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STATE CAPACITY, AGRICULTURAL PRODUCTIVITY AND POVERTY REDUCTION IN AFRICAN COUNTRIES*

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We analyze the effect of state capacity on poverty in Africa. We consider two proxy variables for state capacity: the government effectiveness index, capturing administrative capacity, and the political stability index, a proxy for coercive capacity. Using the system-GMM technique with four-year average panel data from 53 African countries over the period 1995-2014, we find that each of the state capacity variable significantly reduces poverty rate. However, administrative capacity appears to be the most important aspect of state capacity for poverty reduction. The results also suggest that cereal yield, a proxy for agricultural productivity, would be a channel through which state capacity affects poverty in Africa.

Keywords: State Capacity, Poverty, Agricultural Productivity, Africa
JEL Classification: I32, I38, P48

1. INTRODUCTION

States shape development. There is a broad consensus in the development literature that state institutions and their actions have major implications for economic development. This growing literature has mostly focused on the determinants of state capacity (Besley and Persson, 2009, 2010) and its effects on socio-economic outcomes (Acemoglu, 2005; Fearon and Laitin, 2003).

So far, little attention has been given to the analysis of the link between state capacity and poverty. In the end, the impact of state capacity on socio-economic outcomes may not trickle down to the poor people or most vulnerable people in society. According to Hanson and Sigman (2013), there are three key dimensions of state

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capacity: extractive capacity, coercive capacity, and administrative capacity. Each dimension of state capacity has the potential to contribute to poverty reduction. However, because of limited available data, only two dimensions of state capacity (administrative and coercive capacity) are examined in this paper.

Extractive capacity is the ability of state to levy tax on its population and gives state the necessary resources to provide essential public goods and services (school, health, roads, for instance) to the population. Coercive capacity is related to the state's ability to preserve its borders, protect against threats, maintain internal order, and enforce policy. Without peace and security, there is no chance for any viable economic development and poverty is likely to rise. Administrative capacity is a broad dimension that involves many components including the ability of state to develop policy, to coordinate markets by enforcing contracts and protecting property rights, and the ability to produce and deliver public goods and services to the population. A state with weak administrative capacity cannot define and implement sound policies; therefore, such state is less likely to contribute to poverty reduction.

The objectives of this paper are twofold: (i) analyzing the effect of state capacity on poverty, by identifying the dimension of state capacity that is most important for poverty reduction; and (ii) analyzing the transmission channel of state capacity effect on poverty. To the best of our knowledge, this is the first paper that empirically examines the effect of state capacity on poverty and its transmission channel in Africa.

The study of state capacity on poverty is extremely important in a context, where despite high economic growth rates since the mid-1990s, poverty remains high, and compared to other developing regions, poverty has increased in Africa. Indeed, it has been estimated that in 1990, 56 percent of Africans lived with less than $1.25 a day, accounting for 15 percent of world's poor. Over the subsequent 20 years, the region's poverty rate dropped to 48 percent; however, Africa's share of global poverty doubled. Thus, by analyzing the effect of state capacity on poverty, this paper sheds light on another factor (different from economic growth) that could contribute to poverty reduction in Africa. Moreover, several governance indicators assess Africa to be the weakest region in terms of governance quality, meanwhile, African countries cannot improve all governance aspects at once. Therefore, by identifying the dimension of state capacity that is most important for poverty reduction, this paper contributes to prioritize efforts for state capacity and governance improvement in Africa.

The rest of the paper is organized as follows. In section 2, we examine the trends of poverty rate and state capacity indicators. In section 3, we explain our empirical strategy and estimate the models. We examine the results and discuss some policy implications of our main findings in section 4. Section 5 concludes the paper.

