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Democracy and Education: Evidence from the Southern African Development Community*

Manoel Bittencourt[†]

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Abstract

In this paper I investigate whether democracy in the Southern African Development Community (SADC) has had any effect on education during the 1980-2009 period. The results, based on panel time-series analysis (I use the Pooled OLS and Fixed Effects estimators in order to deal with heterogeneity and statistical endogeneity and Fixed Effects with Instrumental Variables, eg the end of the cold war is one of the contemporaneous external sources of variation to democracy, to deal with reverse causality in thin panels), suggest that democracy, and the better governance that tends to be associated with it, has played an important role in terms of widening access to education in the community. All in all, the results are significant because democracy is in its infancy in the continent and to make it work is an aim in itself in Africa, and also because education is an important determinant of growth and development.

Keywords: Democracy, education, Africa.

JEL Classification: H52, I25, O11, O55.

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"To put the hypothesis simply, educated people make good innovators, so that education speeds the process of technological diffusion." Richard Nelson and Edmund Phelps

1 Introduction

The African continent is known for its recent political independence from European rule, political regime changes taking place (particularly) during the cold war, civil and military conflict, and poor macroeconomic performance (in terms of economic activity the late 1980s and early 1990s saw even negative growth rates taking place in some countries). More recently though, the continent has seen some economic structural adjustments and reforms taking place, which combined with a certain degree of political stability, have generally been matched by better economic performance, Bates, Coatsworth and Williamson (2007).

Bearing the above background in mind, I investigate the role of democracy in determining education in the Southern African Development Community (SADC), a community of countries that advocates the importance of democracy and integration as tools for development. It is worth mentioning that this community includes a diverse set of countries, eg with Angola and Mozambique presenting positive growth rates since the 1990s and with some double figures from 2004 onwards, with Botswana and Mauritius presenting positive growth for the whole period investigated, with South Africa presenting positive growth, although modest, since the end of the Apartheid regime in 1994, and with a country like Zimbabwe which has presented negative growth rates since 1999. More specifically, I use data from all fifteen SADC countries between 1980 and 2009, and panel time-series analysis (I use the Pooled OLS and Fixed Effects estimators in order to deal with heterogeneity and statistical endogeneity and Fixed Effects with Instrumental Variables, eg the modernisation hypothesis and the end of the cold war as contemporaneous external sources of variation to democracy, to deal with reverse causality in thin panels) to study whether democracy played any role in education in the community.

In terms of the expected role played by democracy on education, one would argue that democracy, given its internal rationale of political competition and turnover, combined with the fact that southern Africa is a

relatively poor region, would work as a redistributive device towards the median voter. In this case, the political coalitions in power would try to buy out voters by provision of public goods—and education, for capturing the interests of urban workers and employers alike, is always a popular choice—Galor and Moav (2006).

On the other hand, it can be argued that rural landowners—because of non-complementarities between agrarian and unskilled goods and education—do not necessarily favour investment in education, Galor, Moav and Vollrath (2009). Secondly, others would argue that authoritarian regimes, eg the former Soviet Union and some of its satellites, and China, have also invested in education over the years, presumably for ideological indoctrination, Lott (1999) and Brown (1999). All in all, it is not obviously true that democracies would invest in education more than other political regimes, which highlights the importance of testing such hypothesis.

The results, however, suggest that democracy has been a robust determinant of the number of teachers per 100 pupils in secondary schools and also of secondary enrolment in the community. It is therefore fair to say that the internal incentive mechanisms of democracy, which in this case would work towards some redistribution to the median voter, and in southern Africa the median voter tends to be located towards the bottom of the income distribution, Meltzer and Richard (1981), are working well in the community. More practically, investing in education is a noble aim in itself and also of economic importance since education is a determinant of economic growth and development, Becker, Hornung and Woessmann (2011).

In addition, the importance of acquiring a better understanding of the role of democracy on education is because democracy in Africa is in its infancy and there are a number of examples in history that suggest that young democracies can behave rather badly, eg Germany in the 1910s and 1920s, parts of sub-Saharan Africa in the 1960s and the Latin American democracies in the 1980s¹. Therefore, it cannot be emphasized enough the importance of better understanding the causes of democracy, Lipset (1959), and also the consequences of democracy to a variable like education.

¹For instance, Bittencourt (2012) suggests that the first decade of democracy in South America in the 1980s was marred by poor macroeconomic performance, particularly in terms of inflation rates.

2 Some Background

The literature on the consequences of democracy to education has attracted the attention of economists and political scientists alike. Firstly, Brown (1999) uses a sample of poor countries, which includes some sub-Saharan African countries, between 1960 and 1987 to report that changes in democracy have a positive effect on primary school enrolment. In similar vein, Lake and Baum (2001) make use of a sample of 62 countries covering the period 1975-1993 to report that increases in democracy, taking place in young democracies, have had the ability of increasing secondary school enrolment.

On a slightly different vein, Acemoglu and Robinson (2000) design a model which predicts that the extension of the democratic franchise taking place in Europe in the 19th century was an attempt at avoiding revolution. More importantly to our purposes, for them democracy is redistributive by nature, ie democracy has lead to an "extension of education to the masses", particularly in the UK and France. Following that lead, Tavares and Wacziarg (2001) use a sample of 65 countries between 1970 and 1989 to report that democracy has played a positive role on secondary education as well as Galego (2010) who makes use of the number of native cultures before colonisation as a historical instrument for political decentralisation to report that democracy plays a positive role on primary education in a panel of former colonies.

On the other hand, Mulligan, Gil and Sala-i-Martin (2004) do not find evidence that democracy affects education spending in their sample of 142 countries between 1960 and 1990 nor do Aghion, Persson and Rouzet (2012) who find no evidence that democratic transitions play any role on primary education in their panel of countries. In addition, Galor and Moav (2006) argue that education in 19th-century England was extended to the masses before the extension of the democratic franchise, and Murtin and Wacziarg (2013) make use of a historical dataset (1870-2000) to suggest that the role of democracy on education is not conclusive.

