Economic Development and Democracy: The Modernisation Hypothesis in sub-Saharan Africa*

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Abstract

The modernisation hypothesis advances that economic development is a condition for democracy. We investigate Lipset's hypothesis in 46 sub-Saharan African countries from 1960 to 2010 using dynamic panel data analysis. The initial results from widely used development indicators, such as income per capita, education, urbanisation and industrialisation, are inconclusive for the modernisation hypothesis. However, when we combine the common factors from these development indicators into one index using principle component analysis, we obtain positive and significant results for democracy. This evidence suggests that economic development does not rely on income per capita or education alone but requires the development indicators to work simultaneously in supporting democracy.

Keywords: Economic development, democracy, sub-Saharan Africa.

JEL Classifications: O10, O43, O55, P16.

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1 Introduction

In Lipset's (1959) paper on the modernisation hypothesis, he highlights wealth, education, urbanisation and industrialisation as internal conditions for economic development which help to support democracy. He proposes that democracy emerges from this set of conditions that is already in existence in the country and becomes "stabilised because of certain supporting institutions and values, as well as because of its own internal self-maintaining processes".

This paper revisits the debate on the modernisation hypothesis. We use a sample of 46 sub-Saharan African countries between 1960 and 2010 to investigate the relationship between democracy and the various development indicators stated by Lipset (1959) as necessary conditions to support democracy. The analysis includes dynamic panel data with fixed effects, mean group estimator, fixed effects with instrumental variables, System GMM and panel corrected standard errors estimators to account for heterogeneity, endogeneity and cross-section dependence. The initial results indicate little evidence supporting the modernisation hypothesis. However when we use principle component analysis, where we extract the common factors from the development indicators, we find that the modernisation hypothesis holds in the region. The results suggest that economic development depends on income per capita, education, urbanisation and industrialisation working simultaneously, than alone, to support democracy.

This research is related to a growing literature on the relationship between economic development and democracy. On the one hand, studies support Lipset's hypothesis that countries with high levels of income per capita, education, urbanisation and industrialisation are more likely to support democracy. He divides European, English-speaking and Latin American countries into two groups, more democratic and less democratic, and finds that his development indices are much higher for the more democratic countries. Among these studies, Barro (1996, 1999) finds that income per capita, primary schooling, urbanisation and life expectancy tend to generate a gradual rise in democracy. The positive income-democracy relationship is also supported by Benhabib *et al.* (2013), Gundlach & Paldam (2009), and Heid *et al.* (2012) after accounting for the dynamic nature and high persistence of democracy. Moreover, Bittencourt (2013) provides evidence for the modernisation hypothesis in the Latin American region, while Epstein *et al.* (2006) confirm that higher per capita incomes decrease the likelihood of a movement away from democracy.

Evidence in support of a positive education-democracy relationship is reported by Glaeser *et al.* (2007) who find that not only are richer countries more likely to improve their institutions,

but stable democracies are more common in countries with high levels of education. Furthermore, Murtin & Wacziarg (2014) provide empirical support for the modernisation hypothesis, particularly that the level of primary schooling is a more robust determinant of democracy than per capita income.

On the other hand, some studies fail to find any significant relationship between income and democracy, especially when time and fixed effects are included (Acemoglu *et al.* 2008, 2009). Analysis by Przerworski & Limongi (1997) and Burke & Leigh (2010) find that democracy does not increase with per capita income. In addition, Cervellati *et al.* (2014) and Fayad *et al.* (2012) confirm the negative income-democracy relationship, more so in former colonies and resource-rich countries. A case study by Friedman *et al.* (2011) finds that educating women in Kenya does not increase their acceptance of democracy, but increases the perceived legitimacy of political violence.

The existing empirical literature focuses on the role of income and/or education as preferred measures of economic development to investigate the modernisation hypothesis. However, according to Lipset (1959), income per capita or education cannot be the sole basis for rejecting the modernisation hypothesis. We therefore contribute to the existing literature by refining the methodological approach. We use principle component analysis which extracts the common factors from the development indicators and combines them into one main indicator encompassing the "economic development complex " (Lipset 1959). To the best of our knowledge, none of the previous studies use this method. We also extend the data analysis to not only address the usual issues of heterogeneity and endogeneity, but also cross-section dependence by using the panel corrected standard errors estimator as proposed by Beck and Katz (1995).

The mixed empirical evidence in the literature further motivates this research, especially given sub-Saharan's recent decolonisation process which signified the start of new democracies and its subsequent progress towards economic development over the last half century. Today, the region is characterised by relatively fast growth rates, increasing human capital, and improved technological processes. Figure 1 shows that in the last decade sub-Saharan Africa has been among the world's most rapidly growing regions, exceeding growth rates of developed regions, such as Europe and North America.

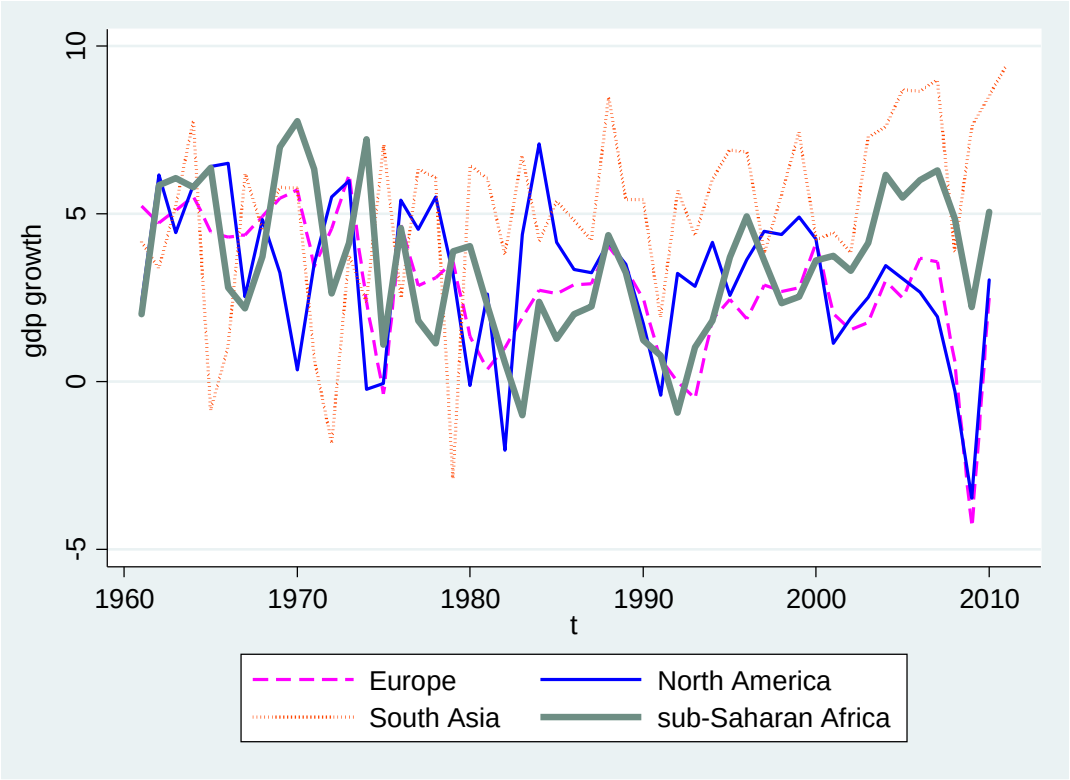

Figure 1: Annual GDP growth rates, 1960-2010. Source: World Development Indicators.

