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Does infrastructure development drive economic complexity in African countries?

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Abstract

This paper investigates the nexus between infrastructure development and economic complexity (EC) for 27 African countries over 2003-2016 period. Employing Ordinary Least Squares, Generalised Method of Moments and Quantile Regressions, empirical findings show that infrastructure development fosters EC in African countries especially transport and electricity infrastructures.

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1. Introduction

Economic complexity (EC) is widely considered as a robust proxy of economic growth and development (Hidalgo, 2021; Felipe et al., 2012; Hidalgo & Hausmann, 2009; Vu, 2020; Hausmann et al., 2007; Tacchella et al., 2013; Hausmann & Hidalgo, 2011). For instance, it is observed that countries which are capable of producing highly sophisticated products like electronics, chemicals and automobile are more likely to experience sustained growth (Hidalgo, 2021; Felipe et al., 2012), less income inequality (Hartmann et al., 2017) and better health outcomes (Vu, 2020). On the contrary, others with less complex products like textile and raw materials suffer persistent underdevelopment. To say that EC offers the ability to produce a variety of sophisticated products, characterized by high returns, reflecting the amount of productive knowledge within an economy (Hidalgo, 2021; Felipe et al., 2012; Hidalgo & Hausmann, 2009). Therefore, understanding the root causes or determinants of economic complexity is of paramount importance in designing policies that can help alleviate underdevelopment, which still persists in many parts of the world, especially in Africa.

So far, some empirical studies have documented some drivers of EC including but not limited to: human capital (Yalta and Yalta, 2021), patents (Nguyen et al., 2020), foreign direct investment (Kannen, 2020; Zhu & Fu, 2013), internet (Lapatinas, 2019), tax burden (Lapatinas et al., 2019) and most importantly, institutional quality (Vu, 2021). Surprisingly, the question of whether infrastructure development drives EC has received little attention, especially for African countries. In spite of the advantages of economic sophistication, statistics show that Africa's performance in terms of ECI is promising but still very low in comparison to other similar regions of the world like East European countries, Latin America and Southern Asia. In 2018, the Observatory of Economic Complexity (OEC) ranked 142 nations of which the last 20 include 15 African countries. These statistics justify the choice of African countries for an empirical investigation.

Theoretically, the development of infrastructure reduces costs, saves time, facilitates transactions and accessibility, brings market opportunities closer to both producers and consumers, and attracts new investments. All of which, is supposed to reallocate and upgrade economic and social activities, and therefore promote the sophistication of productive systems. Recognising the importance of infrastructure development, the Growth Report of (2008) of the Commission on Growth and Development cited investment in infrastructures as crucial to both export diversification and structural transformation (Stern, 1991; Anyanwu and Erhijakpor, 2009). Similarly, Malah and Asongou (2022) and Nchofoung et al. (2022) argue that infrastructure development is a prerequisite for structural change and inclusive human development in Africa. More so, Infrastructures facilitate both internal and foreign trade, enhance communication and expand the productive capacity of an economy (Albala-Bertrand and Mamatzakis, 2014). Following these ideas, Ekeocha et al. (2021) and Agénor (2008) posit that infrastructure development leads to long run economic growth. Accordingly, Agénor and Moreno-Dodson (2006) explained that infrastructures can either promote growth by completing private investment or negatively affect growth by evincing private investment through the crowding out effect. Following the above discussion, our main hypothesis is that infrastructure development fosters economic complexity in Africa.

