ASSESSING THE DETERMINANTS OF EXPORT DIVERSIFICATION IN AFRICA

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Abstract
Diversification of production and exports is critical for African countries to promote sustainable growth and economic transformation. This paper empirically explores the long-run determinants of export diversification by estimating a cross country regression model using a panel of 53 African countries for 1995-2011. System GMM estimates provide robust evidence supporting the importance of per capita income, infrastructure, public investment, human capital and the institutional framework as significant drivers of export diversification. This calls on African countries to design and implement long-term development strategies and institutional reforms to foster export diversification and economic transformation.
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1. Introduction

Africa's remarkable growth since the beginning of this century is yet to induce commensurate social and economic development because it relied heavily on primary commodity production and exports. As a result, the continents' share in global exports declined from 5.0 per cent in 1970 to 2.3 per cent in 2000 before slightly recovering to 3.3 per cent in 2010. At the same time, the share of the rapidly diversifying East Asian countries increased consistently from 2.3 per cent in 1970 to 12.1 per cent in 2000 and 17.8 per cent in 2010. Narrow production base and export concentration do not augur well for sustainable and inclusive growth, employment generation, poverty reduction and reduced vulnerability to external shocks. Diversification of production and exports can act as a driver of high-level inclusive and sustainable growth that fosters economic transformation, employment and poverty reduction.

Proponents of export diversification have proposed three broad channels through which diversification can positively contribute to the growth prospects of an economy. First, diversification necessarily involves increased investment in a wide range of activities. Besides broadening sources of income, this can mitigate the adverse effects of export instability and high terms of trade variations, reducing a country's exposure to external shocks and risks associated with fluctuations in commodity demand and prices (Edwards, 2009). Second, export diversification can act as a distributional tool for channeling mineral fueled revenues to other complementary and supplementary sectors of the economy, and thus ensure steady future inflow of revenues while accounting for inter-generational equity (Page, 2008). Third, export diversification is associated with reduced swings and fluctuations in foreign exchange earnings, increases in GDP and employment

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rates, acceleration of value addition initiatives and improvement in the quality of manufactured products (Osakwe, 2007; Alaya, 2012).

Several challenges continue to hinder efforts by African countries to diversify their economies and attain these economic benefits, especially in resource rich countries (Gelb, 2010). These factors relate to institutions and policies, technology, research and development, human capital, infrastructure, competition in international markets and resource abundance which limits the urge to diversify and industrialize and instead encourages resource capture. Industrial policies are thus essential if African countries are to address these challenges and capitalize on opportunities for increased export diversification, sustainable growth and economic transformation (Elhiraika et al. 2013).

The objective of this paper is to empirically assess the determinants of export diversification in Africa, focusing on policy and institutional factors. The methodology consists of cross country panel regressions which are estimated using system generalized methods of moments (S-GMM) technique. The findings of the paper suggest that export diversification and Africa's structural transformation hinge on several key factors such as income, improved domestic policies and institutional capacity and increased investment in infrastructure and human capital development. In addition to long term industrial and trade policies, export diversification in Africa will benefit from efforts to speed up regional integration and foster intra-Africa trade.

The next section reviews the theoretical and empirical literature while section 3 discusses data issues and the econometric methodology used in the empirical estimation. The results of the model are presented and discussed in section 4 and section 5 concludes with policy recommendations.

2. Literature Review

Recent literature on export diversification has centered on the relationship between diversification and economic growth and the main determinants of diversification which can explain the observed divergence in diversification rates across countries that are characterized by similar initial conditions. Key factors which have been consistently found to be robust in explaining diversification include per capita income, investment, human capital, population, terms of trade, exchange rate, geographical location and institutional and governance factors.

Increases in a country's per capita income offer opportunities for increased diversification due to increases in purchasing power and the ability of consumers to afford a diverse basket of goods. Imbs and Wacziarg (2003) found an inverted U-shaped relationship between sectoral diversification and income levels. They show that as per capita income increases, export diversification increases until a threshold of around US Dollars 9000, after which export concentration takes effect. This pattern implies that African countries, given their low levels of income per capita, are still on the export diversification phase.

