Institutions and Growth Acceleration

by

Thomas Barnebeck Andersen

and

Peter Sandholt Jensen

Discussion Papers on Business and Economics
No. 7/2013

FURTHER INFORMATION
Department of Business and Economics
Faculty of Social Sciences
University of Southern Denmark
Campusvej 55
DK-5230 Odense M
Denmark

Tel.: +45 6550 3271
Fax: +45 6550 3237
E-mail: lho@sam.sdu.dk
http://www.sdu.dk/ivoe

ISBN 978-87-91657-85-6

INSTITUTIONS AND GROWTH ACCELERATIONS

Thomas Barnebeck Andersen

Peter Sandholt Jensen

March 12, 2013

Abstract

This paper estimates the effect of institutions on economic growth in Sub-Saharan Africa over the period 1995-2007. We follow Henderson, Storeygard, and Weil (*American Economic Review* 102(2): 994-1028, 2012) in combining Penn World Tables GDP data with satellite-based data on nightlights in order to arrive at a more accurate measure of economic growth. We find that countries with good institutions grew faster than countries with poor institutions. Using external instruments, 2SLS regressions point to a causal impact. Our findings are consistent with the view that institutions are a root cause of economic development.

JEL Classification: O11, O43, O47

Keywords: institutions; economic growth; 2SLS; Africa

Both authors are affiliated with the Department of Business and Economics, University of Southern Denmark, Campusvej 55, DK-5230 Odense M, Denmark. Contact details: barnebeck@sam.sdu.dk (Andersen) and psj@sam.sdu.dk (Jensen).

I. INTRODUCTION

Economists' thinking about growth has changed fundamentally over the past couple of decades. Where the post-war pioneers of growth theory stressed the accumulation of factors of production, economists have recently turned their attention to institutions as the fundamental cause of comparative development. Good institutions ensure the enforcement of property rights; they put constraints on the actions of elites; and they ensure some degree of equal opportunity for broad segments of society.

The view that institutions are the fundamental cause of development has been backed by an impressive amount of empirical research (e.g., Hall and Jones 1999; Acemoglu, Johnson, and Robinson 2001; Easterly and Levine 2003; Rodrik, Subramanian, and Trebbi 2004; Banerjee and Iyer 2005; Nunn 2008; Dell 2010). By and large, the modus operandi of this research has been to regress the *level* of income per capita on institutional quality and various controls. The logic is that institutions change very slowly, so if one conditions on initial income, as in a standard growth regression, or includes fixed effects it may be very difficult or impossible to uncover an effect from institutions to economic growth. That is, institutions are not generally expected to have discernible short-run effects.

Below we show that this is not always so. We find that institutional differences predict growth variations in Africa during the period 1995-2007, a period of accelerating economic growth. This finding is, we believe, interesting for at least two reasons: From an academic point of view, it is interesting because it strengthens the view of institutions as a root cause of comparative economic development. From a practical point of view, it is interesting because it makes probable that Africa's recent growth is sustainable. The continent has seen many false dawns, driven in large part by ups in commodity prices. But a growth acceleration driven by institutional differences may well be sustainable.

II. EMPIRICAL APPROACH

Consider the following simple growth regression:

(1) $$g_i = \alpha + \beta \cdot INSTITUTIONS_i + \gamma \cdot \log\left(Initial\ GDP\ per\ capita_i\right) + \varepsilon_i.$$

The only variable not entirely self-explanatory is g_i, the average annual growth rate of real income per capita over the period 1995-2007. During this pre-crisis period (i.e., the 2007/08 financial crisis) Africa witnessed something of a growth revival. A simple but obvious test, which the institutions view, if true, should pass is rejection of the null that $\beta = 0$ in equation (1).

