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

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Abstract

In this paper we investigate whether democracy in the Southern African Development Community (SADC) has had any impact on education during the 1980-2009 period. The results, based on panel time-series analysis (we use the Pooled OLS, Fixed Effects and Fixed Effects with Instrumental Variables estimators), strongly suggest that democracy has played an important role in widening access to education in the region. These results are significant not only because democracy is in its infancy in the region and to make it work is an aim in itself in Africa, but also because education (a noble aim in itself) is an important determinant of growth and development. All in all, democracy, and the better governance that tends to be associated with it, is playing not only its expected redistributive role, but also an indirect, nevertheless significant and important, role on prosperity in the community.

Keywords: Democracy, education, SADC.

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1 Introduction and Summary

The African continent has been known for its rather recent political independence from European rule (mostly in the 1960s), political regime changes during the cold war (with some countries sidelining with the former Soviet Union and others with the United States, Berger, Corvalan, Easterly and Satyanath (2013)), civil and military conflicts (which tend to be associated with the role played by natural resources, Besley and Persson (2008)), and poor macroeconomic performance (in terms of economic activity the late 1980s and early 1990s saw even negative growth rates). More recently though, the continent has seen some economic structural adjustments and reforms taking place, not to mention a certain degree of political stability, that have generally been matched by better economic performance overall.

Taking the above eventful background into account, we investigate the role of democracy in determining education in the Southern African Development Community (SADC). It is worth mentioning at this stage that this community of countries includes the likes of Angola, Botswana, the Democratic Republic of the Congo (DRC), Lesotho, Madagascar, Mozambique, Mauritius, Malawi, Namibia, South Africa, Swaziland, Seychelles, Tanzania, Zambia and Zimbabwe, and it professes the importance of "regional integration, peace and security, democracy and development" as tools to eradicate poverty in the region. More specifically, we use data from all fifteen SADC members between 1980 and 2009 and panel time-series analysis to study whether democracy played any role in generating education in the region.

Firstly, one would argue that (particularly in young democracies) 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. In this case, those political coalitions in power would try to buy out voters via provision of public goods, and education, for capturing the interests of urban workers and employers alike, is always a popular choice.

On the other hand, it can be argued that rural landowners—since education would trigger migration to the cities and consequently higher salaries in the country side—do not necessarily favour investment in education, Galor, Moav and Vollrath (2008). Secondly, others would argue that authoritarian

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regimes, *e.g.*, the former Soviet Union and some of its satellites, and China, have also invested in education over the years (probably for ideological indoctrination, Lott (1999) and Brown (1999)). All in all, it is not necessarily true that democracies would invest in education more than other political regimes.

Interestingly enough, although these SADC countries differ in terms of economic and institutional development (*e.g.*, with Botswana, Mauritius and South Africa being more economically and politically developed than most of the other countries in the region, and with other countries transitioning from dictatorship to democracy and vice versa on a rather consistent basis, *e.g.*, Zambia), they also share common factors. For instance, most of them went through those above-mentioned economic and political structural changes from the 1960s onwards. Therefore, we pay special attention to these fifteen countries which are part of a club, or umbrella, or panel that professes the importance of regional integration, democracy (although some of these countries have never implemented democracy as such, *e.g.*, Swaziland and Tanzania) and prosperity as tools to eradicate poverty in the region.

The results suggest that, during the period investigated, 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 rather well in the region. More practically, investing in education is not only a noble aim in itself, but also of economic importance since education is a determinant of economic growth and development, Mankiw, Romer and Weil (1992).

In addition, the importance of acquiring a better understanding of the role of democracy on education is not only because education is a noble and practical outcome to be achieved for all sorts of reasons, but also because democracy in Africa, with some exceptions, is in its infancy, and there are a number of examples in history that suggest that young democracies can behave rather badly (*e.g.*, Germany in the 1910s and 1920s, parts of sub-Saharan Africa in the 1960s and the Latin American democracies in the

1980s)[1]. Therefore, it is important to better understand not only the causes (Lipset (1959)), but also the consequences of democracy to an important variable like education.

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 his sample. In similar vein, Lake and Baum (2001) make use of a sample with 62 countries covering the period 1975-1993 and they 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, *i.e.*, 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 indeed played a positive role on secondary education.

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.

Moreover, a number of case studies have been conducted so far 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

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

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 indeed 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 attendance.

In essence, this (admittedly) non-exhaustive literature review suggests, although there are some notable exceptions, that democracy plays an important role on a range of proxies for education in large cross-sectional, panel and panel time-series data samples. To put it differently, in a continent like Africa—which suffers from chronic poverty—democracy, and the better governance that usually comes with it, has the potential of increasing a variable that is important not only for its own noble redistributive sake, but also because it might influence a variable that generates the much needed economic growth and development in the region.