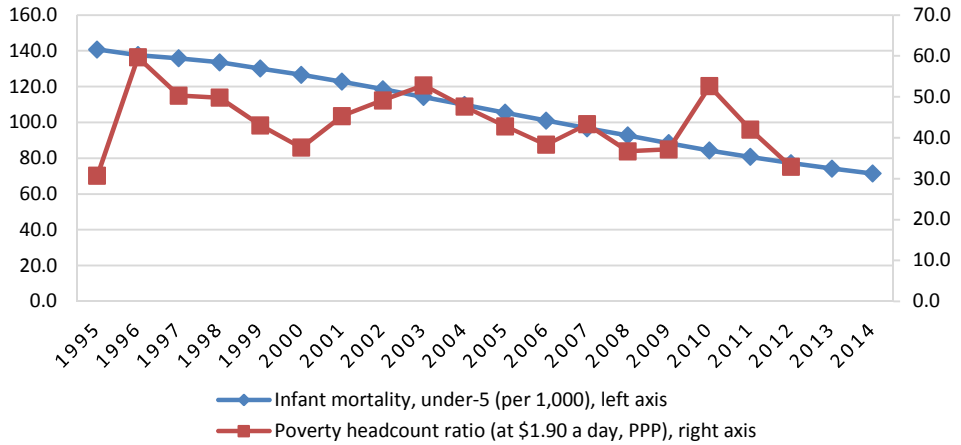
2. TRENDS OF POVERTY RATE AND STATE CAPACITY IN AFRICA

Figures 1 and 2 report the trends of poverty rate and state capacity indicators. We

use two indicators for poverty rate: the poverty headcount ratio and the infant mortality rate. The poverty headcount ratio measures the percentage of population living with less than $1.90 a day (2011 Purchasing Power Parity). The infant mortality variable measures the number of dead children (under five years old) for 1,000 births live. The infant mortality data are more available than the poverty data, because the latter require household surveys which are not frequent, especially in Africa. Given the scarcity of poverty data, the infant mortality rate can be a good proxy for empirical analysis related to poverty rate in developing countries. Indeed, infant mortality is an important non-income indicator of poverty that is better suited to capture the welfare implications of being poor (Ravallion, 1996), and infant mortality is highly correlated with income (Pritchett and Summers, 1996). Moreover, infant mortality rate has been used as a measure of poverty in developing countries (see Ross, 2006).

Figure 1 shows that since 1995, there has been a steady decrease of infant mortality rate in Africa. The average infant mortality rate was 141 deaths for 1,000 births live in 1995, and it dropped to 71 in 2014. This may reflect improved access to education, medicines, health centers as well as higher income.

On the other hand, Figure 1 does not show a linear declining trend for the poverty headcount ratio. While in 1995 the poverty headcount ratio was 30.7 percent, it increased to 33 percent in 2012. Moreover, between 1995 and 2012, poverty headcount has fluctuated a lot in Africa. This may reflect natural hazards, health shocks and price changes that rural households experienced. The low frequency of household poverty data collection may have also contributed to such situation.

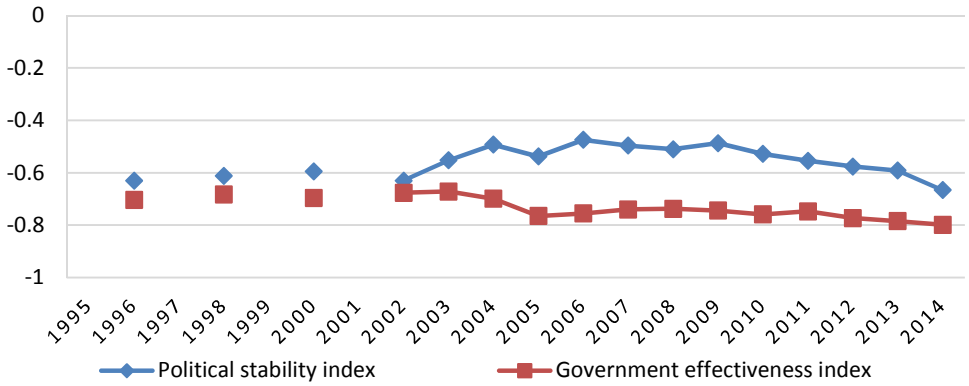


Source: Authors' calculations based on data retrieved from the 2016 World Bank's World Development Indicators.

Figure 1. Trends of Poverty Headcount Rate and Infant Mortality Rate in Africa Over the Period 1995-2014

Figure 2 depicts the trends of the two indicators of state capacity: the government effectiveness and the political stability indexes. The political stability and the government effectiveness indexes have been used in the literature as proxies for coercive capacity and administrative capacity, respectively (see Hanson and Sigman, 2013).