We will conduct this test both in an OLS and a 2SLS setting, where we use the two language instruments proposed by Hall and Jones (1999) in their pioneering study of the role of institutions in economic development and subsequently used in an influential study by Rodrik, Subramanian, and Trebbi (2004). These language variables are, respectively, the fraction of the population speaking English (engfrac) as first language and the fraction speaking a primary European language as first language (eurfrac).[1] With two instruments and one endogenous variable, we rely on over-identification (OID) tests to gauge the exclusion restriction in our sample: Cov(engfrac, ε) = Cov(eurfrac, ε) = 0.[2]

Since GDP is likely to be plagued by non-random measurement error in Africa, we follow Henderson, Storeygard, and Weil (2011) in producing *adjusted* real GDP per capita growth rates by employing satellite data on nightlights. Briefly, the growth observations used below are a convex combination (weight: 0.5) of observed real (chained PPP) GDP per capita growth (from Penn World Tables 7.0) and the fitted values from a regression of this variable on growth in nigthlights.[3]

We follow Rodrik, Subramanian, and Trebbi (2004) in using the composite *rule-of-law* indicator, due to Daniel Kaufmann, Aart Kraay, and Massimo Mastruzzi,[4] for the year 2001 as our institutional quality measure.[5] This indicator captures the protection afforded to property rights as

[1] Primary European languages are English, French, German, Portuguese, and Spanish.
[2] We assume that initial GDP per capita, which is pre-determined, is exogenous in equation (1).
[3] Had we instead used unadjusted data, all our conclusions would carry through.
[4] The worldwide governance indicators are available at http://info.worldbank.org/governance/wgi/index.asp, though we have obtained the indicator from Dani Rodrik's webpage, where a replication dataset is available.
[5] According to Rodrik, Subramanian, and Trebbi (2004), the year 2001 approximates for institutions in the 1990s.

well as the strength of the rule of law.[6] It is a standardized measure, which varies between -2.5 (weakest institutions) and 2.5 (strongest institutions). In our sample, the range is between -1.50 (Guinea-Bissau) and 1.23 (Namibia). The two language instruments are, as noted above, from Hall and Jones (1999).

Several African countries have benefitted substantially from high oil prices and new oil discoveries. Higher oil prices are likely to stimulate growth in the short run regardless of institutionally quality. We therefore rely on an oil exporter dummy coded by Arbache and Page (2009) to investigate whether oil confounds an otherwise positive relationship between institutions and growth. The dummy variable is coded as one if net oil exports make up 30 percent or more of total exports. These large net oil exporters in our sample are Angola, Cameroon, Chad, Congo (Rep.), Gabon, and Nigeria. Finally, in some 2SLS estimations we also use malaria ecology (taken from Sachs 2003) and distance to equator (taken from Rodrik, Subramanian, and Trebbi 2004). These geo-variables are intended to pick up geographical factors, which may otherwise confound results (see Sachs 2003 and Rodrik, Subramanian, and Trebbi 2004 for a discussion).

III. RESULTS

Table 1 reports our regression results. The dependent variable in all columns is adjusted growth. Turning first to OLS results, reported in columns 1 to 3, we first note that there is a positive but statistically insignificant partial correlation between institutions and growth, cf. column 1. Once we include the oil dummy, which itself is statistically significant at 5 percent, the partial correlation between rule of law and growth turns significant at the 1 percent level, cf. column 2. When we drop the large net oil exporters from the sample, as done in column 3, the partial correlation between institutions and growth remains significant at 1 percent.

--Table 1 about here--

[6] Rule of law as our institutions measure also fits well with North's (1990, p. 54) view that the "inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the Third World."

The partial correlation between rule of law and growth from column 2 of the table is shown in figure 1.

--Figure 1 about here--

Columns 4 to 8 of the table report 2SLS results, where the two language variables are invoked as instruments for rule of law. The first thing to note is that instruments are weak in all estimations. This leads us to rely on the Anderson-Rubin statistic, which is robust to weak identification. According to this statistic rule of law is always significant, albeit only marginally so in some columns. The next thing to note is that the exclusion restriction passes the OID test in all columns. Thirdly, in some columns the point estimates of the impact of institutions on growth more than triples. This is not an altogether uncommon occurrence when instruments are weak. Finally, we note that inclusion of malaria ecology and distance to the equator has no impact on our results. In sum, 2SLS estimations are consistent with a causal impact of institutions on economic growth.

