Asongu, Simplice; Odhiambo, Nicholas M.

Working Paper

Inclusive development in environmental sustainability in sub-Saharan Africa: Insights from governance mechanisms

AGDI Working Paper, No. WP/19/006

Provided in Cooperation with:
African Governance and Development Institute (AGDI), Yaoundé, Cameroon

Suggested Citation: Asongu, Simplice; Odhiambo, Nicholas M. (2019) : Inclusive development in environmental sustainability in sub-Saharan Africa: Insights from governance mechanisms, AGDI Working Paper, No. WP/19/006, African Governance and Development Institute (AGDI), Yaoundé

This Version is available at:
https://hdl.handle.net/10419/204953

A G D I Working Paper

WP/19/006

Inclusive development in environmental sustainability in sub-Saharan Africa: insights from governance mechanisms [1]

Forthcoming: Sustainable Development

Simplice A. Asongu
Department of Economics, University of South Africa,
Pretoria, South Africa
E-mail: asongusimplice@yahoo.com

Nicholas M. Odhiambo
Department of Economics, University of South Africa,
Pretoria, South Africa
E-mail: odhianm@unisa.ac.za

[1] This working paper also appears in the Development Bank of Nigeria Working Paper Series.

Research Department

Inclusive development in environmental sustainability in sub-Saharan Africa: insights from governance mechanisms

Simplice A. Asongu & Nicholas M. Odhiambo

January 2019

Abstract

This research examines the relevance of inclusive development in modulating the role of governance on environmental degradation. The study focuses on forty-four countries in sub-Saharan Africa for the period 2000-2012. The Generalised Method of Moments is employed as the empirical strategy and CO_2 emissions per capita is used to measure environmental pollution. Bundled and unbundled governance dynamics are employed, notably: political governance (consisting of political stability/no violence and "voice and accountability"), economic governance (encompassing government effectiveness and regulation quality), institutional governance (entailing corruption-control and the rule of law), and general governance (a composite measure of political governance, economic governance and institutional governance). The following main findings are established. First, the underlying net effect in the moderating role of inclusive development in the governance-CO_2 emissions nexus is not significant in regressions pertaining to political governance and economic governance. Second, there are positive net effects from the relevance of inclusive development in modulating the effects of regulation quality, economic governance and general governance on CO_2 emissions. The significant and insignificant effects are elucidated. Policy implications are discussed.

JEL Classification: C52; O38; O40; O55; P37
Keywords: CO_2 emissions; Governance; Sustainable development; Sub-Saharan Africa

1. Introduction

The relevance of inclusive development in governance for environmental sustainability in sub-Saharan Africa (SSA) is a worthwhile research endeavour for a multitude of reasons, *inter alia*: (i) inclusive development and sustainability are closely aligned with the post-2015 sustainable development agenda; (ii) the importance of good governance in promoting environmental sustainability, and (iii) gaps in the literature. These three factors are expanded in the same order as they are highlighted.

First, in accordance with Amavilah, Asongu and Andrés (2017), inclusive development and environmental sustainability are closely linked in the prism that, for sustained development to reflect sustainability, it is worthwhile for it to be inclusive while for the inclusive development to mirror sustainability, it should withstand the test of being sustained over time. The underlying connections are relevant to the context of this research because we are focusing on inclusive development and environmental sustainability: the former by engaging the inequality-adjusted human development index as a policy variable and the latter because environmental degradation is understood as a policy syndrome that stifles environmental sustainability[2]. A mechanism by which the policy variable can be employed to tackle the policy syndrome is good governance.

Second, there is abundant literature that is consistent on the importance of good governance in the improvement of socio-economic and environmental outcomes in SSA. The attendant literature broadly supports the view that political will is essential in addressing the policy syndrome of environmental degradation, especially in the light of global targets and Sustainable Development Goals (SDGs). Some notable studies advancing this perspective include: Jones(2003), Odhiambo (2009a, 2009b, 2010), Afful-Koomson (2012), Apkan and Akpan (2012), Hongwu (2013, Chemutai (2009), Odhiambo (2014a, 2014b), Anyangwe (2014), Akinyemi, Alege, Osabuohien and Ogundipe (2015), Carl (2016), Akinyemi, Efobi, Asongu and Osabuohien (2018), Jarrett(2017), Asongu, le Roux and Biekpe (2018), Asongu (2018a) and Efobi, Tanankem, Orkoh, Atata, Akinyemi and Beecroft (2018).

Third, to the best of our knowledge, in the light of the issues and narratives covered in the preceding paragraphs, the extant literature has failed to assess linkages between inclusive

[2] The conception and definition of policy syndrome in the light of contemporary inclusive development literature is "inequality" or "growth that is not inclusive" (Asongu & Nwachukwu, 2017a; Tchamyou, Erreygers & Cassimon, 2018). Asongu (2017) understands the concept of policy syndrome as a gap in knowledge economy between two countries. Within the framework of this study, policy syndrome represents environmental degradation and/or pollution.

development, governance and environmental degradation. The study closest to the present research is by Asongu and Odhiambo (2018a), which has investigated how environmental degradation affects inclusive human development in SSA. This research expands the underlying study on two main fronts. On the one hand, the focus is on environmental degradation instead of inclusive development. Hence, the outcome variable of the underlying study is employed as a policy variable in this research. On the other hand, governance channels are engaged as mechanisms by which inclusive development affects CO_2 emissions. This is contrary to the underlying study which does not engage channels by which the independent variable of interest affects the outcome variable. Therefore, the research question this study attempts to answer is the following: how does inclusive development modulate the effect of governance on CO_2emissions in SSA?