Both the government effectiveness and the political stability indexes are retrieved from the World Bank's Worldwide Governance Indicators (WGI). The WGI project constructs aggregate indicators of six broad dimensions of governance, including government effectiveness and political stability. The WGI aggregate indicators are based on 31 underlying data sources reporting the perceptions of governance of a large number of survey respondents and expert assessments worldwide. All the aggregate indicators from the WGI lie between -2.5 and 2.5; the higher the index, the better the quality of governance. The indexes are calculated every two years from 1996 to 2002, and since 2003 on annual basis.[1]



Source: Authors' calculations based on data retrieved from the World Bank's Worldwide Governance Indicators (www.govindicators.org).

Note: Between 1996 and 2002, the Worldwide Governance Indicators were collected every 2-year time. This explains some breaks observed in the Figure around 1996 and 2002.

Figure 2. Trends of the Government Effectiveness and Political Stability Indexes in Africa over the Period 1996-2014

[1] Details on the underlying data sources, the aggregation method, and the interpretation of the indicators, can be found in the WGI methodology paper, Kaufmann et al. (2010).

The government effectiveness index reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The political stability index reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.

Figure 2 shows that, over the period of analysis, on average, the quality of government effectiveness has been lower than the quality of political stability in Africa. More interestingly, the figure shows that the two proxies for state capacity have not followed the same trend. Between 2002 and 2005, the quality of government effectiveness has declined, and has reached its lowest value in 2005. Since 2005, there has been a steady and incremental improvement in the quality of government effectiveness in Africa. However, since 2011 the quality of government effectiveness has started declining again in Africa, and the continent's average quality of government effectiveness in 2014 was lower than its value in 1996. Increased turnover within public administrations may have contributed to deteriorate the quality of government effectiveness over the past years in Africa.

Figure 2 shows that the political stability index has steadily increased between 2002 and 2004. After that, the political stability index has fluctuated, and since 2006 it has followed a declining trend, reaching the value of -0.66 in 2014, the lowest value since the inception of the database. Increased terrorist attacks over the past years may have contributed to the decline of the political stability index in Africa.

3. EMPIRICAL INVESTIGATIONS

3.1. Empirical Strategy

As mentioned earlier, the objectives of this paper are twofold. We first estimate the effects of state capacity on poverty rate, while trying to identify the most important aspect of state capacity for poverty reduction in Africa. We then identify the channels through which state capacity could affect poverty. We examine two aspects of state capacity: the administrative capacity, proxied by the government effectiveness index and the coercive capacity, proxied by the political stability index.[2]

To achieve the two objectives, the paper follows a two-step strategy. At the first step, we estimate the separate and simultaneous effects of state capacity variables on poverty

[2] We could have considered a third aspect of state capacity, which is the extractive capacity. But the proxy for this third aspect of state capacity is not available for most African countries. Indeed, a proxy for extractive capacity could be government revenue as a percentage of GDP (see Hanson and Sigman, 2013). But this variable is not available over long period for most African countries.

rate, while controlling for other determinants of poverty. At the second step, we estimate the effects of state capacity variables on poverty rate, while controlling for the effects of other determinants of poverty and the cereal yield variable, which is a potential channel through which state capacity could affect poverty in Africa. Our assumption is that improved agricultural productivity is a channel through which state capacity could affect poverty, because agriculture is the sector where the large majority of poor people work and earn income in Africa. Our proxy for agricultural productivity is cereal yield.[3] A similar proxy for agricultural productivity has been used by other authors, including Gollin et al. (2014a, b). The effect of increased agricultural productivity on poverty would be higher if supplemented by the existence of other factors, such as rural roads, agro-processing facilities. Indeed, to improve their income and reduce poverty, sometimes in addition to increased productivity, farmers need roads to transport their products from farms to markets, and they also need small processing facilities to transform and increase the value of their products. Despite the importance of those complementary factors (i.e., rural roads and agro-processing facilities), lack of data constraints us to focus our analysis on agricultural productivity as a channel through which state capacity could contribute to poverty reduction.

