Economics Bulletin

Volume 39, Issue 3

Does institutional quality explain the Lucas Paradox? Evidence from Africa

Olufemi A Aluko
Department of Finance, University of Ilorin, Kwara State, Nigeria.

Muazu Ibrahim
Department of Banking and Finance, University for Development Studies, Ghana

Abstract

The Lucas Paradox occurs when capital does not flow from the rich to poor countries contrary to the prediction of the neoclassical model. We examine whether institutional quality explains the Lucas paradox in Africa. Our evidence suggests that, the paradox by far is unexplained by institutional quality. This evidence is robust to the presence of outliers and endogeneity.

The authors are grateful to the Associate Editor, Andreas Hoffmann and anonymous reviewers for their useful comments. The usual disclaimer applies.
Citation: Olufemi A Aluko and Muazu Ibrahim, (2019) "Does institutional quality explain the Lucas Paradox? Evidence from Africa", *Economics Bulletin*, Volume 39, Issue 3, pages 1687-1693
Contact: Olufemi A Aluko - olufemiadewale6@gmail.com, Muazu Ibrahim - imuazu@uds.edu.gh.
Submitted: April 21, 2019. **Published:** July 07, 2019.

1. Introduction

There has been growing concern on why capital does not flow from rich (capital-abundant) to poor (capital-scarce) countries, contrary to the prediction of the neoclassical model under the assumptions of similar constant returns to scale production function and diminishing marginal productivity of capital. The neoclassical model argues that capital should flow downhill, that is, from rich to poor countries due to higher returns on capital and lower capital-labour ratio in poor countries. However, by noting a reverse capital flow trajectory, Lucas (1990) pioneered the inquiry into why capital does not flow in the expected pattern of the neoclassical model. He criticized the neoclassical model and opined that the stock of human capital accumulation, institutional quality, and market imperfections may account for this reverse capital flow. This reverse capital flow is what is widely known as 'Lucas Paradox' among economists. Indeed, it may become a herculean task for poor countries to make capital inflows productive in the presence of low human capital development, weak institutional quality, and market imperfections in form of high degree of sovereign risk exposure and information asymmetry. Conversely, Kalemli-Ozcan *et al.* (2010) argue that the paradox is caused by frictions associated with national borders involving capital flow restrictions and not necessarily the deficiencies of the neoclassical model as opined by Lucas (1990).[1]

Alfaro *et al.* (2008) (AKV, henceforth) contribute a seminal paper to empirically explain the paradoxical flow of capital, as suggested by Lucas (1990). Results from their ordinary least squares (OLS) and instrumental variable (IV) cross-sectional regressions suggest that the explanation of the Lucas paradox is deeply rooted in the quality of institutions. AKV show that the effect of income on capital inflows become insignificant after controlling for institutional quality, thus indicating that institutional quality resolves the paradox.

Empirical studies have emerged following the work of AKV. These empirical studies cast doubt on the thesis that institutional quality explains the Lucas Paradox. Although, unlike AKV who used a semi-log model specification, the empirical studies that ensued employed a log-log model specification. For instance, Azémar and Desbordes (2013) demonstrate that institutional quality does not explain the paradox when atypical observations (outliers) are controlled for. Similarly, Akhtaruzzman *et al.* (2018) invalidate AKV's findings. Olano (2018) observes that the paradox exist in the pre- and post-global financial crisis periods even when institutional quality is controlled for. Using an alternative measure of institutional quality in the form of the economic freedom index (EFI), Snyder (2013) finds that institutional quality does not resolve the paradox. Göktan (2015) uses cross-border bank loans to measure capital inflows and finds that institutional quality fails to explain the paradox when country heterogeneity is accounted for. The author also addresses the bias that may arise as a result of wealth differentials in terms of cross-border bank loans by using the quantile regression estimation method. Göktan (2015) finds that, at lower distributional tail of capital inflows per capita for quantiles between 0.05 and 0.40, the paradox is explained by institutional quality along with human capital and macroeconomic stability.

