in this study the main objective was to economically simulate the opportunity cost of illicit financial flows in terms of financing basic social services in Africa. Specifically, two simulations are supported in this chapter. The first concerns the loss of GDP related to IFFs. The second relates to the loss of GDP that could be allocated to public spending on education. To perform the first simulation, the study was based on the ICOR derived from the Harrod–Domar "financing gap"

model. More recently, this methodology has been used by Nkurunziza (2015) and Moulemvo (2016) to simulate poverty.

In view of these economic simulations, several results follow. Based on the calculated ICOR coefficient, we estimated the loss of GDP in CAEMC at $18 billion and that of WAEMU at $13 billion. Indeed, this loss of GDP in the victim countries would allow allocating additional resources for public social spending.

Following these main results, African governments must limit the extent of illicit financial flows in order to enable the continent to improve the living conditions of populations, particularly in relation to indicators of basic social services. All this through the channels are mentioned in the literature review. The aim is to fight against corrupt practices, to pay taxes to avoid tax evasion of capital and to encourage better management of the external debt.

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Migrant Remittance Inflow and Industrialization in Africa: What Role Does Financial Development Play?

B. W. Adeoye, Chinenye Ifeoma Nwokolo, and Nnenna Ifunanyachukwu Igboanugo

Abstract The eruption of Global Financial Crises at the rear end of 2008 with its aftermath effect has shifted the focal point of financial-cum-capital reliance of most developing countries away from sources of finance induced externally. This, however, kick-started research interest toward considering other ways of sourcing financial resources for development apart from the widely known sources like foreign portfolio investment (FPI), foreign direct investment (FDI) and official development assistance from overseas. This notwithstanding, migrants' remittances imperatively remain a better source of finance as it is found to be more resilient, in times of macroeconomic shocks and other natural disturbances compared to other sources of capital flows. This uniqueness has made it a point of focus to African Development practitioners as a more reliable source for financing development in Africa. Thus, for any developing country to have a sustainable development it must transit from agricultural produce to industrialization as it is seen as the bedrock of development. This ignited our motivation for this study to assess how migrant remittances can directly and/or indirectly influence industrialization using a panel data of 46 African countries from 1980 to 2017. The direct effect is evaluated through financial development channels. The study used both interactive and non interactive empirical evidence methods for a more robust estimation; this includes (a) Fixed Effects techniques (FE) to rule out heterogeneity; (b) General Method of Moments (GMM) to rule out persistence in industrialization and (c) Instrumental Quantile Regressions (QR) to explain for the previous levels of industrialization. The non interactive stipulations will give account for the direct impact of migrant remittances on industrialization while the interactive stipulations will account for the indirect effect. The findings clearly show that personal remittance inflows can only drive industrialization through financial development at the early stage.

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JEL Classification O55 · F24 · G20 · F63

1 Introduction

The eruption of Global Financial Crises at the rear end of 2008 with its aftermath effect has shifted the focal point of financial-cum-capital reliance of some developing countries away from sources of finance induced externally. This, however, kick-started research interest toward considering other ways of sourcing financial resources for development apart from the widely known sources like foreign portfolio investment (FPI), foreign direct investment (FDI) and official development assistance from overseas (Efobi, Asongu, Okafor, Tchamyou, & Tanankem, 2016; Ajide & Alimi, 2018; Olayungbo & Quadri, 2019). This notwithstanding, migrants' remittances imperatively remain a better source of finance, due to the fact that it is found to be more resilient compared to other capital inflows in times of macroeconomic shocks and other natural disturbances (Ratha, Mohapatra, & Xu, 2008). This uniqueness has made it a point of focus to African Development practitioners as a more reliable source for financing development in Africa. In addition, African Development Bank and United Nations Economic Commission for Africa have advised Africans to refocus their attention by leveraging on migrant's remittance.

It was observed in Fig. 1 that remittance has been less pro-cyclical compared to other foreign inflows to Africa. Hence, the motivation for this study is the importance Africans have attached to remittance due to its consistent and continuous flow despite the economic conditions faced by the home country. Consequently, this study examines the likelihood of remittance driving industrialization in Africa and the complementary effort of financial institutions in achieving this industrialization.

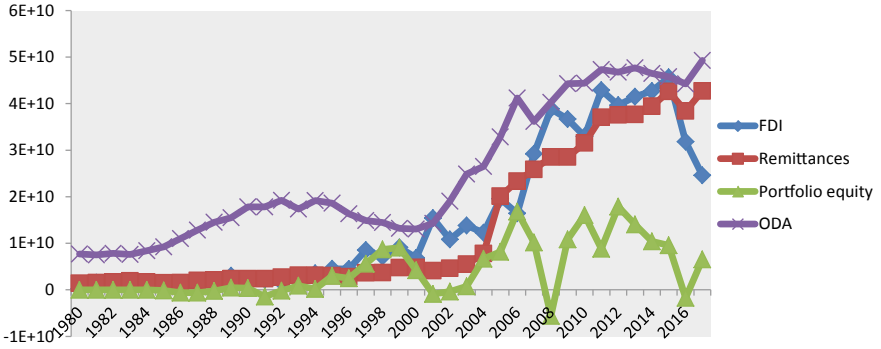

Fig. 1 Foreign inflow to Africa. *Source* Authors' Computation from World Development Indicators (2018)

Moreover, agricultural produce dominates Africa's economy and has also been the major share of foreign exchange earnings especially in Sub-Saharan African countries. (UNCTAD, 2014; Loto, 2016). The adverse effect of this situation includes harming the institutional structure and rent-seeking behavior due to over-dependence on primary produce, exposing the economy to external shocks caused by commodity price change and the country stands at risk because it can be easily broken into by opposing parties that want to take over control of the resources (Collier & Hoeffler, 2001). In addition, this scenario has resulted in the importation of virtually other consumables, eroding the performance of the manufacturing/industrial sectors. More so, it has increased the poverty level because this sector cannot address the rising unemployment rate as the real sector (manufacturing sector). At this point, these tendencies necessitate structural transformation in African countries by moving from primary-based products to industrialization (Chenery & Strout, 1966) considering the negative effect of over-dependence on the primary commodity.

Based on this scenario, it is crystal clear that industrialization is pivotal in Africa. It is widely believed that industrialization will build a more resilient economy that will help to create jobs, improve the standard of living of the people and reduce poverty (Adeoye, 2004; Dauda & Odior, 2016; Loto, 2016).

In the light of the foregoing, several developmental initiative programs have focused on industrialization as the way forward in Africa to combat the rising poverty level and make growth inclusive. For instance, The African Development Bank High5s target considered industrialization as its third goal that will help quicken economic transformation to improve the living conditions of Africans. Also, the African Union Agenda 2063 was designed toward growth and industrialization. In addition, Industrialization is the Ninth Sustainable Development Goals targeted at reducing poverty and increasing living standard of people in Africa through job creation. However, one of the main constraints of industrialization in Africa is capital which has made most countries in the continent resource-dependent. Nevertheless, if remittance is well harnessed due to the huge volume of inflow to Africa[1] and it's less cyclical and volatile nature compared to other capital inflows (see Fig. 1), it can possibly drive industrialization in Africa.

To this end, the impact of migrant remittance on industrialization is assessed with a panel data of 46 African countries spanning from 1980 through 2017. Our important research questions are as follows: to what degree will migrant remittance drive Africa's industrialization? Can this outcome be influenced by the efficiency of financial institutions in various African countries? A survey of the literature on the combined impacts of remittance and financial development on industrialization, from a developmental view of Africa as a whole, reveal there are relatively scanty studies on the issue of the concept. This avails the study opportunity to fill this most recent gap in the literature. Consequently, the importance of this paper is due to the rising trend of migrant's remittance inflows into Africa and the rising policies interest on how to optimally maximize this enormous financial resource. Therefore, to help

[1]From $14 billion in 2001 rose to $40 billion in 2010 and further sprout to $52 billion in 2015 (World Bank, 2017).

resolve the menace of industrialization peculiar to Africa, it is necessary to have a critical view on this issue of context, which would be of help in specifying directions for new policies for development in Africa.

The next section of our paper presents the stylized fact on migrant's remittance inflow, industrialization in Africa and the role of financial development; the third section critically reviews the literature on how remittance inflows can drive industrialization; the forth section comprises the methodology and overview of the data used, while the fifth section contains empirical results and discussion. The final section concludes and makes relevant policy prescriptions and developmental strategies.

2 Stylized Facts on Migrant's Remittance Inflow and Industrialization in Africa

To further broaden our understanding of the variables of interest to this paper (migrant remittance Inflow, industrialization in Africa and the role financial development plays), we explore a trend analysis of the variables for 37 years (1980–2017). Figure 1 presents the comparison trend of the industrial sector performance in Africa and other regions across the world. It was observed that the annual growth rate of the industrial sector in SSA was negative between the period 1982–83 and sprouted to about 4% in 1984; it has incessantly declined after this period until in the year 2000 when it got to a peak of 5%. After that it consistently declined up till 2017. Overall, the industrial annual growth rate was not more than 5% for the entire period of 1980–2017. Excluding countries in Europe and Central Asia/Latin America and the Caribbean, countries from other regions like South Asia and East Asia and the Pacific witnessed a higher growth rate than Sub-Saharan African countries (Fig. 2).

In addition, we further looked at the contribution of the GDP growth rate by sector, in other to compare the industrial sector performance with other sectors in SSA

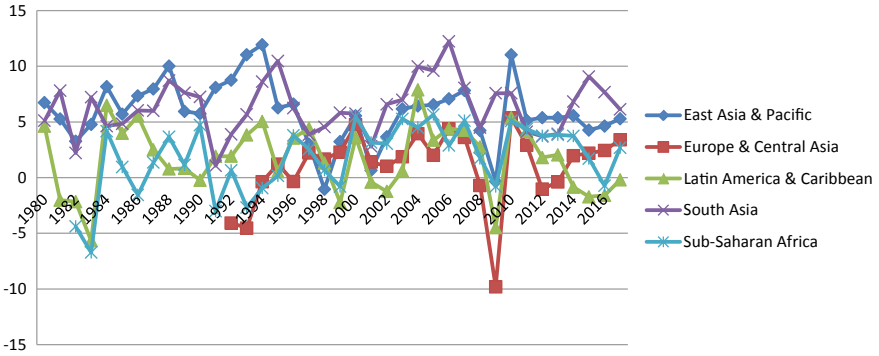

Fig. 2 Industry, value added (annual% growth). *Source* Author's computation from World Development Index (WDI), (2018)

countries. Figure 3 presents an overview of the sectorial performance in SSA. Evidently, based on growth rate, the manufacturing sector performance is far below other sectors. Manufacturing value-added share of GDP (MVA) has been on the decline from 17% in 1981 to less than 10% in 2017, which is lower than those of the agricultural and service sectors. It is apparent from the trend analysis above that Africa has leapfrogged from the agricultural sector to the service sector skipping industrialization. However, several factors have been attributed to the poor performance of the manufacturing/industrial sector in the region most especially the capital among others. Hence, this constraint has made the sector to continue to underperform. Capital is an important input factor that can spur growth in the sector (Solow, 1956; Gui-Diby & Renard, 2015). In recent times, remittance is seen as an essential capital flow that can influence the performance of the industrial sector in Africa either direct or indirect. Based on this, we examined the trend analysis of diaspora remittance in the SSA region compared with other regions (Fig. 4).

Apart from South Asian countries, remittance inflow in SSA countries is consistently higher with volumes that are many folds more than those of East Asia and the Pacific, Europe and Central Asia as well as Latin America and the Caribbean countries. However, aside from South Asia, none of these regions have ever reached this threshold attended by the SSA region as displayed during the entire period of study.

Figure 5 illustrates the relationship between remittance and industrialization in African countries. The scatter plot presented includes a sample of some selected countries in the region, where industrialization is captured as MVA as a share of GDP as used by Efobi et al. (2016) and Gui-Diby and Renard (2015). While remittance is captured using personal remittance as a share of GDP, form the figure, it is observed that a weak negative relationship exists between remittance and industrialization in the selected African countries. Hence, as remittance is increasing, manufacturing value-added percentage of GDP is decreasing. Even using regression analysis (see Table 1), a slightly negative relationship of about 0.03806 exists between

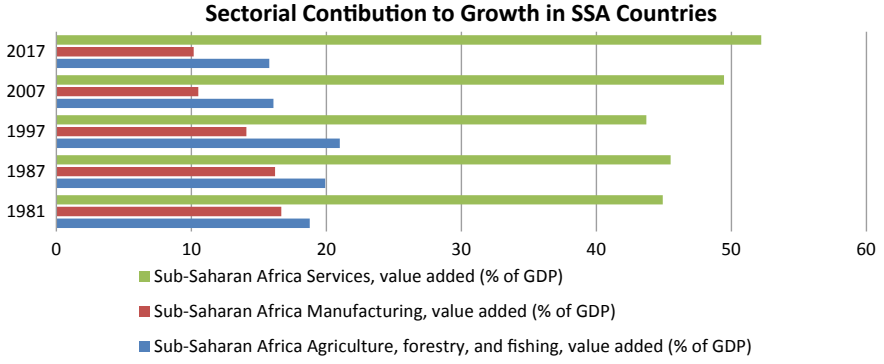

Fig. 3 Sectorial contribution to GDP in Sub-Saharan Africa (percentage). *Source* Author's computation from World Development Index (WDI), (2018)