For an aspect of state capacity to be identified as the most important for poverty reduction, at each of the two aforementioned steps, the effect of that aspect of state capacity should be of the expected sign and significant. In other words, either in the separate or in the simultaneous models, with or without the cereal yield variable, the aspect of state capacity that is identified as the most important for poverty reduction should have the expected effect, and this effect should remain significant regardless of model specifications.[4]

3.2. Model Specifications and Econometric Techniques

Based on the discussions above, we estimate the following models:

$$Poverty\ rate_{it} = c + \alpha goveffec_{it} + \beta polstab_{it} + \theta Z_{it} + u_i + v_t + \varepsilon_{it}, \quad (1)$$

$$Poverty\ rate_{it} = c + \alpha goveffec_{it} + \beta polstab_{it} + \theta Z_{it} + \delta cy_{it} + u_i + v_t + \varepsilon_{it}. \quad (2)$$

Equation (1) estimates the effects of state capacity variables on poverty, while

[3] The cereal yield variable has the advantage of being available for most countries, and it is easier to measure accurately, especially in the African context where statistical capacity is not particularly high. For robustness check, however, the paper also uses agriculture value added per worker as a proxy for agricultural productivity.

[4] If the two aspects of state capacity satisfy the described conditions for the identification of the most important aspect of state capacity for poverty reduction, we will compare the magnitude of the coefficients associated with the two state capacity proxy variables.

controlling for other determinants of poverty, but excluding the cereal yield variable. The other determinants of poverty are represented by vector Z. Based on existing literature, including Dollar and Kraay (2002), we control for the following other determinants of poverty in the models: (a) gross primary education enrollment rates, (b) the natural logarithm of inflation rate, (c) the natural logarithm of trade openness, and (d) economic growth rate.

Equation (2) is similar to equation (1). The difference is that equation (2) controls for cereal yield. In other words, equation (2) estimates the effects of state capacity variables on poverty rate, while controlling for other determinants of poverty as well as for cereal yield. Thus, equation (2) allows identifying the transmission channel of state capacity effect on poverty. Two versions of the two models are estimated: one version estimates the separate effects and the other version assesses the simultaneous effects of the two state capacity variables on poverty.

In both equations (1) and (2), infant mortality rate (under five) is our proxy for poverty rate, because of low regular availability of poverty headcount data. We expect each proxy for state capacity to have a negative and significant effect on poverty rate. Indeed, a state with a strong administrative capacity can define and implement sound policies, which is very likely to contribute to poverty reduction. In the agriculture sector, the ability of state to develop and implement sound policies through investment in agricultural extension programs, fosters the adoption of improved technologies and provides valuable information about efficient techniques of production including high-yield varieties that increase agricultural productivity (Cunguara and Damhofer, 2011; World Bank, 2004; Birkhaeuser et al., 1991). The role of administrative capacity in improving household welfare and thus reducing poverty, through the provision of agricultural extension services, has been investigated in some empirical studies. In Mozambique for instance, Cunguara and Moder (2011) use data from the 2005's national agricultural survey to estimate the economic impact of receipt of agricultural extension services. Their results reveal that the receipt of agricultural extension services increases farmers' incomes by 12 percent.

Government micro-credit program for the poor is another public service that the state can provide through its administrative capacity. In Asia, successful stories of micro-credit reducing poverty programs can be highlighted. Cuong (2008) examines poverty targeting and the impact of the micro-credit program implemented by the Vietnam Bank for Social Policies by providing the poor with credit at low interest rates without collateral. The author's empirical analysis suggests that the underlined program has contributed to reduce the poverty rate of the participants. Khandker and Faruqee (2003) find that credit programs increase the welfare of farmers in Pakistan. Using data from the micro-credit program provided by the Bangladesh rural advancement committee, Zaman (2001) also finds that micro-credit program reduces poverty and vulnerability.

We also expect the political stability index to have a negative and significant effect on poverty. Tebaldi and Mohan (2010) analyze the link between institutions and poverty

for a sample of 53 countries, including 14 Sub-Saharan African (SSA) countries. They find that political instability, not only hurts income levels through market inefficiencies, but also exacerbates the level of poverty by increasing income inequality.