Hence, it is fair to say that this paper is a natural development of the previous literature on the subject. We conduct a case study of an important club of African countries—which share particular characteristics, but which also present their own idiosyncrasies—that attempts to pinpoint in more detail the effects of democracy on education. We do that by taking advantage of panel time-series analysis, which deals with particular econometric issues (heterogeneity and endogeneity), which enables us to provide—to the best of our knowledge, for the first time—informative estimates so that our knowledge of a very idiosyncratic, and also diverse within, southern Africa is deepened.

The remainder of the paper is as follows: the next section describes the data and the empirical strategy used, and then it reports and discusses the results obtained. Section Three concludes the paper.

2 Empirical Analysis

2.1 A Look at the Data

The dataset used covers the period between 1980 and 2009, and fifteen sub-Saharan African countries, which are all members of the SADC, namely Angola, Botswana, the Democratic Republic of the Congo, Lesotho, Madagascar, Mozambique, Mauritius, Malawi, Namibia, South Africa, Swaziland, Seychelles, Tanzania, Zambia and Zimbabwe ($T = 30$ and $N = 15$). To briefly 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. In addition, we 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, we use the rather popular and normalised, so that it ranges from zero to one, polity2 variable (POL) from the Polity IV files. After the brief literature review above, it is reasonable to expect that more democratic societies tend to invest more in education, Tavares and Wacziarg (2001).

The control variables used are rather standard in the literature and include a proxy for government, in this case the ratio of final government consumption expenditure to GDP (GOV), which comes 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 well incur in conspicuous consumption, and therefore divert from more educational purposes, Brown and Hunter (2004). Moreover, with the Solovian prediction in mind, we use the gross fixed capital formation to GDP, INV, as a proxy for investment (and development) and it comes from the World Bank files. It is expected that capital formation requires some degree of education (or that more development leads to education) and therefore a positive effect of investment on education is a plausible prediction, Brown and Hunter (2004).

Furthermore, we include a measure of trade openness, $OPEN$, which is

defined as the sum of exports and imports to GDP, and it comes from the World Bank files as well. It is expected in this case that more open societies, in terms of trade, tend to demand higher levels of education, Kaufman and Segura-Ubiergo (2001). Lastly, we 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 wider access to finance has the potential of widening access to education, Galor and Zeira (1993). In essence, given data availability, we attempt to include the most popular control variables previously used by the literature, without unnecessary duplications so that model uncertainty is minimised, in our empirical specifications later on in the analysis.

To illustrate, in Figure One we plot the averaged-data on education and democracy in all fifteen countries in our sample, and what we can see 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 which was matched by a sharp increase in democracy in the region.
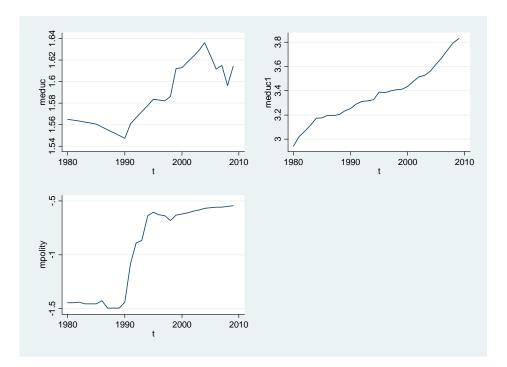
Figure 1: Education and Democracy, SADC, 1980-2009. Sources: World Development Indicators and Polity IV.

Moreover, in Table One we present the correlation matrix of the variables used. Initially, the two variables for education are, as expected, positively and significantly correlated to each other. However, the correlation between them is not terribly strong, which suggests that these variables are actually picking up different effects (*i.e.*, 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 our purposes, both proxies for education are positively correlated to democracy and significant at the 5% level. The control variables present the expected signs (*i.e.*, government consumption and investment, or capital formation, are positively correlated to education, as well as trade openness and finance).

Table 1: The Correlation Matrix: SADC, 1980-2009.

	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

Sources: World Development Indicators and Polity IV. * represents significance at the 5% level.

Furthermore, in Figure Two we plot the OLS regression lines between the education proxies and democracy in all fifteen SADC countries. The relationships are positive and statistically significant, which indicate that there is an economic relationship between democracy and education in the panel.