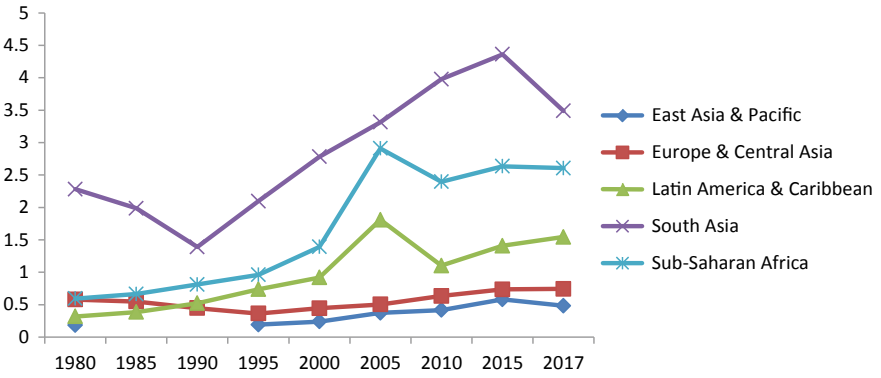

Fig. 4 Remittance inflow as a share of GDP. *Source* Author's computation from World Development Index (WDI), 2018

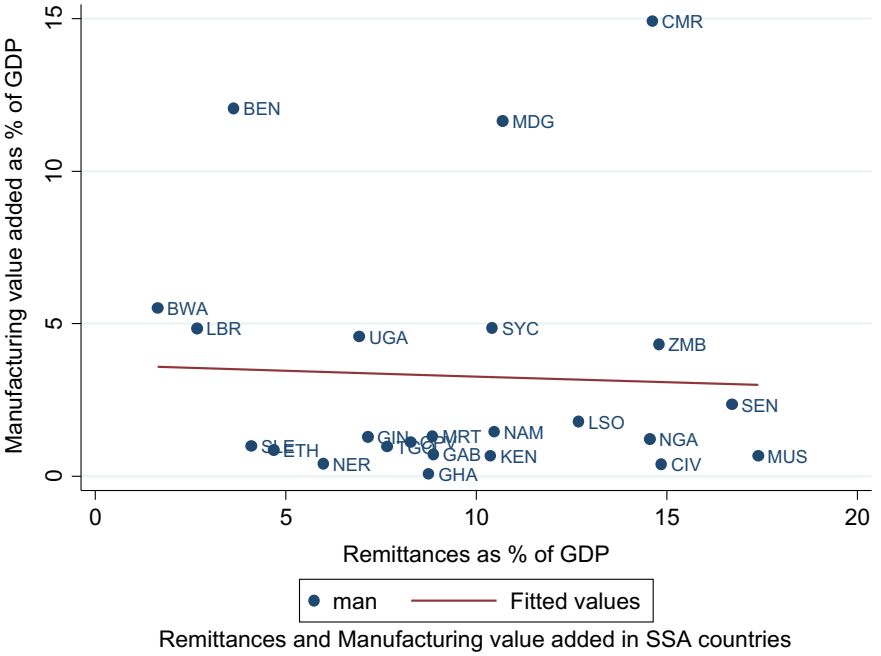

Fig. 5 Scatter plot (industrialization and Remittance in Africa from 1980 through 2017). *Source* Author's Computation (2019)

Table 1 Regression analysis for the scatter plot

Man				
	Coefficients	Standard error	*t* stat	*P*-value
Intercept	3.646429	2.017815	1.807118	0.08444
Rem	−0.03806	0.019360	−1.9660	0.04946

Source Author's Computation

the variables at a 5% significance level. Thus the argument that remittance can drive industrialization in African countries is subject to some factors (macroeconomic factors, inefficiency of financial institutions or the business environment). Although the relationship is preliminary, the study intends to use more sophisticated econometric analytical techniques that will help control for endogeneity and simultaneity issues.

3 Literature Review

This section of the paper undertakes a brief review of the literature and theory underpinning the determinants of migrant's remittance. The theory underpinning migrant remittance based on the literature is majorly channeled through two main factors which include pure altruistic motive and self-interest purpose. The altruistic motive posits that the migrant remit money to family members back home based on their welfare. Therefore, the migrant is satisfied when the well-being and consumption of the family left behind are better off. In a nutshell, remittance is viewed as a mechanism that absorbs shock in a circumstance where the migrant relations are worst hit by the deterioration in economic conditions such as financial crises. In such cases as this, remittance is considered as being countercyclical in nature since they are seen as compensatory transfer to smoothen the consumption of their family member in times of economic disturbances. For self-interest purposes, the motivation for migrant to remit funds to the home country is reduced due to the poor economic conditions in the domestic country. However, remittance is not always countercyclical. This is well spelled out by Lucas and Stark (1985:904); they posit that migrant remit money for investment or acquisition of assets in their home country and for them to be respected when they return to their home country (Stark, 1991, 1995).

On the empirical front, this paper is basically focuses on some salient empirical review that seemed central to the particular study at hand. Hence, the review of literature is in three strands, firstly studies on remittance and financial sector development and secondly, studies on remittance and industrialization.

Remittance and Financial Sector Development

Empirically, the nexus between remittance and financial sector development is well articulated in the literature. Several studies have examined how remittance promotes financial institution efficiency and in spite of different roles remittance plays in the

efficiency process, the raising academic interest on the issue of context is evidence that remittance stimulates efficiency in the financial institution.

Aggarwal, Demirguc-Kunt, and Peria (2011) assessed the link between remittance and financial development using panel data of 109 developing countries from 1975 to 2007. It was observed that remittance is positively significant to financial development. In the same vein, Cooray (2012) examined the effect of remittances on financial sector development in 94 non-OECD countries. It was established that remittances have a positive effect on the efficiency of financial development. In addition, the effect of remittances on financial institutions is felt more in countries where government ownership of banks is lessened. Similarly, Fromentin (2015) analyzed the effect of remittances on financial development in both Latin America and the Caribbean countries and posits that remittances impact financial sector development positively. Ojapinwa and Bashiru (2014) using a panel data of 32 SSA countries, assessed the impact of migrant remittance on financial development spanning from 1996 through 2010. They established that remittance impacts financial development positively across the countries examined. Kaberuka and Namubiru (2014) also recorded a positive impact in Uganda. On the contrary, a similar study was conducted by Karikari, Mensah, and Harey (2016) in 50 developing countries across Africa between 1990 and 2011. It was revealed that remittance does not promote financial sector development. Githaiga and Kabiru (2014) employed a panel of 31 countries spanning from 1980 through 2012 to investigate how remittances determine financial sector development efficiency and discovered that remittances are negatively related to financial sector development.

Remittance and Industrialization Nexus

Dzansi (2013) used a sample of 40 countries between 1991 and 2004. The study showed that remittance promotes the relative growth of traded manufacturing sectors in the home country. On the contrary, Acosta, Lartey, and Mandelman (2009) in their study revealed that the volume of migrant remittance is subject to the rise in real exchange rate and thereafter leads to lack of international competitiveness. This invariably results in a decrease in the output of both manufactured/tradable goods. Hence, remittances can also affect the performance of the manufacturing sector through the increase in demand for non-tradable goods. Amuedo-Dorantes (2014) analyzed the effect of remittance on manufacturing sector performance and found that non-tradable goods are more in demand than tradable ones which affected the production of the sector. In the same vein, Lartey, Mandelman, and Acosta (2008) also confirm this using a panel data of 109 developing countries spanning from 1990 through 2003. The findings showed that remittances have an impact on the prices of non-tradable goods compared to tradable ones. Hossain and Hasanuzzaman (2015) estimated the relevance of migrant remit in Bangladesh economy and showed that remittance impacts investment positively in the long run. It revealed that remittance can boost domestic entrepreneurship and enterprise.

It has been deduced from the literature that remittance can affect industrialization through direct or indirect channels. For instance, Hossain and Hasanuzzaman (2015) established a positive relationship between migrant's remittance and investment in

Bangladesh. Also, another direct effect of remittance is that it can drive industrialization through diaspora skill transfer from abroad to the home country (Brinkerhoff, 2006). Indirect channels through which remittance can influence industrialization include (i) the exchange rate which impacts the manufacturing sector performance negatively, by affecting the value of tradable manufacturing goods. (ii) Another indirect effect of remittance on industrialization is its positive impact on the financial institution by enhancing their level of efficiency (Aggarwal et al., 2011; Ojapinwa & Bashorun, 2014; Karikari et al., 2016). Thus efficiency in this context shows how the financial sector is able to pool savings and allocate is as capital for productive investment that can lead to industrialization in the long run (Ewetan & Ike, 2014; Olayungbo & Quadri, 2019). According to Amuedo-Dorantes, 2014, remittance inflows basically increase the consumption level of households; hence this will in turn affect the manufacturing sector through the rise in the demand for non-tradable goods. Regardless of the channel, what is important is maximizing the positive impact of migrant's remittance and bring about expected industrial growth. Hence, in achieving this, some factors need to be considered. For example, the government has to be involved in policies that are geared toward maximizing the gains from migrant's remit. Firms too need to be involved in this maximization process by promoting migrant's input through vertical integration of domestic businesses/enterprises. Also, individuals can also be involved in this through capacity and skill development. However, in all this government intervention is pivotal among others in maximizing the gains of migrant's remittance. Therefore, it is the duty of the government to create policy and economic incentives that are targeted at encouraging economic transactions. Improving the performance of financial institutions should be the major target of the policy. Hence, the contribution of the financial institution in the link between migrant remittance and industrialization is absolutely supportive. This simply implies that in spite of the quantity and quality of remittance inflows, the financial institution's contributory role in promoting productive investment and business development cannot be overlooked. Studies like Aggarwal et al. (2011), Kaberuka and Namubiru (2014), Ojapinwa and Bashorun (2014), Karikari et al. (2016), have established that positive relationship exists between migrant remittance and financial development basically in countries where there are improved financial institutions. Indisputably, a huge number of studies have examined as well as probed into how remittance inflow enhances financial institution efficiency in developing countries. However, studies on the tripartite relationship of the highlighted issue of context (migrant's remittance-financial development-industrialization) in Africa are scarce or at best emerging. This gave us the privilege to fill the existing gap in the literature.

4 Methodology

4.1 Theoretical Framework and Methodology

The theory that best explains the link between capital flows and industrial growth is the endogenous growth theory (AK model). This theory has been widely adopted by studies (Pagano, 1993; Bailiu, 2000; Saibu, 2014) that have explored the relationship between capital inflows and growth. The endogenous growth theory describes the expected outcomes of changes in financial development and capital inflows on steady-state growth based on the effect they have on capital accumulation. In this regard, the framework is drawn from the work of Pagano (1993), that used it to assess financial development-growth nexus. However, this framework is further extended to include capital inflow (remittances).

In the AK model closed economy version, the total production function is given as

$$Y_t = \mathrm{AK}_t \tag{1}$$

Output in Eq. 1, shows a linear function of the total capital stock. Hence, this production function can also be viewed in a reduced form as to where the economy competes with foreign economies as posited by Romer (1989) or the model where it is assumed to be either physical or human capital. Following the assumption that the stock of capital depreciates at δ per period, the gross investment becomes

$$I_t = K_{t+1} - (1 - \delta)K_t \tag{2}$$

In Eq. 2, only financial intermediaries can transfer savings to investment. In order to achieve this, they keep absorbing resources, ensuring that a dollar saved by individual yields less the dollar saved for investment. In this regard, the proportion of savings left after the financial intermediaries have taken their fraction for service rendered must be equal to gross investment which is required for capital market equilibrium. Thus capital market equilibrium ensures that

$$\varphi S_t = I_t \tag{3}$$

Using Eq. (1) through (3), the output growth rate (g) is written as

$$g = A\left(\frac{1}{Y}\right) - \delta = A\varphi s - \delta \tag{4}$$

where s represents gross savings. The equation shows the steady-state growth rate in the closed economy with financial intermediaries.

The model is further extended to include capital flows (remittances). Assume foreign residents want to invest in their home country or some fractions of the remittances

sent to family members are saved or used for investment purposes. Consequently, a large pool of savings will be available for investment. Thus, when there is a capital inflow (remittance), capital market equilibrium becomes

$$\varphi^*(S_t + \mathrm{Re}m_t) = I_t^* \tag{5}$$

The steady-state growth rate now becomes

$$g^* - A^*\frac{1^*}{Y} - \delta = A^*\varphi^*\frac{(S + \mathrm{Re}m)}{Y} - \delta = A^*\varphi^*S^* - \delta \tag{6}$$

Equation (6) shows the *AK* model steady-state growth rate with the financial intermediary and remittance inflow. Comparing Eqs. (4) and (6) in this endogenous growth model will highlight channels through which capital inflow (remittance) can influence growth. Remittance inflow can drive industrial growth if it leads to an increase in productive investment. However, some fraction of remittances should be used to finance productive investment not only for consumption.

Given that industrial growth is consequently captured by aggregate growth in the economy. Thus, to show the industrial growth rate Eq. (6) is re-written as

$$\mathrm{Ind} = f(A^*(\varphi^*S^* + \mathrm{Re}m) \tag{7}$$

4.2 Model Specification

Drawing from Bailliu (2000) and Saibu (2014) models on financial development, our model is specified as

$$\mathrm{Ind}_{i,t} = f(\mathrm{FinD}_{i,t}, \mathrm{Re}m_{i,t}) \tag{8}$$

$$\mathrm{Ind}_{i,t} = \lambda_0 + \lambda_1 \sum_{i=1}^{n=2} \mathrm{FinD}_{i,t} + \lambda_2 \sum_{i=1}^{n=1} \mathrm{Re}m_{i,t} + \mu_{i,t} \tag{9}$$

$$\begin{aligned}\mathrm{Ind}_{i.t} = \alpha_0 + \alpha_1\mathrm{BM} + \alpha_2\mathrm{DCPS} + \alpha_3\mathrm{Re}m_{i,t} + \alpha_4\mathrm{Elec}_{i,t} + \alpha_5\mathrm{AT}_{i,t} \\ +\alpha_6\mathrm{DI}_{i,t} + \alpha_7\mathrm{PoP} + \alpha_8\mathrm{TO}_{i,t} + \alpha_9\mathrm{FDI}_{i.t} + \mu_{1.t}\end{aligned} \tag{10}$$

Ind is industrialization measured by industry share percent of GDP and manufacturing share percent of GDP. BM denotes broad money as a percent of GDP, DCPS denotes domestic credit to the private sector, Re*m* is remittance, while other variables are control variables for industrialization like Elec which denotes electricity measured by electricity production capacity, AT represents assess to telephone, DI

is domestic investment measured by gross fixed capital formation, Pop denotes population growth, TO represents trade openness and FDI is foreign direct investment to explain economic globalization.