Theoretically, as domestic investment increases, export concentration decreases. Investment, especially by the private sector is considered as an important driver of export diversification as it can lead to increased productivity especially in new sectors. A thriving private sector is associated with research and development, innovation motives

and risk taking ability while engaging in unexploited sectors of the economy (UN, 2011). Similarly, Foreign Direct Investment (FDI) can positively affect export diversification through the acceleration of technology transfer and improvement in a country's production capabilities (Iwamoto and Nabeshima, 2012). It has been argued that the impact of FDI on export diversification in Africa has been weak owing to its concentration on enclave sectors that have limited linkages to the rest of the economy ('Ofa et al. 2012).

Complementing physical capital, human capital accumulation is a pre-requisite for technological advancement and for boosting innovation, technology and skills that are instrumental in the creation of quality and high value products (Hausmann and Klinger, 2006). Human skills have been associated with increased diversification especially in the production of manufactured goods or services which are knowledge based (Agosin et al, 2012). Since the generation of new products necessitates research and development, human knowledge is crucial in the exploration of new, efficient and affordable production techniques.

Another strand of diversification literature has conjectured that the population of a country can accelerate export diversification by inducing greater demand and providing a market for new and higher value products. As an economy's size increases in terms of number and diversity of consumers, there is an incentive for the production of more and varied goods for consumption so as to satisfy different tastes and preferences (Parteka and Tamberi, 2011). Moreover, an increase in a country's population is associated with increased labor which can be used as factor input in the production of diversified products (Jetter and Hassan, 2012).

Regarding terms of trade, both theoretical and empirical literature emphasize its effect on accelerating export concentration by increasing the cost of using factor input in new sectors of the economy. When a country's terms of trade appreciate, the increase in prices associated with the major exported product can lead to a re-allocation of factors of production to that sector, constraining investment and growth in other sectors (Agosin et al, 2012). In addition, positive terms of trade shocks faced by crude oil and primary commodity exporting economies in particular limits the urge for export diversification due to increases in export revenues associated with rising prices of commodities.

Exchange rate polices, especially the overvaluation of a currency can deter export diversification by inflating the prices of exports and undermining the competitiveness of the export sector. Empirical evidence points to the negative effect of an exchange rate appreciation on the production of technology-oriented tradable goods and a long-run positive relationship between overvaluation and export concentration (Agosin et al, 2012).

Regarding the relationship between diversification and geographical location, Adeel and Temple (2009) in a sample of 70 developing countries find that remote countries, defined by their proximity to large water sources such as rivers, seas and oceans, are associated with minimal export diversification and higher growth volatility. They argue that landlocked countries are shelved away from access to shipping routes and this natural barrier to trade negatively affects their degree of diversification and trade. This evidence

is also supported by Matthee and Naudé (2007) who find an inverse relationship between export diversification and distance to export hubs in Southern Africa.

In contrast, close proximity to large markets has been envisaged to increase export diversification by providing a market for varied goods and services and reducing transportation costs. For instance, Breinlinch and Cunat (2011), note that the success of industrialization in South Korea, Singapore and Taiwan was partly due to their close proximity to the large Japanese market. However, geography is not necessarily a destiny as many resource-poor countries such as Mauritius, Singapore and Japan as well as some small landlocked countries such as Switzerland have demonstrated. The success of these countries was underpinned by effective policies and institutions rather than location or resource endowment (Chang, 2012).

More recent literature places greater emphasizes on the importance of governance and institutional arrangements as pre-requisites to export diversification. Governance is a pre-condition to promoting diversification through stronger protection of property rights, facilitation of transactions and ensuring a level-playing field for firms to compete (OECD and UN, 2011; Djankov et al, 2002). The strength and reliability of institutions affect factors such as over-regulation, red tapes and political stability, all of which impact investment and entrepreneurial activities. Improvements in the governance structures of an economy are not only associated with a diversified export base and industrial diversification, but also with reduced conflicts and civil wars that undermine investment and export diversification (Plekhanov et al 2009). Strong institutions which counter corruption, bribes and expropriations exercised by government incumbents when innovators are seeking business licenses and permits are crucial in promoting entrepreneurship and innovation (Starosta de Waldemer, 2010).