However, despite these high growth rates, the young democracies in the region are lagging in their political institutions. Independence has been followed by periods of economic instability and internal social unrest (Bates *et al.* 2007), as well as authoritarianism from ruling parties in several states such as Angola, Burundi, Nigeria, Swaziland and Zimbabwe. These factors have adverse effects on levels of income per capita, education, urbanisation and industrialisation which can delay economic development in the region. This delay may not be conducive to supporting democracy.

2 Empirical Analysis

2.1 Data

Democracy is defined as political or social equality where the power is vested in the people and exercised by them through a free electoral system (Lipset 1959). The dependent variable used to measure democracy is obtained from the Polity IV Project (2010) and captures these

characteristics. The variable (*polity*) is a revised combined score that is computed by subtracting the autocracy score from the democracy score. The resulting unified polity score ranges from -10 (strongly autocratic) to +10 (strongly democratic). A decrease/increase in the polity score will indicate a decrease/increase in democracy. The variable is normalised so that the values are between zero and one.

Different variables for democracy have been used in previous literature, such as the Freedom House Index, constraints on the executive, and protection against expropriation (Acemoglu *et al.* 2008, Benhabib *et al.* 2013, Burke & Leigh 2010, Cervellati *et al.* 2014). We choose a variable which captures all categories of democracy from autocracy, anocracy to full democracies. These anocracies (semi-democratic) regimes may not be captured in binary type variables. According to Cheibub, Gandhi & Vreeland (2009), the choice of measure used should be guided by its theoretical and empirical model such that the results can be evaluated in terms of whether they serve to address important research questions, they can be interpreted meaningfully and are reproducible. For the purpose of this research, the polity score variable is a suitable measure with data available for all countries under review[1].

Following Lipset (1959) and others (Barro 1999, Benhabib *et al.* 2013, Bittencourt 2013, Epstein *et al.* 2006) the explanatory variable used to measure economic development is the real gross domestic product (GDP) per capita (*gdpcap*) obtained from the Penn World Tables 7.1. A positive and significant coefficient for GDP would validate the modernisation hypothesis that wealthier countries tend to be more democratic because they can afford better institutions.

The hypothesis also highlights the importance of education, urbanisation and industrialisation in supporting democracy. Lipset (1959) uses literacy rates, primary education enrollment rates, post-primary enrollment rates and higher education enrollment rates. He finds that the countries in Europe with a high literate population also turn out to be more democratic compared to those countries with low literacy rates. The education (*educ*) variable is obtained from the Barro-Lee education dataset and measures the percentage of population aged 15 years or over with complete primary education. Since the data are taken at 5 year intervals, the variable is interpolated to fill in the missing years. Education encourages people to interact with others and raises the benefits of citizen participation including voting and organising. This raises the support for more

[1]Several papers that use the polity score as a measure of democracy include Barro (2012), Bittencourt (2013), Epstein *et al.* (2006), Fayad *et al.* (2012), Glaeser *et al.* (2007), Gundlach & Paldam (2009), and Murtin & Wacziarg (2014).

democratic regimes relative to dictatorships (Glaeser *et al.* 2007). We therefore expect education to be positively related to democracy.

The urbanisation variable (*urban*) is obtained from the World Development Indicators (WDIs) and measures urban population as a percentage of total population. Lipset (1959) uses the percentage of the population in places of 20,000 and over, the percentage in communities of 100,000 and over, and the percentage residing in standard metropolitan areas as indices for urbanisation. Urban areas are more developed than rural ones and people migrate to cities seeking better opportunities. Urban areas also indicate a society with a large middle class which according to Lipset (1959) plays an important role in advancing democratic parties and suppressing kleptocracy. We expect urbanisation to have a positive effect on democracy.

The industrialisation variable (*industrialisation*) measures the carbon dioxide emissions in metric tons per capita and is obtained from the WDIs. More carbon dioxide emissions indicate expansion of the manufacturing sector in the economy of developing countries. According to the modernisation hypothesis, industrialisation improves productivity and is therefore expected to have a positive effect on democracy. In his analysis, Lipset (1959) uses percentage of males in agriculture and per capita energy consumed as his industrialisation indices. However since data availability for sub-Saharan African countries poses a limitation, we find that the carbon dioxide emissions variable is a suitable alternative measure for industrialisation as it has more data coverage for the 46 countries under review. All variables are logged.

2.2 Descriptive Statistics

Table 1 gives a brief overview of the data. There are significant differences within the development indicators which shows the heterogeneity between the countries. Botswana, Mauritius and South Africa record relatively higher incomes per capita than Burundi, the Democratic Republic of Congo (DRC) and Liberia (at US$160.93). Although the correlation matrix does not show causality, it does give an indication of the degree of linear relationship between two variables. The signs of the correlation coefficients for the democracy variable are in line with expectations, with education indicating a higher correlation than the other determinants. This suggests that education may be a stronger predictor for democracy (Murtin & Wacziarg 2014).

Table 1: Descriptive Statistics and Correlation Matrix

Variable	Obs	Mean	Std. Dev.	Min	Max	Source
Polity	2122	-2.396	5.910	-10	10	Polity IV Project
Gdpcap	2345	1992.00	3229.56	160.93	32241.09	Penn World Tables 7.1
Educ	2448	13.583	5.057	6.1	21.694	Barro-Lee Education Dataset
Urban	2448	27.937	15.882	2.038	85.838	WDI
Industrialisation	2251	0.680	1.624	-0.021	11.720	WDI

	Polity	Gdpcap	Educ	Urban	Industrialisation
Polity	1.000				
Gdpcap	0.146*	1.000			
Educ	0.372*	0.125*	1.000		
Urban	0.260*	0.459*	0.465*	1.000	
Industrialisation	0.175*	0.659*	0.097*	0.412*	1.000

* significant at 5%

However, Figure 2 shows a negatively sloped regression line for the sub-Saharan region when we plot mean income per capita against mean polity score. Interestingly, within the region, the more developed economies, such as Mauritius and South Africa also exhibit higher levels of democracy, compared to the poorer countries, such as Rwanda and the DRC. According to Lipset's (1959) hypothesis, the countries with the lowest per capita income showed up in the less democratic category, while those with the highest per capita income were found in the more democratic category. This hypothesis seems to hold true when we compare the income-democracy correlation within sub-Saharan African countries and that of the relatively wealthier countries such as those found in the Organisation for Economic Cooperation and Development (OECD).