4.3 Data Source and Scope of the Study

This study used secondary data in a panel form comprising 46 Sub-Saharan African countries (SSA) based on the United Nations classification in 2018. The observation period spans from 1980 through 2017. Data was sourced from the World Development Indicator (WDI) of the World Bank (2018). The study adopted Generalized Method of Moment (GMM), Fixed Effect and Quantile regression technique for its analysis. The dependent variable in this study is industrialization which is proxy as MVA percentage of GDP and IVA percentage of GDP.[2] Our independent variables include personal remittance received (% of GDP) and financial development which is measured by variables that capture their access and efficiency level like credit to private sectors and broad money. This shows how efficient the financial institutions are in issuing credit to economic operators because aside from consumption, some fraction of migrant remittance is likely going to be deposited in the financial institution for either future consumption or investment. While our major focus in this study is migrant's remittance, financial development is the link through which migrant's remittance can induce industrialization in Africa. For industrialization, six control variables were employed namely Domestic investment proxy as Gross fixed capital formation percent of GDP, Electricity, Population growth, Domestic investment, Trade openness, Foreign Direct Investment (FDI) and Diaspora Bonds, Access to telephones. Diaspora Bonds are not included in the estimation due to lack of data for SSA countries, since it is anticipated that the a priori expectations of each variable will exert a positive impact on industrialization.

4.4 Empirical Modeling and Estimation Strategies

In estimating the Fixed Effect estimations, we employed the following estimation techniques: (a) Instrumental Variable Fixed Effects techniques (FE) to rule out heterogeneity; (b) General Method of Moments (GMM) to rule out the issue of persistence in industrialization and (c) Quantile Regressions (QR) to explain the previous levels of industrialization. Hence, behavior of the data is necessitated for multiple estimation strategies (Ajide & Alimi, 2018; Asongu & Nwachukwu, 2016; Efobi et al., 2016).

At this point, the instrumentation of the independent variables with the first lag is necessary due to the issue of simultaneity/endogeneity. Hence, the process for

[2]Bundled using Principal Component Analysis (PCA) technique.

instrumenting remittance is as follows:

$$\mathrm{PR}_{it} = \partial + \infty_j(\mathrm{PR}_{i,1-t}) + \mu_{ijt} \tag{11}$$

where PR stands for remittance at period t for country i, ∂ denotes constant, $\mathrm{PR}_{i,t-1}$ denotes remittance at country i at time $t-1$ and μ_{ijt} is stochastic error term. Thus, the fitted values from the instrumentation are the independent variables used in the Fixed Effect and QR specification. Fixed Effect is necessary because the study focuses on a specific N set of countries (set of 46 SSA countries) (Baltagi, 2008).

Hence, the panel Fixed Effect model is expressed as follows:

$$\mathrm{Ind}_{it} = \phi_0 + \phi_1\mathrm{PR}_{it} + \phi_2\mathrm{FinD} + \phi_3\mathrm{PRFinD}_{it} + \sum_{h=1}^{6} x_h X_{hji} + \eta_1 + \mu_{i.t} \tag{12}$$

where Ind_{it} denotes industrialization, PR represents remittance, FinD denotes financial development, PRFinD_{it} denote interaction between remittance and financial development, X represents a set of other covariance (Domestic investment, Trade, Access to telephone, Electricity, Population growth, FDI, Diaspora Bonds), ϕ is constant, η_1 is the country specific effect, subscript i denotes cross-section countries dimension, subscript t represents time series dimensions and μ_{it} denote the error term.

4.5 General Method of Moment (GMM)

For the study to account for endogeneity bite and also to establish the link between the variables, the system GMM technique was adopted. The motivation for adopting this technique includes (i) that the estimation techniques are appropriate in handling the issue of persistence in industrialization (dependent variable). The correlation coefficient of industrialization with its first lag supersedes rule of thumb threshold value. (ii) It appropriates in studies where $N > T$: the sample size N which is the number of countries observed must be far greater than T (number of years). For this study, our sample size which is 46 is greater than the time period 37. (iii) The estimation technique is fit to rule out endogeneity issues. (iv) The GMM technique is consistent with cross-country variations. Following the fourth, it has been suggested by Bond et al. (2001) that among Arellano and Bover (1995) and Blundell and Bover (1998) system, the GMM estimation technique is better compared to the one suggested by Arellano and Bond (1991). The first two reasons for adopting GMM techniques are seen as the basic requirements (Tchamyou, 2018), while the remaining reasons are associated with the merits of adopting the estimation technique (Tchamyou, 2018). Hence, in the specification, the two-step approach is adopted as against the one step to help control heteroskedasticity generated in the residual.

Equations 13 and 14 are specified at levels and first difference to summaries the estimation technique procedures of the system GMM.

$$\begin{aligned}\mathrm{Ind}_{it} =& \phi_0 + \phi_1 \mathrm{Ind}_{it=1} + \phi_2 \mathrm{PR}_{it} + \phi_3 \mathrm{FinD} + \phi_4 \mathrm{PRFinD}_{it} \\ &+ \sum_{h=1}^{6} \infty_h X_{hji-1} + \eta_1 + \xi_1 + \mu_{i.t} \end{aligned} \tag{13}$$

$$\begin{aligned}\mathrm{Ind}_{it} - \mathrm{Ind}_{i,t-\tau} =& \phi_0 + \phi_1 (\mathrm{Ind}_{it=\tau} - \mathrm{Ind}_{i,t-2\tau}) \\ &+ \phi_2 (\mathrm{PR}_{i,t} - \mathrm{PR}_{i,t-\tau}) + \phi_3 (\mathrm{FinD}_{i,t} - \mathrm{FinD}_{i,t-\tau}) \\ &+ \phi_4 \left(\mathrm{PRFinD}_{i,1} - \mathrm{PRFinD}_{i,t-1}\right) \\ &+ \sum_{h=1}^{6} \infty_h \left(X_{hji-1} - X_{hji-2\tau}\right) + \xi_1 - \xi_{1-t} + \mu_{i.t-\tau} \end{aligned} \tag{14}$$

where ∞_h represent tau which is the coefficient of auto-regression, ξ_1 is the time-specific constant. All other variables remain as explained earlier.

4.6 *Instrumental Quantile Regressions*

This modeling technique is basically on the mean values of industrialization. Quantile regression (QR) helps us to address the conditional mean of industrialization, hence, enabling us to assess the nexus all through the conditional distribution of industrialization (Billger & Boel, 2009; Okada & Samreth, 2012; Efobi et al., 2016). The OLS assumption of the normal distribution error term is invalid in the QR estimation model. More so, this technique enables us to check the parameter estimation of conditional distribution of industrialization at various points, therefore making the estimation technique robust in the presence of outliers.

We solve the following optimization problem to obtain the θth quintile estimation of the outcome (or industrialization). This is expressed in Eq. (15) without subscripts, hence Eq. (15) for the sake of simplicity is presented as

$$\min_{\beta \in R^k} \left[\sum_{i \in \{i: yi \geq xi\beta\}} \theta |yi - xi\beta| + \sum_{i \in \{i: yi \geq xi\beta\}} (1-\theta) |yi - xi\beta| \right] \tag{15}$$

where $\theta \in (0, 1)$. Thus, it is contrary to the Ordinary Least Square technique that is basically used for minimizing the sum of square residual; using the QR, it minimized the weighted sum of absolute deviations. Hence, y_i, given x_i which is the industrialization conditional quintile becomes,

$$Qy(\theta/xi) = xi\beta\theta \tag{16}$$

For every θth specific quintile, the unique slope parameters are modeled. Thus, in OLS slope it is analogous to $E(y/x) = xi\beta$ where the parameters are examined basically at the mean of industrialization conditional distribution. From Eq. (16) above, the explained variable yi is industrialization, where xi is a constant term which includes migrant's remittance, financial development, interaction between migrant's remittance and financial development, electricity, assess to telephone, domestic investment, population growth, trade openness and FDI.

5 Empirical Findings and Discussion

This section examines the empirical analysis of the data retrieved as well as its interpretation. Prior to proceeding with the regression result, we make an attempt to discuss the descriptive statistics of the variables employed in order to help in understanding the nature of its variable and its pattern of growth. As part of the analysis, industrialization as a variable is an index obtained by conducting a principal component analysis (PCA) using the variables manufacturing value added and the industry value added. The Eigenvalue of the first component was used in making the industrialization index as the value was the only one greater than 1, having a value of 1.24717. Thus, the index was gotten from its rotation.

Table 2 revealed that the broad money supply as a percentage of GDP was on the average of 27.94% throughout the period under review for the whole Sub-Saharan African countries. One of the countries had a peak of 151.55% broad money outgrowing the current output in the economy while one of the countries within the years had a very low level of financial development measured by the broad money supply of 0.02%. The normality of the broad money supply as a measure of financial development is not following a normal distribution as the Jarque–Bera test shows a significant statistic. Industrialization also hovers around −2.18 and 4.48, meaning that the extent of fluctuations in industrialization is relatively low. The level of infrastructure measured by fixed telephone subscription and electricity power consumption on the average was relatively low as the result reveals that on average, 468.49 Kwh per capita of electricity was consumed in the region throughout the period and 2.09 people per 100 on average have access to fixed telephone subscription.

The domestic credit made available to the private sector on average was 17.80%, lower than the monetary base of the region as a percentage of output, but there were higher lending to the private sector, higher than the level of the broad money supply. The percentage of GDP received as personal remittances on average stood at 4.45%, while its peak was 235.92% and there was a period in which nothing was received as personal remittances. The trade flow in the region was considerably high as it averaged to 70% and had its peak at 311.35%.

The next descriptive statistics conducted is the correlation matrix of the variables; this will help to examine the level of relationship that exists among the explanatory variables.

Table 2 Descriptive statistics of the variables employed

Code	Definition	Mean	Max	Min	Std. Dev.	Jarque-Bera test	Obs
BM	Broad Money	27.94	151.55	0.02	20.63	6214.05	1721
DCP	Domestic Credit to Private sec	17.80	160.12	0.005	19.98	28418.75	1721
EPC	Electricity Power Consumption	468.49	4777.06	17.57	742.06	16090.03	1745
FDI	Foreign Direct Investment	3.46	161.82	−28.62	8.28	993093.40	1748
FTS	Fixed Telephone Subscription	2.09	32.65	0.000	4.55	30827.41	1748
GFCF	Domestic Investment	20.55	89.39	−2.42	9.52	2335.53	1743
IND	Index of Industrialization	0.00	4.48	−2.18	1.12	472.69	1733
PG	Population Growth	2.61	7.92	−6.18	1.04	6998.31	1748
PR	Personal Remittances	4.45	235.92	0.00	17.47	888524.10	1732
T	Trade	70.00	311.35	6.32	36.16	1417.29	1728

Source Authors Construct using Data extracted from World Development Indicator (2018)

The core aim of conducting a correlation matrix is to examine the degree of relationship among the explanatory variables. From Table 3, it can be seen that on average, the highest degree of relationship among the explanatory variables is 0.63 (between domestic credit to private sector and broad money) as they are both measures of financial development and it is expected. It can therefore be concluded that there is no high degree of multicollinearity associated with the regression results and thus, the analysis can be conducted. The next attempt is to assess the stationarity of the variables employed.