The intuition motivating the investigation of nexuses between inclusive development, governance and environmental degradation is simple to follow. First and foremost, the fact that governance standards affect environmental quality is "a given", as supported by attendant studies in the previous paragraph. Second, the equitable distribution of fruits from economic prosperity also affects the manner in which citizens contribute to CO_2 emissions. Accordingly, when the fruits of economic prosperity are equitably distributed across the population, average wealth increases and the average citizen is more likely to contribute to greenhouse gas emissions. Third, inclusive human development can plausibly affect how governance standards affect CO_2 emissions. This is essentially because inclusive development and governance are also intricately connected (Andres, Asongu and Amavilah, 2015). For instance, economic governance within the framework of this study is understood as the formulation and implementation of policies that deliver public commodities. This definition aligns with the hypothetical nexus between inclusive development and environment degradation. On the empirical front, the empirical exercise is tailored such that inclusive human development complements governance to affect environmental degradation. To make this assessment, the net effects (from the unconditional impact of governance on CO_2 emissions and the conditional impact from the interaction between governance and inclusive development) are used to assess how inclusive development modulates the effect of governance on CO_2 emissions.

In the light of the above, this research is also positioned as an empirical study that is focused on theory-building. Hence, it is in accordance with recent empirical literature supporting the framework that applied econometrics motivated by plausible intuition, is a

useful scientific activity. Moreover, in line with the attendant literature, applied econometrics should not exclusively be limited to the acceptance or rejection of existing theoretical underpinnings (Narayan, Mishra & Narayan, 2011; Asongu & Nwachukwu, 2016a).

The rest of the research proceeds as follows. Section 2 covers the data and the methodology. The empirical results are disclosed and discussed in section 3 while section 4 concludes with implications and future research directions.

2. Data and methodology

2.1 Data

The focus of this research is on 44 SSA countries with data for the period 2000-2012[3]. Of the 49 countries in SSA, only 44 are involved in the study because of data availability constraints at the time of the study. The data is obtained from a multitude of sources, namely: (i) the inclusive human development index used as the moderating variable is obtained from the United Nations Development Program (UNDP); (ii) six governance variables (political stability/no violence, "voice & accountability", government effectiveness, regulation quality, corruption-control and the rule of law) are sourced from World Governance Indicators of the World Bank, and (iii) the three control variables (i.e. gross domestic product growth rate, population growth and education quality) and the proxy for environmental degradation (i.e. CO_2 emissions per capita) are from World Development Indicators of the World Bank.

The outcome variable of environmental pollution which is proxied by CO_2 emissions per capita is consistent with recent environmental pollution literature in SSA (Asongu, 2018a, 2018b). The governance mechanisms from Kaufmann, Kraay and Mastruzzi (2010) are increasingly being used in the governance literature. Some recent studies that have employed these six governance indicators include: Andrés *et al*. (2015), Pelizzo, Araral, Pak and Xun (2016), Pelizzo and Nwokora (2016, 2018), Nwokora and Pelizzo (2018), Oluwatobi, Efobi, Olurinola and Alege (2015), Ajide and Raheem (2016a, 2016b) and Asongu and Nwachukwu (2017b). According to the attendant literature: "*The first concept is about the process by which those in authority are selected and replaced (Political Governance): voice and accountability and political stability. The second has to do with the capacity of government to formulate and implement policies, and to deliver services (Economic Governance): regulatory*

[3]The 44 countries are: "Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Democratic. Republic., Congo Republic, Cote d'Ivoire, Djibouti, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda and Zambia".

quality and government effectiveness. The last, but by no means least, regards the respect for citizens and the state of institutions that govern the interactions among them (Institutional Governance): rule of law and control of corruption" (Andres *et al*., 2015, p. 1041).

The adopted inclusive development variable is the inequality-adjusted human development (IHDI), which is the human development index (HDI) that is adjusted for inequality. Accordingly, the "*The human development index (HDI) denotes a national mean of results in three principal dimensions, notably: health and long life, knowledge and basic living standards. The IHDI goes a step further by adjusting the HDI to prevalent levels of inequality in the aforementioned three dimensions. In other words, the IHDI also takes into consideration the manner in which the three underlying achievements are distributed within the population*"(Asongu *et al*., 2017, p. 355).

Three main control variables are adopted in order to account for variable omission bias, notably: gross domestic product (GDP) growth, population growth and education quality. The first-two variables are intuitively expected to increase CO_2 emissions while the sign of the third variable cannot be established with certainty. Accordingly, it is natural to infer that economic prosperity in terms of GDP growth is associated with more CO_2 emissions. This is essentially because GDP growth is associated with more production and consumption of goods and services which entail processes that emit greenhouse gases. In the same vein, a rising population should be associated with enhanced possibilities of consuming commodities and engaging in economic activities, which ultimately bear positively on their contributions to greenhouse gas emissions.

The adopted education variable in this study is the pupil-teacher ratio. Compared to other levels of education, it is preferred essentially because of: (i) data availability constraints in obtaining other indicators of higher learning and (ii) the documented evidence that compared to higher levels of education, primary education has comparatively higher development externalities in countries at initial stages of industrialization. Some studies supporting this thesis include: Petrakis and Stamakis (2002) and Asiedu (2014). In the light of the measurement of this education indicator, an increasing ratio denotes decreasing education quality because more pupils are required to be accommodated by the same teacher, *ceteris paribus*. Hence, while we expect higher quality education to reduce CO_2 emissions, the knowledge imparted on environmental degradation may not require the ability of a single teacher to focus exclusively on a select number of pupils. It follows that the sign of this variable cannot be established a priori.

The limitation to only three control variables is motivated by the failure of estimated models to pass post-estimation diagnostics tests when more instruments are involved in the regressions. Accordingly, even when instruments are collapsed in the estimation process, such proliferation of instruments is still apparent. The use of three control variables is not uncommon in the scholarly literature given that Bruno, De Bonis and Silvestrini (2012) have used two control variables, while Asongu and Nwachukwu (2017c) and Osabuohien and Efobi (2013) have used no control variable.The definitions and sources of the variables are provided in Appendix 1 while the summary statistics is disclosed in Appendix 2. Appendix 3 presents the correlation matrix. For lack of space, the appendices are available upon request.

2.2 Methodology

2.2.1 Principal Component Analysis (PCA)

In order to increase the robustness of the findings, the research is consistent with recent literature in reducing the governance dimensions by means of PCA. Attendant African knowledge economy and governance studies on which this research builds include: Tchamyou (2017) and Asongu, le Roux, Nwachukwu and Pyke (2019). Accordingly, the purpose of the PCA is to reduce the six governance dynamics into four main dimensions: (i) political stability/no violence and "voice & accountability" are reduced to political governance; (ii) government effectiveness and regulation quality are reduced to economic governance; (iii) corruption-control and the rule of law are reduced to institutional governance and (iv) political stability/no violence, "voice & accountability", government effectiveness, regulation quality, corruption-control and the rule of law are reduced to general governance.