Moreover, a number of case studies have been conducted on the subject, particularly on Latin America. Firstly, Kaufman and Segura-Ubiergo (2001) make use of a sample of 14 countries covering the period 1973-1997 to report that the democratic transition experienced by the region has had the effect of increasing spending on education. In similar vein, Brown and Hunter

(2004) use a panel of 17 countries between 1980 and 1997 to report that democracy has had a positive effect on preprimary and primary education spending in Latin America as well as Avelino, Brown and Hunter (2005) who use a sample of 19 countries between 1980 and 1999 to report similar results.

More specifically to Africa, Stasavage (2005) uses a sample of 44 African democracies between 1980 and 1996 to report that those young democracies increased spending on primary education, and Harding and Stasavage (2013) suggest that school attendance is higher in democracies than in non-democracies and they suggest that the abolition of school fees in democratic states plays an important role in enhancing attendance².

In essence, this non-exhaustive literature review suggests that there is no clear verdict about the role of democracy on education. Nevertheless, in a continent like Africa—which suffers from chronic poverty and where the median voter is located more to the bottom of the income distribution—democracy, and the incentive mechanism and better governance that usually come with it, has the potential of increasing education, which is important for its own noble redistributive sake, and also because it might influence a variable that generates the much needed economic growth and development in the community.

Hence, it is fair to say that this paper is a natural development of the previous literature on the subject. I conduct a case study of an important community of African countries—which share particular characteristics and common goals, and which also present their own idiosyncrasies—that attempts to pinpoint in more detail the effects of contemporaneous democracy on education. I do that by taking advantage of more data and of panel time-series analysis, which deals with particular econometric issues, heterogeneity and endogeneity (I take into account external contemporaneous shocks that southern Africa has experienced as sources of external variation to democracy, eg the end of the cold war), which enables me to provide informative estimates so that our knowledge of an idiosyncratic, and also diverse within, southern Africa is deepened.

²In addition, Acemoglu, Naidu, Restrepo and Robinson (2013) survey the literature and also provide evidence of a positive role of democracy on secondary education in a panel of 184 countries between 1960 and 2010.

3 Empirical Analysis

3.1 A Look at the Data

The dataset used covers the period between 1980 and 2009, and fifteen sub-Saharan African countries, namely Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Mozambique, Mauritius, Malawi, Namibia, South Africa, Swaziland, Seychelles, Tanzania, Zambia and Zimbabwe. To illustrate the importance of these countries in the continental context, these fifteen countries accounted for approximately 52% of the total GDP in sub-Saharan Africa in 2009.

The first variable proxying for education, *EDUC1*, is defined as the number of teachers per 100 pupils in secondary education and it is provided by the World Bank's World Development Indicators (WDI). In addition, I use secondary school enrollment as percentage of the corresponding age group as a second proxy for education, *EDUC2*, and it is also provided by the World Bank. For democracy, I use the popular and normalised, so that it ranges from zero to one, *polity2* variable (*POL*) from the Polity IV.

The control variables used are standard in the literature and include a proxy for government, the ratio of final government consumption expenditure to GDP (*GOV*), which come from the World Bank and IMF files. On one hand, government expenditure might be channeled towards education and therefore increase the number of teachers per pupils and secondary enrollment, Avelino, Brown and Hunter (2005). On the other hand, governments might incur in conspicuous consumption, and hence divert from more educational purposes, Brown and Hunter (2004). Moreover, I use the gross fixed capital formation to GDP, *INV*, as a proxy for industrialisation and the data come from the World Bank. It is expected that fixed capital formation, or industrialisation, requires some degree of education in place and therefore a positive effect of fixed capital on education is plausible, Brown and Hunter (2004).

Furthermore, I include a measure of trade openness, *OPEN*, which is defined as the sum of exports and imports to GDP, and the data come from the World Bank files as well. Generally speaking, it is expected that more open societies, given the flows of technology, either tend to demand higher levels of education, Kaufman and Segura-Ubiergo (2001) or to lead to higher total factor productivity, which includes human capital, Andersen and

Dalgaard (2011). Lastly, I use a baseline measure of financial development, the ratio of the liquid liabilities to GDP ($M2$), from the World Bank and it is expected that more access to finance has the potential of widening access to education, Galor and Zeira (1993).

In Figure One I plot the averaged-data on education and democracy and what is shown is that the 1980s saw a slight decline in the number of teachers per 100 pupils, but a consistent increase in secondary enrolment (upper panels). In addition, in the 1980s democracy was at its lowest (lower panel). However, in the 1990s the number of teachers per pupils and secondary enrolment saw a considerable increase, from 4.8 teachers per pupils and less than 30% enrolment to approximately 5.2 teachers and 55% of the corresponding population age group enrolled in secondary school, which were matched by a sharp increase in democracy in the community.

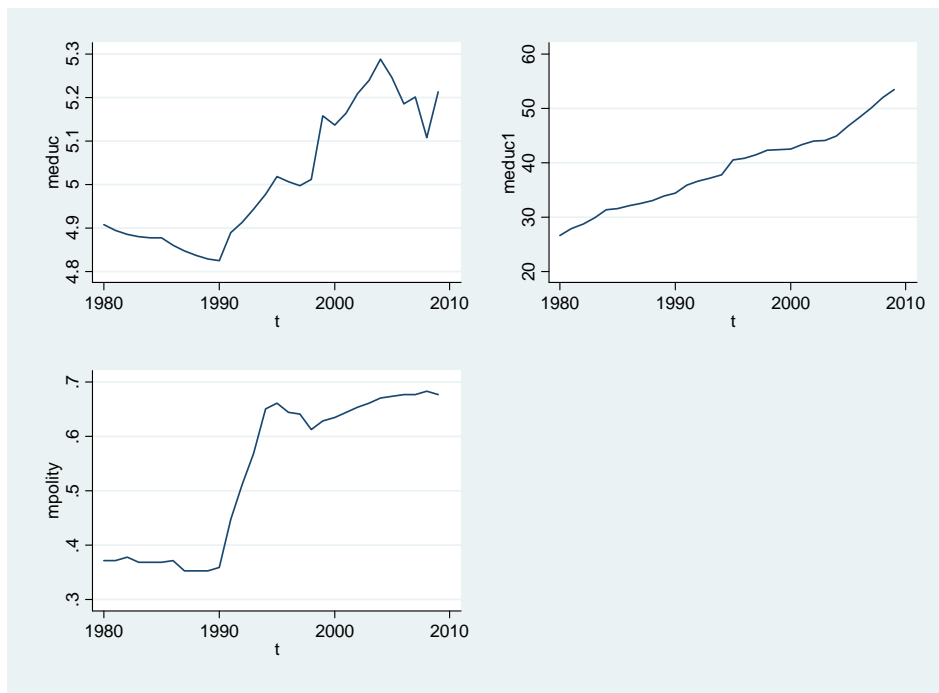


Figure 1: Education and Democracy, SADC, 1980-2009. Sources: WDI and Polity IV.