In a nutshell, this initial descriptive inspection of the data, with all the known caveats associated with descriptive analyses, suggests that there is a positive relationship between democracy and education (*e.g.*, the data plots show the sharp increase in the number of teachers per 100 pupils taking place in the 1990s when democracy also increased in the region, the statistical correlations between education and democracy are positive and significant, and the OLS regression lines indicate a significant positive economic relationship between democracy and education taking place in the community).
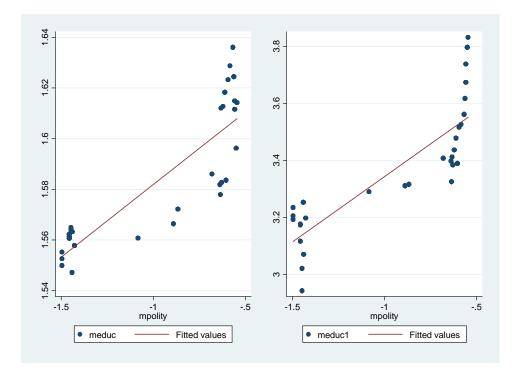
Figure 2: OLS Regression Lines, Education and Democracy, SADC, 1980-2009. Sources: World Development Indicators and Polity IV.

2.2 Empirical Strategy

Since we have a $T > N$, ($T = 30$ and $N = 15$) dataset, the empirical strategy used is based on panel time-series analysis. This is interesting in itself because panel time-series allows us not only to deal with important econometric issues in relatively thin panels—heterogeneity and endogeneity biases—but also to specifically further our knowledge of sub-Saharan Africa without having to incur in the usual removal of African countries from large cross-sectional or panel data analyses. With panel time-series we 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 we can get a clearer picture of the region.

Firstly, although some of the variables are either ratios or indices, and therefore bounded within closed intervals, we also evoke Phillips and Moon (1999) and their result which suggests that the issue of spurious regressions

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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 (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 $T \to \infty$, 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 rather plausible assumption), the FE estimator accounts for important econometric issues in $T > N$ panels, statistical endogeneity and heterogeneity biases, or for the fact that some of these countries do indeed present different levels of economic and political development (*e.g.*, Botswana, Mauritius and South Africa are known to be relatively richer and more politically stable than most other countries in the community, and these country differences are picked up by the heterogeneous intercepts of the FE estimator).

Furthermore, some would argue that reverse causality is a possibility, or that economic endogeneity is present, or that education might lead to democracy and not the inverse, Glaeser, Ponzetto and Shleifer (2007). We therefore use the Fixed Effects with Instrumental Variables (FE-IV) two-stage Least Squares estimator, and firstly we make use of the lag of democracy ($E(democ_{it-1}v_{it} = 0)$) as a baseline identifying instrument for contemporaneous democracy. Then we use the log of income per capita as an instrument for democracy (as proposed by the modernisation hypothesis, Lipset (1959)) and lastly we instrument POL 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 Hoeffler (2013).

Essentially, what is expected of these instruments is that, firstly, democracy (or any other political regime) is rather persistent over time (therefore a positive effect of lagged democracy on contemporaneous democracy is expected). Secondly, income should play a positive role on democracy—as predicted by the modernisation hypothesis—as well as the end of the cold war. 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 region has been on the increase, which suggests that those countries sidelining with the former Soviet Union have had to adapt to the new order[2]. The estimates provided by the FE-IV estimator are asymptotically consistent and efficient as $T \to \infty$, and it retains the time series consistency even if the instrument set is only predetermined, Arellano (2003).

We therefore estimate equations with different pooled estimators (the baseline Pooled OLS (POLS), which assumes homogeneity of intercepts and slopes (admittedly a rather heroic assumption in our panel given the country differences), 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 therefore as follows,

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

$$(1)$$

in which $EDUC$ are the number of teachers per 100 pupils and also secondary enrolment, $DEMOC$ is the political regime variable which proxies for democracy, 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.

2.3 Results and Discussion

In this section we run baseline regressions with democracy on the RHS against our education proxies, and then we include the control variables in a step-wise fashion for robustness sake. After presenting the estimates we discuss the results in light of the previous literature.

Firstly, in Table 2 we report the baseline POLS estimates of democracy on education. In the first panel we use the first proxy for education, the number of teachers per 100 pupils in secondary education, and in the second panel we use our second proxy, secondary school enrolment, $EDUC2$. All $DEMOC$ estimates are positive and statistically significant, which suggests that those young democracies of the SADC have been investing more in

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[2]It is perhaps 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).

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 estimates are not entirely statistically significant. Investment 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 suggests 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). Finally, $M2$ presents the expected positive and statistically significant estimates on secondary enrolment, or that access to simple financial instruments can have a positive effect on financing education.