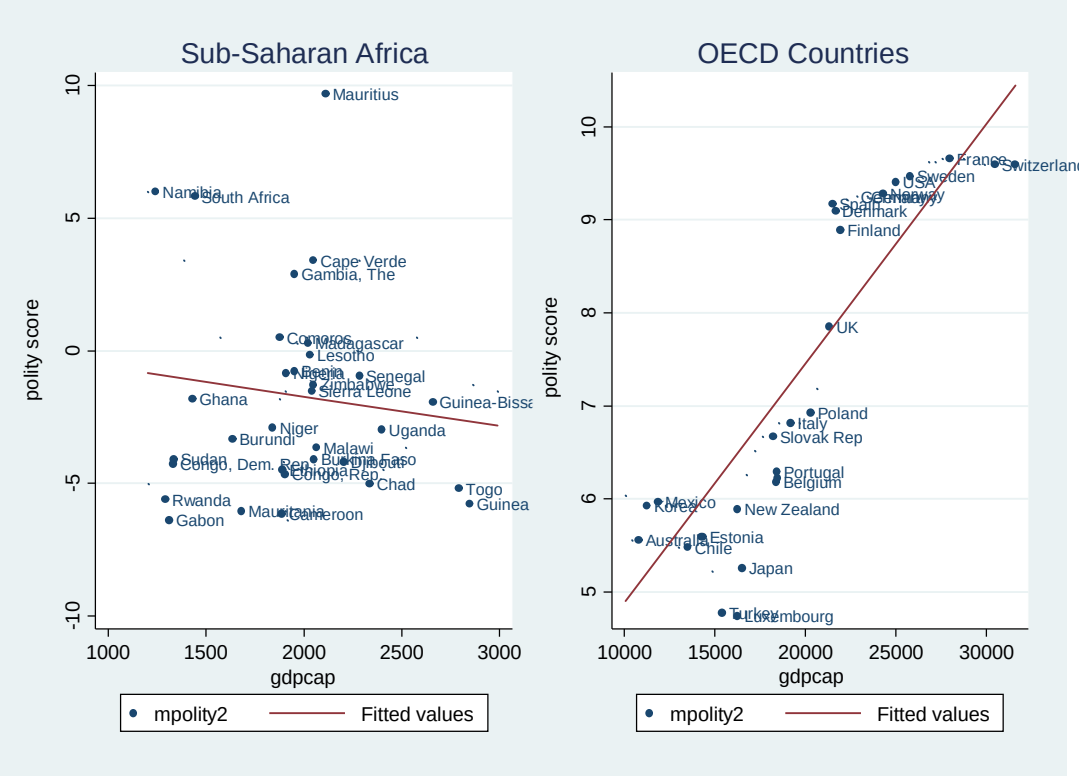

Figure 2: Income and democracy in sub-Saharan Africa and OECD, 1960-2010. Sources: Penn World Table and Polity IV.

2.3 Methodology

Since we have a large cross section (N=46)[2] and a long time period (T=51), we use panel data analysis to investigate the hypothesis that rising income per capita, along with education, urbanisation and industrialisation, increase democracy in the sub-Saharan African region. Since democratic transitions take time, we account for this persistence by including the lagged dependent variable in the specification[3]:

[2] *Sample of countries:* Angola, Benin, Botswana, Burkina Faso, Burundi, Cameron, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic), Congo (Republic), Cote d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Liberia, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

[3] According to Lipset (1959) a persistent political regime is legitimate and hence more likely to improve democracy. This inference is confirmed by Persson and Tabellini (2009) who find that history of democracy is associated

$$\ln polity_{it} = \alpha_i + \beta_1 \ln dpcap_{it} + \beta_2 \ln educ_{it} + \beta_3 \ln urban_{it} + \beta_4 \ln CO2_{it} + \beta_5 \ln polity_{it-1} + \mu_t. \quad (1)$$

In the baseline analysis we use four alternative methods that have become widespread in the empirical literature to estimate dynamic models. The first method is fixed effects which accounts for statistical endogeneity in the form of unobserved heterogeneity across countries such as geographic area, population, historical and colonial background, ethnic and religious composition. The second method is the Pesaran and Smith (1995) Mean Group estimator (MG) which estimates equation (1) for each country separately and an average of the coefficients is calculated. With this estimator, the intercepts, slopes and error variances are allowed to differ across groups.

The third method is fixed effects with instrumental variables (FE-IV) which is used to reduce both heterogeneity and possible economic endogeneity in the form of reverse causality. Reverse causality may be present in the model through income and education. This is observed by Bates *et al.* (2013) who find evidence that the relationship runs from democracy to income rather than the reverse in the African subset of their global data. This relationship is confirmed by Fosu (2013) who finds that greater prevalence of democratic regimes improves overall growth of African economies[4]. Evidence by Bittencourt (2013) suggests that democracy may play an important role in widening access to education in the Southern African Development Community. Moreover, Brown and Hunter (2004) find that democracies devote a higher percentage of their educational resources to primary education in Latin America, while Stasavage (2005) proposes that democratic governments have greater incentive than authoritarian states to provide primary education.

The FE-IV method allows consistent estimation in large samples when the explanatory variables are correlated with the error terms. The validity and reliability of the instrumental variables approach depends on the selection of the instruments which should satisfy the following criteria: i) the instrument must be correlated with the endogenous variable and ii) the instrument must

with the persistence of democracy. They contend that past experience with democracy is beneficial for maintaining democracy and how well current institutions work. This is also consistent with Guiliano and Nunn (2013) who find that past experience with local democracy is associated with more supportive beliefs of national democracy today such as stronger rule of law and higher per capita income. See also Cervellati *et al.* (2014).

[4]More empirical support for democracy causing economic growth can be found in Barro (1996), Acemoglu *et al.* (2014) and Papaioannou & Siourounis (2008).

not have a direct causal effect on democracy. In other words, the exclusion restriction is that the instruments are exogenous to the model and only influence the level of democracy through their impact on income and education.

The first instrument accounts for the latest external wave of globalisation. The variable (*globalisation*) is logged and taken from a dataset compiled by Dreher (2006) and updated by Dreher, Gaston and Martens (2008). This instrument captures movement of goods, capital, skilled labour, as well as transfer of technology and information through openness. However globalisation has not translated into better democratic institutions in the region as indicated by Zimbabwe's autocratic rule, or Swaziland's persistence as an authoritarian state, or South Africa's governance problems. Corruption and weak institutions continue to delay democratic processes in the region.