Finally, the role of institutions that foster regional integration has been cited as a key accelerator of export diversification. Binti (2011) argues that economic integration in East Asian economies has led to faster export diversification in the region. Similarly, regional integration arrangements could facilitate trade and commerce through reforming trade accelerators such as custom procedures and cross-border entrepreneurship and trade (OECD and UN, 2011). Regional Economic Communities in Africa can foster diversification through the establishment of common regional markets and a Continental Free Trade Area (CFTA) which can facilitate the free movement of foactors of production and deepen intra-African trade. Indeed, a recent study demonstrates that, if complimented by effectives trade facilitation measures (including removal of tariff and non-tariff barriers), the establishment of a CFTA would help double the share of intra-Africa trade in total Africa's trade from the current 11 per cent within only 10 years (Mevel and Karingi, 2012).

3. Model Specification

There exist a variety of indices which are used to estimate the degree of export concentration (the inverse of export diversification) in an economy. The most widely used indices include the Ogive index, the entropy index and the Normalized Herfindhal Hirschman index (HHI). All these indices are highly correlated and have been shown to

provide similar ranking in terms of export concentration.[2] Therefore, for the purpose of this study, only the HHI index is used. For each of the countries in the sample, the HHI is calculated as;

$$HHI = \frac{\sqrt{\sum_{i=1}^{n}(x_i/X)\text{^}2} - \sqrt{1/n}}{1 - \sqrt{1/n}} \qquad (1)$$

where x_i denotes the value of exports of the *i*th product, $X = \sum_{i=i}^{N} x_i$ represents the sum of the value of exports of each commodity and *N* represents the number of products. The HHI ranges from $0 \leq H \leq 1$ whereby the minimum value of zero depicts maximum levels of diversification (less specialization) and the maximum value of one represents full specialization (less diversification).

The baseline cross country econometric model specified to analyze the determinants of export diversification in Africa is assumed to take the form:

$$y_{it} = \alpha y_{it-1} + \beta X'_{it} + \lambda_t + \eta_i + \varepsilon_{it} \qquad (2)$$

for i = 1, …, N and t =1, …,T, where the dependent variable, y_{it} represents the Normalized Herfindhal Hirschman index (HHI) of export diversification for country *i* in period *t*, y_{it-1} is the value of the HHI at the beginning of the period (proxy for initial condition), X_{it} is a vector of determinants of export diversification (GDP per capita, domestic investment, FDI, ODA, human capital, terms of trade, institutions and policies), λ_t represent time dummies which capture the impact of common global shocks across countries, η_i denotes country unobserved heterogeneity while ε_{it} is the error term.

The set of variables embodied in X_{it} include policy, governance and institutional factors which have theoretically been assumed to have an impact on export diversification in Africa. Initial concentration index which takes into account the conditions of a country at the beginning of each period is expected to assume a positive sign, implying that countries which have highly concentrated exports at the onset tend to experience inertia in diversifying and have a tendency of remaining concentrated. GDP per capita in constant 2000 US dollars is included as a proxy of a country's standard of living. It is expected to foster diversification mainly by increasing purchasing power for a variety of goods and increasing resources for productive investment. Therefore, a negative sign is expected with the concentration index.

[2] It is important to note that the export concentration indices might be susceptible to changes in commodity prices, resulting in a higher concentration at times of commodity prices hikes although such biases are not expected to be high enough to affect the trend of the export concentration measure.

Gross fixed capital formation is used as a proxy for domestic private and public investment. However, whereas domestic private investment is strongly envisaged to stimulate export diversification, the effect of public investment is rather unclear theoretically. It is predicted to positively accelerate diversification to the extent that government investments are channeled to the provision of infrastructure and basic services which favor the growth of new sectors of the economy. On the contrary, public investment can deter diversification if channeled to support existing export industries that are characterized by limited value addition and impact on diversification. It is therefore useful from policy perspectives to separate the impact of private investment from that of public investments as done in the estimation procedure.

The coefficients of international capital flows such as FDI and ODA can take either sign depending on the country's absorption capacity and policies. FDI is envisaged to spur export diversification to the extent that it is market seeking and acts as a channel of diffusing spillovers (technology and information) from overseas countries to local firms (Iyer, 2011; Jayaweera, 2009). But it is expected to have a negative role when it is concentrated in the enclave natural resource sectors, as it is the case in most African countries. Therefore, it is the quality rather than the quantity of FDI that matters most in determining its effectiveness in diversification. In the same vein, ODA inflows to Africa can boost export diversification if they are channeled to the provision of infrastructure, especially transport and energy projects. Conversely, if ODA disbursement leads to real exchange rate appreciation or a Dutch Disease, it can undermine a country's competitiveness, constraining diversification of production and exports.