Moreover, Table One presents the descriptive statistics and the correlation matrix of the variables used (in logs). Initially, the two variables for education are positively and significantly correlated to each other. How-

ever, the correlation between them is not strong, which suggests that these variables are in fact picking up different effects, ie the number of teachers per pupils can be seen as a proxy capturing quality of education and secondary enrollment, for being a head count, is probably capturing quantity of education.

More importantly to my purposes, both proxies for education are positively correlated to democracy and significant at the 5% level. The control variables present the expected signs too, ie government consumption and fixed capital formation are positively correlated to education as well as trade openness and finance.

Table 1: Descriptive Statistics and the Correlation Matrix: SADC, 1980-2009.

Variables	Obs	Ave	Std Dev	Min	Max	Source
EDUC1	450	5.01	1.17	2.64	7.96	WDI
EDUC2	450	38.86	28.00	3.04	117.85	WDI
DEMOC	450	.534	.334	0	.952	Polity IV
GOV	450	19.85	9.48	2.12	55.39	WDI
INV	450	20.91	10.46	2.06	76.69	WDI
OPEN	450	89.90	44.60	14.32	255.01	WDI
M2	450	32.53	21.14	.461	120.46	WDI

	EDUC1	EDUC2	DEMOC	GOV	INV	OPEN	M2
EDUC1	1						
EDUC2	0.276*	1					
DEMOC	0.176*	0.408*	1				
GOV	0.246*	0.204*	0.069	1			
INV	0.147*	0.136*	0.245*	0.403*	1		
OPEN	0.454*	0.458*	0.219*	0.497*	0.471*	1	
M2	0.027	0.506*	0.320*	0.334*	0.334*	0.373*	1

* represents significance at the 5% level.

Lastly, Figure Two shows the OLS regression lines between the education proxies and democracy. The relationships are positive and statistically significant, which indicate that there is an economic relationship between democracy and education in the panel, suggesting that democracy is playing its redistributive role towards widening access to education in the community.

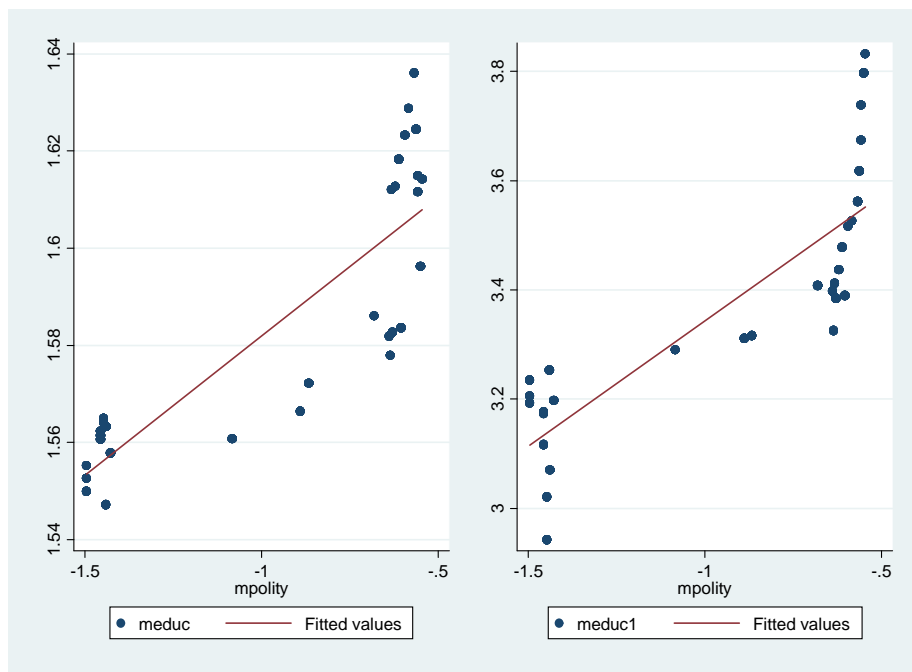


Figure 2: OLS Regression Lines, Education and Democracy, SADC, 1980-2009. Sources: WDI and Polity IV.

3.2 Empirical Strategy

Since I have a $T > N$ dataset, $T = 30$ and $N = 15$, the empirical strategy used is based on panel time-series analysis. Panel time-series allows me to deal with important econometric issues in relatively thin panels—heterogeneity and endogeneity biases—and also to specifically further our knowledge of sub-Saharan Africa without having to incur in the removal of African countries which usually takes place in large cross-sectional or panel data analyses. With panel time-series I can specifically analyse the SADC case, with all its idiosyncrasies and differences within, without treating it either as an outlier or as a dummy, and therefore a clearer picture of the community can be obtained.

Firstly, although some of the variables are either ratios or indices and bounded within closed intervals, I also evoke Phillips and Moon (1999) result which suggests that the issue of spurious regressions is much less of a problem in panels because of the averaging taking place in panel estimators, which

reduces the prospective noise coming from such regressions.

Secondly, the issue of statistical endogeneity, because the unobserved individual effects which are nested in the error term might be correlated to the regressors, and heterogeneity of intercepts are dealt with by the one-way Fixed Effects (FE) with robust standard errors estimator, which provides consistent estimates in models when $T \rightarrow \infty$, Smith and Fuertes (2010), and Achen (2001).

Essentially, although these countries shared some political and economic transitions in their recent history, which makes the homogeneity of slopes a plausible assumption, the heterogeneous intercepts of the FE estimator account for important econometric issues in $T > N$ panels, statistical endogeneity and heterogeneity biases, or for the fact that some of these countries do present different levels of economic and political development, eg Botswana, Mauritius and South Africa are known to be relatively richer and more politically stable than most other countries in the community.