The more plausible channel for globalisation is through income per capita. For example, openness increases income per capita through exports to a wider global market, while importation of technologies through multinational corporations improves productivity in the recipient countries. Figure 3 shows that during the 1980s to 1990s the average democracy level in the region was declining with the average income per capita, but during that same period average globalisation continued to rise. The statistical evidence also shows a positive linear relationship between globalisation and income per capita.

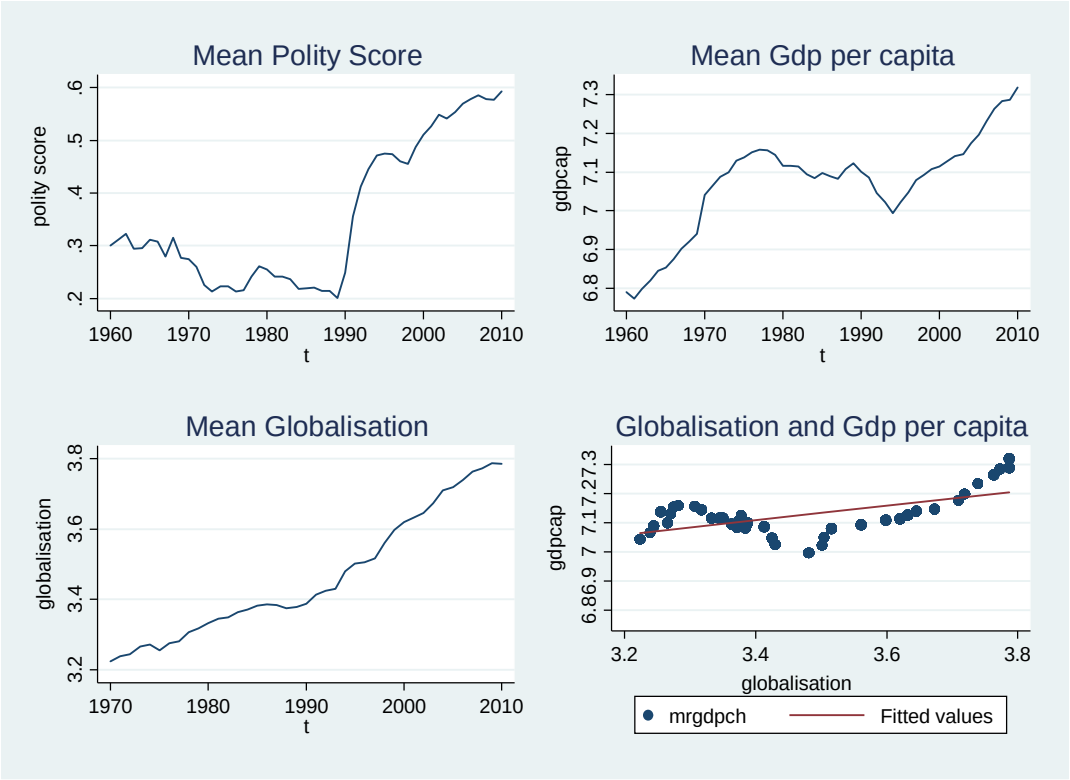

Figure 3: Democracy, income and globalisation, 1960-2010. Sources: Polity IV, Penn World Table and Dreher *et al.* (2008)

Furthermore, empirical evidence in literature indicates that open countries are more likely to have higher GDP growth (Barro 1996, Frankel & Romer 1999, Greenaway *et al.* 2001, Krueger 1998, Sachs *et al.* 1995). According to Andersen and Dalgaard (2011), greater international interaction between people from different nations facilitates the diffusion of ideas thus stimulating aggregate productivity. Furthermore, Wacziarg & Welch (2008) find that countries that liberalised their trade regimes experienced higher average annual growth rates, while Dreher (2006) provides panel evidence from 123 countries that globalisation promotes growth.

The end of the Cold War is another external shock which marked the end of the ideological conflict between the United States and the former Soviet Union. We use a post-Cold war dummy (*post-Cold War*: 0 = 1960-1990, 1 = 1991-2010) as an instrument for education. Again, case study evidence shows that the end of the Cold War did not bring about significant changes in democratic regimes in the region. For example, Angola, the DRC, Ethiopia, Mozambique and Somalia aligned themselves with communist rule, and more than a decade after the end of the Cold War, there

has not been significant improvements in these countries' democracies, with episodes of instability interrupting their transitions. If anything, the end of the Cold War is associated with an increase in Western international assistance in developing regions which allowed poor countries to redirect their resources to development programs such as improving education (Boockmann and Dreher 2003). As such, we expect the end of the Cold War to have a positive effect on levels of education through these development programs.

The fourth method is the System GMM (Sys-gmm) by Blundell and Bond (1998)[5]. Sys-gmm estimates parameters of interest by using a set of moment conditions as instruments. It uses lagged levels of the endogenous variable as instruments for the first-differenced model, as well as additional moment conditions from the first differenced form of the endogenous variable for the model in levels. We also include the external instruments globalisation and post-Cold war dummy in the Sys-gmm specification. To reduce the possibility of instrument proliferation which may overfit endogenous variables and fail to expunge their endogeneity, we specify the number of lags instead of using all available lags for the instruments (Roodman 2009a)[6]. As a rule of thumb, Roodman (2009a) suggests that the number of instruments should be strictly lower than the number of countries in the sample. Sys-gmm also takes care of serial correlation and persistence which are more than likely to be present in the lagged dependent variable. We include the two-step robust procedure which uses the Windmeijer's (2005) finite-sample correction for downward-biased standard errors and makes it a more efficient estimator than the one-step robust specification.

3 Results

3.1 Baseline Analysis

Table 2 shows results for the different estimators controlling for country differences, fixed effects and mean group. A negative and mostly significant relationship is found between income and democracy. A ten percent increase in income per capita decreases democracy by about two percent. This result indicates that the level of wealth is not contributing to the advancement of democracy in the region. Despite experiencing fast growth rates, sub-Saharan Africa remains the

[5] See also Acemoglu *et al.* (2009), Heid *et al.* (2012) and Murtin & Wacziarg (2014) for Sys-gmm analysis.

[6] We use the second lag up to the tenth lag for democracy, income and education. Further distant lags were required to account for the time persistence of democracy.

poorest region in terms of average income per capita relative to the rest of the world (Bolt *et al.* 2014).