Hitherto, there is no precise empirical evidence to explain the Lucas Paradox in Africa. Consequently, we examine whether institutional quality explains the paradox in Africa. We

[1] Kalemli-Ozcan *et al.* (2010) use a simple frictionless open economy model with perfectly diversified ownership of capital to show that capital flows among the 50 states in United States are in line with the expectation of the neoclassical model.

focus our attention on only institutional quality as a possible explanation for the paradox in Africa because AKV argue that weak institutional quality is the prominent cause of the lack of capital flows into poor countries. The choice to conduct the research on African countries is tactical for two reasons. First, most African countries are characterized by weak institutional quality. Weak institutional quality is a major obstacle to capital inflows in African countries (Montiel 2006).[2] Second, among the continents in the world, Africa has the highest number of countries regarded as poor despite its abundant labour and rich natural resources endowment to attract capital inflows. Acemoglu *et al.* (2001) argue that most African countries are poor as a result of weak institutional quality.

We contribute significantly to the literature in two ways. First, this study is a pioneering effort on the role of institutional quality in explaining the Lucas Paradox in Africa. Till date, discussions and implications of the Lucas Paradox for Africa are often gleaned from public discourse with no empirical backing. Second, we rely on estimation approaches that are robust to outliers and endogeneity while controlling for several crucial ancillary variables. Our overall conclusion is that, the paradox by far, is unexplained by institutional quality.

We structure the rest of the paper as follows. In the next section, we describe the data and present the empirical model. In Section 3, we present the empirical results. We provide concluding remarks in Section 4.

2. Data and empirical model

Africa consists of 54 countries, out of which we select 37 countries for this study informed by the availability of data.[3] The dependent variable is average capital inflows per capita. Consistent with Azémar and Desbordes (2013) and AKV, we obtain capital inflows per capita by first-differencing foreign claims on domestic capital obtained over the period 1996-2015 from Lane and Milesi-Ferretti (2018).[4] For transformation into per capita terms, the first-differenced foreign claims on domestic capital are divided by the population size (mid-year total population) taken from World Development Indicators (WDI) of the World Bank. Foreign claims on domestic capital is the sum of direct and portfolio equity investment inflows in current US dollars, and then deflated by the US consumer price index (CPI) with base year 2010 = 100 also taken from WDI. Following AKV, we use the initial (1996) GDP per capita valued in terms of purchasing power parity (PPP), which comes from WDI, to measure income. We use the average of the six World Governance Indicators (WGI) provided by the World Bank (Kaufmann *et al.* 2010) to capture institutional quality, averaged over the period 1996-2015. These indicators include (i) voice and accountability, (ii) political stability and absence of violence, (iii) government effectiveness, (iv) regulatory quality, (v) control of corruption, and (vi) rule of law. The scores on the indicators range between -2.5 and +2.5, with higher scores implying better governance.

[2] Empirical studies suggest that improvements in institutional quality stimulate inflow of capital (see Bénassy-Quéré *et al.*, 2007; Asiedu, 2006).

[3] The countries considered in this study are Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo Republic, Cote d'Ivoire, Gabon, Gambia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Sudan, Swaziland, Togo, Tunisia, Uganda, Zambia, and Zimbabwe.

[4] The year 1996 is taken as the starting period because it is the initial year in the institutional quality dataset.

Human capital, restrictions to capital mobility, and sovereign risk are included as controls. For human capital, we use the average value of human capital index from 1996–2014, taken from the Penn World Table version 9.0 (Feenstra *et al.* 2015). The index is based on years of schooling and return on education. The financial openness index by Aizenman *et al.* (2008) averaged over the period 1996-2015 is used to proxy restrictions to capital mobility. The index is the first standardized principal component of the original set of variables relating to regulatory controls over current or capital account transactions, existence of multiple exchange rates, and the repatriation requirements for export proceeds. The index is normalized between 0 and 1, with higher (lower) values indicating lower (higher) restrictions to capital mobility. Sovereign risk is measured by the logarithm of average value of ratio of central government debt to GDP from 1996–2015 obtained from the International Monetary Fund (IMF) database.[5] Higher values indicate that the government has a higher tendency to default in payment of its debt, implying higher degrees of sovereign risk. AKV identify that the degree of sovereign risk is an indicator of the level of market imperfections in a country.