Table 4 (see Appendix) reveals the panel unit root test at both level and first difference by assuming that the unit root process is common across cross sections and the other unit root process follows the individual uniqueness. The variables employed were investigated to examine at what order of stationarity they are. It is important that the variables exhibit constant mean and variance over time for regression analysis to be done. To do this, the Levin *t*-test assuming a common unit root process and the Im, Pesaran and Shin test that assume individual unit root test were employed. From Table 4, the result however revealed that broad money supply, domestic credit to private sector, electricity power consumption, fixed telephone subscription, population growth rate and trade are not stationary at level and were further tested at first difference. The result reported the variables to be stationary at

Table 3 Correlation matrix

	BM	DCP	EPC	FDI	FTS	GFCF	IND	PG	PR	T
BM	1.00									
DCP	0.63	1.00								
EPC	0.28	0.61	1.00							
FDI	0.02	−0.04	−0.02	1.00						
FTS	0.61	0.52	0.43	0.08	1.00					
GFCF	0.12	0.05	−0.01	0.23	0.17	1.00				
IND	0.05	0.17	0.13	0.03	0.12	0.22	1.00			
PG	−0.33	−0.26	−0.22	0.02	−0.40	0.01	−0.05	1.00		
PR	0.09	−0.02	−0.07	0.04	−0.02	0.13	−0.04	−0.11	1.00	
T	0.27	0.12	0.03	0.30	0.36	0.31	0.35	-0.16	0.26	1.00

BM, Broad Money; *DCP* Domestic Credit to Private sectors; *EPC* Electricity Power Consumption; *FDI* Foreign Direct Investment; *FTS* Fixed Telephone Subscription; *GFCF* Domestic Investment; *IND* Index of Industrialization; *PG* Population Growth; *PR* Personal Remittances; *T* Trade openness

Table 4 Effect of personal remittances on the level of industrialization in Africa

Variables	GMM	RE	Q.10	Q.25	Q.50	Q.75	Q.90
L.IND	0.890*** (0.004)						
PR	−0.0003*** (0.000)	−0.010*** (0.001)	−0.0005 (0.001)	−0.005*** (0.001)	−0.008*** (0.001)	−0.012*** (0.001)	−0.020*** (0.001)
BM	−0.001** (0.001)	−0.002 (0.002)	−0.005* (0.003)	−0.006*** (0.002)	−0.004*** (0.001)	−0.008*** (0.001)	−0.008** (0.004)
DCP	−0.002*** (0.000)	−0.014*** (0.002)	0.014*** (0.002)	0.012*** (0.003)	0.006** (0.002)	0.010*** (0.003)	0.013** (0.006)
EPC	0.00003*** (0.000)	0.0001 (0.000)	−0.0008** (0.000)	0.00006 (0.000)	0.00002*** (0.000)	0.00002** (0.000)	0.00003*** (0.000)
FDI	0.001* (0.000)	−0.006*** (0.002)	−0.009 (0.006)	−0.018*** (0.003)	−0.023*** (0.008)	−0.012 (0.012)	−0.012*** (0.004)
FTS	0.002 (0.002)	0.010 (0.008)	0.004 (0.012)	−0.033*** (0.013)	−0.024*** (0.007)	−0.015* (0.009)	−0.068*** (0.010)
GFCF	0.002*** (0.001)	0.010*** (0.002)	-0.003 (0.005)	0.009*** (0.003)	0.013*** (0.003)	0.027*** (0.006)	0.044*** (0.005)
PG	−0.034*** (0.005)	−0.065*** (0.018)	−0.103*** (0.030)	−0.037 (0.053)	−0.031 (0.037)	0.021 (0.029)	0.020 (0.034)
T	0.0001 (0.000)	0.001* (0.001)	0.003 (0.003)	0.011*** (0.001)	0.015*** (0.001)	0.015*** (0.002)	0.025*** (0.002)
Constant	0.076**	0.181	−1.058***	−1.399***	−1.260***	−1.161***	−1.286***
Observations	(0.032) 1,671	(0.141) 1,716	(0.140) 1,716	(0.155) 1,716	(0.165) 1,716	(0.114) 1,716	(0.158) 1,716
Number of countries	46	46					

(continued)

Table 4 (continued)

Variables	GMM	RE	Q.10	Q.25	Q.50	Q.75	Q.90
AR (1) Prob.	0.000						
AR (2) Prob.	0.170						
Sargan Chi (Prob)	32.51(0.298)						
Hansen Chi (Prob)	11.45(0.324)						
Fisher	51903.1***						
Wald Prob.		0.000					

Standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$, Figures in parenthesis without *'s are standard errors.; Index of Industrialization *BM* Broad Money; *DCP* Domestic Credit to Private sectors; *EPC* Electricity Power Consumption; *FDI* Foreign Direct Investment; *FTS* Fixed Telephone Subscription; *GFCF* Domestic Investment; IND; *PG* Population Growth; *PR* Personal Remittances; *T* Trade openness

first difference both when it assumes the individual unit root process and when it assumes the common unit root process. Other variables aside from the ones listed above are stationary at level, meaning that long-run relationship is feasible for them.

The next section presents the econometrics results of our models earlier stated in section three. To do this, we present three different tables, one examining the effect of personal remittances inflows as well as financial development measures on industrialization. The next table examines the modulating effect which financial development measured by broad money plays in enhancing the procyclicality of personal remittances inflow in industrialization. Also, the last table examines the modulating effect which financial development measured by domestic credit to the private sector which plays in enhancing the procyclicality of personal remittances inflow in industrialization.

Table 5 presents the non interactive effect of remittances on industrialization in Africa. We first present the system Generalized Methods of Moments estimation result. It can be revealed from the analysis that following the system GMM, personal remittances have a negative effect on the level of industrialization and this is statistically significant at 1%. The implication of this result is that remittance inflow into the region is not channeled toward industrialization. Allowing for random effects result did not show the contrary as the impact of remittance inflows on industrialization remains significant and negative. Examining the quintile regression result in order to investigate if higher remittance inflows have different impacts on the extent of industrialization within the region, the result further shows that for panel C, D, E and F, personal remittances still have negative impact on industrialization irrespective of the level of industrialization. The result reveals that for economies with higher level of industrialization, personal remittance inflows have a larger negative impact than the countries with lower level of industrialization.

It is also important to examine the impact of financial development measured by broad money supply on Africa's industrialization strength. From the result, it can be seen that broad money supply available has an indirect impact on industrialization, irrespective of the technique used, whether the GMM employed for correction of endogeneity or the random effect. The quantile regression also shows that broad money supply as a percentage of GDP within the region does not stimulate industrialization. However, for domestic credit to the private sector, the result shows that using GMM and Random effect Panel OLS, the result remained negative, but for the quantile regression, it shows different conclusions that can be drawn; this justifies the relevance of adopted empirical strategy. From panel C to F, the effect which domestic credit to private sector has on industrialization was positive, especially for countries where the level of industrialization is low. The conclusion here is that domestic credit alone as a measure of financial development enhances the level of industrialization irrespective of the current level of industrialization while personal remittances and broad money supply do not yield positive interaction.

We further examine the post-diagnostic properties of the system-GMM model estimated. We begin by examining if there is the presence of serial correlation of first-order AR (1) process as well as the second-order AR (2) process. The Arellano–Bond test for autocorrelation has a null hypothesis of no autocorrelation and is applied

Table 5 Effect of personal remittances interacting with broad money on the level of industrialization in Africa

Variables	GMM	RE	Q.10	Q.25	Q.50	Q.75	Q.90
IND_{t-1}	0.890*** (0.003)						
PR	−0.0004*** (0.000)	−0.010*** (0.001)	−0.001 (0.001)	−0.005*** (0.001)	−0.008*** (0.001)	−0.012*** (0.001)	−0.020*** (0.002)
BM	−0.001** (0.001)	−0.002 (0.002)	−0.004 (0.003)	−0.007*** (0.002)	−0.004*** (0.001)	−0.008*** (0.002)	−0.008** (0.004)
DCP	−0.002*** (0.000)	−0.014*** (0.002)	0.014*** (0.002)	0.011*** (0.003)	0.006*** (0.002)	0.011*** (0.002)	0.013** (0.005)
PR*BM	−0.00039* (0.000)	−0.00001 (0.000)	0.00007*** (0.000)	0.00003* (0.000)	−0.00001** (0.000)	−0.00006*** (0.000)	−0.0001*** (0.000)
EPC	0.00004*** (0.000)	0.00001 (0.000)	-0.00007 (0.000)	0.00007 (0.000)	0.00002*** (0.000)	0.00002** (0.000)	0.00003*** (0.000)
FDI	0.001** (0.000)	−0.006*** (0.002)	−0.009*** (0.003)	−0.017*** (0.003)	−0.024*** (0.005)	−0.011 (0.012)	−0.012** (0.005)
FTS	0.001 (0.001)	0.010 (0.008)	0.001 (0.008)	−0.032*** (0.011)	−0.024*** (0.007)	−0.014 (0.009)	−0.068*** (0.015)
GFCF	0.002*** (0.001)	0.010*** (0.002)	−0.002 (0.004)	0.009** (0.004)	0.013*** (0.003)	0.027*** (0.006)	0.043*** (0.005)
PG	−0.034*** (0.005)	−0.065*** (0.018)	−0.104*** (0.024)	−0.038 (0.037)	−0.020 (0.032)	0.027 (0.026)	0.021 (0.051)
T	0.0002 (0.000)	0.001* (0.001)	0.003 (0.002)	0.011*** (0.002)	0.015*** (0.001)	0.015*** (0.001)	0.025*** (0.003)
Constant	0.075** (0.029)	0.184 (0.142)	−1.098*** (0.091)	−1.400*** (0.133)	−1.277*** (0.095)	−1.180*** (0.145)	−1.276*** (0.208)

(continued)

Table 5 (continued)

Variables	GMM	RE	Q.10	Q.25	Q.50	Q.75	Q.90
Observations	1,671	1,716	1,716	1,716	1,716	1,716	1,716
Number of countries	46	46					
AR (1) Prob.	0.000						
AR (2) Prob.	0.168						
Sargan Chi (Prob)	33.26(0.41)						
Hansen Chi (Prob)	31.18(0.457)						
Fisher	84699.1***						
Wald Prob.		0.000					

Standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$, Figures in parenthesis without *'s are standard errors; Index of Industrialization *BM* Broad Money; *DCP* Domestic Credit to Private sectors; *PR*BM* interaction between personal remittance and Broad Money; *EPC* Electricity Power Consumption; *FDI* Foreign Direct Investment; *FTS* Fixed Telephone Subscription; *GFCF* Domestic Investment; IND, *PG* Population Growth; *PR* Personal Remittances; *T* Trade openness

to the differenced residuals. The test for AR (1) process in first differences usually rejects the null hypothesis but this is expected since the first difference variable will be correlated with the error term. However, in order to detect autocorrelation in levels it is important to test for AR (2) in first differences. The result shows that there is no serial correlation of AR (2) associated with the result as the model estimated shows that the null hypothesis of no serial correlation is not rejected. The Sargan test has a null hypothesis that the instruments as a group are exogenous. Therefore, the higher the *p*-value of the Sargan statistic, the better. The result also reveals that we fail to reject the null hypothesis that the instruments used are exogenous, meaning that the set of instruments are exogenous. In robust estimation, as well, Stata reports the Hansen J statistic instead of the Sargan with the same null hypothesis. The result also reveals that they are not rejected. The fisher statistics tests the null hypothesis that there is no considerable harmony associated with the regression result. The *f*-statistics was also rejected.

Table 6 examines the modulating effect which financial development in the form of broad money supply has on causing personal remittance flows to have a significant impact on industrialization. As earlier examined in Table 5, it was seen that personal remittances does not have a positive impact on industrialization irrespective of the level of industrialization in Africa. This finding is in line with the scatter plot and the regression analysis done earlier as a preliminary. However, we take a step further to examine if financial development in the form of increasing broad money supply stimulates personal remittance inflows to have a significant impact on industrialization. Using the system-GMM, we can discover that the interaction between personal remittance inflows and broad money still did not stimulate industrialization. The same result is applicable for the random effect as the result revealed that the level of financial development cannot cause a stimulus and positive emission of positive influence on industrialization. However, to justify the use of techniques such as the quantile regression; the result revealed that at lower level of industrialization (Q.10) and (Q.25), personal remittances was able to cause a positive stimulus on industrialization simply because the level of financial development as measured by broad money was able to accommodate it. At higher level of industrialization (Q.50; Q.75 and Q.90), personal remittances could not cause increases in industrialization irrespective of the level of financial development associated with the region.

Table 7 also presents the result that shows the modulating effect which financial development in the form of domestic credit to private sector has on causing personal remittance flows to have significant impact on industrialization. As earlier also examined in Table 5, it was seen that personal remittances do not have positive impact on industrialization irrespective of the level of industrialization in Africa. However, we take a step further to examine if financial development in the form of domestic credit to private sector stimulate personal remittance inflows to have significant impact on industrialization. Using the system-GMM, we can discover that the interaction between personal remittance inflows and domestic credit to private sector still did not stimulate industrialization. The same result is applicable for the random effect as the result revealed that the level of financial development cannot cause a stimulus and positive emission of positive influence on industrialization. However, to

Table 6 Effect of personal remittances interacting with domestic credit to private sector on the level of industrialization in Africa

Variables	GMM	RE	Q.10	Q.25	Q.50	Q.75	Q.90
IND_{t-1}	0.890*** (0.003)						
PR	−0.0003*** (0.000)	−0.010*** (0.001)	−0.001 (0.002)	−0.005*** (0.001)	−0.008*** (0.001)	−0.012*** (0.001)	−0.019*** (0.002)
BM	−0.001 (0.001)	−0.002 (0.002)	−0.004* (0.003)	−0.006** (0.003)	−0.004*** (0.001)	−0.009*** (0.002)	−0.008*** (0.003)
DCP	−0.002*** (0.000)	−0.014*** (0.002)	0.014*** (0.002)	0.012*** (0.004)	0.006*** (0.002)	0.012*** (0.003)	0.013*** (0.005)
PR*DCP	−0.00003*** (0.000)	−0.00013 (0.000)	0.00017*** (0.000)	−0.00029 (0.000)	−0.000066 (0.000)	−0.0002*** (0.000)	−0.0004*** (0.000)
EPC	0.00004*** (0.000)	0.00001 (0.000)	−0.00008 (0.000)	0.00006 (0.000)	0.00002*** (0.000)	0.00002** (0.000)	0.00003*** (0.000)
FDI	0.001*** (0.000)	−0.006*** (0.002)	−0.009*** (0.003)	−0.018*** (0.003)	−0.024*** (0.004)	−0.016 (0.013)	−0.012 (0.007)
FTS	0.0008 (0.001)	0.009 (0.008)	0.002 (0.011)	−0.034** (0.016)	−0.024*** (0.008)	−0.016** (0.007)	−0.069*** (0.007)
GFCF	0.002*** (0.000)	0.010*** (0.002)	−0.002 (0.005)	0.009*** (0.003)	0.013*** (0.003)	0.027*** (0.006)	0.044*** (0.006)
PG	−0.033*** (0.005)	−0.064*** (0.018)	−0.099*** (0.023)	−0.043 (0.042)	−0.019 (0.041)	0.025 (0.029)	0.021 (0.044)
T	0.0001 (0.000)	0.001* (0.001)	0.003 (0.003)	0.011*** (0.001)	0.015*** (0.002)	0.015*** (0.002)	0.025*** (0.002)
Constant	0.074** (0.031)	0.190 (0.142)	−1.116*** (0.099)	−1.379*** (0.120)	−1.278*** (0.136)	−1.171*** (0.118)	−1.278*** (0.161)