Interestingly, the negative relationship validates evidence by Cervellati *et al.* (2014) who find that the effect of income on democracy is negative in former colonies, more so in those countries that were subject to extractive colonisation strategies and historically displayed lower constraints on the executive (Acemoglu *et al.* 2001). These characteristics are common to sub-Saharan Africa as all the countries are former colonies (except Ethiopia) with weak institutions that have persisted over time.

Education is mostly positive and significantly related to democracy suggesting that an educated population is more likely to put pressure on the government for better political institutions that protect their rights and private property. A ten percent increase in primary education attainment increases democracy by two percent.

Table 2: Fixed Effects (FE) and Mean Group Estimator (MG) Results

	1	2	3	4	5	6	7	8
POLITY	FE	FE	FE	FE	MG	MG	MG	MG
Gdpcap	-0.006	-0.063**	-0.074**	-0.058	0.027	-0.133***	-0.208***	-0.156*
	(0.034)	(0.027)	(0.033)	(0.041)	(0.076)	(0.050)	(0.068)	(0.087)
Educ		0.270***	0.220***	0.204***		0.214***	-0.114	-0.168*
		(0.034)	(0.046)	(0.047)		(0.041)	(0.090)	(0.091)
Urban			0.064	0.088			0.450***	0.567***
			(0.054)	(0.056)			(0.170)	(0.207)
Industrialisation				-0.023				-0.036
				(0.016)				(0.039)
Polity $_{t-1}$	0.910***	0.852***	0.852***	0.851***	0.876***	0.772***	0.717***	0.665***
	(0.010)	(0.016)	(0.016)	(0.016)	(0.018)	(0.024)	(0.028)	(0.031)
Observations	2,045	2,045	2,045	1,946	2,045	2,045	2,045	1,946
F / Wald test	4621.89***	2897.65***	2133.43***	1636.58***	2233.04***	1084.05***	664.67***	459.76***
R-squared	0.829	0.844	0.844	0.844	0.283	0.267	0.257	0.245
Number of i	46	46	46	45	46	46	46	45
Country FE	YES	YES	YES	YES	YES	YES	YES	YES

Coefficients reported. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The coefficient for urbanisation is positive and sometimes significant. Urbanised societies indicate a growing middle class which is likely to demand democratic institutions and a better quality of life. Industrialisation enters negatively and insignificantly in the regressions.

The lagged dependent variable is positive and significant, supporting evidence for the persistence of democratic institutions. The variable is also not equal to one which suggests there is no unit root present. The F and Wald statistics for overall joint significance of the regressors are statistically significant across the models.

Table 3 reports results for the FE-IV and sys-gmm methods. The results improve significantly

from the previous estimates and remain robust in interpretation. A ten percent increase in income per capita now lowers democracy by between four percent and eighteen percent, while education increases democracy by twelve percent. The coefficients for income per capita and education are significantly larger due to the external variation from the instruments which reduces the endogeneity bias. The identifying external instruments in the first stage regression are statistically significant, as well as the F-test for joint significance which minimises the issues of weak instruments. The globalisation instrument is positively and significantly related to income per capita which is in line with expectations, while the end of the Cold War coincides with higher education levels given the increased influence of international organisations in developing countries.

Table 3: Fixed Effects with Instrumental Variables (FE-IV) and System-GMM Results

	1	2	3	4	5	6	7	8
POLITY	FE-IV	FE-IV	FE-IV	FE-IV	SYS-GMM	SYS-GMM	SYS-GMM	SYS-GMM
Gdpcap	0.477***	-0.892***	-0.902***	-1.793***	0.003	-0.051**	-0.088***	-0.106***
	(0.081)	(0.182)	(0.189)	(0.569)	(0.003)	(0.020)	(0.031)	(0.033)
Educ		0.754***	1.004***	1.225***		0.127***	-0.135	-0.177
		(0.093)	(0.141)	(0.250)		(0.042)	(0.117)	(0.134)
Urban			-0.272**	-0.522***			0.302**	0.381**
			(0.106)	(0.165)			(0.128)	(0.150)
Industrialisation				0.519***				0.019
				(0.177)				(0.037)
Polity $_{t-1}$	0.944***	0.740***	0.729***	0.710***	1.001***	0.966***	0.980***	0.979***
	(0.011)	(0.028)	(0.029)	(0.049)	(0.014)	(0.022)	(0.029)	(0.033)
Observations	1,730	1,730	1,730	1,643	1,730	1,730	1,730	1,643
F test	3869.68***	1825.08***	1269.38***	504.89***	84298.30***	10835.10***	877.55***	465.78***
R-squared	0.812	0.732	0.711	0.447				
Hansen J test p-value					0.148	0.134	0.154	0.151
AR(2) p-value					0.941	0.920	0.889	0.473
No. of instruments					21	32	32	32
Number of i	45	45	45	44	45	45	45	44
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
First Stage Regressions								
Globalisation	0.584***	0.649***	0.487***	0.290***				
	(0.044)	(0.056)	(0.061)	(0.054)				
Post-Cold War		0.246***	0.140***	0.131***				
		(0.013)	(0.012)	(0.012)				
F test for weak instruments	89.23***	60.85***	55.89***	170.32***				
F test for weak instruments		1369.29***	1501.83***	1106.79***				

Coefficients reported. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Urbanisation and industrialisation have inconclusive results which make it difficult to draw any inferences. The conflicting results may indicate that while the easier communication and transportation in urban areas may facilitate the resistance of tyranny by people, these same factors may also allow a dictator to monitor and control them.

The positive and significant coefficient for lagged dependent variable indicates the persistence of democracy. The F statistics for overall joint significance of the regressors remains statistically

significant.

Under the Sys-gmm estimation, we fail to reject the null of the Hansen J test for exogeneity of instruments and conclude that the instruments are valid. The number of instruments conform to Roodman's (2009a) rule of thumb, they are less than the number of countries in the sample. We fail to reject the Arellano Bond (2) test for no second order serial correlation in the first differences and conclude that there is no second order serial correlation.

The internal social conditions put forward by Lipset (1959) showed that wealthier, more urbanised, more industrialised and more literate countries were more democratic than the countries that were characterised with low incomes per capita, less urbanisation, less industrialisation and low literacy rates. Based on the above estimates, the results we obtain are inconclusive indicating low and sometimes ambiguous predictive power on democracy coming from urbanisation and industrialisation. Primary education attainment turns out to be a stronger determinant for encouraging democracy in the region, compared to the commonly used income per capita (Murtin & Wacziarg 2014).

But how do we explain the modernisation hypothesis in countries with relatively high education attainment but low income per capita such as Zimbabwe or countries with high income per capita but relatively low education attainment such as South Africa? These anomalies make it difficult to infer the modernisation hypothesis based on one economic development indicator. Furthermore, Lipset (1959) states that income per capita or education cannot be the sole basis for rejecting the hypothesis. Most of the literature reviewed either rejects or fails to reject the modernisation hypothesis based on the causal results they obtain between income and democracy. The "economic development complex" which Lipset (1959) refers to in his paper comprises of interrelated variables that have to work together in order to support democracy.