The criteria used to select common factors are from the Kaiser (1974) and Jolliffe (2002) rule of thumb which requires that eigenvalues that are higher than the mean should be retained. The corresponding retained eigenvalue should also reflect at least 70% of combined information in the constituent indicators. The findings of the PCA are presented in Table 1. From the table, it is apparent that the underlying criteria are respected in the retention of the common factors: political governance (*Polgov*), economic governance (*Ecogov*), institutional governance (*Instgov*) and General governance (*G.Gov*) respectively, reflect eigenvalues (variations) of 1.671, 1.878, 1.861 and 4.892 (83.5 %, 93.9 %, 93.0 % and 81.50%).

"Insert Table 1 here"

2.2.2 GMM Specification

Borrowing from Tchamyou (2019a, 2019b), the mode of empirical analysis adopted in this research is the Generalised Method of Moments (GMM). Drawing on the underlying literature, at least four factors motivate the choice of the empirical strategy. First, the outcome variable of CO_2 emissions is persistent because the correlation between its level and first lags values is higher than the threshold of 0.800, which is the rule of thumb for establishing persistence in an indicator (Tchamyou *et al.*, 2019). Second, the number of countries under investigation is higher than the number of periods in each country. Third, cross-country variations are considered in the empirical analysis because the data structure is panel. Fourth, the concern of endogeneity is tackled from two fronts: (i) reverse causality or simultaneity is addressed with the help of a process of instrumentation and (ii) the unobserved heterogeneity is also taken on board by means of controlling for time invariant omitted variables.

The methodological framework adopted in this study is the Roodman (2009a, 2009b) approach. This improvement of the GMM technique (from Arellano & Bover, 1995) has been established to restrict the proliferation of instruments in contemporary development literature, notably: Asongu and Nwachukwu, (2016b), Tchamyou *et al.* (2019) and Boateng, Asongu, Akamavi and Tchamyou (2018).

The following equations in level (1) and first difference (2) summarise the standard *system* GMM estimation procedure.

$$CO_{i,t} = \sigma_0 + \sigma_1 CO_{i,t-\tau} + \sigma_2 HD_{i,t} + \sigma_3 G_{i,t} + \sigma_4 HDG_{i,t} + \sum_{h=1}^{3} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (1)$$

$$\begin{aligned} CO_{i,t} - CO_{i,t-\tau} = {} & \sigma_1 (CO_{i,t-\tau} - CO_{i,t-2\tau}) + \sigma_2 (HD_{i,t} - HD_{i,t-\tau}) + \sigma_3 (G_{i,t} - G_{i,t-\tau}) + \sigma_4 (HDG_{i,t} - HDG_{i,t-\tau}) \\ & + \sum_{h=1}^{3} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \end{aligned} \quad (2)$$

where $CO_{i,t}$ is the CO_2 emissions variable of country i in period t, σ_0 is a constant, HD represents inclusive human development, G entails governance (political stability, voice & accountability, government effectiveness, regulation quality, rule of law and corruption-control, political governance, economic governance, institutional governance and general governance), HDG denotes an interaction between a CO_2 emission variable and governance ("political stability" × "inclusive development", "voice & accountability" × "inclusive development", "government effectiveness" × "inclusive development", "regulation quality" × "inclusive development", "corruption-control" × "inclusive development", "rule of law" × "inclusive development", "political governance" × "inclusive development", "economic

governance" × "inclusive development", "institutional governance" × "inclusive development", and "general governance" × "inclusive development"), W is the vector of control variables (*GDP growth, population growth* and *education quality*), τ represents the coefficient of auto-regression which is one within the framework of this study because a year lag is enough to capture past information, ξ_t is the time-specific constant, η_i is the country-specific effect and $\varepsilon_{i,t}$ is the error term.

2.2.3 Identification and exclusion restrictions

In the light of the specification process in the previous section, this research is still consistent with that attendant contemporary literature in the strategy of identification and exclusion restrictions, notably: Asongu and Nwachukwu, (2016c), Tchamyou and Asongu (2017), Boateng *et al.* (2018), Meniago and Asongu(2018) and Tchamyou *et al.* (2019). In essence, the strategy of identification is such that the years are considered to be strictly exogenous variables while the endogenous explaining indicators are considered as endogenous explaining variables. Roodman (2009b) accords with this strategy of identification because he has argued that invariant variables cannot be endogenous after a first difference[4].

Contingent on the framework of identification, the assumption of exclusion restriction is validated when the alternative hypothesis of the Difference in Hansen Test (DHT) for instrument exogeneity is rejected. This alternative hypothesis is the position that the instruments are not valid. In others words, it is also the stance that the endogenous variables are main channels by which the strictly exogenous variables affect the outcome variable or CO_2 emissions. The underlying identification framework is broadly consistent with the standard instrumental variable (IV) strategy in which a rejection of the alternative hypothesis of the Sargan test is an indication that the instruments are valid (Beck, Demirgüç-Kunt & Levine, 2003; Asongu & Nwachukwu, 2016d).

3. Presentation of results

The empirical findings are disclosed in this section. Table 2 presents nexuses between political governance, inclusive development and environmental degradation while Table 3 shows results of linkages between economic governance, inclusive development and environmental degradation. In Table 4, the findings on connections between institutional

[4]Hence, the procedure for treating *ivstyle* (years) is 'iv (years, eq(diff))' whereas the *gmmstyle* is employed for predetermined variables.

governance, inclusive development and environmental degradation are disclosed, whereas Table 5 focuses on linkages between general governance, inclusive development and environmental degradation. Four main information criteria are employed to assess the post-estimation validity of the GMM findings[5]. Based on these criteria, the models are overwhelmingly valid with a few exceptions, notably: the first estimations on government effectiveness in Table 3 and general governance in Table 5 where the null hypothesis of the Hansen test is rejected. It is relevant to note that the Hansen test is robust but sensitive to the proliferation of instruments whereas the Sargan test is not robust but not sensitive to the proliferation of instruments. Hence, a cautious approach is to adopt the Hansen test and avoid the proliferation of instruments by ensuring that in every specification, the number of cross sections is higher than the corresponding number of instruments.