Several papers have analyzed the effect of political instability on economic growth, thus, indirectly on poverty. Alesina and Perotti (1996) find that the probability of coup (a proxy for political instability) reduces investment, which is a primary engine of growth. Alesina et al. (1996) also find a negative effect of political instability on economic growth. In the same vein, Asiedu (2006) uses a panel data approach for 22 countries in SSA over the period 1984-2000 to analyze the effect of political instability on foreign direct investments (FDI). Asiedu's empirical results indicate that political instability variables have negative and significant effects on FDI, suggesting that policies promoting political stability could attract FDI, and could have an indirect impact on long-term economic growth, which can reduce poverty in Africa. Similarly, Fosu (2003) employs the political instability index in an export growth model for a sample of 30 SSA countries. Fosu's empirical results suggest that the political instability index reduces export performance in SSA, as it has negatively affected competitiveness, which adversely affects poverty reduction.

We also expect a negative and significant effect of the cereal yield variable on poverty. Indeed, as outlined earlier, the cereal yield variable is a proxy for agricultural productivity. And an increase in agricultural productivity could contribute to poverty reduction, because higher agricultural productivity means more income that farmers and their families can use to buy more goods and services, including spending for health and education. Higher agricultural productivity also means more available time that farmers can use to develop other activities that may increase their earnings. Along the same vein, Schneider and Gugerty (2011) argue that there are multiple pathways through which increases in agricultural productivity can reduce poverty, including real incomes change, employment generation, rural non-farm multiplier effects and food price effects.

Empirically, Byerlee et al. (2005) review 12 country case studies and use bivariate analysis to compare agricultural growth per worker across countries. They show that countries with the highest agricultural growth per worker experienced the greatest rate of rural poverty reduction. Fan et al. (2000) use a multi-equation model that estimates headcount poverty ratio as a function of expenditure and non-expenditure causal factors to explain the relationship between government policy and poverty reduction in 14 Indian states from 1970-1993. They find that spending on rural roads and agricultural research reduces rural poverty, as these types of investments have much larger poverty impacts and generate higher productivity growth.

Fan et al. (2004) use provincial-level data for the past decades to examine the impact of government effectiveness on growth, poverty and inequality reduction in rural China. Their main results suggest that increased government investments in roads and education reduce rural poverty because they stimulate agricultural production and create improved employment opportunities in the nonfarm sector. Mosley and Suleiman (2007) analyze the link between the effectiveness of aid and poverty reduction, using a number

of African case studies. They put forward that administrative capacity through the ability of governmental institutions to use foreign aid by developing protection risk-minimizing strategies (in infrastructure, research, extension and budget management) which are supportive of agricultural development could significantly reduce poverty. It has been the case of Ethiopian and Ugandan governments that set up an increasingly harmonious policy dialogue with donors.

In addition to our three variables of interest (i.e., government effectiveness, political stability and cereal yield) we also control for the following variables.

Primary education. Education can contribute to poverty reduction. For the poor, access to primary education can improve their productivity; it can also improve their health conditions and those of their families; thereby, reducing poverty. Access to education could also increase the chance of poor people to migrate to urban areas for relatively better paid jobs, which would also contribute to poverty reduction. Thus, we expect a negative effect of education on poverty.

Litschig and Morrison (2013) find that intergovernmental transfers on education outcomes reduce poverty in Brazil. More specifically, using data from Brazil, they find that better and more widespread education and improved public service provision increase poor households' incomes, and reduce poverty rate by about 4 percentage points. Similarly, a study from OECD (OECD, 2002) shows that policies providing universal education and health services in poor countries such as Madagascar and Tanzania significantly improve the welfare of vulnerable people.

For our empirical analysis, we use the gross primary school enrollment rate, as a proxy for primary education level. The primary school enrollment rate variable measures children's primary educational level regardless of their age. This is the best available proxy for primary education for most African countries.

Inflation rate. High inflation rate is expected to have a positive effect on poverty. Inflation can be bad for the poor, since they do not have necessary means to hedge their revenue against the negative effect of high inflation rates.

Using the Indian budget datasets, Mishra and Ray (2011) find that relative price changes increase inequality and poverty. They highlight two main channels that may drive this effect. The first channel is that an increase in the relative price of food compared to non-food items will affect the poorer households more adversely than the richer ones. The second one is due to the fact that the changes in prices affecting goods consumed by children may affect harder households with large number of children (poor households) than childless households (rich households). Powers (1995) also uses a measure of poverty based on goods and services actually consumed, rather than on income, to estimate the link between inflation rate and poverty. Powers finds that inflation has a robust and positive effect on poverty rate, suggesting that inflation is harmful for poor people. Similarly, Dessus et al. (2008) use a model of poverty deficit, the variation in financial resources required to eliminate poverty under perfect targeting, to assess the effect of food inflation on poor households. Covering a sample of 72 developing countries that includes 16 SSA countries, their analysis highlights that an

increase in food prices raises urban poverty and the cost of alleviating this corresponding poverty deficit may exceed 3 percent of gross domestic product.