In Figure 4, when we compare the polity scores in 1990 and 2010, there is evidence of significant improvements in democracy within the region. Yet we cannot say the same for incomes per capita during the 10 years which show slow progress in accumulation of wealth, indicating that income per capita may not be the only condition sufficient to support democracy. Education, urbanisation and industrialisation simultaneously play a significant role.

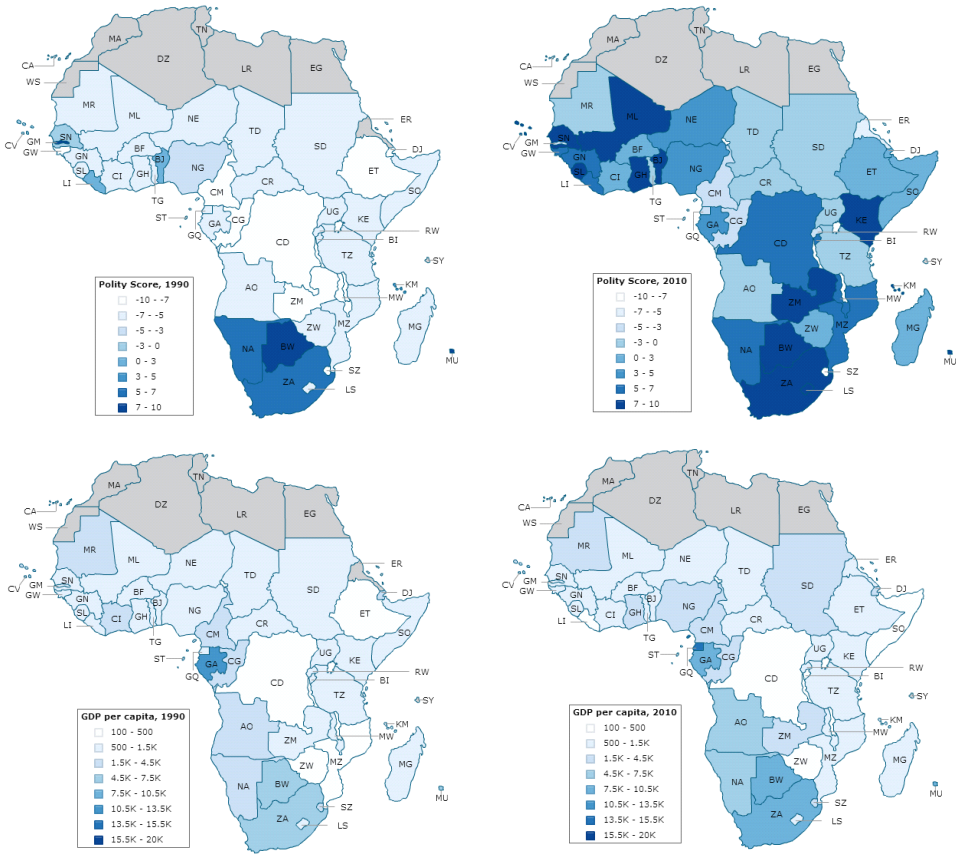

Figure 4: Changes in democracy and income between 1990 and 2010. Sources: Polity IV and Penn World Table.

In light of this, we create an index of economic development (*ecdvpt*) using principle component analysis. This approach allows us to reduce the set of explanatory variables, *i.e.* income, education, urbanisation and industrialisation, into one combined variable. Principle component accounts for most of the variance in the observed variables as it extracts the common factors amongst them and combines these factors into a variable that can be used as a predictor in subsequent analyses. The new index shows that it accounts for sixty percent of the variance found in the explanatory variables which is high enough to retain it[7]. Interestingly, Figure 5 now

[7]In principle component analysis, two commonly used criteria for solving the number of components are the eigenvalue-one (Kaiser, 1960) and the scree test (Cattell, 1966). We retain and interpret any component with an eigenvalue greater than one as it is accounting for a greater amount of variance. In this case, the eigenvalue is 2.41. The scree test plots the eigenvalues associated with each component and looks for a "break "between the

shows a positive linear relationship emerging between the combined development indicators and democracy in sub-Saharan Africa.

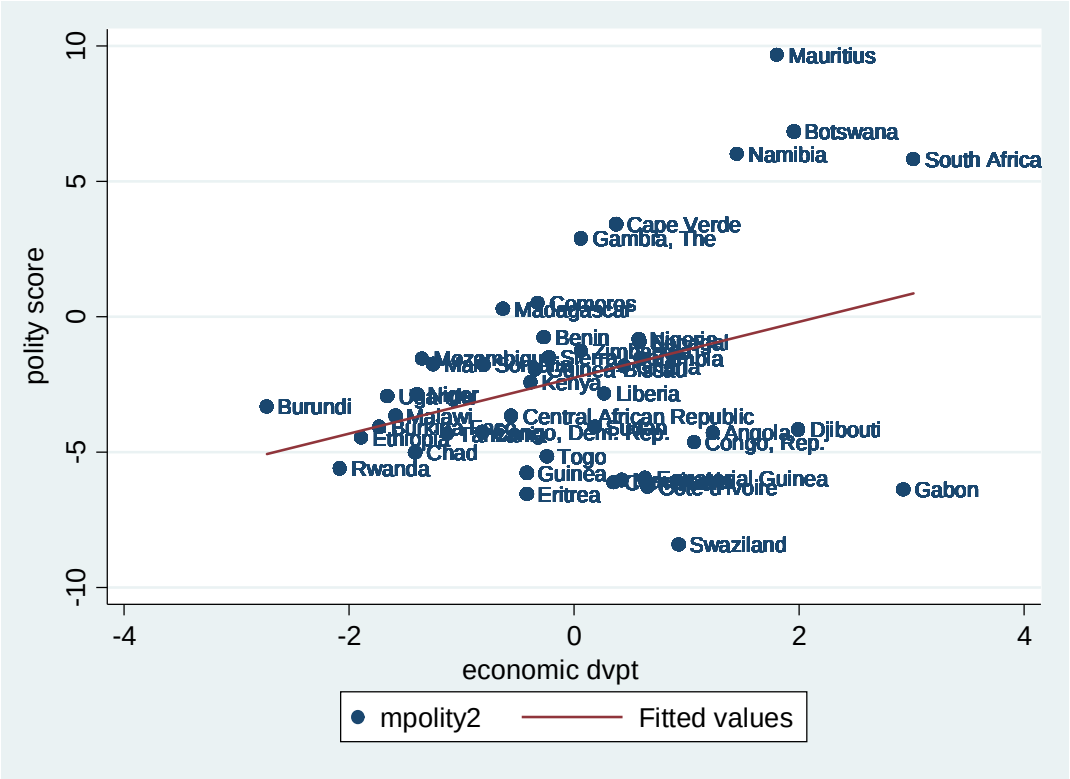

Figure 5: Economic development and democracy, 1960-2010. Sources: Polity IV, Penn World Table, Barro-Lee and World Development Indicators.