In order to assess the overall effect of the role of inclusive development in modulating the impact of governance on CO_2 emissions, net effects are computed. The computation of these net effects entails both the conditional and the conditional effects of governance dynamics: the latter effect being the impacts from the estimates corresponding to the interaction between inclusive development and governance dynamics. For instance, in the second column of Table 3, the net effect of inclusive development in modulating the relevance of regulation quality in CO_2 emissions is 0.0459([0.551× 0.450] + [-0.202]). In the calculation, the average value of inclusive human development is 0.450, the unconditional impact of regulation quality is -0.202 and conditional effect from the interaction between regulation quality and inclusive development is 0.551. This approach to computing net effects is consistent with contemporary literature on interactive regressions (Tchamyou & Asongu, 2017; Agoba *et al*., 2019).

The underlying net effects cannot be established from Table 2 and Table 4 because at least one estimated coefficient required for their computations is not significant. In Table 3 and Table 5, there is a positive net effect from the relevance of inclusive development in modulating the effects of regulation quality, economic governance and general governance on CO2 emissions.

[5] "*First, the null hypothesis of the second-order Arellano and Bond autocorrelation test (AR (2)) in difference for the absence of autocorrelation in the residuals should not be rejected. Second the Sargan and Hansen over-identification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in Hansen Test (DHT) for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fischer test for the joint validity of estimated coefficients is also provided*" (Asongu & De Moor, 2017, p.200).

"Insert Tables 2-5 here"

4. Concluding implications and future research directions

4.1 Findings

This research has examined the relevance of inclusive development in modulating the role of governance on environmental degradation. The study focuses on 44 countries in sub-Saharan Africa for the period 2000-2012. The Generalised Method of Moments is employed as empirical strategy and the CO_2 emissions per capita is used to measure environmental pollution. Bundled and unbundled governance dynamics are employed notably: political governance (consisting of political stability/no violence and "voice & accountability"), economic governance (encompassing government effectiveness and regulation quality), institutional governance (entailing corruption-control and the rule of law) and general governance (a composite measure of political governance, economic governance and institutional governance). The following main findings are established. First, the underlying net effect in the moderating role of the inclusive development in the governance-CO_2 emissions nexus is not significant in regressions pertaining to political governance and economic governance. Second, there are positive net effects from the relevance of inclusive development in modulating the effects of regulation quality, economic governance and general governance on CO_2 emissions.

While the results have produced effects we did not anticipate, two facts are worth articulating before further discussion the results. On the one hand, unexpected findings have as much economic significance and policy relevance as expected findings. On the other hand, the insignificant findings also have as much economic significance and policy relevance as significant findings. Concerning the latter insights, the insignificant findings should not be understood within the framework of publication bias or a "file drawer" concern in social science research, where insignificant, null and unexpected findings are discarded in preference for significant, strong and expected results (Rosenberg, 2015; Franco, Malhotra & Simonovits, 2014; Boateng *et al*., 2018). The underlying two points are expanded for policy implications.

4.2 Conclusions

First, the unexpected findings can be explained from two perspectives which also double as policy implications. (i) When the fruits of economic prosperity are equitably distributed across the population by means of better education, more income and enhanced health facilities (i.e. components of the human development index), the average person is endowed with more opportunities of participating in the production and consumption processes that are positively correlated with the emission of greenhouses gases. (ii) Good governance is a necessary but not a sufficient mechanism for the reduction of greenhouse gas emissions. This is partly because the governance standards in most countries in sub-Saharan Africa are poor and partly because it might be relevant to complement the attendant governance mechanisms with other factors that are exogenous to greenhouse gas emissions in order to have the expected net negative sign on CO_2emissions. On the front of low governance standards in the sub-region, it is worthwhile to articulate that the governance variables have positive and negative values and hence, the negatively skewed distributions of the underlying variables (which is a feature of governance variables in Africa) can be construed as poor governance instead of good governance.

Second, the insignificant findings from institutional governance and political governance dynamics may be traceable to the fact that the conception and definition of inclusive human development is most aligned with economic governance. Accordingly, economic governance is conceived and defined in this study as the formulation and implementation of policies that deliver public commodities. These public commodities are inherent components of the inclusive human development index.

Future studies can extend the established findings by considering alternative mechanisms by which environmental pollution can be mitigated in order to promote the green economy. Moreover, assessing if the findings withstand empirical scrutiny from country-specific standpoints is also worthwhile. This latter recommendation for future research is motivated by the fact that country-specific effects are inherently eliminated in the GMM specification in order to control for endogeneity. While this study focuses exclusively on CO_2 emissions, there are other environmental problems that should also be the focus of future research, notably: land erosion, sea rise, biodiversity loss, rapid desertification, rainforest loss, and urban pollution.

References

Afful-Koomson, T., (2012). "Governance Challenges for a Green Economy in Africa", United Nations University, https://unu.edu/publications/articles/governance-challenges-for-a-green-economy-in-africa.html(Accessed: 07/04/2017).

Agoba, A. M., Abor, J., Osei, K. A., & Sa-Aadu, J. (2019). Do independent Central Banks Exhibit Varied Bahaviour in Election and Non-Election Years: The Case of Fiscal Policy in Africa. *Journal of African Business*: Forthcoming.

Ajide, K. B, & Raheem, I. D., (2016a). "Institutions-FDI Nexus in ECOWAS Countries", *Journal of African Business*, 17(3), pp. 319-341.

Ajide, K. B, & Raheem, I. D., (2016b). "The Institutional Quality Impact on Remittances in the ECOWAS Sub-Region", *African Development Review*, 28(4), pp. 462–481.

Akinyemi, O., Alege, P., Osabuohien, E., & Ogundipe, A., (2015). "Energy Security and the Green Growth Agenda in Africa: Exploring Trade-offs and Synergies", Department of Economics and Development Studies, Covenant University, Nigeria.