The contribution of this paper is at least twofold. Firstly, this is likely the first study to investigate the link between infrastructure development and EC particularly for African countries. To the best of our knowledge, only Chauke and Ncanywa (2021) and Lapatinas (2019) considered this nexus. Our study differs from these studies in three ways. (1) By distinguishing between several types of composite measures of infrastructure development (African composite infrastructure index and its four components: transport, electricity, ICT and water supply and sanitation infrastructure indexes) unlike Lapatinas (2019) who considered only internet or Chauke and Ncanywa (2021) with mere government spending in infrastructures. (2) By employing an improved Economic Complexity Index, corrected for difficulties in exporting certain products and (3), by extending the analysis to cover a panel of

African countries whose choice is based on (i) Africa remains among the least competitive region globally (OEC, 2018) and (ii) Africa's performance in terms of infrastructures development has been increasing over the last two decades though the pace and pattern differs both across countries and among the different infrastructure types. As an illustrative example, ICT has known a sharp increase early 2005 as the number of devices increased from 130 to 900 million, including 200 million smartphones. In 2016, Sub-Saharan Africa alone had nearly 420 million subscribers (Malah and Asongou, 2022; AfDB, 2018). Electricity supply in Africa has not increased that much. Energy supply in the region remains a serious concern. Yet, the African continent remains the least endowed region of the world in infrastructure stocks (Bond, 2016). Secondly, this study is likely the pioneer to employ quantile regressions for investigating this nexus. Our findings show that infrastructure development promotes economic complexity in African countries especially transport and electricity infrastructures. The estimates remain consistent even with the use of an alternative proxy of economic complexity as well as controlling for institutional dynamics and the resource curse hypothesis.

The rest of the paper is organised as follows: section 2 presents the data, model and estimation strategy. Then, section 3 presents the results, discussions and robustness checks. The last section concludes.

2. Data and methodology

2.1. Data

This study uses panel data on 27 African countries (Algeria, Angola, Botswana, Cameroon, Congo. Dem. Rep., Congo. Rep., Cote d'Ivoire, Egypt. Arab Rep., Ethiopia, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Morocco, Mozambique, Namibia, Nigeria, Senegal, South Africa, Sudan, Tanzania, Togo, Tunisia, Zambia, Zimbabwe) over the period 2003-2016. Full data description and definition is provided in Tables I, II and VI.

Table I: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ECI	362	-1.007	0.569	-2.791	0.304
ECI+	335	-1.186	0.787	-3.532	0.59
AIDI	378	20.1	16.399	0.369	85.663
Transport	378	9.105	10.726	0.38	57.524
Electricity	378	11.018	16.925	0.134	93.559
ICT	378	4.768	8.939	0	66.085
Water supply sanitation	378	49.091	22.722	6.044	99.014
Financial development	326	24.77	27.643	0.796	142.422
Education	316	102.418	15.961	61.095	149.307
Trade	370	70.556	25.024	1.378	156.862
Resources Rents	378	13.276	11.717	0.242	58.688
Governance*	378	0	2.231	-4.001	5.941

* Governance is a proxy for institutional quality which is a composite index constructed from Principal Components Analysis using the Worldwide Governance Indicators database.