Human capital, proxied by gross secondary school enrollment rate, is hypothesized to induce export diversification through increased availability of skilled labor for new and innovative investments. An increase in specialized human capital is associated with higher research and development, high technology production techniques, low cost of production and a greater diversified production chain. Similarly, population growth can lead to increased diversification (lower HHI value) through the inducement of higher and varied demand for goods and services.

Terms of trade, calculated as the ratio of the export unit value index to the import value index is expected to increase sectoral concentration due to increased commodity prices that entice the exportation of unprocessed raw materials. An overvalued real effective exchange rate is envisaged to deter export diversification through reduced competitiveness of a country's export sector due to high prices vis-à-vis other countries. Therefore, both terms of trade and the real exchange rate are envisaged to have positive coefficients.

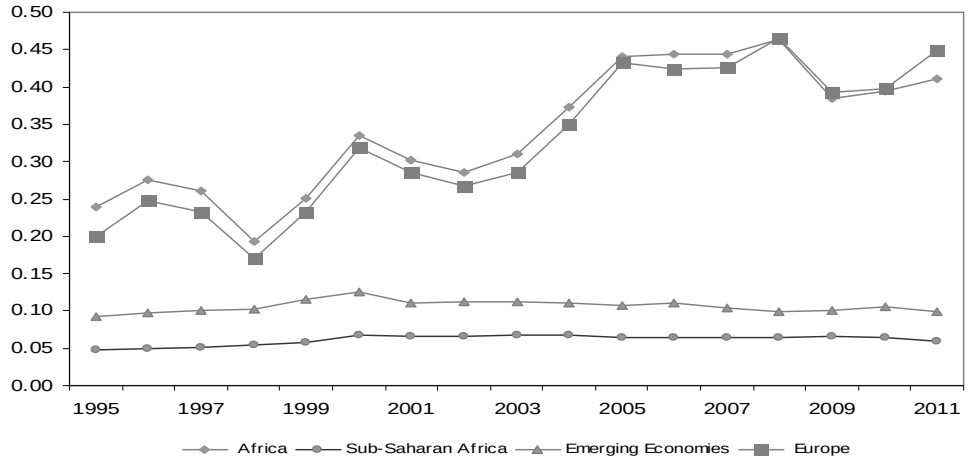
Finally, institutional and governance factors are proxied by two different policy indicators. Government effectiveness captures the perception of the quality of public services, the independence of government from political interference and the credibility of government in formulating and implementing its policies while the rule of law index is a perception index on the quality of contract enforcement, property rights and the likelihood of crimes and violence. Both of these policy indices range from negative 2.5 to positive 2.5, with lower values indicating lower rankings in governance levels. They are all envisaged to lower export specialization.

4. Model estimation and discussion of results

The data used in this paper consists of a balanced annual panel for 53 African countries over the period 1995 to 2011 and is extracted from three different sources: Data on the HHI is extracted from the United Nations Conference on Trade and Development (UNCTAD) database while data on all other variables is obtained from the African Development Indicators and the World Governance Indicator databases of the World Bank[3].

Figure 1 shows the evolution of Africa's HHI of export diversification compared with Europe and Emerging Economies. The figure suggests that for Africa as a whole and in sub-Saharan Africa in particular, exports are highly concentrated, as illustrated by the two upper most curves which tend towards the HHI maximum value of one. This trend unmasks Africa's reliance on few commodities. In fact, according to the UNDP (2011), the share of primary commodity exports in Africa's total exports increased from 75 per cent in 1995 to 81 per cent in 2009. By contrast, Europe and Emerging countries are characterized by diversified export baskets.