Akinyemi, O., Efobi, U., Asongu, S., & Osabuohien, E., (2018). "Green Growth Strategy and Trade Performance in sub-Saharan Africa", Department of Economics and Development Studies, Covenant University, Nigeria.

Akpan, G. E. & Akpan, U. F. (2012). "Electricity Consumption, Carbon Emissions and Economic Growth in Nigeria", *International Journal of Energy Economics and Policy*, 2(4), pp. 292-306.

Amavilah, V., Asongu, S. A., & Andrés, A. R., (2017). "Effects of globalization on peace and stability: Implications for governance and the knowledge economy of African countries", *Technological Forecasting and Social Change*, 122 (September), pp. 91-103.

Andrés, R. A, Asongu, S. A., & Amavilah, V. H., (2015). "The Impact of Formal Institutions on Knowledge Economy", *Journal of the Knowledge Economy*, 6(4), pp. 1034-1062.

Anyangwe, E. (2014). "Without energy could Africa's growth run out of steam?"*theguardian*, http://www.theguardian.com/global-development-professionals-network/2014/nov/24/energy-infrastructure-clean-cookstoves-africa(Accessed: 08/09/2015).

Arellano, M., & Bover, O., (1995), "Another look at the instrumental variable estimation of error components models", *Journal of Econometrics*, 68(1), pp. 29-52.

Asiedu, E., (2014). "Does Foreign Aid in Education Promote Economic Growth? Evidence From Sub-Saharan Africa", *Journal of African Development*, 16(1), pp. 37-59.

Asongu, S. A., (2017). "Knowledge Economy Gaps, Policy Syndromes and Catch-up Strategies: Fresh South Korean Lessons to Africa", *Journal of the Knowledge Economy*, 8(1), pp. 211–253.

Asongu, S. A., (2018a). "CO2 emission thresholds for inclusive human development in sub-Saharan Africa", *Environmental Science and Pollution Research*, 25(26), pp. 26005-26019.

Asongu, S. A., (2018b). "ICT, Openness and CO2 emissions in Africa", *Environmental Science and Pollution Research*, 25(10), pp. 9351-9359.

Asongu S. A. & De Moor, L., (2017). "Financial globalisation dynamic thresholds for financial development: evidence from Africa", *European Journal of Development Research*, 29(1), pp. 192–212.

Asongu, S. A., le Roux, S., Nwachukwu, J. C., & Pyke, C., (2019)."The Mobile Phone as an Argument for Good Governance in Sub-Saharan Africa", *Information Technology & People*, DOI: 10.1108/ITP-01-2018-0011.

Asongu, S. A., le Roux, S., & Biekpe, N., (2017). "Environmental degradation, ICT and inclusive development in Sub-Saharan Africa", *Energy Policy*, 111(December), pp. 353-361.

Asongu, S. A., le Roux, S.,, & Biekpe, N., (2018). "Enhancing ICT for environmental sustainability in sub-Saharan Africa", *Technological Forecasting and Social Change*, 127(February), pp. 209-216.

Asongu, S. A., & Nwachukwu, J. C., (2016a). "Revolution empirics: predicting the Arab Spring", *Empirical Economics*, 51(2), pp. 439-482.

Asongu, S. A, & Nwachukwu, J. C., (2016b). "The Mobile Phone in the Diffusion of Knowledge for Institutional Quality in Sub Saharan Africa", *World Development*, 86 (October), pp. 133-147.

Asongu, S. A., & Nwachukwu, J. C., (2016c). "The Role of Governance in Mobile Phones for Inclusive Human Development in Sub-Saharan Africa", *Technovation*, 55-56 (September-October), pp. 1-13.

Asongu, S. A, & Nwachukwu, J. C., (2016d). "Foreign aid and governance in Africa", *International Review of Applied Economics*, 30(1), pp. 69-88.

Asongu, S. A., & Nwachukwu, J. C., (2017a)."Quality of Growth Empirics: Comparative Gaps, Benchmarking and Policy Syndromes", *Journal of Policy Modeling*, 39(5), pp.861-882.

Asongu, S. A, & Nwachukwu, J. C., (2017b). "Is the Threat of Foreign Aid Withdrawal an Effective Deterrent to Political Oppression? Evidence from 53 African Countries", *Journal of Economic Issues*, 51(1), pp. 201-221.

Asongu, S. A., & Nwachukwu, J. C., (2017c)." Foreign Aid and Inclusive Development: Updated Evidence from Africa, 2005–2012", *Social Science Quarterly*, 98(1), pp. 282-298.

Asongu, S. A., & Odhiambo, N. M., (2018a). "Environmental Degradation and Inclusive Human Development in Sub- Saharan Africa", *Sustainable Development*, DOI: 10.1002/sd.1858.

Asongu, S. A., & Odhiambo, N. M., (2018b). "Basic formal education quality, information technology, and inclusive human development in sub- Saharan Africa", *Sustainable Development*. DOI: 10.1002/sd.1914.

Beck, T., Demirgüç-Kunt, A., & Levine, R., (2003), "Law and finance: why does legal origin matter?", *Journal of Comparative Economics*, 31(4), pp. 653-675.

Boateng, A., Asongu, S. A., Akamavi, R., & Tchamyou, V. S., (2018). "Information Asymmetry and Market Power in the African Banking Industry", *Journal of Multinational Financial Management,* 44(March), pp. 69-83.

Bruno, G., De Bonis, R., & Silvestrini, A., (2012). "Do financial systems converge? New evidence from financial assets in OECD countries". *Journal of Comparative Economics*, 40(1), pp. 141-155.

Carl, D., (2016). The Green State in Africa. New Haven, CT: Yale University Press

Chemutai, B., (2009). "Achieving Effective National Environmental Governance in Africa", I SS Today, https://issafrica.org/iss-today/achieving-effective-national-environmental-governance-in-africa (Accessed: 07/04/2017).