Thirdly, some would argue that reverse causality is a possibility or that education might determine democracy, Glaeser, Ponzetto and Shleifer (2007), and Murtin and Wacziarg (2013). I therefore use the Fixed Effects with Instrumental Variables (FE-IV) two-stage Least Squares estimator and the estimates provided by this estimator are asymptotically consistent and efficient as $T \rightarrow \infty$, and it retains the time series consistency even if the instrument set is only predetermined, Arellano (2003).

With the assumption ($E(democ_{it-1}v_{it} = 0)$) in mind, firstly I make use of the lag of democracy as a baseline identifying instrument for contemporaneous democracy. Then I evoke the modernisation hypothesis, Lipset (1959) and Barro (1999), and make use of the log of income per capita as an instrument for democracy. Lastly, I instrument democracy with a dummy for the end of the cold war, which takes the value of zero between 1980 and 1989, and then of one from 1990 onwards, Bates, Block, Fayad and Hoefler (2013). All in all, differently from Galego (2010) who uses a historical instrument for democracy, I make use of a contemporaneous external shock that the community has experienced in the 1990s as an external source of variation to democracy in the SADC.

What is expected of these instruments is that, firstly, democracy is rather persistent over time, therefore a positive effect of lagged democracy on contemporaneous democracy is expected, Barro (1999). Secondly, the mod-

ernisation hypothesis suggests that democracy is positively determined by income. Lastly, the end of the cold war dummy should positively influence democracy in the community. As Figure 1 illustrates, since the external shock which is provided by the end of the ideological conflict between the West and the former Soviet Union in the 1990s democracy in the community has been on the rise, which suggests that those countries sidelining with the former Soviet Union have had to adapt to the new more democratic order³.

I therefore estimate equations with different pooled estimators, the baseline Pooled OLS (POLS), which assumes homogeneity of intercepts and slopes, the FE and FE-IV estimators, so that different econometric issues are dealt with and more reliable estimates provided. The one-way FE estimated equation is as follows,

$$EDUC_{it} = \alpha_i + \beta DEMOC_{it-1} + \gamma GOV_{it} + \delta INV_{it} + \epsilon OPEN_{it} + \varepsilon M2_{it} + v_{it} \quad (1)$$

where *EDUC* are the number of teachers per 100 pupils and secondary enrolment, *DEMOC* is the political regime variable, *GOV* is the share of final government consumption to GDP, *INV* is the share of gross fixed capital formation to GDP, *OPEN* is a measure of economic openness and *M2* is the share of the liquid liabilities to GDP.

3.3 Results and Discussion

In Table 2 I report the baseline POLS estimates of democracy on education. In the first panel I use the first proxy for education, the number of teachers per 100 pupils in secondary education, and in the second panel I use the second proxy, secondary school enrolment. All *DEMOC* estimates are positive and statistically significant, which suggest that those young democracies of the SADC have been investing more in education during the period. For instance, in column 5, first panel, an increase by 1 percentage point in democracy leads to an increase by .03 percentage points in the number of teachers per 100 pupils.

About the control variables, *GOV* presents positive estimates, suggesting that government consumption is geared towards education, however those

³It is worth mentioning that during the cold war there were (sponsored) conflicts and regime changes taking place in SADC countries like Angola, Mozambique and Namibia (to mention just a few), Bates, Coatsworth and Williamson (2007).

estimates are not entirely statistically significant. Fixed capital presents negative estimates, which do not support the prediction that capital formation in the SADC would require people with secondary education to operate particular technologies, however those estimates are not wholly significant either.

Trade openness presents positive and significant estimates, which suggest at this stage that open societies tend to invest more in education, probably because of the competition coming from international trade and the need that particular governments see in compensating the population for particular losses (as advocated by the compensation hypothesis). On the other hand, it can be argued that open societies tend to display higher total factor productivity, which includes human capital, because of the flows of knowledge, people, ideas and technologies. Lastly, *M2* presents the expected positive and statistically significant estimates on secondary enrolment (lower panel), which suggest that access to simple financial instruments can have a positive effect on financing access to education.

Table 2: Pooled OLS Estimates of Democracy on Education, 1980-2009.

EDUC1	POLS (1)	POLS (2)	POLS (3)	POLS (4)	POLS (5)
DEMOC	.042 (3.65)	.038 (3.46)	.039 (3.36)	.025 (2.35)	.033 (2.93)
GOV		.106 (4.79)	.106 (4.42)	.024 (1.02)	.029 (1.07)
INV			-.001 (-0.08)	-.058 (-2.55)	-.024 (-0.91)
OPEN				.214 (8.39)	.236 (8.34)
M2					-.075 (-4.04)
F test	13.34	18.48	12.29	28.37	23.14
R ²	0.03	0.08	0.08	0.21	0.23
EDUC2	POLS (1)	POLS (2)	POLS (3)	POLS (4)	POLS (5)
DEMOC	.354 (9.61)	.345 (9.54)	.357 (9.53)	.312 (8.95)	.228 (6.62)
GOV		.306 (4.28)	.342 (4.41)	.069 (0.88)	.100 (1.22)
INV			-.090 (-1.20)	-.278 (-3.83)	-.504 (-6.26)
OPEN				.715 (8.76)	.581 (6.77)
M2					.469 (8.26)
F test	92.31	57.24	38.68	53.47	56.49
R ²	0.18	0.21	0.21	0.33	0.43

T-ratios in parentheses. Number of observations: $NT = 450$. *EDUC1* is the number of teachers per 100 pupils, *EDUC2* is secondary school enrolment, *DEMOC* is a proxy for political regime characteristics, *GOV* is the government's consumption share to GDP, *INV* is the gross fixed capital formation ratio to GDP, *OPEN* is a measure of economic openness and *M2* is the liquid liabilities ratio to GDP. POLS is the Pooled OLS estimator.

In Table 3 I report the FE estimates of democracy on education. All *DEMOC* estimates are positive and statistically significant. For example, in the upper panel, column 5, for every percentage point increase in democracy, there is a .06 percentage points increase in the number of teachers per 100 pupils in the community.

About the control variables, *GOV* does not present clear-cut estimates or does investment. Furthermore, the proxy for trade openness is not statistically significant anymore, however the proxy for financial development keeps its positive and statistically significant estimate on secondary school enrolment.