Figure 1: Africa's HHI compared to Europe and Emerging Economies

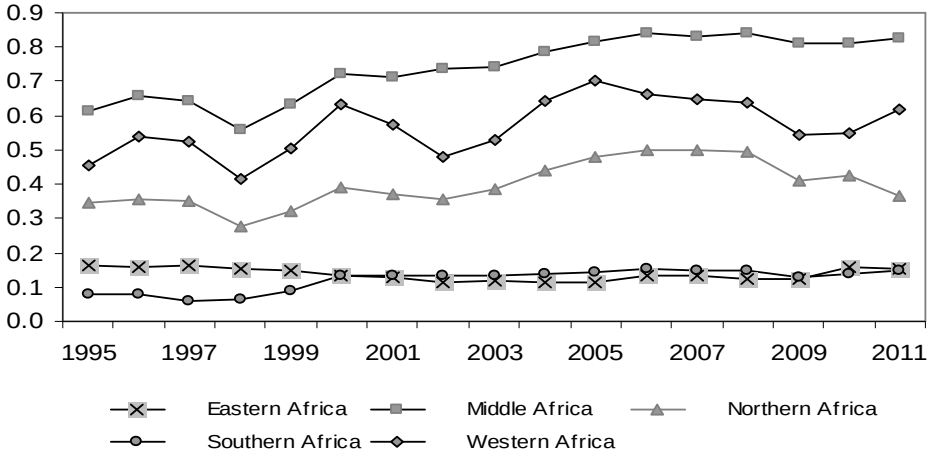


Note: Country classification based on the UNCTAD (2012).

Figure 2 shows notable heterogeneity in the levels of export diversification in Africa's five geographical sub-regions. Countries categorized as Middle Africa and Western Africa exhibits high levels of specialization (HHI of above 0.4) as compared to the Eastern Africa and Southern Africa regions, with an HHI of less than 0.2 for the sample period. The most highly concentrated African economies include Angola whose HHI over the sample period is around 0.92 while Chad ranks second with an average HHI of 0.80 over the sample period.

[3] The sample consists of all African countries excluding South Sudan due to data limitations. Data sources, definitions and sources for each variable are elaborated in the Appendix

Figure 2: Evolution of HHI in Africa by subregion



Note: Country classification based on the UNCTAD 2012

Descriptive statistics of the variables are summarized in Annex Table 1. The relatively large number of observations and the variability of data, both within and between countries, increase the precision of the estimates yielded and the possibility of uncovering a causal relationship in the estimation of the baseline model. For the sample countries as a whole, the mean value of the HHI is less than 0.5, reflecting moderate levels of export diversification, especially when compared to developed or emerging economies. The pair-wise correlations of the variables considered are also presented in the Annex Table. Most of the coefficients turned out with the expected signs and are significant at the 5 percent level.

The dynamic nature of the baseline equation renders Ordinary Least Squares (OLS) regressions estimates biased and inconsistent because of the autocorrelation induced by the presence of the lagged dependent variables among the regressors, reverse causality between HHI and the covariates and time invariant country characteristics. Therefore, only findings from S-GMM regressions are presented in the Tables below.

To assess the validity of the estimates, diagnostic tests are reported in the lower panel. They include the number of instruments generated in each specification, alongside the p-values corresponding to the Hansen test, the Difference- in-Hansen test and the Arellano tests for auto correlation of both order one and two. In all the specifications, the p-values of the AR(2) fails to reject the null hypothesis of no autocorrelation in the residuals while the Hansen test fails to reject the null hypothesis of joint validity of all the instruments used.

The p-values of the Difference-in-Hansen test fail to reject the null hypothesis of using the lagged first differences as valid instruments for the equations in level in the S-GMM. All the right hand side variables are assumed to be endogenous and are thus instrumented using their own lagged values, starting from the second lag.