How large is the effect quantitatively? Using column 2, which produces by far the most conservative estimate, we have that a one standard deviation increase in rule of law leads to a 0.5 standard deviation increase in adjusted growth. This is equivalent to an increase in average annual growth of 0.82 percentage points. Another way to appreciate economic significance is to consider the counterfactual scenario in which Guinea-Bissau (the hindmost) would achieve the level of institutional quality of Namibia (the topmost). This move corresponds to an annual growth increase of 3.55 percentage points. Another way to appreciate the economic significance of the results is to view them through the lens of a neoclassical growth model. With the long-run growth rate exogenously given, changes in rule of law will have long-run levels effects. We obtain the long-run relation log(GDP per capita)=1.3·rule of law. The aforementioned counterfactual scenario would thus have raised the steady state level of GDP per capita by a factor 3.5.

IV. CONCLUDING REMARKS

This paper has shown that over the period 1995-2007 institutions correlate with economic growth on the world fastest-growing continent: Africa. Invoking external instruments produces similar results. Our findings are consistent with the view that institutions are a root cause of comparative economic development.

REFERENCES

ACEMOGLU, D., S. JOHNSON, AND J. A. ROBINSON (2001): "The Colonial Origins of Development: An Empirical Investigation," *American Economic Review*, 91, 1369–1401.

ARBACHE, J., AND J. Page (2009): "How Fragile is Africa's Recent Growth?" *Journal of African Economies*, 19, 1-24

BANERJEE, A., AND L. IYER (2005): "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India," *American Economic Review*, 95, 1190–1213.

DELL, M. (2010): "The Persistent Effect of Peru's Mining Mita," *Econometrica*, 78, 1863–1903.

EASTERLY, W., AND R. LEVINE (2003): "Tropics, Germs, and Crops: How Endowments Influence Economic Development," *Journal of Monetary Economics*, 50, 3–39.

HENDERSON, V., A. STOREYGARD, AND D. WEIL (2012): "Measuring Economic Growth from Outer Space," *American Economic Review*, 102, 994-1028.

NORTH, D. (1990): "Institutions, institutional change, and Economic development," Cambridge: Cambridge University Press.

NUNN, N. (2008): "The Long-Term Effects of Africa's Slave Trades," *Quarterly Journal of Economics*, 123, 139–176.

RODRIK, D., A. SUBRAMANIAN, AND F. TREBBI (2004): "Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development," *Journal of Economic Growth*, 9, 131-165.