(continued)

Table 6 (continued)

Variables	GMM	RE	Q.10	Q.25	Q.50	Q.75	Q.90
Observations	1,671	1,716	1,716	1,716	1,716	1,716	1,716
Number of countries	46	46					
Wald Chi-Sq		188.24					
AR (1) Prob.	0.000						
AR (2) Prob.	0.168						
Sargan Chi (Prob)	35.52 (0.306)						
Hansen Chi (Prob)	11.6 (0.395)						
Fisher	95229.2***						
Wald Prob.		0.000					

Standard errors in parentheses ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$, Figures in parenthesis without *'s are standard errors; Index of Industrialization; *BM* Broad Money; *DCP* Domestic Credit to Private sectors; *PR*DCP* interaction between personal remittance and Domestic Credit to Private sectors; *EPC* Electricity Power Consumption; *FDI* Foreign Direct Investment; *FTS* Fixed Telephone Subscription; *GFCF* Domestic Investment; *PG* Population Growth; *PR* Personal Remittances; *T* Trade openness

Table 7 Panel unit root test

	Test at level		Test at first difference		
	Common unit root process	Individual unit root process	Common unit root process	Individual unit root process	Conclusion
Variable	Levin, Lin and Chu *t**	Im, Pesaran and Shin W-stat	Levin, Lin and Chu *t**	Im, Pesaran and Shin *W*-stat	
BM	0.67009 (0.7486)	1.30362 (0.9038)	−12.7096** (0.0000)	−18.1743** (0.0000)	Stationary at I(1)
DCP	−0.05190 (0.4793)	1.96005 (0.9750)	−14.2362** (0.0000)	−17.6900** (0.0000)	Stationary at I(1)
EPC	6.13661 (1.0000)	8.29821 (1.0000)	−6.63133** (0.0000)	−12.9507** (0.0000)	Stationary at I(1)
FDI	−4.55393*** (0.0000)	−5.87425*** (0.0000)	–	–	Stationary at I(0)
FTS	−1.57353 (0.0578)	1.18305 (0.8816)	−6.77503** (0.0000)	−16.2959** (0.0000)	Stationary at I(1)
GFCF	−3.46042*** (0.0003)	−3.64561*** (0.0001)	–	–	Stationary at I(0)
PG	−17.2605*** (0.0000)	−24.7222*** (0.0000)	–	–	Stationary at I(0)
PR	−1.85503* (0.0318)	−0.17151 (0.4319)	−18.8493** (0.0000)	−22.7310** (0.0000)	Stationary at I(1)
T	−1.39950 (0.0808)	−1.72004* (0.0427)	−18.3327** (0.0000)	−21.5155** (0.0000)	Stationary at I(1)
IND	−2.93176*** (0.0017)	−2.09658* (0.0180)	–	–	Stationary at I(0)

* Implies statistically significant at 5% and ** Implies Statistically significant at 1%; *BM* Broad Money; *DCP* Domestic Credit to Private sectors; *PR*DCP* interaction between personal remittance and Domestic Credit to Private sectors; *EPC* Electricity Power Consumption; *FDI* Foreign Direct Investment; *FTS* Fixed Telephone Subscription; *GFCF* Domestic Investment; *PG* Population Growth; *PR* Personal Remittances; *T* Trade openness Index of Industrialization

justify the use of techniques such as the quantile regression; the result revealed that at lower level of industrialization (Q.10), personal remittances was able to cause a positive stimulus on industrialization simply because the level of financial development as measured by domestic credit to private sector was able to accommodate it. At medium and higher level of industrialization (Q.25, Q.50; Q.75 and Q.90), personal remittances could not cause increases in industrialization irrespective of the level of financial development associated with the region.

6 Conclusion and Policy Recommendation

This study examines the effect which personal remittance inflow has on Africa's industrialization trajectory given the level of financial development persistent in the region as measured by domestic credit to private sector and broad money supply. It can be concluded from the study that personal remittance inflow alone cannot cause a positive impact on the level of industrialization; likewise do broad money supply and domestic credit to private sector, irrespective of the technique employed as well as the level of industrialization persistent in Africa. However, the interaction of personal remittance inflow and broad money supply reveals that personal remittance inflow given the level of broad money is able to increase the industrialization in those countries already at the bottom of industrialization than the countries with a higher level of industrialization. The result for domestic credit to private sectors reveals among others that personal remittance inflow interacting with domestic credit to private sector increases industrialization also among countries already experiencing the very low industrialization pace. The implication of this study is that personal remittance cannot increase industrialization at a higher pace; that is, personal remittance inflows can only finance low level of industrialization and not massive investments for mega industrialization growth. Based on our empirical findings, the policy implication is that; there is need for improved financial institution in Africa such that the pool savings from remittance can be directed to massive investment that will lead to industrialization. The focus for further research is to assess other means through which remittance can drive industrialization in Africa since remittance is a reliable source of capital inflow for developing countries.

Appendices

Appendix 1
See Table 4.
Appendix 2
See Table 8.

Table 8 Variable definitions and measurement unit

Code	Variables	Variable details	Measurement unit	Sources of data
IND	Industrialization	Manufacturing value added/industrial value added	% of GDP Index by PCA	World Bank (WDI)
PR	Personal remittance	Personal remittance received	% of GDP	World Bank (WDI)
BM	Bank efficiency	Broad money	% of GDP	World Bank (WDI)
DCP	Domestic credit	Domestic credit to private sectors	% of GDP	World Bank (WDI)
EPC	Electricity	Electricity Power Consumption	Kwh per capital	World Bank (WDI)
FDI	FDI	Foreign direct investment	% of GDP	World Bank (WDI)
FTS	Assess to telephone	Fixed telephone subscription	Per 100 people	World Bank (WDI)
GFCF	Domestic investment	Gross fixed capital formation	% of GDP	World Bank (WDI)
PG	Population	Population growth	Annual growth	World Bank (WDI)
T	Trade openness	Trade	% of GDP	World Bank (WDI)

WDI World Bank Development Indicators

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The ECOWAS Common Investment Market Vision: A Conceptual Preview

Ernest Amoabeng Ortsin

Abstract In 2009 the Economic Community of West African States (ECOWAS) launched a vision to create a Common Investment Market (CIM). The main objective of the CIM is to harmonize investment codes of all ECOWAS member states in order to boost factor movement and, ultimately, promote trade and investments. However, more than a decade after the launch, the CIM vision is yet to materialize. This paper discusses the progress that has been made so far and the inhibitions that have slowed the process. The trend of the analysis shows that even though the region has successfully created a free trade area (with the implementation of the ECOWAS Trade Liberalization Scheme) and a customs union (with the implementation of the Common External Tariff), some of the countries still operate national investment laws that are hugely at variance with some critical protocols of the Community. A typical example includes the fact that the three biggest economies, Nigeria, Ghana and Cote d'Ivoire continue to implement rules that are inimical to trade and investment. This is to the extent that whilst Nigeria maintains a "prohibition list" that bans the importation of certain category of goods, Ghana operates an investment regime which requires all foreigners (including ECOWAS nationals) to bring in a minimum capital of $1,000,000 before they can trade in the country's retail sector. Meanwhile, Cote d'Ivoire's national investment laws also create "exceptions" that are no-go-areas for foreigners, including ECOWAS nationals. The paper concludes with some recommendations based on a conceptualization of how the CIM can be attained through the formulation of policy frameworks, promotion of free movement of persons and goods; development of infrastructural networks, integration of financial systems, participation of the private sector and the attraction of Foreign Direct Investments (FDI) into the region.

Keywords ECOWAS · Investment · Common investment market · West Africa

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1 Introduction

Regional integration in West Africa officially began on 28 May 1975, with the launch of the Lagos Treaty that established the Economic Community of West African States (ECOWAS). Under Article 2 of the Treaty, the aims and objectives of ECOWAS were, among others, defined as follows:

> To promote co-operation and development in all fields of economic activity particularly in the fields of industry, transport, telecommunications, energy, agriculture, natural resources, commerce, monetary and financial questions and in social and cultural matters for the purpose of raising the standard of living of its peoples, of increasing and maintaining economic stability, of fostering closer relations among its members and of contributing to the progress and development of the African continent (United Nations Treaty Series, p. 20).

In order to achieve the above aim, the treaty enjoined leaders of the Community to ensure the attainment of some ten aims and objectives as stated in Box 1 (Annex 1).

However, it is important to mention that ECOWAS was birthed at a time when the entire region was embroiled in a security imbroglio. Of the 15 heads of state (or their representatives) who signed the treaty, more than half the number was made up of soldiers (United Nations Treaty Series, pp. 40–41). Indeed, this was at a time that the spate of coups and counter-coups had more or less militarized the entire region (Japhet 1978; McGowan 2005). Thus, even though the soldiers succeeded in establishing the community organization, there was a lot of bad blood among them, in terms of cross-border relations. It was not until the late 1990s that some of them started reaching out to each other, like what happened in the case of Rawlings of Ghana and Eyadema of Togo (Panafrican News Agency 1998).

Without doubt, the frosty relations among the leaders adversely affected trade and investment within ECOWAS, right at its inception. The fear and suspicion of dissidents executing coups from neighbouring countries led to stricter border controls (which has regrettably persisted till today). The wanton corruption and mismanagement of the economies also meant that not much production took place in the member states in terms of manufacturing (Atuobi 2007). The high-handedness of the soldiers equally prevented citizens from participating in the regional integration process. Thus, there was neither democracy nor leadership accountability unlike in the European Union (EU) experience where regional integration followed a participatory process, including the holding of referendums (Friedrich 2006; Marxsen 2015).

Given the above situation, it did not come as a surprise that the first decade of ECOWAS did not record much economic progress. This is because the soldiers were busy closing borders rather than opening them up for trade and investment. Regional giant, Nigeria, remained unstable after the overthrow of Murtala Mohammed in 1976; Ghana also became unstable after the 1979 Rawlings coup and the same could be said of countries such as Burkina Faso, Mali and Niger that also experienced series of coups d'etat (Japhet 1978; McGowan 2005). As a consequence, the bliss and glitz

of the new community organization, following its momentous formation, gradually evaporated into the nebulous clouds of insecurity.

The second and third decades of ECOWAS, inopportunely, witnessed more coups d'etat and protracted civil wars which first broke out in Liberia and later spread to Sierra Leone (Zack-Williams 1999; Bøås 2005; Huband 2013). This compelled the military leaders to set up the ECOWAS Ceasefire Monitoring Group (ECOMOG) which turned out to be quite potent in dealing with the conflicts. Later, Cote d'Ivoire, Guinea-Bissau and others also degenerated into more conflicts that required the intervention of ECOMOG soldiers and the leaders responded with more military interventions (Howe 1997; Kabia 2009).

Some critics have described as ironic the evolution of ECOWAS from an economic organization into a peace and security set up (Olanisakin 2011; Aleman 2018). This is because, invariably, what started as an initiative to boost trade and investment ended up becoming more of a peacekeeping organization. And, by the time the conflicts started subsiding in the early 2000s, West Africa had lost precious amounts of time firefighting rather than developing their economies.

In 1993, leaders of the region revised the Lagos Treaty with the view to making it more reflective of modern global trends in regionalism. This was around the time that EU integration was crystallizing with the operationalization of the Maastricht Treaty, leading into a common market with a single currency—the Euro (Eichenberg and Dalton 2007). The Maastricht Treaty also enhanced the powers of the European Parliament, thereby deepening the concept of supranational institutions in regional integration (Maurer 2003). ECOWAS leaders took a cue from the developments within the EU and initiated some reforms in its Treaty and also revitalized its integration programmes. For example, for the first time, the leaders took the concept of supranationality more seriously with the creation of institutions such as a community parliament and a community court of justice within ECOWAS (Victor 1996; Adetula 2016; Nwankwo 2017). They also made more commitment towards constitutional governance and this resulted in the democratic wave that swept through the entire region during the 1990s (Hartmann 2013).

In terms of trade, ECOWAS leaders, as part of the reforms, reinvigorated the ECOWAS Trade Liberalization Scheme (ETLS) which had been in the offing for more than a decade and a half (NANTS 2013; Karaki and Verhaeghe 2017; Fajana 2018). Not many private sector businesses initially took interest in the ETLS. The apathy was due to low publicity surrounding the scheme's implementation, as well as harassments at the borders and the numerous roadblocks and checkpoints along the ECOWAS transport corridors. For the private sector in the region, there are other challenges in terms of their cost of production: electricity tariffs are high; cost of borrowing is high; import duties on raw materials are high, etc. In spite of this, their products have to face stiff competition from cheaper imports from China and elsewhere. The current average intra-regional trade of about 20% (Table 1), though a vast improvement over what existed a decade ago, still falls short of what pertains in other regions of the world, including Asia (51%), North America (54%) and Europe (70%) as noted by Fasan (2019).