Table 1: System GMM; Dependent Variable: Normalized HHI, 1995-2011

	(1)	(2)	(3)	(4)	(6)
GDP per capita	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(3.16)	(3.50)	(2.85)	(2.75)	(3.25)
Public Investment	-0.005	-0.005	-0.007***	-0.010***	-0.008*
	(-1.15)	(-1.05)	(-2.72)	(-2.83)	(-1.85)
Population Growth	-0.018	-0.018	0.016	-0.009	-0.001
	(-0.48)	(-0.49)	(0.45)	(-0.18)	(-0.02)
Human Capital	-0.006**	-0.005**	-0.005*	-0.005	-0.006*
	(-2.02)	(-2.15)	(-1.71)	(-1.32)	(-1.70)
Exchange Rate	0.000	0.000	0.000	0.000	0.000
	(0.42)	(0.38)	(0.47)	(0.14)	(0.67)
Terms of Trade	0.001*	0.001*	0.001**	0.001**	0.001***
	(1.82)	(1.81)	(2.12)	(2.58)	(1.74)
Government Effectiveness	-0.084	-0.043	-0.058	-0.079	-0.141**
	(-1.28)	(-0.57)	(-0.87)	(-1.02)	(-1.96)
SSA (Dummy)		0.099			
		(0.91)			
Oil-Rich Countries (Dummy)			0.311***	0.333***	
			(3.61)	(3.39)	
ODA				0.006	
				(1.31)	
Rule of Law					0.103
					(1.31)
Constant	0.389**	0.326*	0.285**	0.341	0.386**
	(2.04)	(1.87)	(1.99)	(1.23)	(1.97)
Number of Observations	350	350	350	350	350
Number of Countries	43	43	43	43	43
Number of Instruments	41	42	36	39	38
Hansen test p-value	0.255	0.251	0.507	0.370	0.379
Diff in Hansen p-value	0.702	0.704	0.711	0.844	0.896
AR(1) p-value	0.178	0.200	0.157	0.329	0.149
AR(2) p-value	0.624	0.638	0.846	0.543	0.688

t statistics in parentheses whereby significance is denoted *** for p<0.01, ** for p<0.05 and * for p<0.1 All standard errors are two-step, robust and clustered by country.

Across all specifications, all the significant coefficients turned out with their expected signs and have important intuitive interpretation and implications as discussed below. GDP per capita is negative and highly statistically significant at the one percent level implying that as income per capita increases in an economy, there is a corresponding change in the pattern of consumption preference, with a bias towards more diversified products. Growth in income and increased purchasing power and demand appears to stimulate diversification of exports. This finding supports recent observations that Africa's growing middle income class and increased domestic demand have strongly added to diversification of its sources of growth in recent years (AfDB et al. 2012).

Public investment as a share of GDP turned out to have a negative and significant relationship with the normalized HHI of export diversification. This result supports government capital expenditure as a key component in stimulating manufacturing and other activities through the provision of infrastructure, human and institutional capabilities and basic services that promote entrepreneurship and improve the business environment and investment climate.

Human capital appears to be a strong and positive determinant of export diversification, indicating that countries whose population exhibit higher levels of education are more likely to promote export diversification. This highlights the importance of post primary education in equipping the workforce with sufficient and practical skills that stimulate innovation and research and development. This finding strongly supports the criticism often leveled against the Structural Adjustment Programs of the 1980s and 1990s and the more recent poverty reduction strategies that emphasized primary education as sufficient component of the human capital with little attention to post-primary education and vocational training (Elhiraika et al. 2013).

The empirical findings suggest that terms of trade and ODA have negative effect on diversification. This indicates that as commodity prices increase, resource-rich countries are more likely to specialize in the production and export of a few products in order to benefit from increased export revenues. On the other hand, ODA inflows may not promote diversification if used to support export sectors in which an economy commands a comparative advantage. In fact, due to the absence of coherent and effective industrial policies in most African countries, budgetary resources, into which aid flows are mostly channeled, are mostly devoted to social sectors with little or no effect on production and export performance.

Finally, population growth and real exchange rate seem to have no important impact on export diversification in Africa. The weak population is perhaps due to the high poverty rate, estimated at 46 per cent in 2012 for the continent as a whole in addition to high income inequality inequality associated specifically with commodity-driven growth. Improved macroeconomic and exchange rate management in most African countries in the last two decade appears to at least partly explain the neutral impact of the real exchange rate on export diversification (UNECA and AUC, 2012).

In table 2, three more explanatory variables are introduced in the baseline regression model: domestic credit to the private sector (a proxy for financial development), telephone lines per one hundred people (a proxy for infrastructure) and private investment as a share of GDP. The inclusion of these variables follows a strand of recent literature which argues that access to credit accelerates the pace of export diversification through the provision of capital needed for entrepreneurial activities while the role of infrastructure, as a crucial accelerator of a country's export diversification has been underscored by several studies (e.g. UNECA and AUC, 2007). Private investment is envisaged to induce changes in export structure and accelerate export diversification by increasing productivity and the amount of capital stock in the economy (Alaya, 2012).