The empirical model informed from AKV is expressed as:

$$logF_i = \mu + \alpha logY_i + \beta INSQ_i + \rho X_i' + \varepsilon_i \qquad (1)$$

where log denotes natural logarithm, F_i is the average capital inflows per capita, Y_i is GDP per capita (PPP) in 1996, $INSQ_i$ is the average institutional quality; X_i' is a vector consisting of the controls, μ is the constant term, while ε_i is the error term. According to AKV, the Lucas Paradox is resolved when $\alpha < 0$ or statistically insignificant.

Table I shows the descriptive statistics of data for the 37 countries in the sample. The coefficient of variation (CV), calculated as standard deviation divided by mean, shows that average capital inflows per capita has the largest amount of variation across the countries in the sample followed by initial GDP per capita (PPP) given their higher values of CV. The positive skewness statistic of all the variables indicates that they are skewed to the right.

Table I: Descriptive Statistics

	Mean	Std. Dev	CV	Skewness
Average capital inflows per capita	3.83	20.29	5.30	5.82
Initial GDP per capita (PPP)	3,445.56	3897.41	1.13	2.48
Average institutional quality	-0.55	0.55	-1	0.45
Average human capital	1.73	0.39	0.23	0.32
Average restrictions to capital mobility	0.31	0.29	0.94	1.54
Average sovereign risk	64.38	40.90	0.64	2.60

Notes: Std. Dev and CV respectively denotes standard deviation and coefficient of variation.

3. Empirical results

We present the empirical results in Table II. The results in columns [1] to [3] are obtained using the OLS estimator. In column [1], the coefficient of the initial GDP per capita (PPP) is positive and statistically significant and this suggests that the Lucas Paradox is present in Africa. Column [2] shows that the coefficient of the initial GDP per capita (PPP) remains positive and statistically significant after controlling for institutional quality, suggesting that institutional quality does not make the Lucas Paradox disappear in Africa. In column [3] where human

[5] WDI provides the data on central government debt to GDP for Mauritius.

capital, restrictions to capital mobility, and sovereign risk are controlled for, our findings on the effect of initial GDP per capita (PPP) remain robust with a relatively huge coefficient.

Table II: The Lucas Paradox in Africa

	[1] OLS	[2] OLS	[3] OLS	[4] MM	[5] MM	[6] MM	[7] IV	[8] IV
Constant	-8.84***	-7.36***	-16.40***	-10.45***	-10.22***	-15.68***	-8.72***	-16.75***
	(2.55)	(2.32)	(2.95)	(1.13)	(1.99)	(2.74)	(3.09)	(2.72)
Log[initial GDP per capita (PPP)]	0.99***	0.84***	1.23***	1.17***	1.14***	1.16***	1.14***	1.53***
	(0.33)	(0.29)	(0.29)	(0.15)	(0.25)	(0.37)	(0.36)	(0.30)
Average institutional quality		0.63	1.03*		0.07	0.49	1.95*	1.44***
		(0.55)	(0.54)		(0.39)	(0.52)	(1.01)	(0.76)
Average human capital			-0.13			0.20		-0.46
			(0.53)			(0.80)		(0.66)
Average restrictions to capital mobility			1.55**			0.96		1.30*
			(0.75)			(0.71)		(0.73)
Log(Average sovereign risk)			1.51***			1.25		1.27**
			(0.47)			(0.94)		(0.57)
Weak identification test (*p-value*)							0.00***	0.00***
Over-identification test (*p-value*)							0.25	0.19
R^2	0.36	0.40	0.65	0.70	0.69	0.76	0.54	0.74

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% level respectively and robust standard errors are reported in parenthesis. Robust R^2 (w) reported for MM-estimations.

Indeed, because results produced from the OLS estimator are likely to be biased due to the presence of outliers in the sample, we employ the MM-estimator which produces results robust to the presence of outliers.[6] The results produced by the MM-estimator are reported in columns [4]-[6] and these columns show that the coefficient of the initial GDP per capita (PPP) is positive and statistically significant. Indeed, these findings are qualitatively similar to OLS results. Thus, we can say that the presence of outliers in the sample does not affect the argument inferred from the OLS results that institutional quality does not explain the Lucas Paradox in Africa.