Table 1 Share of intra-regional trade in the external trade of ECOWAS member states (%), 2011–2016

Member state/year	2011		2012		2013		2014		2015		2016		Avg
	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	
Burkina Faso	708	25.6	7.6	22.8	11	22.6	17.6	25	13	18.7	13.9	22.3	17.3
Benin	29.5	20.9	28.8	19.9	26.5	16.3	20.2	11.6	22	15.6	20.9	13.2	20.5
Cape Verde	2.2	1.4	0.4	0.8	1.8	0.8	0.3	1.6	3.8	3.4	1.7	1.8	1.7
Cote d'Ivoire	26.4	24.9	29.1	27.3	32	24.6	23.4	23.2	19.7	19.5	25.2	22.6	24.8
Ghana	32.9	9.6	11.4	7.2	8.8	7.8	9.9	3.2	10.5	3.5	10.5	3.4	9.9
Gambia	86.8	26.6	84.3	33	88.8	29.3	84.7	25.9	77.2	33.4	84	29.6	57
Guinea	7.7	4.5	9.2	2.7	3.4	2.3	25.3	2.8	25	6.6	25.2	6.6	10.1
Guinea–Bissau	10.6	15.3	3	11	3.7	13.2	24.6	11.1	5.3	9.8	6.6	11.4	10.5
Liberia	6.7	21.2	28.7	22.4	17	22	55.1	16.8	60.9	13.2	57.6	13.2	27.9
Mali	15.3	41.8	11.7	46.5	13.2	39.5	10.8	38.3	13.5	34.9	13.5	34.9	26.2
Niger	12	14.5	30.5	18.9	41.7	20.3	40.9	17.7	24.4	13.9	13.5	13.9	23.6
Nigeria	2.8	1.2	3.9	0.4	5.3	4.9	4.4	0.6	6.5	3	5.1	2.8	3.4
Sierra Leone	6.2	24.6	1.2	32.7	6.7	34.7	6.5	44.1	32.9	19	11.4	28.3	20.7
Senegal	37	13.5	36	15.6	38.5	13.7	39.1	11.4	37.8	10.8	38.5	13	25.4
Togo	63.1	8.3	55.2	9.4	59.1	10.8	56.4	10.7	56.3	9.6	57.5	10.4	33.9
External trade of ECOWAS: Share of intra-community trade in % of external trade of ECOWAS													
Share of intra-community trade (%)	10	8.8	8	12.2	11.8	13.7	9.8	9.7	13.5	10.7	11.9	11.1	10.9

Source ECOWAS Commission. Cited in (Fajana 2018)

2 Review of Literature

In Sub-Saharan Africa (SSA) regional integration (and particularly common investment market) has been recommended as a development strategy by several experts. This is for the simple reason that a well-integrated single market creates the space that is attractive to investors (both domestic and foreign). It is for this reason that SSA countries have been vigorously pursuing regional integration in the last few decades, with the ultimate aim of bringing in FDIs.

An avalanche of the literature exists on different models of regional integration. According to Hix and Goetz (2000), the methods of integration comprising institution-building policy integration have attracted the most attention. However, contrary to the "neo-functionalis"' theory of Haas (1956) and the 'liberal-intergovernmental' theory of Moravcsik (1993) which are widely viewed as the driving thoughts behind EU integration, Hix and Goetz argue that much of the EU success depends on the evolution of domestic policies.

In the history of European integration, the launch of the Maastricht Treaty in November 1993 marked a turning point both in the economic and political spheres (Eichenberg and Dalton 2007). The creation of a single market through the implementation of the Schengen Agreement in 1995 and the introduction of the Euro in 1999 cemented European integration to its current levels (Steinwachs et al. 2017).

Much of the European integration processes were modelled around the stages of economic integration as espoused by Viner (1950) and Balassa (1961) and several others. In the model of Viner, emphasis was placed on the need for European countries to adopt a customs union through a common eternal tariff (CET) arrangement to create trade. Balassa, on the other hand, was more elaborate in his five steps of economic integration namely, free exchange area; customs union; common market; economic union, economic and monetary union (Andrei 2012).

Ahmed et al. (2011) have investigated Foreign Direct Investment (FDI) flows in Africa and indicated that following the disappointing economic performance of SSA economies in the late 1980s, some reforms were carried out in the early 1990s to drive in foreign trade and FDI. Using the Autoregressive Distributed Lag (ARDL) approach and Pedroni panel estimation procedures that allow for heterogeneity, they found out that exports and FDI have a significant impact on economic growth.

Lall (2002) recommends that countries need to adopt FDI initiatives that are strategically targeted and back them with policy interventions. Recipient countries need to maximize the transfer of technology and complement them with appropriate in-country policies. Harrison (1994) takes the view that multinationals raise wages for local workers but then technology transfer is generally limited to only joint ventures that receive foreign equity participation.

Ajayi (2006) contends that many developing countries see FDI as an engine of growth which provides capital for investment, increases competition among industries in the host country, and assists local industries to become more productive through the adoption of more efficient technologies which sometimes spill over to

other local firms. Among others, Ajayi notes that FDI accelerates the integration of host countries' economies into the global marketplace.

There is a longstanding debate about whether developing countries need aid or FDI (Lyons 2014; González 2014; Kavuka 2018). In the opinion of Buthe and Milner (2008) aid and FDI affect countries differently. According to them, aid contributes powerfully to both economic growth and human development and, that, the higher the level of human capital in a country, the more aid contributes.

On the other hand, Buthe and Milner found that FDI has no effect on economic growth and rather slows the rate of human development in developing countries. They argue further that contrary to the long-held development-policy assumption that aid and FDI serve as substitutes or complements in accelerating the development of poor countries, they rather slow the rate of human development in less-developed countries. To them, developing countries need more democracy and aid but not FDI.

For West Africa, domestic investment (DI) or private sector participation is crucial as was found by Adams (2009) in his analysis of the impact of FDI and DI on economic growth in Sub-Saharan Africa for the period 1990–2003. Adams established that DI is positive and significantly correlated with economic growth in both ordinary least square (OLS) and fixed effects estimation. The study concluded that Africa needs a targeted approach to FDI in order to increase the absorption capacity of local firms as well to increase cooperation between governments and multinational corporations (MNC) to promote their mutual benefit.

De Gregorio (2005) has noted that FDI always occupies a high position on the agenda of policymakers in emerging markets. Narula and Driffield (2012) also indicate that FDI is contentious for both academics and policymakers because of the promise it holds for development in resource-constrained countries. The only challenge, according to Reinhart and Rogoff (2003) is that insecurity in Africa (in the form of wars) may be a contributory factor to the low inflow of FDI. This is besides other macroeconomic factors that inhibit investments such as high inflationary rates and exchange rate fluctuations.

3 Conceptual Preview of an ECOWAS CIM

The ECOWAS Common Investment Market (CIM) vision was launched in 2009 with the aim of galvanizing and maximizing investment opportunities in the region (Sesay 2009). To achieve this aim ECOWAS member states are expected to harmonize their national investment policies into a single code that would ease the bottlenecks usually associated with investments in the region. The ECOWAS CIM seeks to build on the current levels of integration within the region. This is based on the fact the formal launch of the ETLS effectively turned the region into a free trade area (FTA). And the launch of the common external tariff (CET) in 2015 also turned the region into a customs union. Within the model of economic integration proposed by Balassa (1961), the next logical stage for ECOWAS after an FTA and CU is a common market.

The Court of Justice of the European Union in the Schul judgment defined a common market to, among others, refer to "elimination of all obstacles to intra-community trade in order to merge the national markets into a single market bringing about conditions as close as possible to those of a genuine internal market" (CJEU 1982). According to Cuyvers (2017), a common market allows all the factors of production (labour, capital and enterprise) to move freely within a region as if they were moving within an internal country market.

Thus, what ECOWAS seeks to do with its CIM is to fully integrate the markets of its members into one big trading area. But, for this to become possible, there are some important cornerstones that must be laid. The first among them is the formulation of policies like a Common Investment Code (CIC) that harmonizes all national investment policies. The second is the facilitation of trade through the protocol on the free movement of persons and goods and the right of establishment. The third is the need for infrastructures like transportation and telecommunication systems that link the region together. The fourth is the integration of financial markets (particularly payment systems) through the use of a common currency like the proposed Eco. The fifth is the involvement of the local private sector through regional networks such as the Federation of West African Chambers of Commerce and Industry (FEWACCI). And, finally, sixth is the attraction of FDI. The next sections of the paper discuss the interplay of these six factors and what progress or otherwise ECOWAS has so far made in this regard (Fig. 1).

3.1 Policy Frameworks

An audit of the policy frameworks that have been set in motion as scaffolds for the creation of a CIM in West Africa shows that the vision is supported by the Community's 1993 Revised Treaty; protocol relating to the free movement of persons, right of residence and establishment; protocol relating to community enterprises and the ECOWAS Trade Liberalization Scheme (ETLS). However, in terms of actual frameworks for the CIM, not much has been done to create the necessary enabling environment. Indeed, apart from the Supplementary Act Adopting Community Rules on Investment and the Modalities for their Implementation within ECOWAS, most of the normative policy frameworks required to actualize the vision are yet to come into fruition. For example, the Common Investment Code (CIC) is still under negotiation whereas the Common Trade Policy (CTP) is yet to come into force (ECOWAS 2017).

In a study carried on behalf of the ECOWAS Commission on the process of ECOWAS investment policies harmonization, Aremu (n.d.) identified four major challenges with investments in the region. Firstly, there is the need for reforms on land and business ownership in order to move away from the current practice where some Member States place restrictions. Secondly, some of the Member States also need to move away from protectionist policies under the guise of nurturing small

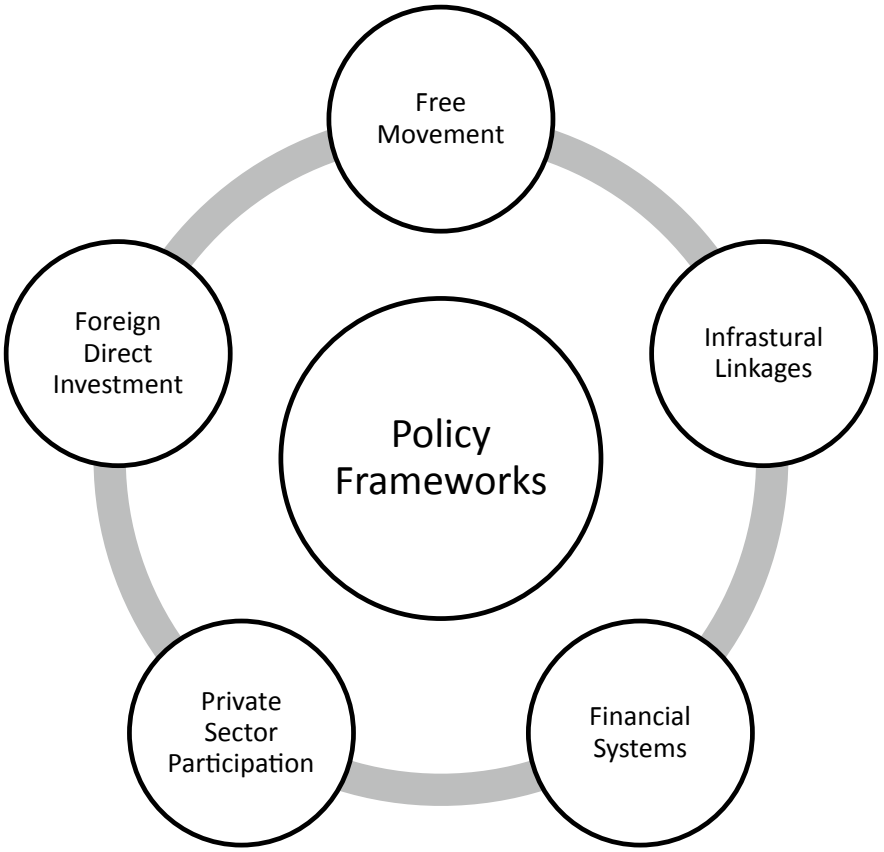

Fig. 1 Conceptual framework for an ECOWAS CIM *Source* Author

and medium-scale enterprises (SMEs). Thirdly, Member States need to ensure transparency in the implementation of investment laws. And, fourthly, there is also the need for consistency in the application of the investment policy regulations.

A major conundrum facing the quest for a CIC is whether the approach should be uniformization or harmonization of national laws on investment. In the former approach, the legal differences between the provisions of national investment policies among the Member States would be removed and replaced with a common or identical text. If the latter approach, which is more popular, is adopted, it will mean that domestic provisions from the various Member States, which are not similar, will have to be modified in line with a regional reform process (Ibid.).

The Supplementary Act has been in force since 2008 but there are still serious problems with its implementation. According to Article 3 of the Act, its objective is "to promote investment that supports sustainable development of the region."

Articles 5 and 6 deal with "National Treatment" and "Most Favored Nation Treatment," respectively, in which Member States are enjoined to eschew discriminatory practices.

For example, Article 5 (1) states that:

> Each Member State shall accord to investors of another Member State treatment no less favourable than that, which it accords, in like circumstances to any other investor operating in its territory, with respect to the management, conduct, operation, expansion and sale or other disposition of investments.

Equally, Article 6 (1) states that:

> Each Member State shall accord to investors of another Member State treatment no less favourable than that it accords in like circumstances, to investors of any other state within the Community with respect to the management, conduct, operation, expansion, sale or other disposition of investments.

However, in reality, there are several infractions of this Act that flies in the face of the efforts being made to promote regional trade and investment. Ghana, in recent times, has received a lot of flak for its national investment laws which infringe on ECOWAS protocols. The country, as per its investment guidelines, promoted by the Ghana Investment Promotion Centre (GIPC) states that:

> All enterprises in the country with foreign participation are required to register with the Ghana Investment Promotion Centre (GIPC). Under the new GIPC Act, 2013 (Act 865), the minimum capital required for retail business has also moved from US $300,000 to $1 million, while foreign investors who participate in joint venture enterprises have to show a minimum capital of $200,000 with wholly owned foreign enterprises showing a minimum capital of $500,000.

The provision on retail trade has created frictions between the Ghana Union Traders Association (GUTA) and the Nigerian Union Traders Association of Ghana (NUTAG). In recent times, there have been clashes between GUTA and NUTAG members in places like Suame, a trading centre in the Ashanti Region of Ghana. In 2018, ECOWAS had to intervene when about 400 shops belonging to Nigerians were closed down in Ghana.