Moreover, the F* test suggests that there is evidence of country fixed effects, which justifies and reinforces the use of the FE estimator and also

make these estimates preferable to those in Table 2.

Table 3: Fixed Effects Estimates of Democracy on Education, 1980-2009.

EDUC1	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)
DEMOC	.052 (2.35)	.049 (2.24)	.052 (2.46)	.052 (2.49)	.056 (2.97)
GOV		-.038 (-1.42)	-.030 (-1.17)	-.030 (-1.11)	-.033 (-0.95)
INV			-.041 (-2.57)	-.041 (-2.17)	-.024 (-0.98)
OPEN				-.000 (-0.01)	.012 (0.22)
M2					.030 (0.68)
F test	5.50	2.76	3.94	3.05	2.24
F* test	157.50	149.43	154.55	127.72	107.11
R ²	0.03	0.00	0.00	0.00	0.00
EDUC2	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)
DEMOC	.148 (3.71)	.154 (3.72)	.155 (3.54)	.154 (3.42)	.188 (3.63)
GOV		.092 (0.96)	.093 (0.93)	.093 (0.89)	.144 (1.16)
INV			-.006 (-0.10)	-.006 (-0.10)	-.060 (-0.88)
OPEN				.006 (0.04)	.007 (0.04)
M2					.212 (2.10)
F test	13.74	7.12	5.88	4.42	4.47
F* test	180.96	173.12	172.02	140.43	109.13
R ²	0.18	0.21	0.21	0.21	0.32

T-ratios in parentheses. Number of observations: $NT = 450$. *EDUC1* is the number of teachers per 100 pupils, *EDUC2* is secondary school enrolment, *DEMOC* is a proxy for political regime characteristics, *GOV* is the government's consumption share to GDP, *INV* is the gross fixed capital formation ratio to GDP, *OPEN* is a measure of economic openness and *M2* is the liquid liabilities ratio to GDP. FE is the one-way Fixed Effects estimator.

In Tables 4, 5 and 6 I report the FE-IV estimates using the lag of democracy, income per capita and the cold war dummy as the identifying instruments for contemporaneous democracy (all estimated systems are just identified). The democracy estimates on education are all positive and statistically different from zero. For instance, according to Table and equation 5, upper panel, for every percentage point increase in democracy, there is an increase of .08 points in the number of teachers per 100 pupils.

About the controls, government consumption presents positive and significant estimates on secondary enrolment, which suggest that government

consumption can be diverted to more educational purposes. Fixed capital displays a detrimental effect to the number of teachers per pupils and openness plays a negative role on secondary school enrolment in Tables 5 and 6. On the other hand, financial development presents positive and significant effects against both proxies for education, which highlights the role of the liquid liabilities in facilitating access to secondary education in general in the community.

Lastly, the F^* test suggests the presence of regional fixed effects and the instruments are consistent with prior expectations, ie lagged democracy, income per capita and the end of the cold war dummy all present positive and significant effects on democracy. The F test in the first-stage regressions are all statistically significant as well, which minimise the issue of weak instruments (the complete first-stage regressions are available on request).

Table 4: Fixed Effects with Instrumental Variables Estimates (lagged democracy).

EDUC1	FE-IV (1)	FE-IV (2)	FE-IV (3)	FE-IV (4)	FE-IV (5)
DEMOC	.054 (7.83)	.051 (7.35)	.055 (8.04)	.056 (7.80)	.059 (7.67)
GOV		-.035 (-1.97)	-.025 (-1.42)	-.026 (-1.45)	-.029 (-1.35)
INV			-.046 (-4.00)	-.045 (-3.80)	-.028 (-1.96)
OPEN				-.008 (-0.42)	.005 (0.21)
M2					.032 (2.26)
F* test	159.70	152.32	159.05	131.65	111.20
R ²	0.02	0.00	0.00	0.00	0.00
IV	DEMOC ₋₂	DEMOC ₋₂	DEMOC ₋₂	DEMOC ₋₂	DEMOC ₋₂
	.930 (54.90)	.930 (53.86)	.934 (53.51)	.924 (51.56)	.917 (47.14)
F test	3013.80	1503.12	1005.47	763.93	514.65
EDUC2	FE-IV (1)	FE-IV (2)	FE-IV (3)	FE-IV (4)	FE-IV (5)
DEMOC	.164 (7.98)	.171 (8.23)	.171 (8.12)	.171 (7.80)	.204 (8.86)
GOV		.104 (1.95)	.103 (1.90)	.102 (1.88)	.146 (2.28)
INV			.007 (0.20)	.008 (0.22)	-.036 (-0.85)
OPEN				-.006 (-0.11)	-.008 (-0.12)
M2					.213 (4.94)
F* test	185.25	177.17	176.03	145.28	112.51
R ²	0.17	0.21	0.21	0.25	0.31
IV	DEMOC ₋₂	DEMOC ₋₂	DEMOC ₋₂	DEMOC ₋₂	DEMOC ₋₂
	.930 (54.90)	.930 (53.86)	.934 (53.51)	.924 (51.56)	.917 (47.14)
F test	3013.80	1503.12	1005.47	763.93	514.65

T-ratios in parentheses. Number of observations: $NT = 450$. *EDUC1* is the number of teachers per 100 pupils, *EDUC2* is secondary school enrolment, *DEMOC* is a proxy for political regime characteristics, *GOV* is the government's consumption share to GDP, *INV* is the gross fixed capital formation ratio to GDP, *OPEN* is a measure of economic openness and *M2* is the liquid liabilities ratio to GDP. FE-IV is the Fixed Effects with Instrumental Variables estimator and the instrument is the lag of *DEMOC*.

Table 5: Fixed Effects with Instrumental Variables Estimates (income per capita).