We re-estimate the dynamic regressions with the new economic development variable. We use the same instruments, but enter them in separate regressions to avoid over-identification. We now find a positive and significant relationship between economic development and democracy. The results indicate that the modernisation hypothesis does hold in the region once we account for the interrelationship between the development indicators. Income per capita alone may fail to capture other aspects of economic development found in education, urbanisation and industrialisation. This oversight in literature may bring in some bias in the interpretation of the modernisation hypothesis. The identifying instruments remain statistically significant and in line with expectations. The external instruments significantly improve the efficiency of economic

components with relatively large eigenvalues and those with small eigenvalues. The components that appear before the break are assumed to be meaningful and are retained.

development in increasing democracy.

Table 4: Principle Component Results

	1	2	3	4	5
POLITY	FE	MG	FE-IV	FE-IV	SYS-GMM
Ecdvpt	0.080***	0.089***	0.111***	0.236***	0.048***
	(0.014)	(0.026)	(0.018)	(0.017)	(0.013)
Polity $_{t-1}$	0.891***	0.833***	0.907***	0.857***	0.997***
	(0.014)	(0.018)	(0.010)	-0.011	(0.009)
Observations	1,946	1,946	1,643	1,946	1,643
F / Wald test	3396.99***	2260.88***	4977.45***	4255.58***	5717.21***
R-squared	0.836	0.270	0.861	0.811	
Hansen J test p-value					0.262
AR(2) p-value					0.518
No. of instruments					22
Number of i	45	45	44	45	44
Country FE	YES	YES	YES	YES	YES
First Stage Regressions					
Globalisation			2.286***		
			(0.067)		
Post-Cold War				1.055***	
				(0.034)	
F test for weak instruments			715.74***	533.97***	

Coefficients reported. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3.2 Additional Analysis

We extend the analysis by estimating an OLS regression with panel corrected standard errors (Beck & Katz 1995) to account for correlation across countries. A shock to one country may have a spillover effect on another. Democracy is more effective when there is more than one democratic country, and this is evident from the numerous interventions from intergovernmental organisations such as the African Union in countries such as Burundi, Somalia and Sudan to promote democratic governance across sub-Saharan Africa. This spread of democracy represents cross-section dependence between institutions' development in one country and others in the region. We therefore test for cross-section dependence using the Breusch-Pagan/LM test of independence and reject the null hypothesis that residuals across entities are not correlated.

Parks (1967) and Kmenta (1986) proposed a method for dealing with cross-section dependence based on the feasible generalised least squares (FGLS). But this method assumes that the variance-covariance matrix of the errors is known, and not estimated, which can pose a prob-

lem for panel models with a large number of parameters. Beck and Katz (1995) show that the overconfidence in the standard errors makes the FGLS estimation unsuitable for panel models with more time points than cross-section units, as is the case in this study, $T > N$. A more suitable approach would be to use the OLS parameter estimates but replace the OLS standard errors with panel corrected standard errors (PCSE). The xtpcse command in Stata calculates panel-corrected standard error estimates for linear cross-sectional time-series models where the parameters are estimated by OLS or Prais-Winsten regression. When computing the standard errors and the variance-covariance estimates, xtpcse assumes that the disturbances are, by default, heteroskedastic and contemporaneously correlated across panels.

Table 5 reports the results. We find that they are robust and similar to the previous results with income per capita reducing democracy. Education dominates the explanatory powers of the model indicating that human capital is an essential part of the development complex, while urbanisation and industrialisation remain insignificant. The positive coefficient for the principle component confirms the development complex which encourages democracy. Income per capita, education, urbanisation and industrialisation have to work simultaneously to have the desired positive effect on democracy. The Wald test is statistically significant indicating the overall significance of the model.

Table 5: Panel Corrected Standard Errors (PCSE)

	1	2	3	4	5
POLITY	PCSE	PCSE	PCSE	PCSE	PCSE with PCA
Ecdvpt					0.030***
					(0.007)
Gdpcap	-0.010	-0.026***	-0.036***	-0.033**	
	(0.010)	(0.010)	(0.011)	(0.014)	
Educ		0.288***	0.271***	0.259***	
		(0.042)	(0.044)	(0.046)	
Urban			0.022	0.029*	
			(0.015)	(0.016)	
Industrialisation				-0.006	
				(0.010)	
Polity $_{t-1}$	0.912***	0.861***	0.861***	0.863***	0.906***
	(0.021)	(0.018)	(0.018)	(0.019)	(0.020)
Observations	2,045	2,045	2,045	1,946	1946
Wald test	2020.53***	2876.41***	2935.47***	2733.14***	2039.14***
R-squared	0.875	0.897	0.896	0.899	0.877
Number of i	46	46	46	45	45

Coefficients reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

4 Conclusion

This paper contributes to the literature by revisiting Lipset's law and testing the hypothesis that economic development in the form of rising income per capita, education, urbanisation and industrialisation will support and increase democracy. The initial results are unclear making it difficult to draw any conclusion on the modernisation hypothesis. The preferred measure for economic development, income per capita, is negatively related with democracy, while education turns out to be a better predictor with a positive effect on democracy. Urbanisation and industrialisation have weak explanatory powers for democracy. The results, however, become more conclusive when we extract the principal component in the observed variables. We find that the index for economic development contributes significantly to democracy in the region, indicating that it takes all development indicators working simultaneously, not in isolation, to support democracy.

Bearing in mind that African democracies are just over 50 years in the making and based on the extended period it took our predecessors in Western Europe to democratise, Africa may still be on time (Pinkovskiy & Sala-i-Martin 2014; Young 2012).

5 Appendix

The ambiguous results for urbanisation and industrialisation may indicate delays in the processes (Gollin, Jedwab & Vollrath 2013). Gollin *et al.* (2013) fail to find that Africa is relatively urbanised for its level of development and they attribute this lag to urbanisation without industrialisation. They argue that resource export countries where resource endowments may be used to shift labour away from tradable manufacturing sector to non-tradable services hinders industrialisation. This delay may slow down the process of other development indicators. For robustness we use lagged explanatory variables to take into account that changes in the observed variables may be persistent over time and take time to affect democracy[8]. The results are relatively similar to the contemporaneous ones showing uncertainty about the validity of the modernisation hypothesis coming through the different development indicators, but robust in supporting the modernisation hypothesis when principle component is used.