Table 2: POLS 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: $NT = 450$. The estimated equation is $EDUC_{it} = \alpha + \beta DEMOC_{it-1} + \gamma GOV_{it} + \delta INV_{it} + \epsilon OPEN_{it} + \varepsilon M2_{it} + \upsilon_{it}$, in which $EDUC1$ 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 we report the FE estimates of democracy on education. As before, in the first panel we report the effect of democracy on the number of teachers per 100 pupils, $EDUC1$, and in the second panel we report the estimates using the second proxy for education, secondary school enrolment as percentage of the corresponding age group. 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 region.

About the control variables, GOV does not present clear-cut estimates nor 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 not only justifies and reinforces the use of the FE estimator in this instance, but also make these estimates preferable to those in Table 2.

Table 3: FE 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: $NT = 450$. The estimated equation is $EDUC_{it} = \alpha_i + \beta DEMOC_{it-1} + \gamma GOV_{it} + \delta INV_{it} + \epsilon OPEN_{it} + \varepsilon M2_{it} + \upsilon_{it}$, in which $EDUC1$ 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 Table 4 we report the FE-IV estimates using the first lag of democracy as our identifying instrument for contemporaneous democracy. The democracy estimates on education are all positive and statistically different

from zero. For instance, according to equation 5, upper panel, for every percentage point increase in democracy, there is an increase of .06 points in the number of teachers per 100 pupils.

About the controls, government consumption is now presenting positive and significant estimates on secondary enrolment (bottom panel), which suggests that government consumption can be diverted to more educational purposes. Investment and openness keep their not so clear-cut estimates (although investment displays a detrimental effect on the number of teachers per pupils). On the other hand, financial depth presents positive and significant effects against both proxies for education this time, which highlights the role of the liquid liabilities in facilitating access to secondary education in general in the community.

Finally, the F* test suggests the presence of regional fixed effects, and the t-stats of our identifying instrument (which as predicted presents a positive effect on contemporaneous democracy) and the F test in the first-stage regressions are all statistically significant (available on request), which minimises the issue of weak instruments.

Table 4: FE-IV Estimates of Democracy on Education, 1980-2009.

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
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

T-ratios in parentheses. Number of observations: $NT = 450$. The estimated equation is $EDUC_{it} = \alpha_i + \beta DEMOC_{it-1} + \gamma GOV_{it} + \delta INV_{it} + \epsilon OPEN_{it} + \varepsilon M2_{it} + \upsilon_{it}$, in which $EDUC1$ 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 $DEMOC$.

In Table 5 we report the FE-IV estimates of democracy on education, but now we invoke the modernisation hypothesis and make use of income per capita as the identifying instrument for democracy. As before, in both panels, all democracy estimates are positive and significant against the number of teachers per 100 pupils and secondary enrolment. In this case, making use of the complete specification in column 5, upper panel, for every percentage point increase in democracy, there is an .08 point increase in the number of teachers per 100 pupils in the region (which, given the role of the external variation provided by our instrument, is a larger effect than the ones provided by our baseline POLS and also FE estimates).

On the control variables, government consumption, once again, displays positive and significant effects on school enrolment, which suggests that, depending on what governments spend their budgets on, government consumption can be conducive to secondary enrolment. Gross capital formation is still not entirely convincing against secondary enrolment (although it keeps its negative effect on the number of teachers per pupils), however trade openness now displays negative and significant estimates on secondary enrolment (bottom panel). A more consistent story is displayed by the liquid liabilities and their role in financing access to secondary enrolment and also in increasing the number of teachers per pupils in the community.

Finally, the F* test suggests that there is evidence of country fixed effects, and in the first-stage regressions (available on request), income per capita displays the expected positive effect against democracy (which is evidence in favour of the modernisation hypothesis), and the t-stats of our identifying instrument and the F tests for overall significance are all different from zero, minimising the issue of weak instruments in our regressions.

Table 5: FE-IV Estimates of Democracy on Education, 1980-2009.

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
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

T-ratios in parentheses. Number of observations: $NT = 450$. The estimated equation is $EDUC_{it} = \alpha_i + \beta DEMOC_{it-1} + \gamma GOV_{it} + \delta INV_{it} + \epsilon OPEN_{it} + \varepsilon M2_{it} + v_{it}$, in which $EDUC1$ 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.

In Table 6 we report the FE-IV estimates, but now we use our end of the cold war dummy (with zeros from 1980 to 1989, and ones elsewhere) as our identifying instrument for democracy. Yet again, all democracy estimates against education are positive and significantly different from zero. For instance, using regression 5, upper panel, for every percentage point increase in democracy, there is a .07 percentage point increase in the number of teachers.