However, Agyekum (2019) argues that Ghana is not the only ECOWAS country that has investment laws that protect its domestic retail sector. According to Agyekum, Nigeria and Cote d'Ivoire are guilty of the same breaches so far as the ECOWAS protocols are concerned. He cites Section 17 of the Nigeria Investment Promotion Commission (NIPC) Act, Chapter N117 (Decree No. 16 of 1995) which states that: "except as provided in Section 18 of this Act and subject to this Act, a non-Nigerian may invest and participate in the operation of any enterprise in Nigeria." However, Section 18 of the same Act notes that: "the provisions of this Act shall not apply to the 'negative list' as defined in Section 31 of this Act." Then, Section 31 defines the "negative list" as the "list of those sectors of investment prohibited to both foreign and Nigerian investors … and such other items as the Federal Executive Council may, from time to time, determine."

Based on the element of "prohibition" and the "negative list," Agyekum argues that the provision can be potentially used to prevent foreigners who want to invest in

certain sectors of the Nigerian market. This is in spite of the fact that the prohibition makes reference to both Nigerians and foreigners.

On Cote d'Ivoire, Agyekum makes reference to Article 4 of the Ordinance No. 2012-487, dated June 7, 2012 on the Investment Code of the country which states that: "This Code shall apply to all private investments made in Cote d'Ivoire by an individual or legal entity, with the exception of investments eligible for specific aid schemes established by the General Tax Code or specific laws." Again, Agyekum makes reference to the element of "exception" and concludes that the laws can be applied in a discriminatory manner when it comes to the "specific aid schemes" established by the "General Tax Code or specific laws."

Outside the realms of investments, Nigeria still stands accused of autarky based on its infamous "prohibition list" (see Appendix 2) which bans the importation of certain categories of products into the country. It does not matter whether these products emanate from the region the Nigerian Customs Service (NCS) is very strict on the enforcement of the ban. For example, it is quite paradoxical that Cote d'Ivoire and Ghana are the world's largest producers of cocoa but they cannot export cocoa butter and cocoa cakes to neighbouring Nigeria as per the prohibition list. Again, live birds, which are classified as duty-free export under the ETLS cannot be exported to Nigeria as per the prohibition list. Private sector operators from other member states have had a cause to complain about this situation but the Nigerian authorities have not budged.

3.2 Free Movement

The 1979 ECOWAS protocol relating to the free movement of persons, residence and establishment remains one of the most crucial protocols of ECOWAS (Adepoju 2002; Mbachi and Ikeanyibe 2017). Indeed, of all the protocols, decisions and conventions ratified by the leadership of ECOWAS, perhaps it is the most significant protocol that impacts directly on the lives of ordinary citizens of the community. According to the protocols, "a citizen of the Community visiting any Member State for a period of not exceeding ninety (90) days shall enter the territory of that Member State through the official entry point free of visa requirements" (ECOWAS 1979).

The protocol further states, with regard to vehicles, that "a private vehicle registered in the territory of a Member State may enter the territory of another Member State and remain there for a period not exceeding ninety (90) days," upon presentation of the following documents: valid licence, matriculation certificate (ownership card) log book and an insurance policy recognized within the Community. When it comes to commercial vehicles, the requirements are still the same except that they are limited to 15 days stay and also prohibited from engaging in commercial activities whilst in the territory of another Member State (Ibid.).

The implementation of this protocol, however, has been fraught with several challenges. Some of the challenges include cross-border harassments, extortions, closures

and others (Olusegun Bolarinwa 2015; Adepoju 2015; Aduloju 2017). There are several reasons why these cross-border problems persist in spite of all the efforts that have been put in place over the years to improve upon the situation.

A careful analysis of the history of the region shows that one of the reasons has to do with the hangover effects of the military years that saw borders tightly manned by security operatives to check against dissident operations. Another reason, perhaps, has to do with the fact that ECOWAS member states heavily rely on the revenues from the borders as one of their major sources of income. And, thirdly, another reason has to do with the current security situation where activities of terrorist organizations like Boko Haram and Al-Qaeda have heightened security concerns across the region.

ECOWAS countries, therefore, in their attempts to create a common investment market have a responsibility to ensure that cross-border relations are improved to facilitate free movement of persons and goods. The joint border post (JBP) concept (ECOWAS 2013), supported by the European Union, is one of the surest ways to ease congestion at the borders. Countries must also make extra effort to reduce the roadblocks along the transport corridors since many of them serve as extortion points for customs and police officials.

3.3 Infrastructural Networks

One of the prerequisites of a common investment market is the ease of inter-linkages between and among the participating countries. This means there must be networks of physical linkages such as roads, railways, airlines and shipping lines. In addition, there must be communication networks as well as cross-platform payment systems. These infrastructures are supposed to assist in the movement of persons, facilitate transactions and support exchange of vital information among country-level institutions including law enforcement agencies.

Transportation systems in West Africa, to all intents and purposes, are far from being developed. The trans-coastal highway from Dakar to Lagos which passes through 12 member states is not in the best of conditions (apart from the Abidjan to Lagos corridor which is receiving attention). The Trans-Sahelian highway which passes through seven countries from Dakar to Lagos is also in bad condition apart from a few sections which are paved. The major challenge has been that, rather than constructing new highways, the authorities have been relying on existing national highways most of which face neglect. The resultant effect is that road transport is quite laborious and unreliable as a means of carrying passengers and carting goods. It is, however, the only feasible option at the moment.

Air transport has its own peculiar challenges. Virtually all the major national carriers including Air Afrique, Nigeria Airways and Ghana Airways have collapsed. Airlines that are presently active include Arik Air, ASKY Airlines, Air Burkina, TACV, Air Cote d'Ivoire, Aero Contractors, AWA, Medview and Air Peace. Measured against other regions, the cost of air transport in West Africa is extremely high. According to IATA, aviation taxes in West Africa are the highest on the continent

(Ghanaweb 2018). Sometimes, the costs of intra-regional flights are more expensive than in Europe. This is besides the frustrations including delays, cancellations, lost baggage, etc. that many passengers face. Attempts by ECOWAS to establish a regional airline, ECO-Air, some two decades ago have so far proved unsuccessful.

When it comes to marine transport, the story is not different. None of the member states currently operates a shipping line. The effort to establish the West and Central African Coastal Shipping Link (Sealink Project) under the auspices of FEWACCI (working in collaboration with the Ghana National Chamber of Commerce and Industry, NEXIM Bank of Nigeria, Transimex of Cameroon and the ECOWAS Commission) has also not yielded the required outcomes.

Between 1984 and 1994, ECOWAS completed the INTELCOM I project which connected 11 coastal member states with a network of submarine cables to facilitate automatic telephone, telex and telefax communications links. The three landlocked countries (Burkina Faso, Mali and Niger) were later connected with access routes to the submarine cables (ECOWAS 2016a). The second phase of the project, INTELCOM II, is intended to facilitate the full digitalization of telecommunication links in the region, using cutting-edge Information and Communications Technology (ICT). It hopes to achieve it through the establishment of 32 intra-state fibre-optic links to create a regional backbone for Member States (ECOWAS 2016b).

According to the Infrastructural Consortium for Africa (2018), the African continent has an annual infrastructural financing gap of between $130 billion and $170 billion. West African countries, therefore, have a Herculean task to improve upon their infrastructural systems in order to connect the region together through road and rail networks as well as high-speed telecommunications.

3.4 Financial Systems

The ECOWAS Monetary Cooperation Programme (EMCP) which began in 1987 as an offshoot of the West Africa Clearing House (WACH) is aimed at creating a common currency within the region to facilitate transactions (WAMA 2019). However, this programme which is being implemented by the West Africa Monetary Agency (WAMA) has been met with several challenges. In 2000, the West Africa Monetary Zone (WAMZ) was created to assist non-CFA countries (Gambia, Ghana, Guinea, Nigeria, Liberia and Sierra Leone) to achieve a common currency—Eco—which will be later merged with the CFA. After almost two decades of trying, the introduction of the Eco has been postponed four times and a new date is now 2020 (which still does not look feasible because the countries continue to struggle with the convergence criteria).

The absence of a common currency means that there are currently eight different currencies in circulation in the region. This makes the cost of transaction rather expensive due to exchange rate fluctuations. Intra-regional bank transactions are also mostly dependent on correspondent banking because the ECOWAS Payments and Settlement System (EPSS) is yet to come on stream. Traders in the region are

therefore faced with numerous challenges in making cash transfers to effect business transactions. It is, however, significant to recognize the contributions of banks such as Ecobank and leading Nigerian banks (particularly UBA and Zenith) which have spread throughout the region. These banks are supporting intra-regional trade. It is also important to note that Afreximbank is currently supporting the design and implementation the Pan-African Payment and Settlement Platform (PAPSP) across the continent (Egbuna 2019).

Another important leg of the financial systems is the need for an integrated financial market in West Africa. Already, the eight countries that form the Union Economique et Monetaire Ouest Africaine (UEMOA) have their own common stock market known as the *Bourse Régionale des Valeurs Mobilières* (BRVM 2019). In addition, the West Africa Capital Markets Integration Council (WACMIC) has been established, since 2013, tasked with the mandate of supervising the integration of all capital markets in West Africa through the coordination of relevant stakeholders, such as ECOWAS, West Africa Monetary Institute (WAMI) and UEMOA, and the sourcing of funds and other resources to support the implementation (BRVM 2019). WACMIC includes members of BVRM and the stock exchanged of Ghana, Nigeria, Sierra Leone and Cape Verde.

Agyapong (2014) has noted that capital markets play significant roles in the development of economies and therefore can be benchmarked as vital determinants of regionalization and single currency area formation. Nnorom (2017) believes that the cross-border listing and region-wide trading of securities would create broader and deeper liquidity for the stock exchanges. It is therefore important that ECOWAS countries work harder to achieve financial integration to support the CIM.

3.5 Private Sector

Since 2007, the ECOWAS Commission has been running a private sector directorate which is tasked with the mandate of, among others, improving the investment climate in the region in order to grow domestic investment and attract FDI. To achieve this, the directorate is expected to work with regional bodies such as FEWACCI, Federation of West African Manufacturers Associations (FEWAMA), West African Pharmaceutical Manufacturers Association (WAPMA), West African Bankers Association (WABA), West Africa Road Transporters Union (WARTU), West African Insurance Companies Association (WAICA), etc.

The challenge, however, is that in reality most of the regional bodies either only exist in name or they have become moribund. As a result, the participation of the private sector has not been that effective. Apart from the ETLS, which has a number of private companies participating, not much has been happening in the private sector front. The exception, perhaps, is in the banking sector where a number of Nigerian banks have been able to establish presence in the majority of the ECOWAS member states. For example, United Bank for Africa (UBA) has branches in ten ECOWAS

countries (UBA 2019) whilst Zenith Bank has branches in three ECOWAS countries (Zenith 2019).

For the ECOWAS common investment market to work, it will be necessary for ECOWAS to encourage more cross-border investments. Already, private sector operators like Aliko Dangote have begun initiatives aimed at spreading their investments across the region. For example, Dangote cement is now being produced and marketed in Ghana (Baaba-Hudson 2018).

3.6 Foreign Direct Investment

Whether domestic or foreign, the role of investment as a catalyst for development remains *sine qua non* in the discourse of academics and policymakers. In both advanced and developing economies, investment has been identified as a critical factor in the movement and distribution of global resources for development. Particularly, in the last half century, development experts have harped on the importance of Foreign Direct Investment (FDI) outflows from the global north to the global south to ensure equitable global development (Mallampally and Sauvant 1999; Hansen and Rand 2006; Buthe and Milner 2008) (Fig. 2).

Much of the growth in gross domestic product (GDP) of developing countries, including Sub-Saharan Africa (SSA) can be attributed to investments by transnational corporations (Sekkat and Veganzones-Varoudakis 2007). This, as a matter of fact, can be observed in the sectors of mining and crude oil production where the

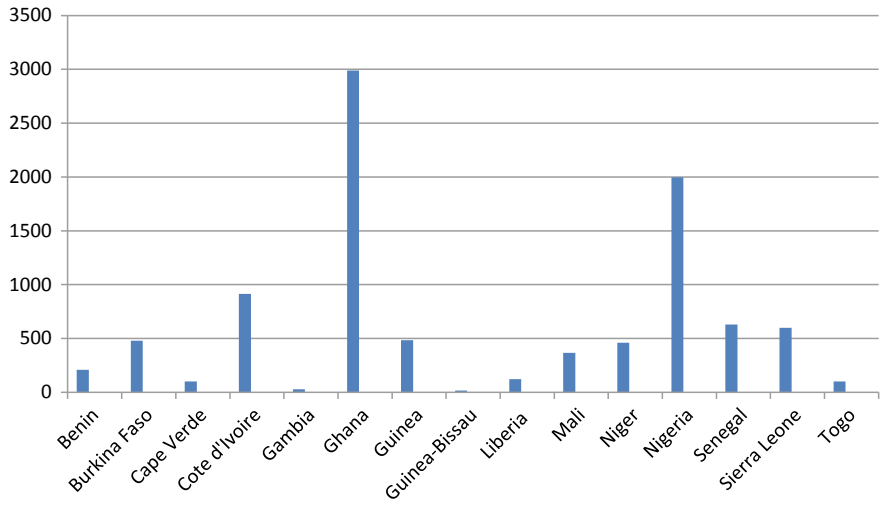

Fig. 2 Chart showing FDI inflows into ECOWAS countries (in billions of dollars) *Source* World Investment Report 2019

Table 2 Eight currencies within ECOWAS

	Country	Currency
1	Cape Verde	Escudo
2	The Gambia	Dalasi
3	Ghana	Cedi
4	Guinea	Guinea Franc
5	Liberia	Liberian Dollar
6	Sierra Leone	Leone
7	Nigeria	Naira
8	UEMOA countries (Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, Togo)	CFA

Source Author

investments largely come from outside the continent (Frynas and Paulo 2007; Ezeoha and Cattaneo 2012).