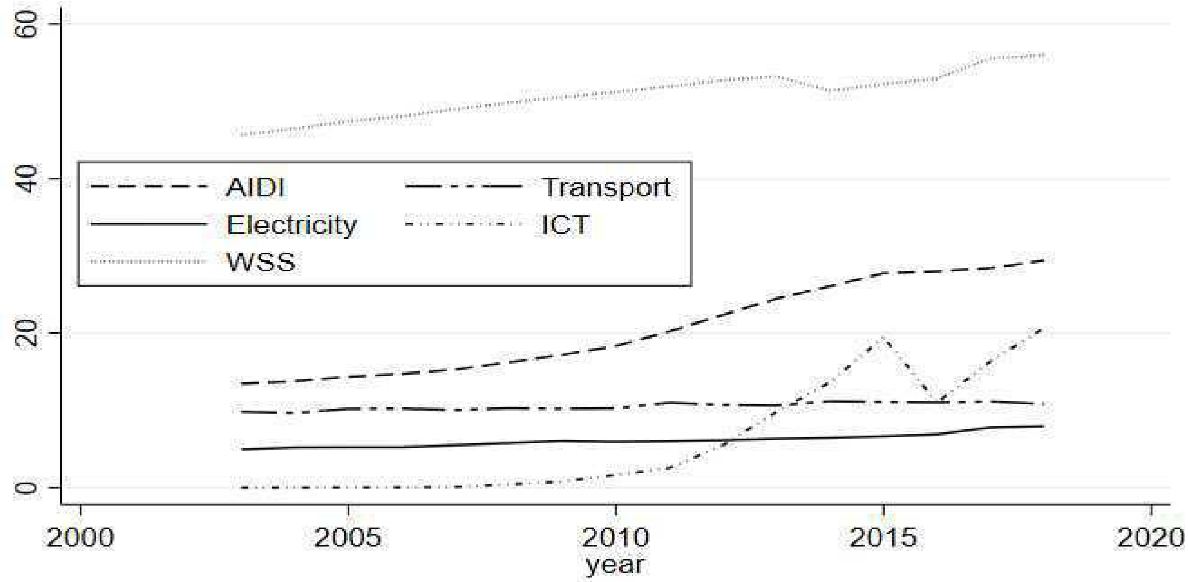
The main dependent variable is economic complexity. This variable is approximated by economic complexity index (ECI) extracted from the Observatory of Economic Complexity (OEC) database[1]. It captures the connectedness of an economy's existing capabilities (knowledge) to drive diversification into related complex production, using the Product Space as documented by Hausmann (2009) and Hidalgo (2021). However, given some measurement

[1] Available at: https://oec.world/

errors often associated with data collection and processing, we test the robustness of our results using an improved proxy of economic complexity, the ECI+ introduced by Albeaik et al. (2017). The advantage of using this proxy is the fact that it is adjusted to account for the goods and services which a country produces but faces difficulties exporting.

Our independent variable of interest is infrastructure development, captured by the African Infrastructure Development composite Index (AIDI) provided by the African Development Bank[2]. We also employ four components of AIDI: 1) Electricity which is measured by the production of electricity of a given country, including both public and private energy generated and energy imported from abroad, 2) Transport which is measured by total road network in kilometres and total paved roads, 3) ICT which is measured by the number of internet users per 100 inhabitants and the total number of phone subscriptions and lastly, 4) water and sanitation (WSS) which is a proxy for improved sanitation facilities and the percentage of the population with access to water source.

Figure 1: Infrastructure trends in Africa.



Source: Authors' constructions using data from AfDB (2018).

Table II: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ECI	1.000											
(2) ECI+	0.808	1.000										
(3) AIDI	0.619	0.687	1.000									
(4) Transport	0.434	0.504	0.689	1.000								
(5) Electricity	0.578	0.647	0.750	0.346	1.000							
(6) ICT	0.292	0.297	0.663	0.228	0.322	1.000						
(7) WSS	0.574	0.596	0.862	0.698	0.588	0.344	1.000					
(8) Financial dev.	0.688	0.742	0.745	0.282	0.860	0.426	0.571	1.000				
(9) Education	0.305	0.348	0.117	0.087	0.112	0.083	0.023	0.145	1.000			
(10) Trade	0.142	0.019	-0.024	-0.024	-0.076	-0.046	0.010	0.039	0.307	1.000		
(11) Resources	-0.430	-0.379	-0.205	-0.091	-0.158	-0.201	-0.176	-0.320	0.049	0.457	1.000	
(12) Governance	0.600	0.552	0.431	0.268	0.471	0.167	0.403	0.538	0.275	0.174	-0.435	1.000

Note: WSS is water supply and sanitation infrastructure, Financial dev. is financial development, Resources is resources rents,

Following the extant literature, we include control variables in our analysis to capture other factors that may affect EC other than infrastructure. These include: *Resources rents*; the exploitation of natural resources can either lead to the neglect of productive sectors or

[2] Available at: https://dataportal.opendataforafrica.org/AIDI.

generate conflict (Malah and Asongou, 2022) which in turn slows the economy and hinders the production of complex goods. Thus, we expect a negative sign as documented by the literature on the resource curse hypothesis. *Trade;* openness to trade can facilitate the movement of goods and persons, encourage specialisation and innovation thus leading to improvements in EC. *Governance.* Following Vu (2021) we expect a positive sign for institutional quality*; financial development;* Nguyen and Su (2021) and Chu (2020), show that financial development improves economic complexity. All these control variables are obtained from the World Development Indicators except Governance which is a composite index constructed from Principal Components Analyses (PCA) using the Worldwide Governance Indicators database.