We use the annual variation of the consumer price index as our measurement of the inflation rate. To limit the effect of outliers on the coefficient associated with the inflation rate, we use the natural logarithm of the inflation rate.

Openness to international trade. Trade openness can reduce poverty by generating higher growth rates, giving the poor access to alternative sources of income, or by giving them access to more and better goods and services. The experience of East Asian countries illustrates how openness to international trade can contribute to poverty reduction. On the other hand, openness to international trade could increase poverty by increasing inequality, excluding the poor from the gains of openness, and thereby increasing poverty rate.

Xin and Smyth (2010) use a survey administered across 30 Chinese cities to assess the link between economic openness and subjective well-being in China. Their results show that people living in cities with high levels of economic openness have lower levels of well-being. However, other scholars find a negative relationship between openness and poverty rate. For example, Hassine and Kandil (2009) use a model based on country-level panel data collected for nine southern Mediterranean countries to explore the link between trade liberalization, agricultural productivity and poverty. Their empirical analysis reveals that poverty reduction is driven by an increase in trade openness and this effect is channeled by the positive effects of openness on farming efficiency and productivity. Thus, the effect of openness on poverty can be ambiguous.

In this paper, in order to control for trade openness, while reducing the effect of outliers, we use the natural logarithm of trade openness, which is measured as the sum of exports and imports as a percentage of GDP.

Economic growth rate. Using a large sample of developed and developing countries, Dollar and Kraay (2002) find that incomes of the poor rise proportionately with average incomes, and they conclude that growth is good for the poor. Based on Dollar and Kraay (2002)'s finding, we expect a negative and significant effect of economic growth rate on poverty. However, not all growth benefits the poor, and depending on the sources of growth, high economic growth rates may be accompanied by poverty increase or it may have no effect on poverty. Economic growth is measured by annual variation of real GDP.

For the econometric analysis, we use non-overlapping four-year average panel data over the period 1995–2014. Panel data have the advantage of allowing country and time fixed effects (represented by u_i and v_t in the model, respectively) to be controlled for. Country fixed effects account for time-invariant specific factors that could affect a country's poverty rate, its agricultural productivity as well as its state capacity, including factors such as landlocked position and distance to equator. Likewise, the use of time fixed effects allows us to control for international shocks, such as the 2008 economic crisis, that simultaneously affects poverty rate in different countries.

Despite its advantages, the fixed effect model does not properly handle the

endogeneity issue, which may exist in our models. Indeed, while state capacity may explain the level of poverty, the fact that countries are poor may also explain the quality of state capacity, leading to reverse causality between poverty and state capacity. In addition, endogeneity issue may arise because of measurement errors of the explanatory variables. To address the endogeneity issue, we use the system-GMM technique, developed by Blundell and Bond (1998). This technique has the advantage of dealing with the endogeneity of all the explanatory variables using their lagged values (in level and in first difference) as instrumental variables.

We run panel regressions with four-year average data over the period 1995-2014 for 53 African countries. Thus, each country should normally have five observations. However, some variables are not available for the entire period or for all countries (see Table A1 in the appendix with descriptive statistics of the main variables used in this paper). Therefore, we use unbalanced panel data, which implies that when reporting econometric results, the number of countries and observations may be less than 53 and 265, respectively. The use of four-year panel data also allows us taking into account the fact that significant poverty reduction and improved state capacity require a certain time to materialize. All the variables used in this paper are retrieved from the World Bank's 2016 World Development Indicators.

We use the fixed effects as well as the system-GMM techniques to run regressions. However, our comments will focus more on the system-GMM results because these results are corrected from endogeneity bias.