In all the specifications, the coefficient of initial HHI remains significant at the one percent level, suggesting path dependence in export diversification. This highlights the importance of a country's initial conditions in its development path and supports the view that resource-rich African countries are more likely to continue exporting unprocessed raw materials with limited diversification in the absence of visionary leadership and effective industrial and diversification strategies. Indeed, as experiences from East Asia and the developed economies indicate, massive industrialization and economic diversification hinges crucially on the existence of effective long-term development strategies, including well-designed and effectively implemented industrial policies (Chang, 2012; Elhiraika et al. 2013).

Table 2: System GMM; Dependent Variable: Normalized HHI, 1995-2011

	(1)	(2)	(3)	(4)
Initial HHI	0.582***	0.575***	0.607***	0.583
	(3.43)	(4.41)	(4.69)	(0.28)
GDP per capita	-0.000**	-0.000**	-0.000**	-0.000
	(2.40)	(2.34)	(2.06)	(0.13)
Population Growth	-0.054	-0.057	-0.051	-0.047
	(-1.39)	(-1.42)	(-1.20)	(-0.12)
Infrastructure	-0.002**	-0.003**	-0.003**	-0.003
	(-2.14)	(-2.18)	(-1.96)	(-0.21)
Terms of Trade	0.001*	0.001	0.001	0.001
	(1.69)	(1.13)	(1.61)	(0.10)
Human Capital	-0.005**	-0.006**	-0.004*	-0.005
	(-2.39)	(-2.25)	(-1.78)	(-0.08)
Private Investment		-0.002	-0.002	-0.002
		(-0.79)	(-0.64)	(-0.07)
Private Sector Credit		0.002	0.001	0.002
		(0.72)	(0.42)	(0.07)
SSA (Dummy)			0.049	
			(0.70)	
Landlocked Countries (Dummy)				0.051
				(0.05)
Constant	0.470***	0.547***	0.419***	0.470
	(2.86)	(3.37)	(3.05)	(0.19)
Number of Observations	357	340	340	340
Number of Countries	47	46	46	46
Number of Instruments	36	40	45	45
Hansen test p-value	0.138	0.178	0.151	0.199
Diff in Hansen test p value	0.138	0.233	0.107	0.221
AR(1) p-value	0.017	0.016	0.011	0.756
AR(2) p-value	0.670	0.542	0.587	0.871

t statistics in parentheses whereby significant is denoted *** for p<0.01, ** for p<0.05 and * for p<0.1 All standard errors are two-step, robust and clustered by country.

The coefficient of infrastructure is negative and significant highlighting the importance of economic policies to address the infrastructure deficits currently experienced in most African economies. Private sector credit as a share of GDP remains insignificant given the low levels of financial intermediation in African countries.

Private investment is found to have no significant effect of export diversification, although its coefficient has the anticipated sign. This rather unexpected finding is perhaps a reflection of the fact that in most African countries private investment remains concentrated in the non-tradeable goods sector and exports rely heavily on the commodity sector which is dominated by foreign investors and government with limited linkages to the rest of the economy. Bebczuk et al. (2006) find that private investments accelerate export concentration when domestic firms take advantage of specialization based on economies of scale rather than exploring new sectors of the economy because of risks, uncertainty and lack of information. Finally, across all the three specifications, the hypothesis that human capital and per capita income are key drivers and long-term determinants of export diversification in Africa remains robust.

5. Conclusions

This paper has attempted to assess the long-run determinants of export diversification for 53 African countries during 1995-2011. The findings underpin the importance of per capita income, public investment, institutions and policies, human capital and infrastructure as key long-run determinants of export diversification on the continent. Per capita income is associated with increased purchasing power and demand for diversified products while public investment accelerates export diversification through the provision of basic services. Moreover, institutions and policies that promote good economic and corporate governance are a pre-requisite for African countries to transform their economies through diversification while secondary school education is associated with increased knowledge and skills pertinent for entrepreneurship and research and development.