2.2. Methodology

We follow the works of Lapatinas (2019), Nguyen et al. (2020) and Chauke and Ncanywa (2021) which we extend to include infrastructures as a driver of EC and specify the following model.

$$EC_{it}=\beta_0+\vartheta EC_{it-1} + \beta_1 INFRAS_{it} + \beta_2 X_{it} + \gamma_i+\eta_t+\epsilon_{it} \qquad (1)$$

Where EC_{it} is Economic complexity for country i in period t, $INFRAS_{it}$ is infrastructure development approximated by the African Infrastructure Development Index (AIDI) and its four components, X is a vector of control variables, γ_i *and* η_t are respectively country specific and time fixed-effect; ϵ_{it} is the error term.

To estimate our model, three techniques are used. We start with the Ordinary Least Squares (OLS) method. However, the OLS does not account for country-specific factors, generally time invariant like for example, a country's history or land-locked position. This can lead to inconsistent estimates. This inconsistency may arise as a result of the lag dependent variable present among the regressors (Nickell, 1981; Wooldridge, 2010). More so, there is likely endogeneity between infrastructure development and economic complexity which theoretically, may arise due to reverse causality, omitted variable bias or measurement errors, common to the developing world due to low statistical capacity.

To solve these problems, we employ the two-step system Generalised Method of Moments (s-GMM) which according to Roodman (2009), performs better than the one-step estimator. Initially, this model was introduced by Arellano and Bond (1991) and later improved by Arellano and Bover (1995) and subsequently by Blundell and Bond (1998). A common problem with the s-GMM is the proliferation of instruments which in turn, weakens the Hansen's statistics. Roodman (2009) suggests as solution, to limit instruments below the number of panels. Also, we treat as potentially endogenous, all explanatory variables. The validity of this model relies on (1) the exogeneity condition for instrument validity and over identifying restrictions for which the P-value of Hansen test should be insignificant (i.e greater than 10%) and (2) there should be no autocorrelation of order two (i.e AR(2) p-value>10%).

3. Results and discussions

3.1. Baseline results

Our baseline results obtained from the estimation of equation (1) using the standard OLS estimator are presented in Table III. These results indicate that all the infrastructure coefficients are positive and strongly significant at 1% except ICT which is positive but non-significant. This implies for instance that a 10 percent increase in the composite infrastructure index (AIDI), all things held constant, would lead to a 0.093 percentage points increase in economic complexity. The rationale of this result is that improvements in the quality and stock of infrastructure reduce costs, save time, and facilitate transactions and promote human development, spur investment and therefore, foster economic sophistication. This is consistent with Malah and Asongou (2022) and Nchofoung et al. (2022). Infrastructures also facilitate both internal and foreign trade, enhance communication and expand the productive capacity of an economy (Albala-Bertrand and Mamatzakis, 2014). Similarly, the positive and significant coefficients of transport infrastructure and access to water supply and sanitation (WSS) indexes can be explained by the fall in commuting cost and the reduction of time spent to access water which is now channelled towards the acquisition of knowledge needed to produce complex goods. The positive coefficient of electricity is justified in that, electricity is the main source of energy in Africa and the development of the other sectors of the economy: setting up of installations and machines (all of which are associated with complex goods) require energy for their development. Finally, the positive though non-significant effect of ICT infrastructure is consistent with Lapatinas (2019) who employing dynamic panel estimators on 100 countries over 2004-2015 period, found that internet usage drives economic complexity.