Efobi, U., Tanankem, B., Orkoh, E., Atata, S. N., Akinyemi, O., & Beecroft, I., (2018). "Environmental Pollution Policy of Small Businesses in Nigeria and Ghana: Extent and Impact", *Environmental Science and Pollution Research*: DOI: 10.1007/s11356-018-3817-x.

Franco, A., Malhotra, N., & Simonovits, G., (2014). "Publication Bias in the Social Sciences: Unlocking the File Drawer", *Science*, 345(6203), pp. 1502-1505.

Hongwu, L., (2013). "How to solve African governance and development issues: A perspective from China", BRIDGES AFRICA, http://www.ictsd.org/bridges-news/bridges-africa/news/how-to-solve-african-governance-and-development-issues-a (Accessed: 07/04/2017).

Jarrett, M. B., (2017). "Lights out: poor governance and Africa's energy crisis", *The Africa Report*. http://www.theafricareport.com/News-Analysis/lights-out-africas.html (Accessed: 01/12/2018).

Jolliffe, I. T. (2002) Principal Component Analysis (2nd Ed.) New York: Springer.

Jones, K. R., (2003). "Multilateral Environmental Agreements in Africa: Efforts and Problems in Implementation", *International Environmental Agreements*, 3(2), pp.97-135.

Kaiser, H. F. (1974) "An index of factorial simplicity" *Psychometrika* 39(1), pp. 31–36.

Kaufmann, D., Kraay, A & Mastruzzi, M., (2010). "The worldwide governance indicators: Methodology and analytical Issues". *World Bank Policy Research Working Paper* No 5430, Washington.

Meniago, C., & Asongu, S. A., (2018). "Revisiting the finance-inequality nexus in a panel of African countries", *Research in International Business and Finance*, 46(December), pp. 399-419.

Narayan, P.K., Mishra, S., & Narayan, S., (2011). "Do market capitalization and stocks traded converge? New global evidence". *Journal of Banking and Finance*, 35(10), pp.2771-2781.

Nwokora, Z., & Pelizzo, R., (2018). "Measuring Party System Change: A Systems Perspective", *Political Studies*, 66(1), pp. 100-118.

Odhiambo, N. M., (2009a). "Electricity consumption and economic growth in South Africa: a trivariate causality test". *Energy Economics*, 31(5), pp. 635–640.

Odhiambo, N. M., (2009b). "Energy consumption and economic growth nexus in Tanzania: an ARDL bounds testing approach". *Energy Policy*, 37 (2), pp. 617–622.

Odhiambo, N. M., (2010). "Energy Consumption, Prices and Economic Growth in Three SSA Countries: A Comparative Study" *Energy Policy*, 38(5), pp. 2463-2469.

Odhiambo, N. M., (2014a). "Energy Dependence in Developing Countries: Does the Level of Income Matter'", *Atlantic Economic Journal*, 42(1), pp. 65–77.

Odhiambo, N. M., (2014b). "Electricity Consumption, Exports And Economic Growth in the Democratic Republic of Congo: An ARDL-Bounds Testing Approach", *Journal of Developing Areas*, 48(4), pp.189-207.

Oluwatobi, S., Efobi, U.R., Olurinola, O.I., Alege, P. (2015). "Innovation in Africa: Why Institutions Matter", *South African Journal of Economics*, 83(3), pp. 390-410.

Osabuohien, E. S., & Efobi, U. R., (2013). "Africa's money in Africa", *South African Journal of Economics*, 81(2), pp. 292-306.

Pelizzo, R., Araral, E., Pak, A., & Xun, W., (2016). "Determinants of Bribery: Theory and Evidence from Sub- Saharan Africa", *African Development Review*, 28(2), pp. 229-240.

Pelizzo, R., & Nwokora, Z., (2016). "Bridging the Divide: Measuring Party System Change and Classifying Party Systems", *Politics & Policy*, 44(6), pp. 1017-1052.

Pelizzo, R., & Nwokora, Z., (2018). "Party System Change and the Quality of Democracy in East Africa", *Politics & Policy*, 46(3), pp. 505-528.

Petrakis, P. E., &Stamatakis, D. (2002). "Growth and educational levels: a comparative analysis". *Economics of Education Review*, 21(2), pp. 513-521.

Roodman, D., (2009a). "A Note on the Theme of Too Many Instruments", *Oxford Bulletin of Economics and Statistics*, 71(1), pp. 135-158.

Roodman, D., (2009b). "How to do xtabond2: An introduction to difference and system GMM in Stata", *Stata Journal*, 9(1), pp. 86-136.

Rosenberg, M. S., (2005). "The file-drawer problem revisited: a general weighted method for calculating fail-safe numbers in meta-analysis", *Evolution*, 59(2), pp. 464-468.

Tchamyou, V. S., (2017). "The Role of Knowledge Economy in African Business". *Journal of the Knowledge Economy*, 8(4), pp. 1189-1228.

Tchamyou, V. S., (2019a). "Education, Lifelong learning, Inequality and Financial access: Evidence from African countries". *Contemporary Social Science*.
DOI: 10.1080/21582041.2018.1433314.

Tchamyou, V. S., (2019b)."The Role of Information Sharing in Modulating the Effect of Financial Access on Inequality". *Journal of African Business*: Forthcoming.

Tchamyou, V. S., & Asongu, S. A., (2017). "Information Sharing and Financial Sector Development in Africa", *Journal of African Business*, 18(7), pp. 24-49.

Tchamyou, V.S., Erreygers, G., & Cassimon, D., (2019). "Inequality, ICT and Financial Access in Africa", *Technological Forecasting and Social Change*,139(February), pp. 169-184.