Taking a cue from AKV, we deal with the possible endogeneity of institutional quality, which may cause the OLS results to be spurious, by employing an IV estimator based on the two-stage least squares method. We instrument institutional quality with distance from equator, share of countries' population speaking one of the five primary European languages as the first language, logarithm of European settler mortality rate, and ethnic fractionalization. While the decision to use distance from equator and share of countries' population speaking one of the five primary European languages as first language as instruments stem from Azémar and Desbordes (2013), European settler mortality rate and ethnic fractionalization are used based on pedagogic arguments. Islam (2004) and Acemoglu *et al.* (2001) contend that logarithm of European settler mortality rate serves as a good instrument for institutional quality of former European colonies.[7] La Porta *et al.* (1999) argue that the quality of institutions weakens as a result of ethnic fractionalization. Easterly *et al.* (2006) use ethnic fractionalization as an instrument for institutional quality.[8] Data on distance from equator and ethnic fractionalization

[6] We use the *robreg* Stata command built by Jann (2010) to invoke the MM-estimator.

[7] Most African countries are former European colonies which were perceived by European settlers to either be inhospitable or extractive states. Acemoglu *et al.* (2001) argue that European settlers set up weak institutions in inhospitable and extractive states.

[8] Easterly and Levine (1997) allude that ethnic fractionalization is responsible for the weak institutional quality in Africa.

are taken from La Porta *et al.* (1999). Hall and Jones (1999) and Acemoglu *et al.* (2001) provide data on share of countries' population speaking one of the five primary European languages as first language and European settler mortality rate, respectively.

The results of the IV estimator are presented in columns [7] and [8]. The weak identification test rejects the hypothesis that the instruments are weak. The over-identification test does not reject the hypothesis of over-identifying restrictions, implying that the instruments are valid. The results obtained from the IV estimator also show that the coefficient of the initial GDP per capita (PPP) is positive and significant, consistent with the OLS results. This informs that the OLS results are not influenced by the endogeneity problem that may arise as a result of the inclusion of institutional quality in the model. It is worth mentioning that institutional quality has a positive and statistically significant coefficient in columns [3], [7], and [8]. This suggests that higher levels of institutional quality attract capital into African countries. In other words, capital is more likely to flow into African countries with presence of good institutions.

3.1 Robustness tests

We replicate the regressions in Table II using the initial (1996) GDP per capita in constant 2010 US dollars, sourced from WDI, as a proxy for income.[9] Table III reports the results of the robustness tests. The results in Table III are akin to the main results, thus confirming the robustness of the findings in terms of income measurement.

Table III: Robustness Tests

	[1] OLS	[2] OLS	[3] OLS	[4] MM	[5] MM	[6] MM	[7] IV	[8] IV
Constant	-7.79***	-6.60***	-15.57***	-8.68***	-8.43***	-15.23***	-7.75***	-15.37***
	(1.92)	(1.71)	(2.49)	(0.92)	(1.25)	(2.61)	(2.35)	(2.30)
Log(initial GDP per capita in constant 2010 US dollars)	0.96***	0.83***	1.30***	1.05***	1.02***	1.20***	1.13***	1.53***
	(0.28)	(0.24)	(0.25)	(0.13)	(0.17)	(0.24)	(0.31)	(0.24)
Average institutional quality		0.59	1.03**		0.09	0.57	1.86**	1.54**
		(0.53)	(0.50)		(0.28)	(0.42)	(0.91)	(0.65)
Average human capital			-0.50			-0.09		-0.72
			(0.53)			(0.58)		(0.57)
Average restrictions to capital mobility			1.82**			1.27**		1.60**
			(0.72)			(0.54)		(0.69)
Log(Average sovereign risk)			1.58***			1.42**		1.34**
			(0.45)			(0.70)		(0.55)
Weak identification test (*p-value*)							0.00***	0.00***
Over-identification test (*p-value*)							0.24	0.15
R^2	0.40	0.44	0.71	0.70	0.69	0.82	0.60	0.79

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% level respectively and robust standard errors are reported in parenthesis. Robust R^2 (w) reported for MM-estimations.