Our controls follow the similar patterns already reported, *i.e.* with government consumption displaying some positive effects on school enrolment, gross capital formation is not having the predicted positive effect on educa-

tion, and openness is displaying negative effects on education as well. The proxy for financial development, $M2$, keeps its role of facilitating access to education though.

Moreover, in the first-stage regressions, the external shock hitting the continent, which is characterised by the dummy for the end of the cold war, presents positive and significant effects on democracy (confirming the prediction that with the end of the ideological conflict between the West and the former Soviet Union, came also more democratic institutions in the region). Furthermore, the F test for overall significance are statistically significant as well, which reduces the possibility of weak instruments.

Table 6: FE-IV Estimates of Democracy on Education, 1980-2009.

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
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

T-ratios in parentheses. Number of observations: $NT = 450$. The estimated equation is $EDUC_{it} = \alpha_i + \beta DEMOC_{it-1} + \gamma GOV_{it} + \delta INV_{it} + \epsilon OPEN_{it} + \varepsilon M2_{it} + \upsilon_{it}$, in which $EDUC1$ 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, so far, 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: our 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 region. Those results are good news not only for democracy and the better governance that it tends to create, given the political competition that is usually associated with it, but also because human capital is an important determinant of economic growth and development in general. All in all, it seems that democracy plays a rather indirect, nevertheless important, role on prosperity in the region[3], 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. Nevertheless, a word of caution is perhaps in place in the sense that secondary education tends to be associated with more urban interests, and southern Africa is still very 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. On the other hand, rural landowners usually do not have any incentive in lobbying for human capital formation (usually primary education) which would only incentivise migration to the cities and consequently higher salaries in the country side, Galor, Moav and Vollrath (2008). Hence, investigating the effect of democracy, if any, on primary education in the region would be an interesting extension to this paper.

Moreover, the instrumental variables estimates 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, *e.g.*, via social grants which enable more pupils into secondary education, Avelino,

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[3]We have also tried different specifications, *e.g.*, with deeper lags for democracy on the RHS. The results are similar to the ones reported above. Also, we 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. Results are available on request.

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).

Furthermore, the proxy for capital accumulation is not presenting the expected signs or entirely significant estimates (although the FE and FE-IV estimates suggest that investment might be detrimental to the number of teachers per pupils). These not so clear-cut estimates are probably because, although there are exceptions, southern Africa is still predominantly rural and capital accumulation tends to take place in more urban settings. In addition, Galor (2005) argues 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 more formal human capital accumulation. 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 incur losses coming from international trade. In this case it is plausible that those technologies and goods coming from abroad, given the limited capacity of these African countries, are not affecting any local business, therefore there are no losses to be compensated. On the other hand, Tables 5 and 6, bottom panels, suggest that the efficiency hypothesis might be at work, *i.e.*, that those countries not only opened up their economies in the 1990s (probably influenced by the Washington consensus and international organisations like the World Bank), but also cut expenditure on secondary enrolment as part of particular stabilisation programmes, Kaufman and Segura-Ubiergo (2001). All in all, the subject deserves more attention.

Also rather notable is that our baseline proxy for financial development displays interesting results in the sense that it confirms 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)[4]. A more thorough study on the

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[4]Although not entirely comparable, Avelino, Brown and Hunter (2005) use a variable

role of financial development (with data on credit to the private sector) on education would be a natural extension to this paper.

3 Final Remarks

Using a dataset covering the period between 1980 and 2009, in this paper we 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 that are all members of the SADC. The results, based on panel time-series analysis, 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 also highlights 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.

The quality of the evidence presented is, to a certain extent, boosted because we take advantage of panel time-series analysis, which deals with important empirical issues, such as heterogeneity bias and endogeneity in relatively thin panels. Essentially, this analysis is important because it allows us to specifically study the SADC region, instead of treating the community either as a dummy or as an outlier to be removed from the sample. 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.

Regarding future work, firstly, investigating the role of democracy on primary education would be a natural extension to this paper. Secondly, the role of access to finance and how it can affect education is an interesting, and of practical importance, subject that deserves some attention and could also complement the present study.

To conclude, the SADC experience is informative firstly because it encapsulates a number of countries, which no doubt share important characteristics, but which also have their own idiosyncrasies (not to mention that this sort of sample provides us with interesting panel variation). Secondly,

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for financial openness, however they are not able to report any significant effect of finance on education in Latin America.

democracy in the region is in its infancy, and since we have never-ending waves of democratisation affecting different regions of the world (some of which are successful, but not all of them), the study of how young democracies behave is of particular importance. Lastly, understanding what affects education is important not only because education is a noble aim in its own, but also because education is an important determinant of growth, development and consequently prosperity.

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