Table 1: Principal Component Analysis (PCA) for Governance (Gov)

Principal Components	Component Matrix(Loadings)						Proportion	Cumulative Proportion	Eigen Value
	VA	PS	RQ	GE	RL	CC			
First PC (*G.Gov*)	0.395	0.372	0.411	0.426	0.439	0.404	0.815	0.815	4.892
Second PC	-0.037	0.873	-0.357	-0.303	0.037	-0.124	0.067	0.883	0.407
Third PC	0.747	-0.035	0.157	-0.131	-0.086	-0.626	0.052	0.935	0.314
First PC (*Polgov*)	0.707	0.707	---	---	---	---	0.835	0.835	1.671
Second PC	-0.707	0.707	---	---	---	---	0.164	1.000	0.328
First PC (*Ecogov*)	---	---	0.707	0.707	---	---	0.939	0.939	1.878
Second PC	---	---	-0.707	0.707	---	---	0.060	1.000	0.121
First PC (*Instgov*)	---	---	---	---	0.707	0.707	0.930	0.930	1.861
Second PC	---	---	---	---	-0.707	0.707	0.069	1.000	0.138

P.C: Principal Component. VA: Voice & Accountability. RL: Rule of Law. R.Q: Regulation Quality. GE: Government Effectiveness. PS: Political Stability. CC: Control of Corruption. G.Gov (General Governance): First PC of VA, PS, RQ, GE, RL & CC. Polgov (Political Governance): First PC of VA & PS. Econgov (Economic Governance): First PC of RQ & GE. Instgov (Institutional Governance): First PC of RL & CC.

Table 2: Political governance, inclusive development and environmental degradation

	Dependent variable: CO2 emissions per capita					
	Political Stability (PS)		Voice & Accountability (VA)		Political Governance (Polgov)	
CO2 emissions (-1)	**0.875*** **	**0.949*** **	**0.887*** **	**0.951*** **	**0.872*** **	**0.944*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Political Stability (PS)	0.023	-0.016	---	---	---	---
	(0.716)	(0.773)				
Voice & Accountability (VA)	---	---	-0.102	-0.010	---	---
			(0.146)	(0.906)		
Political Governance (Polgov)	---	---		---	0.001	-0.045
					(0.978)	(0.249)
Inclusive Development (ID)	0.175	0.187	**0.418** **	0.358	0.271	0.139
	(0.567)	(0.344)	**(0.047)**	(0.022)	(0.244)	(0.359)
PS ×ID	-0.011	0.113	---	---	---	---
	(0.944)	(0.388)				
VA × ID	---	---	**0.278***	0.127	---	---
			(0.050)	(0.530)		
Polgov × ID	---	---	---	---	0.037	**0.184** **
					(0.736)	**(0.048)**
GDP growth	---	0.00004	---	0.0001	---	-0.0002
		(0.936)		(0.785)		(0.593)
Population growth	---	0.002	---	-0.002	---	0.003
		(0.880)		(0.869)		(0.784)
Education	---	-0.001	---	0.001	---	0.0005
		(0.213)		(0.214)		(0.542)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Net effects	na	na	na	na	na	na
AR(1)	(0.036)	(0.012)	(0.040)	(0.018)	(0.035)	(0.016)
AR(2)	**(0.120)**	**(0.419)**	**(0.111)**	**(0.166)**	**(0.126)**	**(0.322)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.415)**	**(0.315)**	**(0.227)**	**(0.468)**	**(0.424)**	**(0.366)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	---	(0.030)	---	(0.042)	---	(0.033)
Dif(null, H=exogenous)	**(0.736)**	**(0.692)**	**(0.552)**	**(0.815)**	**(0.672)**	**(0.742)**
(b) IV (years, eq(diff))						
H excluding group	---	(0.077)	---	(0.077)	---	**(0.114)**
Dif(null, H=exogenous)	---	**(0.773)**	---	**(0.948)**	---	**(0.743)**
Fisher	**447.73*** **	**833608*** **	**4661.87*** **	**81816.60*** **	**2036.66*** **	**99029.57*** **
Instruments	25	36	25	36	25	36
Countries	42	41	42	41	42	41
Observations	347	244	347	244	347	244

*, **, ***: significance levels of 10%, 5% and 1% respectively. *DHT*: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. *OIR*: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients, Hausman test and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the *AR(1)*and*AR(2)* tests and; b) the validity of the instruments in the Sargan *OIR* test. Na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. Constants are included in the estimations. The mean value of inclusive human development is 0.450.

Table 3: Economic governance, inclusive development and environmental degradation

	Dependent variable: CO2 emissions per capita					
	Regulation Quality (RQ)		Government Effectiveness (GE)		Economic Governance (Ecogov)	
CO2 emissions (-1)	**0.989*** (0.000)**	**0.953*** (0.000)**	**0.868*** (0.000)**	**0.965*** (0.000)**	**0.973*** (0.000)**	**0.962*** (0.000)**
Regulation Quality (RQ)	**-0.202** (0.010)**	0.030 (0.708)	---	---	---	---
Government Effectiveness (GE)	---	---	**-0.217** (0.034)**	0.176 (0.224)	---	---
Economic Governance (Ecogov)	---	---	---	---	**-0.075* (0.099)**	0.070 (0.298)
Inclusive Development (ID)	0.135 (0.619)	0.199 (0.359)	**0.666** (0.040)**	-0.164 (0.478)	**-0.383** (0.045)**	0.236 (0.190)
RQ ×ID	**0.551*** (0.001)**	-0.030 (0.824)	---	---	---	---
GE × ID	---	---	**0.556*** (0.005)**	-0.290 (0.283)	---	---
Ecogov × ID	---	---	---	---	**0.223** (0.012)**	-0.135 (0.271)
GDP growth	---	0.00003 (0.946)	---	-0.0007 (0.166)	---	-0.00007 (0.899)
Population growth	---	0.008 (0.567)	---	**0.022** (0.021)**	---	0.019 (0.120)
Education	---	-0.0009 (0.335)	---	**-0.001** (0.045)**	---	-0.001 (0.375)
Time effects	Yes	Yes	Yes	Yes	Yes	Yes
Net effects	0.0459	na	0.0332	na	0.0253	na
AR(1)	(0.048)	(0.017)	(0.032)	(0.017)	(0.049)	(0.017)
AR(2)	**(0.115)**	**(0.203)**	**(0.124)**	**(0.378)**	**(0.123)**	**(0.234)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.202)**	**(0.608)**	(0.070)	**(0.166)**	**(0.252)**	**(0.340)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	---	(0.028)	---	(0.027)	---	(0.047)
Dif(null, H=exogenous)	**(0.393)**	**(0.954)**	**(0.163)**	**(0.455)**	**(0.511)**	**(0.648)**
(b) IV (years, eq(diff))						
H excluding group	---	(0.057)	---	(0.023)	---	(0.024)
Dif(null, H=exogenous)	---	**(1.000)**	---	**(0.789)**	---	**(0.991)**
Fisher	**11323.77***	**543058***	**2547.04***	**62431.83***	**6895.42***	**52370.01***
Instruments	25	36	25	36	25	36
Countries	42	41	42	41	42	41
Observations	347	244	347	244	347	244

*, **, ***: significance levels of 10%, 5% and 1% respectively. *DHT*: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. *OIR*: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients, Hausman test and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the *AR(1)*and*AR(2)* tests and; b) the validity of the instruments in the Sargan *OIR* test. Na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. Constants are included in the regressions. The mean value of inclusive human development is 0.450.