4. Concluding remarks

Our study is the first attempt at empirically examining whether institutional quality explains the Lucas Paradox in Africa. We show that income exerts a positive and statistically significant effect on inflows per capita in Africa and this attests to the existence of the Lucas Paradox in Africa. We find that institutional quality does not explain the Lucas Paradox. This finding is not influenced by the presence of outliers and endogeneity problem, further providing credence to the lack of explanation of the Lucas Paradox by institutional quality in Africa. The findings are robust to the alternative measure of income.

[9] AKV use initial GDP per capita in constant US dollars as an alternative proxy for income.

References

Acemoglu, D., Johnson, S., Robinson, J.A. (2001) "The colonial origins of comparative development: An empirical investigation" *American Economic Review* **91(5),** 1369-1401.

Aizenman, J., Chinn, M.D., Ito, H. (2008) "Assessing the emerging global financial architecture: Measuring the trilemma's configurations over time" National Bureau of Economic Research Working Paper No. 14533.

Akhtaruzzaman, M., Hajzler, C., Owen, P.D. (2018) "Does institutional quality resolve the Lucas Paradox?" *Applied Economics* **50(5),** 455-474.

Alfaro, L., Kalemli-Ozcan, S., Volosovych, V. (2008) "Why doesn't capital flow from rich to poor countries? An empirical investigation" *The Review of Economics and Statistics* **90(2),** 347-368.

Asiedu, E. (2006) "Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability" *World Economy* **29(1),** 63-77.

Azémar, C., Desbordes, R. (2013) "Has the Lucas Paradox been fully explained?" *Economic Letters* **121(2),** 183-187.

Bénassy-Quéré, A., Coupet, M., Mayer, T. (2007) "Institutional determinants of foreign direct investment" *World Economy* **30(5),** 764-782.

Olano, A.D.V. (2018) "The Lucas Paradox in the Great Recession: Does the type of capital matter" *Economics Bulletin* **38(2),** 1052-1057.

Easterly, W., Levine, R. (1997) "Africa's growth tragedy: Policies and ethnic divisions" *Quarterly Journal of Economics* **112(4),** 1203-1250.

Easterly, W., Ritzan, J., Woolcock, M. (2006) "Social cohesion, institutions, and growth" Center for Global Development Working Paper No. 94.

Feenstra, R.C., Inklaar, R., Timmer, M.P. (2015) "The next generation of the Penn world table" *American Economic Review* **105(10),** 3150-3182.

Göktan, M.G. (2015) "On the explanation of the Lucas Paradox" *Economic Letters* **137,** 109-113.

Hall, R.E., Jones, C.I. (1999) "Why do some countries produce so much more output per worker than others?" *Quarterly Journal of Economics* **114(1),** 83-116.

Islam, N. (2004) "Settler mortality rate as an instrument for institutional quality" International Centre for the Study of East Asian Development Working Paper Series Vol. 28.

Jann, B. (2010) "ROBREG: Stata module providing robust regression estimators" Available from http://ideas.repec.org/c/boc/bocode/s457114.html.

Kalemli-Ozcan, S., Reshef, A., Sørensen, B.E., Yosha, O. (2010) "Why does capital flow to rich states" *The Review of Economics and Statistics* **92(4),** 769-783.

Kaufmann, D., Kraay, A., Mastruzzi, M. (2010) "The worldwide governance indicators: A summary of methodology, data and analytical issues" World Bank Policy Research Working Paper No. 5430.

Lane, P.R., Milesi-Ferretti, G.M. (2018) "International financial integration in the aftermath of the global financial crisis" *IMF Economic Review* **66(1),** 189-222.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W. (1999) "The quality of government" *Journal of Law, Economics, & Organization* **15(1),** 222-279.

Lucas, R.E. (1990) "Why doesn't capital flow from rich to poor countries?" *American Economic Review* **80(2),** 92-96.

Montiel, P. J. (2006) "Obstacles to investment in Africa: Explaining the Lucas Paradox" Paper presented at the High-Level Seminar organized by the IMF Institute and Joint Africa Institute.

Snyder, T.J. (2013) "Increasing returns, institutions, and capital flows" *Eastern Economic Journal* **39(3),** 285-308.