Every year, the United Nations Conference on Trade and Development (UNCTAD) releases a world investment report which shows the patterns of FDI inflows and outflows to the various regions of the world. In the 2018 report, Africa received an impressive 11 per cent increase in FDI inflows, amounting to $46 billion, in spite of the global slump (UNCTAD 2018). This is unlike the year 2017 where Africa's share of global FDI slumped by 21.5% from $53 billion in 2016 to $42 billion.

In West Africa, Nigeria, Ghana and Cote d'Ivoire have traditionally been the largest recipients of FDI over the decades. Quite significantly, Ghana, for the first time, overtook Nigeria in the 2019 report. Although the country's FDI dipped by 8%, its $3.3 billion inflows was enough to outperform Nigeria whose share plunged by as much as 43% to $2.2 billion. Overall, the region recorded a 15% decline in its FDI inflows (see Table 2).

Against the backdrop that 11 member states of the Economic Community of West African States (ECOWAS) are classified as Least Developed Countries (LDCs), the question of investments (local or foreign) for the region's development is critical. Many analysts view the ongoing regional integration efforts of ECOWAS as quite catalytic in creating the right atmosphere to attract the needed resource for the growth and development of the region.

As mentioned earlier, as much as 11 ECOWAS member states are classified among the 33 Least Developed Countries (LDCs) in Africa. Only Nigeria, Ghana, Cote d'Ivoire and Cape Verde are designated lower middle income. This makes the ECOWAS region one of the poorest in the world. It therefore comes as no surprise when the World Bank (2018) states that the region's share of total FDI inflows into Africa is a dismal 5%. One of the core visions of the CIM is to open the region up for FDIs. But the trend in the last decade requires serious reforms on the part ECOWAS countries to be able to attract significant amounts of FDI inflows.

In 2018, according to UNCTAD's World Investment Report (2019) FDI flows to the region declined by 15% to $9.6 billion. And this was largely due to Nigeria where

flows plunged by 43% to $2 billion. In respect of Ghana, the flows also dipped by 8% to $3 billion. This means Ghana topped the region in terms of FDI but it is quite worrying that the total FDI fell under $10 billion. There have been suggestions for more special economic zones (SEZ) to be created to attract FDI. Nigeria is already leading in this direction with some 38 SEZ. But there are recommendations for cross-border SEZ like the one created by Cote d'Ivoire, Mali and Burkina Faso in 2018.

4 Conclusion

This paper assessed the progress of ECOWAS towards a CIM. It is obvious from the discussion that more work has to be done to push the process forward. After more than a decade of trying, the region is yet to complete the process of developing a CIC which is a *sine qua non* for a CIM. Equally, after more than four and half decades of efforts implementing the protocol on free movement, there are still lingering challenges partly due to the fact that infrastructure for transportation across the region remains a big challenge. In terms of financial systems, the never-ending saga of the postponements of the Eco and the absence of effective payment systems also remains a challenge that must be addressed with decisive action. The paper also established that even though the ETLS has paved the way for private sector participation in the ECOWAS integration process, there are still huge gaps that need filling in order to promote regional domestic investments. Finally, with regards to FDI, it is quite unfortunate that the regional giant, Nigeria, has been on the decline with its share. This has monumental implications for the entire region. There is need for issues of security and macroeconomic challenges to be tackled frontally.

5 Recommendations

5.1 Need for a Uniformized Common Investment Code

As inferred from the paper, one of the challenges delaying the introduction of a Common Investment Code is the approach to be adopted (i.e. whether it would be necessary to harmonize existing investment laws or create an entirely new code). It is the considered view of the author that adopting the latter approach would be better. This is against the background that harmonization of the present codes might lead to some country-specific exceptions which may turn out to create problems later. Therefore, just like how the common external tariffs were adopted, it would be necessary for a new CIC to be created. Of course, this would not mean that the existing documents should be discarded. Rather they can form the basis for the crafting of the new CIC.

5.2 Need for Freer Movement of Persons and Goods

ECOWAS, no doubt, deserves tonnes of credit for being the first regional economic community to implement a protocol on free movement. The challenges, notwithstanding the fact that citizens do not have to pay for visa fees, are very important for a region where there is a lot of fluidity in informal cross-border trade. ECOWAS leaders therefore need to consolidate the gains which have been made so far by implementing more trade facilitation programmes. There is need for the numerous roadblocks and checkpoints to be significantly reduced. And, more importantly, security agencies including the police, customs and immigration need more training in how to deal with citizens of the Community. At the moment, it seems like the concept of ECOWAS citizenship has not yet permeated the consciousness of both nationals and security officials. And that explains why most of the security officials deal with ECOWAS citizens as foreigners. Therefore ECOWAS needs to step up education on its Vision 2020 which focuses more on "ECOWAS of People" rather than "ECOWAS of States."

5.3 Need for Networked Infrastructure

An ECOWAS region with interstate rail services would be phenomenal. It would automatically checkmate all the land border harassments. An ECOWAS region where interstate communication is cheap would be exciting. It would encourage a lot of exchanges between citizens from different parts of the Community. So, ECOWAS leaders need to focus on investing in common infrastructure, especially in the areas of transportation and communication. Presently, there is a lot of movement by air, which is encouraging, but the airfares are prohibitive and so only persons attending sponsored conferences or business meetings are normally able to afford. What ECOWAS leaders need to do is to introduce policies that would lead to a reduction in the airfares (for example, reductions in airport taxes).

5.4 Need for Region-Wide Financial System

As ECOWAS countries struggle to actualize the common currency programme, one of the things leaders of the Community can focus on is the expedition of the payment systems. For trade and investments to thrive, interbank payment systems are crucial. And, in these days of mobile money transactions that support online payments and so on, it would be exhilarating to see how a fully integrated financial system works out in the ECOWAS region. Leaders, therefore, need to pay attention to payment systems. In addition, there is need for financial investments à la stock exchanges to be developed in order to encourage interstate trading in stocks.

5.5 Need for Increased Private Sector Participation

A common investment market without local private sector participation will certainly not be worth its sort. Frankly speaking, the private sector in ECOWAS is one of the weakest links in the chain of integration. Because manufacturing in the region is very low, and there is very little exchange of goods. It is therefore not surprising that trade among ECOWAS countries is below 20%. What ECOWAS countries need to do, individually, is to reduce the cost of doing business. Indeed, there is need for massive investments in the area of electricity supply which is a major cost component in production in most of the member states. Collectively, they can work on initiatives like the West Africa Power Pool (WAPP) and the West Africa Gas Pipeline (WAGP) which are all aimed at making energy available at a cheaper cost to member states. It is also important for the countries to improve upon their macroeconomic environment and improve access to loans, especially for startups. Regional business groupings like FEWACCI and the others also need strengthening.

5.6 Need for More Foreign Direct Investment Inflows

The combined population of ECOWAS countries is nearing 400 million people. This is a substantial market size that should be attractive to most foreign investors. With the adoption of the CET, ECOWAS countries appear to have positioned themselves well for international investments. The major challenge now, however, has to do with the growing insecurity situation with Boko Haram insurgencies in the northeastern part of Nigeria and that of Al-Qaeda in the Islamic Maghreb (AQIM) along the Sahel region. ECOWAS member states, therefore, need to deal with the security conundrum, just as they did during the outbreak of the civil wars in Liberia and Sierra Leone. Beyond security, though, the countries need to improve upon their investment climate and this is where the CIC comes in strongly. A well-crafted CIC that assures investors of easy access to the entire market of ECOWAS is most likely going to attract a torrent of FDI inflows that would lead to skills building, employment creation, technology transfer and infrastructural development. Indeed, in the final analysis, ECOWAS countries ought to be able to establish the right nexus between investment and development. And, for a region that is designated one of the poorest in the world, more investments—both domestic and foreign—are required.

Appendix 1

Box 1: Article 2 of 1975 ECOWAS Original Treaty: Aims of the Community

Clause 2 of Article 2 states that: the Community shall by stages ensure:

i. the elimination as between the Member States of customs duties and other charges of equivalent effect in respect of the importation and exportation of goods;
ii. the abolition of quantitative and administrative restrictions on trade among the Member States;
iii. the establishment of a common customs tariff and a common commercial policy towards third countries;
iv. the abolition as between the Member States of the obstacles to the free movement of persons, services and capital;
v. the harmonisation of the agricultural policies and the promotion of common projects in the Member States notably in the fields of marketing, research and agro-industrial enterprises;
vi. the implementation of schemes for the joint development of transport, communication, energy and other infrastructural facilities as well as the evolution of a common policy in these fields;
vii. the harmonisation of the economic and industrial policies of the Member States and the elimination of disparities in the level of development of Member States;
viii. the harmonisation, required for the proper functioning of the Community, of the monetary policies of the Member States;
ix. the establishment of a Fund for Co-operation, Compensation and Development; and
x. such other activities calculated to further the aims of the Community as the Member States may from time to time undertake in common (p. 20).[1]

Source ECOWAS Treaty (1975).

Appendix 2

Box 2: Nigeria's Import Prohibition List

1. Live or dead birds including frozen poultry—HS codes 0105.1100–0105.9900, 0106.3100–0106.3900, 0207.1100–0207.3600 and 0210.9900.

[1] Ibid.

2. Pork, beef—HS codes 0201.1000–0204.5000, 0206.1000–0206.9000, 0210.1000–0210.2000.
3. Birds eggs—HS code 0407.0000; excluding hatching eggs.
4. Refined vegetable oils and fats—HS code 1507.1000.00–1516.2000.29 [but excluding refined Linseed, Castor and Olive oils. Crude vegetable oil are however NOT banned from importation].
5. Cane or beet sugar and chemically pure sucrose, in solid form containing added flavouring or colouring matter—HS code 1701.91.1000–1701.99.9000 in retail packs.
6. Cocoa butter, powder and cakes—HS codes 1802.00.0000–1803.20000, 1805.001000–1805.00.9000, 1806.10.0000–1806.20.0000 and 1804.00.0000.
7. Spaghetti/noodles—HS codes 1902.1100–1902.30.0000.
8. Fruit juice in retail packs—HS codes 2009.11.0012–2009.11.0013–2009.9000.99.
9. Waters, including mineral waters and aerated waters containing added sugar or sweetening matter or flavoured, ice snow—HS codes 2201.1000–2201.90.00, other non-alcoholic beverages HS code 2202.10.00–2202.9000.99 [but excluding energy or health drinks {liquid dietary supplements} e.g. Power Horse, Red Ginseng etc.] HS code 2202.9000.91 and beer and stout (bottled, canned or otherwise packed) HS code 2203.0010.00–2203.0090.00.
10. Bagged cement—HS code 2523.2900.22.
11. Medicaments falling under headings 3003 and 3004 as indicated below:

    - Paracetamol tablets and syrups.
    - Cotrimoxazole tablets syrups.
    - Metronidazole tablets and syrups.
    - Chloroquine tablets and syrups.
    - Haematinic formulations; ferrous sulphate and ferrous gluconate tablets, folic acid tablets, vitamin B complex tablet [except modified released formulations].
    - Multivitamin tablets, capsules and syrups [except special formulations].
    - Aspirin tablets [except modified released formulation and soluble aspirin].
    - Magnesium trisilicate tablets and suspensions.
    - Piperazine tablets and syrups.
    - Levamisole tablets and syrups.
    - Clotrimazole cream.
    - Ointments—penicillin/gentamycin.
    - Pyrantel pamoate tablets and syrups.
    - Intravenous fluids [dextrose, normal saline, etc.].

12. Waste pharmaceuticals—HS code 3006.9200.
13. Mineral or chemical fertilisers containing two or three of the fertilising elements nitrogen, phosphorus and potassium (NPK 15-15-15), excluding organic fertiliser HS code 3105.10.00.00–3105.90.00.00.
14. Soaps and detergents—HS code 3401.11.1000–3402.90.0000 (in retail packs only).
15. Mosquito repellant coils—HS code 3808.9110.91 (mosquito coils).
16. Rethreaded and used pneumatic tyres but excluding used trucks tyres for rethreading of sized 11.00 × 20 and above 4012.2010.00.
17. Corrugated paper and paper boards—HS code 4808.1000, and cartons, boxes and cases made from corrugated paper and paper boards HS code 4819.1000, toilet paper, cleaning or facial tissue—HS code 4818.1000–4818.9000 excluding baby diapers and incontinence pads for adult use 4818.4000.41 and exercise books—HS code 4820.2000.
18. Telephone re-charge cards and vouchers—HS code 4911.9990.91.
19. Carpets and other textile floor coverings falling under HS code 5701.10.000–5705.00.0000.
20. All types of foot wears, bags and suitcases HS codes 6401.1000.11–6405.9000.99 and 4202.1100.10–4202.9900.99 [but excluding safety shoes used in oil industries, sports shoes, canvas shoes all completely knocked down (CKD) blanks and parts].
21. Hollow Glass Bottles of a capacity exceeding 150 ml (0.15 l) of all kinds used for packaging of beverages by breweries and other beverage and drink companies—HS code 7010.9021.29 and 7010.9031.00.
22. Used compressors—HS code 8414.3000, used air conditioners—HS codes 8415.1000.11–8415.9000.99 and used fridges/freezers—HS codes 8418.1000.11–8418.69.0000.
23. Used motor vehicles above fifteen (15) years from the year of manufacture—HS codes 8703.10.00–8703.90.0000.
24. Ball point pens and parts including refills (excluding tip) HS code 9608.10.0000.
25. Tomato paste or concentrate put up for retail sale—2002100000, 2002902000, 200290900.0

Source Nigeria Customs Service (2019).[2]

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