Table 4: Institutional governance, inclusive development and environmental degradation

	Dependent variable: CO2 emissions per capita					
	Rule of Law (RL)		Corruption Control (CC)		Institutional Governance (Instgov)	
CO2 emissions (-1)	**0.836*** **	**0.953*** **	**0.879*** **	**0.959*** **	**0.853*** **	**0.963*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Rule of Law (RL)	-0.075	-0.029	---	---	---	---
	(0.445)	(0.739)				
Corruption Control (CC)	---	---	-0.190	-0.092	---	---
			(0.240)	(0.248)		
Institutional Governance (Instgov)	---	---	---	---	-0.071	-0.019
					(0.305)	(0.707)
Inclusive Development (ID)	**0.670***	0.173	0.547	**0.300***	0.426	0.076
	(0.083)	(0.368)	(0.364)	**(0.064)**	(0.296)	(0.551)
RL ×ID	0.158	0.183	---	---	---	---
	(0.491)	(0.315)				
CC × ID	---	---	0.416	0.205	---	---
			(0.215)	(0.179)		
Instgov × ID	---	---	---	---	---	0.057
						(0.569)
GDP growth	---	-0.00005	---	0.0001	---	0.0001
		(0.930)		(0.774)		(0.794)
Population growth	---	-0.002	---	0.009	---	0.003
		(0.839)		(0.337)		(0.799)
Education	---	-0.0007	---	-0.0006	---	-0.0006
		(0.339)		(0.240)		(0.437)
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
Net effects	na	na	na	na	na	na
AR(1)	(0.033)	(0.017)	(0.031)	(0.017)	(0.032)	(0.018)
AR(2)	**(0.103)**	**(0.319)**	**(0.109)**	**(0.241)**	**(0.113)**	**(0.257)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.165)**	**(0.427)**	**(0.119)**	**(0.592)**	**(0.141)**	**(0.653)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	---	(0.050)	---	(0.071)	---	(0.048)
Dif(null, H=exogenous)	**(0.276)**	**(0.745)**	**(0.262)**	**(0.854)**	**(0.227)**	**(0.936)**
(b) IV (years, eq(diff))						
H excluding group	---	(0.066)	---	**(0.152)**	---	(0.091)
Dif(null, H=exogenous)	---	**(0.940)**	---	**(0.929)**	---	**(0.998)**
Fisher	**3280.27*** **	**90777.73*** **	**1570.90*** **	**528408*** **	**3294.44*** **	**0.963*** **
Instruments	25	36	25	36	25	36
Countries	42	41	42	41	42	41
Observations	347	244	347	244	347	244

*, **, ***: significance levels of 10%, 5% and 1% respectively. *DHT*: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. *OIR*: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients, Hausman test and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the *AR(1)*and*AR(2)* tests and; b) the validity of the instruments in the Sargan *OIR* test. Na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. Constants are included in the regressions. The mean value of inclusive human development is 0.450.

Table 5: General governance, inclusive development and environmental degradation

	Dependent variable: CO2 emissions per capita			
CO2 emissions (-1)	**0.886*** **	**0.901*** **	**0.917*** **	**0.966*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**
General Governance (Ggov)	**-0.062** **	**-0.060*** **	**0.041***	0.015
	(0.015)	**(0.006)**	**(0.059)**	(0.723)
Inclusive Development (ID)	0.232	**0.386*** **	0.060	0.185
	(0.280)	**(0.000)**	(0.734)	(0.321)
Ggov ×ID	**0.156** **	**0.144*** **	-0.056	-0.025
	(0.011)	**(0.004)**	(0.131)	(0.759)
GDP growth	---	**0.0006***	0.0002	-0.00004
		(0.076)	(0.653)	(0.923)
Population growth	---	---	**-0.020***	0.017
			(0.084)	(0.151)
Education	---	---	---	-0.0005
				(0.547)
Time effects	Yes	Yes	Yes	Yes
Net effects	0.0011	0.0048	na	na
AR(1)	(0.036)	(0.041)	(0.057)	(0.017)
AR(2)	**(0.118)**	**(0.125)**	**(0.112)**	**(0.218)**
Sargan OIR	(0.000)	(0.000)	(0.027)	(0.000)
Hansen OIR	(0.084)	**(0.102)**	**(0.198)**	**(0.380)**
DHT for instruments				
(a)Instruments in levels				
H excluding group	---	(0.079)	(0.005)	(0.040)
Dif(null, H=exogenous)	**(0.203)**	**(0.170)**	**(0.709)**	**(0.728)**
(b) IV (years, eq(diff))				
H excluding group	---	---	(0.074)	(0.060)
Dif(null, H=exogenous)	---	**(0.200)**	**(0.443)**	**(0.916)**
Fisher	**4224.87*** **	**9974.38*** **	**34319.29*** **	**45111.03*** **
Instruments	25	29	32	36
Countries	42	42	42	41
Observations	347	342	306	244

"*, **, ***: significance levels of 10%, 5% and 1% respectively. *DHT*: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. *OIR*: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients, Hausman test and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the *AR(1)*and*AR(2)* tests and; b) the validity of the instruments in the Sargan *OIR* test. Na: not applicable because at least one estimated coefficient needed for the computation of net effects is not significant. Constants are included in the regressions. The mean value of inclusive human development is 0.450".