Table III: Infrastructure development and Economic complexity (OLS)

	Dependent Variable: ECI					
	(1)	(2)	(3)	(4)	(5)	(6)
AIDI	0.00929***					
	(0.00185)					
Transport		0.0140***				0.173***
		(0.00203)				(0.0516)
Electricity			0.00919***			0.148*
			(0.00265)			(0.0753)
ICT				6.58e-05		0.0450
				(0.00276)		(0.0400)
WSS					0.00709***	0.137**
					(0.00110)	(0.0592)
Financial dev.	0.00567***	0.00877***	0.00454**	0.00979***	0.00685***	0.258***
	(0.00121)	(0.000869)	(0.00177)	(0.00103)	(0.000978)	(0.0839)
Education	0.00512***	0.00505***	0.00535***	0.00543***	0.00629***	0.159***
	(0.00145)	(0.00139)	(0.00148)	(0.00152)	(0.00141)	(0.0391)
Trade	0.00539***	0.00538***	0.00659***	0.00436***	0.00489***	0.284***
	(0.00116)	(0.00111)	(0.00134)	(0.00120)	(0.00112)	(0.0546)
Resources rents	-0.0192***	-0.0192***	-0.0231***	-0.0173***	-0.0190***	-0.471***
	(0.00289)	(0.00277)	(0.00338)	(0.00302)	(0.00280)	(0.0644)
Governance	0.0284**	0.0192	0.0189	0.0356**	0.0192	0.0227
	(0.0144)	(0.0140)	(0.0154)	(0.0151)	(0.0141)	(0.0567)
Constant	-2.023***	-2.027***	-1.962***	-1.921***	-2.296***	-0.0577
	(0.149)	(0.143)	(0.152)	(0.155)	(0.155)	(0.0371)
Observations	265	265	265	265	265	265
R-squared	0.648	0.674	0.631	0.614	0.667	0.688

Source: Authors' computation. Notes: The values in parentheses are the standard errors. ***, ** and * denote significance at 1%, 5% and 10%, respectively

In specification (6), all the types of infrastructure except AIDI[3] are included simultaneously into the regression. These variables are standardized with mean of zero and a

[3] Not included because it can potentially cause multicollinearity, given that its correlation coefficient with other infrastructure composite indexes exceeds the threshold of 0.7.

standard deviation of one. Therefore, the magnitudes of the resulting coefficients can be compared. Interestingly, results show that transport infrastructure is the most important type of infrastructure for economic complexity in African countries followed by electricity infrastructure. The rationale here is that the ease in movements of persons and goods reduces commuting cost and encourages investments in even more sophisticated products. Also, energy supply has always been a core element required for the development of other sectors of the economy (Malah and Asongou, 2022). For instance, the setting up of ICT tools and the establishment of machinery needed to produce sophisticated products highly requires constant and reliable energy supply. Thus, improving the quality and quantity of the transport network and electricity supply is highly beneficial for economic complexity and structural transformation in Africa.

Regarding control variables, consistent with Nguyen and Su (2021) and Chu (2020), financial development improves economic complexity. Actually, a well-developed financial market, through cost reduction and better allocation of scarce resources, favours the development of innovative projects, which in turn fosters economic complexity. Resources rents have a negative and significant effect on EC. This result is in accordance with the resource curse hypothesis documented in the literature. Indeed the abundance of natural resources in Africa could undermine the development of highly productive sectors by reducing their competitiveness through 'Dutch disease' or lead to the deterioration of institutions, in particular by generating conflicts and corruption. Our results present some similarities with those of Camargo and Gala (2017), Yalta and Yalta (2021) and Malah and Asongou (2022). Meanwhile, Openness to trade has a positive and significant effect on economic complexity. This result is in accordance with the fundamental theories of international trade whereby specialisation and openness to trade brings about efficiency and sophistication of products (Nguyen et al., 2021). Finally, the positive effect of governance is consistent with the literature. Indeed '*well-functioning institutions fundamentally drive structural transformation towards productive activities via strengthening incentives for innovative entrepreneurship, fostering human capital accumulation, and deploying human resources in acquiring productive capabilities*' (Vu, 2021; p. 1).