EDUC1	FE-IV (1)	FE-IV (2)	FE-IV (3)	FE-IV (4)	FE-IV (5)
DEMOC	.056 (2.22)	.056 (2.23)	.062 (2.45)	.062 (2.04)	.079 (3.64)
GOV		-.032 (-1.43)	-.020 (-0.88)	-.020 (-0.88)	-.019 (-0.78)
INV			-.046 (-3.46)	-.046 (-3.61)	-.026 (-1.73)
OPEN				-.000 (-0.01)	-.003 (-0.13)
M2					.041 (2.32)
F* test	149.83	142.52	147.55	116.91	97.92
R ²	0.03	0.01	0.01	0.01	0.00
IV	INCOME	INCOME	INCOME	INCOME	INCOME
	.604 (5.35)	.604 (5.45)	.587 (5.31)	.499 (4.53)	.800 (6.73)
F test	28.58	22.49	17.11	17.99	20.63
EDUC2	FE-IV (1)	FE-IV (2)	FE-IV (3)	FE-IV (4)	FE-IV (5)
DEMOC	1.14 (5.49)	1.14 (5.61)	1.18 (5.47)	1.40 (4.68)	.915 (6.97)
GOV		.638 (3.52)	.701 (3.60)	.689 (3.09)	.564 (3.81)
INV			-.245 (-2.17)	-.143 (-1.15)	-.136 (-1.48)
OPEN				-.904 (-3.06)	-.505 (-2.88)
M2					.585 (5.49)
F* test	18.84	18.88	17.89	11.99	23.26
R ²	0.16	0.20	0.19	0.10	0.23
IV	INCOME	INCOME	INCOME	INCOME	INCOME
	.604 (5.35)	.604 (5.45)	.587 (5.31)	.499 (4.53)	.800 (6.73)
F test	28.58	22.49	17.11	17.99	20.63

T-ratios in parentheses. Number of observations: $NT = 450$. *EDUC1* is the number of teachers per 100 pupils, *EDUC2* is secondary school enrolment, *DEMOC* is a proxy for political regime characteristics, *GOV* is the government's consumption share to GDP, *INV* is the gross fixed capital formation ratio to GDP, *OPEN* is a measure of economic openness and *M2* is the liquid liabilities ratio to GDP. FE-IV is the Fixed Effects with Instrumental Variables estimator and the instrument is income per capita.

Table 6: Fixed Effects with Instrumental Variables Estimates (end of cold war dummy).

EDUC1	FE-IV (1)	FE-IV (2)	FE-IV (3)	FE-IV (4)	FE-IV (5)
DEMOC	.048 (4.10)	.044 (3.63)	.047 (3.86)	.046 (3.30)	.072 (4.95)
GOV		-.041 (-2.17)	-.032 (-1.74)	-.032 (-1.74)	-.024 (-1.08)
INV			-.039 (-3.37)	-.040 (-3.37)	-.026 (-1.79)
OPEN				.004 (0.21)	.001 (0.05)
M2					.037 (2.39)
F* test	157.12	148.92	153.88	125.89	105.23
R ²	0.03	0.00	0.00	0.00	0.00
IV	COLD	COLD	COLD	COLD	COLD
	.855 (13.03)	.830 (12.60)	.821 (12.49)	.763 (10.98)	.816 (10.82)
F test	169.70	89.61	61.60	48.31	37.75
EDUC2	FE-IV (1)	FE-IV (2)	FE-IV (3)	FE-IV (4)	FE-IV (5)
DEMOC	.395 (9.35)	.417 (9.37)	.422 (9.31)	.478 (8.74)	.460 (8.77)
GOV		.228 (3.33)	.241 (3.45)	.241 (3.28)	.294 (3.59)
INV			-.064 (-1.47)	-.037 (-0.80)	-.097 (-1.84)
OPEN				-.251 (-2.96)	-.181 (-1.90)
M2					.337 (5.98)
F* test	118.60	111.61	109.05	82.48	76.29
R ²	0.18	0.21	0.21	0.12	0.25
IV	COLD	COLD	COLD	COLD	COLD
	.855 (13.03)	.830 (12.60)	.821 (12.49)	.763 (10.98)	.816 (10.82)
F test	169.70	89.61	61.60	48.31	37.75

T-ratios in parentheses. Number of observations: $NT = 450$. *EDUC1* is the number of teachers per 100 pupils, *EDUC2* is secondary school enrolment, *DEMOC* is a proxy for political regime characteristics, *GOV* is the government's consumption share to GDP, *INV* is the gross fixed capital formation ratio to GDP, *OPEN* is a measure of economic openness and *M2* is the liquid liabilities ratio to GDP. FE-IV is the Fixed Effects with Instrumental Variables estimator and the instrument is a dummy for the end of the cold war.

In a nutshell, democracy in the SADC has been a positive influence on the number of teachers per pupils and also on secondary enrolment, Lake and Baum (2001). To put the above estimates in perspective: the normalised index for democracy in the Democratic Republic of the Congo in 1992 was .476 and .714 in 2009, a 50% change in a matter of 17 years. Therefore, using

the estimate in Table 6, column 5, upper panel, for every 10% increase in democracy, which is a rather conservative assumption given the example of the DRC, there is a .72% increase in the number of teachers per pupils in the community. Those results, in a community where the median voter is located more to the bottom of the income distribution, are good news for democracy, the political competition that is usually associated with it and the better governance that it tends to create, and also because human capital is an important determinant of economic growth and development in general⁴, Tavares and Wacziarg (2001).

In addition, democracy, better governance, education and development are important objectives that the SADC aims to achieve, so, the results presented above bode well with its own objectives. However, a word of caution is in place in the sense that secondary education tends to be associated with more urban interests and southern Africa is still rather rural. More specifically, in urban areas education captures the interests of the broad population who need skills and also of the employers who are after skills, Galor and Moav (2006). On the other hand, rural landowners do not have any incentive in lobbying for human capital formation (usually primary education) because of non-complementarities between land and human capital, Galor, Moav and Vollrath (2009). Nevertheless, in the Appendix I present results of democracy on primary completion rates that are consistent with the ones presented above.

Moreover, the instrumental variables estimates in Tables 4, 5 and 6 (lower panel) suggest that government consumption can be conducive to secondary enrolment, but not to the number of teachers per pupils. Those estimates are perhaps indicating that governments in the community are consuming secondary education, eg via social grants which enable more pupils into secondary education, Avelino, Brown and Hunter (2005). In any case, we have to take these estimates with a pinch of salt because there is no evidence that government consumption is going towards more teachers per pupils (or to education quality).

⁴I have also tried different specifications, eg with deeper lags for democracy on the RHS. The results are similar to the ones reported above. Moreover, I tested for a non-linear relationship, however at this stage there is still no evidence that those young democracies of the SADC are to reach a plateau (as more mature societies have) in terms of investment in education. In addition, I used a Generalised Least Squares estimator to account for cross-sectional dependence and the results are consistent to the ones reported as well. Results are available on request.