The empirical findings strongly underpin the importance of institutions and policies that promote structural changes in production and exports. African countries require industrial policies which facilitate both vertical and horizontal diversification. This underpins the importance of governance effectiveness and credibility in the formulation and implementation of sound economic policies. Moreover, investment friendly regulatory policies which support the proper functioning of the market are crucial in eliminating market frictions and inefficiencies. This, among other things, requires strong property rights policies and a credible rule of law which promotes the enforcement of contracts.

Another significant conclusion is the importance of policies aimed at reducing infrastructural deficits and boosting human capital. Policy makers need to formulate better infrastructural policies which lead to lower costs of doing business and those which encourage both domestic and foreign investment. Complementing this is the need for quality education which equips the workforce with relevant labor market skills geared at innovation, entrepreneurial activities, research and development and better management skills.

In line with the above conclusions, it is also arguable that regional integration in Africa can play a critical role in promoting export diversification, not only through the

alignment of custom procedures and facilitating cross-border movement of people, goods and services, but also through the reduction of bureaucratic procedures, cost of doing business, transit time for goods, faster diffusion of technology and the expansion of end markets for Africa's products.

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ANNEX TABLES

Table 1: Summary Statistics and correlations, 1995-2011

Variable	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard Deviation	Number of Observations	Correlation with HHI
GDP per capita	1152.9	1677.1	1683.7	463.0	810	0.04
Terms of Trade	101.6	24.9	12.6	20.5	598	-0.001
Human Capital	39.7	26.5	25.2	6.4	513	-0.20***
HHI	0.5	0.2	0.2	0.1	901	1.0
Initial HHI	0.5	0.2	0.2	0.1	848	0.89***
Public Investment	8.1	19.2	5.2	18.5	770	0.11*
Private Investment	14.5	34.7	10.4	33.1	769	0.02
Population Growth	2.3	0.1	0.8	0.7	848	0.22***
Rule of Law	-0.7	0.7	0.7	0.2	850	-0.22***
Exchange Rate	659.2	1690.6	1515.7	767.4	877	0.13*
Infrastructure	19.0	28.8	17.3	23.0	839	-0.16**
Private Sector Credit	20.3	22.8	21.8	6.2	795	-0.49***
ODA	10.9	13.4	10.4	8.6	824	0.11*
Government Effectiveness	-0.7	0.7	0.6	0.2	848	-0.28***

Note: Significance is denoted by *** for p<0.01, ** for p<0.05 and * for p<0.1

Table 2: Definition, Measurement Units and Sources of Data used in the Analysis

Variable	Definition	Units	Source
HHI	Herfindhal-Hirschmann index	Normalized between 0 and 1	UNCTAD
GDP per capita	This is the gross domestic product divided by midyear population	Constant US Dollars	African Development Indicators
Gross Public Investment	Public sectors' gross domestic fixed capital formation	Percentage of GDP	African Development Indicators
Population Growth	The exponential rate of growth of midyear population expressed as a percentage	Annual growth rate	African Development Indicators
Human Capital	Gross secondary enrollment ratio of total enrollment: Ratio of total enrollment to population of age group attending secondary level education	Ratio	African Development Indicators
Exchange Rate	Principal exchange rate based on monthly average	Local currency units relative to the US dollar	African Development Indicators
Terms of Trade	Export price index divided by import price index	Index (2000=100)	African Development Indicators
Government Effectiveness	This is the perception of the quality of: public services, civil service, policy formulation and independence from political pressure	Scale ranging from negative 2.5 to 2.5	Worldwide Governance Indicators
Infrastructure	Telephone lines per 100 people	Telephone lines per 100 people	African Development Indicators
Private Sector Credit	Financial resources provided to the private sector and mandate a claim for repayment	Percentage of GDP	African Development Indicators
Private Investment	Gross investment by the private sector plus its fixed domestic assets	Percentage of GDP	African Development Indicators
Official Development Assistance	Actual transfer of international financial resources by donors	Percentage of GDP	African Development Indicators
Rule of Law	Perception of a countries quality of contract enforcement, property rights judicial process and the likelihood of crime and violence	Scale ranging from negative 2.5 to 2.5	Worldwide Governance Indicators

Note: *Both the African Development Indicators and Worldwide Governance Indicators Databases belong to the World Bank. UNCTAD refers to the United Nations Conference on Trade and Development Database.*