4. RESULTS

4.1. Baseline Results

Table 1 reporting the baseline results of separate effects of state capacity variables on poverty, shows that both the government effectiveness and the political stability indexes have negative effects on poverty, as expected. However, the results highlight that only the government effectiveness index has a negative and significant effect on poverty, regardless of econometric specification. The system-GMM results (column 5 of Table 1) suggest that a one standard deviation increase in the government effectiveness index, i.e., an increase of 0.6 of the government effectiveness index would be associated with 0.27 percentage points reduction in the poverty rate. More concretely, the result suggests that if Eritrea were to improve its average government effectiveness index over the period of analysis (-1.23) to that of Algeria (-0.62), Eritrea would likely experience 0.27 percentage points reduction in the poverty rate.

Table 2 reports the results of simultaneous effects of state capacity proxy variables on poverty. According to the results in Table 2, after simultaneously controlling for the political stability and the government effectiveness variables, only the latter has a negative and significant effect on poverty.

Table 1. Separate Effects of State Capacity Variables on Poverty Rate

VARIABLES	Fixed Effects				System-GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.181***		-0.221***		-0.448*		-0.354**	
	(2.74)		(3.89)		(1.76)		(1.97)	
Pol stability		-0.0349		-0.0834***		-0.121*		-0.0711
		(0.92)		(2.71)		(1.68)		(0.77)
GDP growth rate	0.005	0.004	0.005	0.0039	0.0109	0.0141**	0.0159	0.00805
	(1.49)	(1.19)	(1.240)	(0.94)	(1.47)	(2.06)	(1.34)	(0.51)
Log(inflation rate)	-0.006	-0.012	-0.020	-0.0345**	0.059*	0.0478	0.0441	0.0471
	(0.32)	(0.56)	(1.57)	(2.16)	(1.65)	(1.04)	(1.33)	(1.15)
Log(openness)	-0.0605	-0.0524	-0.103**	-0.0926*	-0.150	-0.0771	-0.0678	-0.292*
	(0.95)	(0.81)	(1.96)	(1.68)	(0.79)	(0.49)	(0.54)	(1.65)
Primary education	-0.001	-0.0022*	-0.00027	-0.00107	-0.0058**	-0.00673**	-0.00469**	-0.00105
	(1.25)	(1.89)	(0.25)	(0.99)	(2.29)	(2.66)	(2.09)	(0.15)
Log(cereal yield)			-0.180***	-0.183***			-0.230*	-0.288*
			(3.13)	(3.15)			(1.73)	(1.70)
Constant	4.437***	4.612***	5.815***	6.014***	4.962***	5.037***	6.700***	7.937***
	(16.38)	(17.03)	(13.30)	(13.27)	(0.772)	(7.64)	(7.08)	(5.35)
Observations	219	219	210	210	219	219	210	210
R-squared (adjusted)	0.96	0.96	0.97	0.96				
Number of countries	49	49	47	47	49	49	47	47
Sargan-Hansen test[1]					0.294	0.617	0.263	0.172
AR(1)					0.001	0.001	0.024	0.017
AR(2)[2]					0.364	0.774	0.325	0.897

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2]Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table 2. Simultaneous Effects of State Capacity Variables on Poverty Rate

VARIABLES	Fixed Effects		System-GMM	
	(1)	(2)	(3)	(4)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.196***	-0.186***	-0.583**	-0.423*
	(3.02)	(3.20)	(2.46)	(1.72)
Pol stability	0.0141	-0.0356	-0.044	0.0582
	(0.41)	(1.32)	(0.28)	(0.57)
GDP growth rate	0.0048	0.0047	0.0098	0.0111
	(1.52)	(1.21)	(1.46)	(1.13)
Log(inflation rate)	-0.0042	-0.0258*	0.0402	0.0490
	(0.22)	(1.85)	(1.04)	(1.25)
Log(openness)	-0.0639	-0.100*	-0.212	-0.197*
	(1.07)	(1.87)	(1.56)	(1.74)
Primary education	-0.0014	-0.0003	-0.00453*	-0.004*
	(1.22)	(0.28)	(1.82)	(1.64)
Log(cereal yield)		-0.182***		-0.232*
		(3.21)		(1.71)
Constant	4.441***	5.833***	5.008***	7.187***
	(16.74)	(13.49)	(9.08)	(6.41)
Observations	219	210	219	210
R-squared	0.96	0.96		
Number of countries	49	47	49	47
Sargan-Hansen test[1]			0.534	0.450
AR(1)			0.022	0.012
AR(2)[2]			0.228	0.244