Furthermore, the FE and FE-IV fixed capital formation estimates suggest that capital formation might in fact be detrimental to the number of teachers per pupils. These estimates are probably indicating that, although there are exceptions, southern Africa is still predominantly rural and capital formation tends to take place in more urban settings. In addition, Galor and Moav (2006) argue that the first stage of the industrial revolution taking place in Britain in the 18th century was mostly based on physical capital and not necessarily on formal human capital accumulation and also that the industrialists started lobbying for mass education only in the second-stage of the industrial revolution. It is therefore plausible to assume, as predicted by the unified growth theory, that the SADC is going through the same sort of developmental process that more mature societies have already gone through, or that physical and human capital are still not complementary to each other in the community.

The proxy for trade openness is not wholly clear cut either. Essentially, there is little evidence for the compensation hypothesis at this stage, or that the governments in the region are buying out with education those who would suffer losses coming from international trade. On the other hand, Tables 5 and 6, bottom panels, suggest that the efficiency hypothesis might be at work, ie that those countries opened up their economies in the 1990s (probably influenced by the Washington consensus and international organisations like the World Bank), and had to cut expenditure on secondary enrolment as part of particular stabilisation programmes, Kaufman and Segura-Ubiergo (2001). Furthermore, Galor and Mountford (2008) argue that nonindustrialised countries, because of trade openness, tend not to invest in education, but to concentrate on low-skilled products.

Also notable is that the proxy for financial development displays consistent results that confirm that access to finance, or that the existence of less imperfect financial markets, might play an important role in widening access to secondary education and consequently on social mobility, Galor and Zeira (1993)⁵. A more thorough study on the role of financial development with data on credit to the private sector on education would be a natural extension to this paper.

⁵Although not entirely comparable, Avelino, Brown and Hunter (2005) use a variable for financial openness, however they are not able to report any significant effect of finance on education in Latin America.

Lastly, the first-stage regressions highlight the importance of development, in terms of income per capita (which is evidence for the modernisation hypothesis), and also of the end of the ideological conflict between the West and the former Soviet Union directly on democracy and indirectly on education in the region.

4 Final Remarks

Using a dataset covering the period between 1980 and 2009, I have investigated the role of democracy in determining the number of teachers per 100 pupils in secondary schools and also secondary school enrolment in a panel of sub-Saharan African countries. The results suggest that democracy has had a positive and significant effect on education in the region. More specifically, democracy proved to be a robust determinant of secondary education, which highlights its redistributive role and also its indirect role in determining prosperity in the community. Or to put it in another way, there is some evidence that policy reform, in this case access to education, followed political change in the community, Bates, Coatsworth and Williamson (2007).

The quality of the evidence presented is to a certain extent boosted because I take advantage of panel time-series analysis, which deals with important empirical issues, such as heterogeneity bias, and also because I make use of a contemporaneous external shock (the end of the cold war) affecting the region to deal with endogeneity in relatively thin panels. Therefore, the empirical analysis conducted here represents a step forward in terms of achieving insightful estimates, avoiding unwarranted generalisations and in improving our knowledge on the subject in sub-Saharan Africa.

To conclude, the SADC experience is informative firstly because it encapsulates a number of countries, which no doubt share important characteristics and goals, but which also have their own idiosyncrasies. Secondly, democracy in the region is in its infancy and since there are never-ending waves of democratisation affecting different regions of the world—some of which are successful, some of which are not—the study of how young democracies behave is of particular importance. Lastly, understanding what affects education is important because education is a noble aim in its own and also because, as well put by Nelson and Phelps (1966), education is an important determinant of growth, development and consequently prosperity in a

globalised world.

A Appendix

I present some extra regressions with primary school completion as percentage of the relevant age group, *EDUC3*, from the World Bank as the dependent variable and with foreign aid, *AID*, from the World Bank as well on the RHS. The foreign aid variable is defined as the net official development assistance received as percentage to GDP. I also present a regression with time effects.

All *DEMOC* estimates are positive and significant against primary education, and are consistent with the estimates reported above. Government consumption plays a positive role on primary education, which is consistent with the results on secondary education as well. Fixed capital formation also confirms its no effect on education, which suggests non-complementarities between physical and human capital in the community.

Trade openness presents positive effects on primary education, which is some evidence for the compensation hypothesis. Access to finance confirms its positive role on education. Lastly, there is no evidence that foreign aid increases primary education in the community, results which are not consistent with the Millennium Development Goals nor with the findings by Dreher, Nunnenkamp and Thiele (2006). All the same, the role of aid on education deserves more attention.

Table 7: Extra Estimates of Democracy on Education, 1980-2009.

EDUC3	POLS (1)	FE (2)	FE-time (3)	FE-IV (4)	FE-IV (5)	FE-IV (6)
DEMOC	.113 (6.12)	.108 (1.74)	.134 (4.58)	.122 (6.48)	.242 (6.06)	.090 (3.04)
GOV	.223 (4.76)	.164 (2.42)	.154 (3.21)	.165 (3.45)	.217 (3.97)	.156 (3.25)
INV	-.070 (-1.15)	-.013 (-0.13)	-.000 (-0.02)	-.020 (-0.45)	-.025 (-0.51)	-.011 (-0.25)
OPEN	.175 (3.07)	.274 (2.29)	.243 (3.37)	.272 (3.94)	.119 (1.38)	.295 (4.01)
M2	.062 (1.33)	.139 (2.13)	.094 (1.74)	.165 (3.27)	.266 (4.10)	.122 (2.26)
AID	-.124 (-7.00)	-.028 (-1.04)	-.062 (-2.37)	-.018 (-0.88)	.005 (0.25)	-.033 (-1.60)
F test	54.89	5.09	4.49			
F* test		30.86	28.68	30.06	24.73	30.74
R ²	0.57	0.49	0.56	0.49	0.41	0.48
IV				DEMOC ₋₂	INCOME	COLD
				.945 (37.36)	1.37 (8.33)	1.07 (10.58)
F test				296.27	22.83	31.26

T-ratios in parentheses. Number of observations: $NT = 450$. *EDUC3* is primary school completion as percentage of the relevant age group, *DEMOC* is a proxy for political regime characteristics, *GOV* is the government's consumption share to GDP, *INV* is the gross fixed capital formation ratio to GDP, *OPEN* is a measure of economic openness, *M2* is the liquid liabilities ratio to GDP and *AID* is foreign aid. POLS is the Pooled OLS, FE is the one- and two-way Fixed Effects and FE-IV is the Fixed Effects with Instrumental Variables estimators.