Table 6: Results with lagged variables

	1	2	3	4	5	6	7	8	9	10	11
	FE	FE	MG	MG	FE-IV	FE-IV	FE-IV	SYS-GMM	SYS-GMM	PCSE	PCSE
Ecdvpt $_{t-1}$		0.049***		0.067***		0.115***	0.195***		0.049***		0.015**
		(0.009)		(0.014)		(0.018)	(0.016)		(0.014)		(0.006)
Gdpcap $_{t-1}$	-0.027		-0.095		-1.812***			-0.103**		-0.013	
	(0.027)		(0.076)		(0.572)			(0.038)		(0.012)	
Educ $_{t-1}$	0.179***		-0.207*		1.203***			-0.195		0.177***	
	(0.039)		(0.120)		(0.246)			(0.118)		(0.037)	
Urban $_{t-1}$	0.030		0.339*		-0.436***			0.387***		0.026*	
	(0.042)		(0.173)		(0.158)			(0.132)		(0.015)	
Industrialisation $_{t-1}$	-0.032***		-0.065**		0.489***			0.012		-0.020**	
	(0.009)		(0.0310)		(0.167)			(0.039)		(0.008)	
Polity $_{t-1}$	0.885***	0.922***	0.739***	0.880***	0.688***	0.906***	0.881***	0.975***	0.993***	0.895***	0.930***
	-0.011	(0.011)	(0.026)	(0.014)	(0.053)	(0.010)	(0.010)	(0.037)	(0.011)	(0.016)	(0.016)
Observations	1966	1,966	1,966	1,966	1,650	1,650	1,966	1,682	1,682	1,923	1,966
F test	2731.94***	4805.80***	848.61***	3727.37***	499.37***	5114.44***	5444.18***	439.67***	5004.20***	4108.28***	3372.55***
R-squared	0.872	0.867	0.234	0.252	0.437	0.864	0.845			0.916	0.905
Hansen J test p-value								0.154	0.188		
AR(2) p-value								0.523	0.488		
No. of instruments								32	22		
Number of i	45	45	45	45	44	44	45	44	44	45	45
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES		
First Stage Regressions											
Globalisation $_{t-1}$					0.277***	2.271***					
					(0.053)	(0.067)					
Post-Cold War					0.135***		1.047***				
					(0.012)		(0.035)				
F test for weak instruments					161.76***	714.22***	540.77***				
F test for weak instruments					1135.18***						

Coefficients reported. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Although natural resources and foreign aid do not form part of the modernisation hypothesis as postulated by Lipset (1959), they may be considered as omitted variables given our sample of countries. Most African countries are resource rich and rely on foreign aid for development

[8] See Acemoglu *et al.* (2008; 2009), Barro (1996), Bruckner & Ciccone (2011), Cervellati *et al.* (2014), Papaioannou & Van Zanden (2014) for empirical results with similar lagged explanatory variables.

from external donors. We therefore include logged variables for resource rents and net official development aid obtained from the WDIs.

Moreover, Fayad *et al.* (2012) decompose income per capita into resource and non-resource rich countries and discover that the nations whose incomes are not dependent on resources validate the modernisation hypothesis, while resource rich nations hinder democracy due to rentier effects[9]. Research by Djankov *et al.* (2008) also finds that foreign aid has a negative effect on democracy through the same rentier effects as the natural resource curse, but Savun & Tirone (2011) argue that external democratisation aid improves democratic governance by reducing the uncertainty of future political commitments and promises among domestic groups.

We find that the inclusion of these variables do not significantly change the interpretation of the results. The modernisation hypothesis still holds when we combine the development indicators into one index, whereas the variables in isolation show no concrete evidence of supporting the modernisation hypothesis. Both resource rents and foreign aid do not have conclusive evidence.

Table 7: Aid and Resources

	1	2	3	4	5	6	7	8	9	10	11
POLITY	FE	FE	MG	MG	FE-IV	FE-IV	FE-IV	SYS-GMM	SYS-GMM	PCSE	PCSE
Ecdvpt		0.015		0.038		0.087***	0.289***		0.101**		0.010*
		(0.011)		(0.056)		(0.022)	(0.032)		(0.047)		(0.006)
Gdpcap	-0.059*		-0.152		-1.704***			0.137		-0.026**	
	(0.033)		(0.142)		(0.473)			(0.195)		(0.013)	
Educ	0.132***		-0.329**		1.106***			-0.388		0.189***	
	(0.048)		(0.166)		(0.224)			(0.299)		(0.057)	
Urban	0.056		1.946**		-0.525***			1.167**		0.036**	
	(0.046)		(0.910)		(0.169)			(0.544)		(0.016)	
Industrialisation	-0.021		-0.088		0.490***			-0.282*		-0.011	
	(0.014)		(0.080)		(0.145)			(0.153)		(0.009)	
Aid	0.012	0.037**	-0.019	0.006	-0.054*	0.032**	-0.026*	-0.230**	-0.014	-0.000	0.018**
	(0.016)	(0.018)	(0.031)	(0.023)	(0.029)	(0.013)	(0.014)	(0.113)	(0.013)	(0.009)	(0.009)
Resource rents	0.010	0.011	-0.040	0.057**	0.110***	0.007	-0.016	0.132	0.152	-0.012*	-0.009
	(0.011)	(0.010)	(0.032)	(0.026)	(0.039)	(0.013)	(0.014)	(0.214)	(0.123)	(0.006)	(0.006)
Polity $_{t-1}$	0.893***	0.926***	0.568***	0.732***	0.717***	0.911***	0.881***	0.848***	0.966***	0.891***	0.930***
	(0.013)	(0.011)	(0.037)	(0.036)	(0.043)	(0.011)	(0.012)	(0.089)	(0.053)	(0.022)	(0.020)
Observations	1,551	1,551	1,551	1,551	1,521	1,521	1,551	1,521	1,521	1,551	1,551
F/Wald test	1722.50***	2557.58***	280.46***	423.03***	373.13***	2301.70***	1865.25***	87.46***	408.50***	3656.99***	2902.24***
R-squared	0.868	0.865	0.215	0.238	0.507	0.861	0.824			0.911	0.902
Hansen J test p-value								0.452	0.084		
AR(2) p-value								0.092	0.059		
No. of instruments								32	22		
Number of i	45	45	45	45	44	44	45	44	44	45	45
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
First Stage Regressions											
Globalisation					0.262***	2.141***					
					(0.055)	(0.073)					
Post-Cold War					0.121***		0.658***				
					(0.012)		(0.032)				
F test for weak instruments					117.03***	310.36***					
F test for weak instruments					764.44***		183.56***				

Coefficients reported. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

[9] Se also Mehlum, Moene & Torvik (2006) on 'Institutions and the Resource Curse '.

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