3.2. Sensitivity tests

As mentioned before, the OLS results could be biased due to reasons discussed earlier in section 2.2. To handle these issues, we employ the system GMM estimator. Results for this exercise are presented in Table IV. We also used an alternative dependent variable, the ECI+, an improved ECI corrected for difficulties to export goods in a given country, in order to further check the robustness of our results. Consistent with previous estimates, the GMM results suggest a positive relationship between infrastructure development and economic complexity. This positive effect is significant irrespective of the proxy of the dependent variable used (ECI and improved ECI) as well as the type of composite infrastructure, except ICT which is positive but not significant as documented previously in the baseline results. The lagged dependent variable is positive and significant throughout irrespective of the specification and the dependent variable used. This suggests that previously attained levels of sophistication matter for current ability to further produce complex products.

The diagnostic tests do not reveal any abnormality. In fact, the P-values of the AR(2) and Hansen OIR statistics are non-significant, suggesting respectively that our results do not suffer from second order serial autocorrelation of residuals and that the over identifying restrictions and exogeneity conditions of the instruments set is valid. More so, the number of instruments is lower than the number of countries, indicating that our model do not suffer from instrument proliferation. Finally, the Fisher statistics of overall validity suggest that our results are globally significant.

Table IV: Infrastructure and ECI Vs ECI+ (system GMM)

	Dependent variable: ECI					Dependent variable: ECI+				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lagged (ECI)	0.714***	0.700***	0.742***	0.866***	0.700***					
	(0.0320)	(0.0297)	(0.0375)	(0.0154)	(0.0324)					
Lagged (ECI+)						0.858***	0.811***	0.705***	0.863***	0.841***
						(0.0259)	(0.0445)	(0.0677)	(0.0186)	(0.0391)
AIDI	0.00336**					0.00135*				
	(0.00129)					(0.000753)				
Transport		0.00457***					0.00361**			
		(0.000781)					(0.00144)			
Electricity			0.00345**					0.00808***		
			(0.00152)					(0.00277)		
ICT				8.58e-05					0.000175	
				(0.000699)					(0.000879)	
WSS					0.00291***					0.00184**
					(0.000880)					(0.000753)
Financial dev.	0.000820	0.00206***	-2.85e-05	0.000717**	0.00109	0.00105**	0.00237**	0.00399*	0.00129*	0.00154
	(0.000721)	(0.000692)	(0.00130)	(0.000266)	(0.000732)	(0.000405)	(0.000933)	(0.00193)	(0.000696)	(0.000937)
Education	0.000302	0.000544	0.000402	0.000404	0.00111	0.00241***	0.00262***	0.00463***	0.00281***	0.00279***
	(0.000686)	(0.000773)	(0.000916)	(0.000305)	(0.000672)	(0.000411)	(0.000682)	(0.000993)	(0.000361)	(0.000732)
Trade	0.00160*	0.00194*	0.00176*	0.00129***	0.00153	-2.92e-05	-0.000740	0.000816	-0.000449	-0.00114
	(0.000838)	(0.000949)	(0.000857)	(0.000263)	(0.000941)	(0.000634)	(0.000939)	(0.000779)	(0.000753)	(0.000855)
Resources rents	-0.00555**	-0.00731**	-0.00616**	-0.00346***	-0.00691**	-0.00355**	-0.00396*	-0.00848***	-0.00189	-0.00302
	(0.00218)	(0.00279)	(0.00230)	(0.000667)	(0.00294)	(0.00147)	(0.00212)	(0.000975)	(0.00151)	(0.00219)
Governance	0.0220*	0.0155	0.0157	0.0104***	0.0169	0.0193**	0.0130	0.0173***	0.0215***	0.00907
	(0.0117)	(0.0134)	(0.0108)	(0.00267)	(0.0127)	(0.00793)	(0.0112)	(0.00447)	(0.00585)	(0.0115)
Constant	-0.447***	-0.489***	-0.382***	-0.230***	-0.610***	-0.417***	-0.467***	-0.948***	-0.433***	-0.466***
	(0.108)	(0.109)	(0.118)	(0.0358)	(0.114)	(0.0639)	(0.0960)	(0.215)	(0.0488)	(0.112)
Observations	225	225	225	225	225	210	210	210	210	210
Countries	23	23	23	23	23	23	23	23	23	23
AR(1)	0.00692	0.00799	0.00698	0.00707	0.00733	0.0133	0.0156	0.0171	0.0137	0.0148
AR(2)	0.204	0.191	0.198	0.234	0.183	0.785	0.831	0.999	0.755	0.800
Hansen OIR	0.346	0.371	0.465	0.140	0.427	0.292	0.483	0.354	0.465	0.354
Fisher	1260***	1080***	1193***	3.653e+06***	1343***	69703***	5030***	66057***	38682***	6881***
Instruments	15	15	15	22	15	22	15	22	22	15