References

- [1] Acemoglu, D. and J. A. Robinson (2000). "Why did the West extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective." *The Quarterly Journal of Economics*: 1167-1199.
- [2] Acemoglu, D., S. Naidu, et al. (2013). Democracy, redistribution and inequality. Prepared for the Handbook of Income Distribution edited by Anthony Atkinson and François Bourguignon.
- [3] Achen, C. H. (2001). Why Lagged Dependent Variables Can Suppress the Explanatory Power of Other Independent Variables. Prepared for the Annual Meeting of the Political Methodology Section of the American Political Science Association, UCLA, July 20-22, 2000.

- [4] Andersen, Thomas, and Carl-Johan Dalgaard (2011). "Flows of people, flows of ideas, and the inequality of nations." *Journal of Economic Growth* 16:1-32.
- [5] Arellano, M. (2003). "Panel data econometrics." Oxford University Press: *Advanced texts in Econometrics*.
- [6] Avelino, G., D. Brown, et al. (2005). "The effects of capital mobility, trade openness, and democracy on social spending in Latin America, 1980-1999." *American Journal of Political Science* 49(3): 625-641.
- [7] Barro, R. (1999). "Determinants of Democracy." *The Journal of Political Economy* 107(6): S158-S183.
- [8] Bates, R. H., J. H. Coatsworth, et al. (2007). "Lost decades: postindependence performance in Latin America and Africa". *Journal of Economic History* 67(4): 917-943.
- [9] Bates, R. H., S. A. Block, et al. (2013). "The New Institutionalism and Africa." *The Journal of African Economies* 22(4): 499-522.
- [10] Becker, Sascha, Erik Hornung, and Ludger Woessmann (2011). "Education and catch-up in the industrial revolution" *American Economic Journal: Macroeconomics* 3:92-126.
- [11] Bittencourt, Manoel (2012). "Democracy, Populism and Hyperinflation: Some Evidence from Latin America". *Economics of Governance* 13(4): 311-332.
- [12] Brown, D. (1999). "Reading, Writing, and Regime Type: Democracy's Impact on Primary School Enrollment." *Political Research Quarterly* 52(4): 681-707.
- [13] Brown, D. S. and W. Hunter (2004). "Democracy and Human Capital Formation: Education Spending in Latin America, 1980 to 1997." *Comparative Political Studies* 37(7): 842-864.
- [14] Dreher, A., P. Nunnenkamp, et al. (2008). "Does Aid for Education Educate Children? Evidence from Panel Data." *World Bank Economic Review* 22(2): 291-314.

- [15] Galego, F. (2010). "Historical origins of schooling: the role of democracy and political decentralisation." *Review of Economics and Statistics* 92(2): 228-243.
- [16] Galor, O. and J. Zeira (1993). "Income Distribution and Macroeconomics." *Review of Economic Studies* 60: 35-52.
- [17] Galor, O. and O. Moav (2006). "Das Human-Kapital: a theory of the demise of the class structure." *The Review of Economic Studies* 73(1): 85-117.
- [18] Galor, O. and A. Mountford (2008). "Trading Population for Productivity: Theory and Evidence." *Review of Economic Studies* 75(4): 1143-1179.
- [19] Galor, O., Omer Moav, and Dietrich Vollrath (2009). "Inequality in Landownership, the Emergence of Human-Capital Promoting Institutions, and the Great Divergence". *Review of Economic Studies* 76(1): 143-179.
- [20] Glaeser, Edward, Giacomo Ponzetto, and Andrei Schleifer (2007). "Why does democracy need education?" *Journal of Economic Growth* 12: 77-99.
- [21] Harding, R. and D. Stasavage (2013). "What Democracy Does (and Doesn't do) for Basic Services: School Fees, School Inputs, and African Elections." *Journal of Politics* Forthcoming.
- [22] Kaufman, R. R. and A. Segura-Ubiergo (2001). "Globalization, Domestic Politics, and Social Spending in Latin America: A Time-Series Cross-Section Analysis, 1973-97." *World Politics* 53(4): 553-587.
- [23] Lake, D. A. and M. A. Baum (2001). "The Invisible Hand of Democracy: Political Control and the Provision of Public Services." *Comparative Political Studies* 34(6): 587-621.
- [24] Lipset, Seymour Martin (1959). "Social Requisites of Democracy: Economic Development and Political Legitimacy." *The American Political Science Review* 53(1): 69-105.

- [25] Lott, J. R. (1999). "Public Schooling, Indoctrination, and Totalitarianism". *Journal of Political Economy* 107: S127-157.
- [26] Meltzer, A. and Richard, S. (1981). "A Rational Theory of the Size of the Government." *Journal of Political Economy* 89: 914-27.
- [27] Mulligan, C. B., R. Gil, et al. (2004). "Do Democracies Have Different Public Policies than Nondemocracies?" *Journal of Economic Perspectives* 18: 51-74.
- [28] Murtin, Fabrice, and Romain Wacziarg (2013). "The democratic transition". *Journal of Economic Growth* Forthcoming.
- [29] Nelson, R. R. and E. S. Phelps (1966). "Investment in Humans, Technological Diffusion, and Economic Growth." *The American Economic Review* 56(1/2): 69-75.
- [30] Phillips, P. and H. R. Moon (1999). "Linear Regression Limit Theory for Nonstationary Panel Data". *Econometrica* 67(5) :1057-1112.
- [31] Smith, Ron and Ana-Maria Fuertes (2010). "Panel time-series." *cemmap*: London.
- [32] Stasavage, D. (2005). "Democracy and Education Spending in Africa." *American Journal of Political Science* 49(2): 343-358.
- [33] Tavares, J. and R. Wacziarg (2001). "How democracy affects growth." *European Economic Review* 45: 1341-1378.