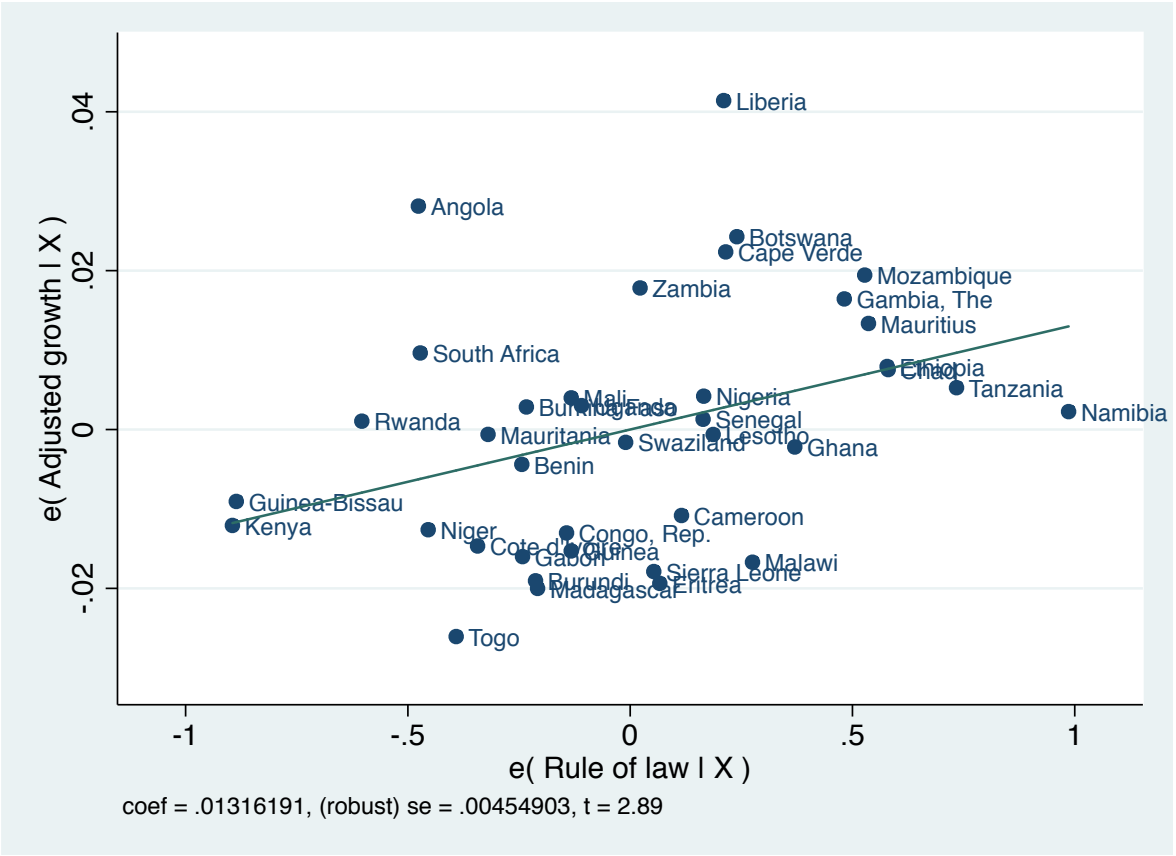
SACHS, J., (2003): "Institutions Don't Rule: Direct Effects of Geography on Per Capita Income," *NBER Working Paper* No. 9490.

Table 1: OLS and 2SLS Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation method	**OLS**	**OLS**	**OLS**	**2SLS**	**2SLS**	**2SLS**	**2SLS**	**2SLS**
Dep. variable	Adjusted growth 1995-2007							
Rule of law	0.006	0.013***	0.015***	0.024*	0.053**	0.059**	0.052**	0.052**
	(0.005)	(0.005)	(0.005)	(0.014)	(0.027)	(0.029)	(0.026)	(0.021)
Initial GDP per capita	-0.005	-0.010**	-0.010*	-0.012*	-0.029**	-0.033**	-0.029**	-0.027***
	(0.004)	(0.005)	(0.006)	(0.007)	(0.012)	(0.015)	(0.012)	(0.009)
Oil dummy		0.018**			0.057**		0.056**	0.052***
		(0.007)			(0.026)		(0.026)	(0.019)
Malaria ecology							-0.000	-0.000
							(0.000)	(0.000)
Distance to equator								-0.000
								(0.001)
Constant	0.068**	0.102***	0.103**	0.121**	0.248***	0.276**	0.248***	0.243***
	(0.033)	(0.034)	(0.042)	(0.055)	(0.092)	(0.111)	(0.091)	(0.078)
Observations	38	38	32	38	38	32	38	38
R-squared	0.077	0.174	0.199					
Oil-exporters excluded	No	No	Yes	No	No	Yes	No	No
K-P *F* stat				3.598	2.665	2.493	2.521	3.486
A-R Wald stat *p*-value				0.001	0.003	0.006	0.005	0.000
Hansen *J* stat *p*-value				0.912	0.883	0.870	0.891	0.812

Notes: Robust standard errors reported in parenthesis. Asterisks *, **, *** indicate p<0.1, p<0.05, p<0.01. K-P F-Statistic refers to the Kleibergen-Paap F statistic, and A-R test refers to the Anderson-Rubin Wald test, where H_0 is "rule of law" = 0. Hansen J stat is the over-identification test. Instruments for rule of law in columns 4 to 8 are engfrac and eurfrac.

Figure 1: Partial Correlation



Notes: The figure plots the partial correlation between rule of law and adjusted growth based on column 2 of Table 1.