Source: Authors' computation. Notes: The values in parentheses are the standard errors. ***, ** and * denote significance at 1%, 5% and 10%, respectively. The fall in observations when ECI+ output is compared to ECI is as a result of missing data in the ECI+ variable.

Table V: Infrastructure and EC (Quantile Regressions)

	Dependent variable: ECI		
	Q25	Q50	Q75
AIDI	0.00522*	0.00915***	0.0145***
	(0.00306)	(0.00246)	(0.00230)
Control variables	Yes	Yes	Yes
Transport	0.0169***	0.0144***	0.0121***
	(0.00266)	(0.00263)	(0.00265)
Control variables	Yes	Yes	Yes
Electricity	0.00840**	0.00579*	0.00944**
	(0.00401)	(0.00335)	(0.00393)
Control variables	Yes	Yes	Yes
ICT	-0.00834	0.000976	0.00635*
	(0.00508)	(0.00329)	(0.00325)
Control variables	Yes	Yes	Yes
WSS	0.00440**	0.00840***	0.00921***
	(0.00184)	(0.00144)	(0.00124)
Control variables	Yes	Yes	Yes
Observations	265	265	265

Source: Authors' computation. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Seeking beyond the average effect as provided so far by the OLS and GMM results, this paper goes further to employ Quantile Regressions (QR). This is a nonparametric estimation technique introduced by Koenker and Bassett (1978) which uses conditional means to account for extreme values of the dependent variable in percentiles. The main advantage of this method over the OLS for example, is that QR is more robust to outliers and non-normal errors. The results, presented for the 25th, 50th and 75th quantiles in Table V, puts forth some interesting insights. While all other composite infrastructure indexes are positive and significant across the different quantiles of the EC distribution at conventional levels, ICT infrastructure however, presents heterogeneous results. At the 25^{th} and 50^{th} quantiles respectively, the effect is negative and positive but non-significant. It is only significant at the 75^{th} quantile suggesting that ICT infrastructure will matter for economic complexity only at higher values of EC distribution.

4. Conclusion

Does infrastructure development drive economic complexity in African countries? This paper contributes to the literature by answering to this important question using data for 27 African countries over 2003-2016 period. Employing the Ordinary Least Squares, Generalised Method of Moments and Quantile Regressions, findings show that infrastructure development fosters economic complexity especially transport and electricity infrastructures. Despite some heterogeneity observed across the EC distribution, our findings remain important when an alternative dependent variable (ECI+) is used. Therefore, policies aiming to promote output sophistication in African countries should consider infrastructure development, especially transport and electricity supply as a prerequisite.

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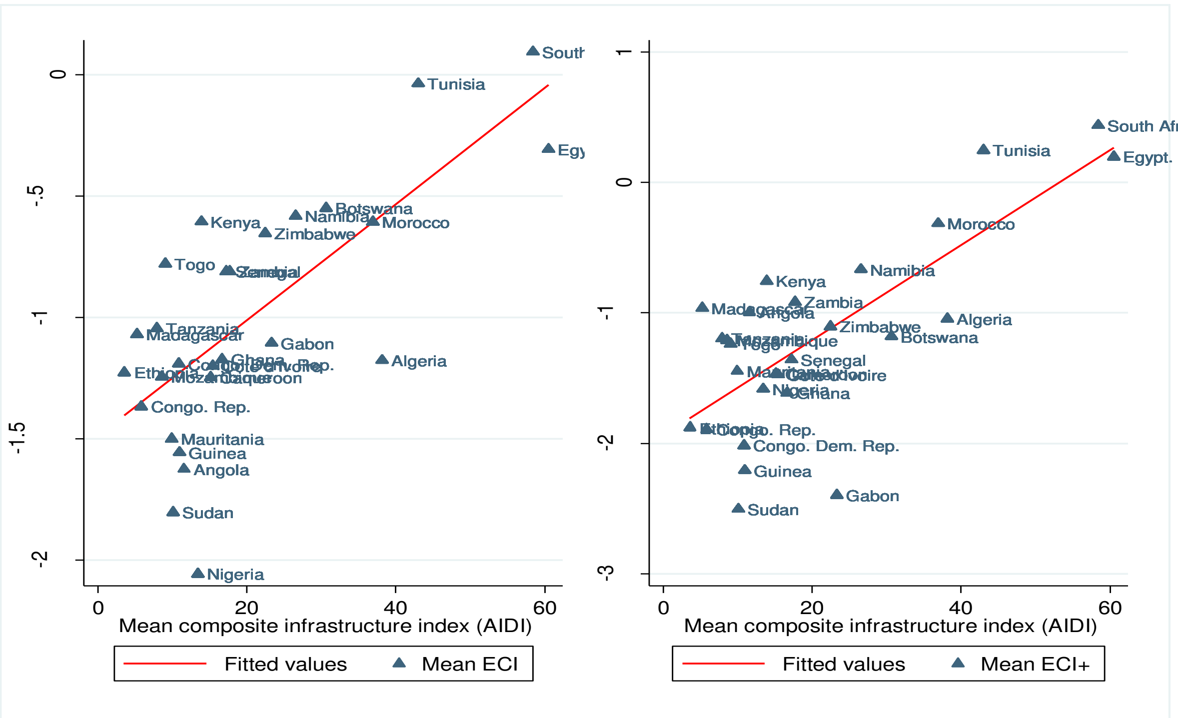
Appendix

Table VI: Definition of variables and sources of data

Variable	Brief definition	Source of data
ECI	Economic complexity index.	OEC
ECI+	Improved economic complexity index, adjusted for difficulties in exporting some products.	Albeaik et al. (2017)
AIDI	Composite index of infrastructure quality and its four sub-components.	AfDB (2018)
Financial development	Domestic credit to private sector (% GDP).	WDI (2022)
Education	Secondary school enrolment (% gross).	WDI (2022)
Ressources rents	Total natural resource rents (% GDP).	WDI (2022)
Gouvernance	Composite index for Institutional quality constructed from Principal Components Analysis (PCA).	Authors, using WGI (2022)
Trade	Sum of imports and exports of goods and services (% GDP).	WDI (2022)

Source: Authors' construction. Notes: WDI denote the World Bank, World Development Indicators; OEC is the Observatory of Economic Complexity and WGI is the Worldwide Governance Indicators.

Figure 2: Scatter plot of composite infrastructure index and economic complexity.



Source: Authors' construction