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2]Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Beyond their direct effects, the paper aims at identifying the transmission channel of the effects of state capacity variables on poverty. We assume that the increase in agricultural productivity is a potential channel through which state capacity can affect poverty. To assess our assumption, we control for cereal yield, our proxy for agricultural productivity. The results in Tables 1 and 2 show that regardless of econometric specification, the cereal yield variable has a negative and significant effect on poverty. According to the results, an increase of one percent in cereal yield would generate a reduction of poverty of 0.18 to 0.29 percent. Moreover, when controlling for the cereal yield variable, the effects of the government effectiveness index decline, but remain negative and significant, suggesting additional effects (than those transiting through agricultural productivity) of administrative capacity on poverty reduction.

Thus, as we expect, the results suggest that agricultural productivity is a channel through which state capacity could affect poverty in Africa. The results also suggest that

government effectiveness would have a negative effect on poverty beyond its effect transiting through increased agricultural productivity. Another conclusion from the results is that administrative capacity is the most important aspect of state capacity for poverty reduction. Not only does the proxy for administrative capacity have a larger effect on poverty reduction, its coefficient remains negative and significant when estimating the separate and simultaneous effects of state capacity variables, with or without the cereal yield variable.

In addition to our variables of interest, the results in Tables 2 and 3 show that trade openness and primary education have negative effects on poverty as expected and depending on econometric specification the effects of these variables are significant.

Table 3. Separate Effects of State Capacity Variables on Poverty Rate in the Sub-Saharan Africa Sub-Sample

VARIABLES	Fixed Effects				System-GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.216***		-0.261***		-0.370*		-0.292*	
	(3.24)		(4.65)		(1.64)		(1.82)	
Pol stability		-0.052		-0.104***		-0.107		0.059
		(1.33)		(3.26)		(1.22)		(0.52)
GDP growth rate	0.0049	0.004	0.005	0.0038	0.0087	0.0113*	0.014	0.004
	(1.59)	(1.22)	(1.24)	(0.89)	(1.32)	(1.71)	(1.51)	(0.52)
Log(inflation rate)	-0.0014	-0.010	-0.0159	-0.0349**	0.0435	0.0083	0.023	0.0436
	(0.08)	(0.47)	(1.20)	(2.04)	(1.07)	(0.20)	(0.69)	(0.75)
Log(openness)	-0.0609	-0.0473	-0.109*	-0.0976*	-0.168	-0.106	-0.0537	-0.324*
	(0.92)	(0.69)	(1.90)	(1.64)	(1.34)	(0.64)	(0.47)	(1.78)
Primary education	-0.0017	-0.0027**	-0.0004	-0.0014	-0.0054**	-0.0055**	-0.00385**	-0.003
	(1.50)	(2.25)	(0.38)	(1.26)	(2.62)	(2.58)	(1.96)	(1.13)
Log(cereal yield)			-0.189***	-0.186***			-0.287**	-0.416**
			(3.17)	(3.11)			(2.27)	(2.25)
Constant	4.536***	4.734***	5.969***	6.180***	5.604***	5.228***	7.138***	9.333***
	(16.04)	(16.33)	(13.42)	(13.34)	(13.22)	(7.91)	(7.90)	(6.04)
Observations	196	196	187	187	196	196	187	187
R-squared (adjusted)	0.96	0.95	0.95	0.95				
Number of countries	44	44	42	42	44	44	42	42
Sargan-Hansen test[1]					0.120	0.732	0.458	0.90
AR(1)					0.000	0.000	0.062	0.052
AR(2)[2]					0.186	0.845	0.214	0.927

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2]Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

4.2. Robustness Checks

We run several tests to check for the robustness of our findings. The first robustness check consists of estimating the models with a sub-sample of Sub-Saharan African (SSA) countries. Indeed, given differences in their economic structure with the rest of the continent, one may suspect that the results may have been driven by Northern African countries.[5] The results in Tables 3 and 4 suggest that estimating the models in the sub-sample of SSA countries confirms our main findings. In the SSA sub-sample too, we find that administrative capacity is the most important aspect of state capacity for poverty reduction: the government effectiveness index, a proxy for administrative capacity has a negative and significant effect on poverty when estimating separately or simultaneously the effects of state capacity variables on poverty. Moreover, as in the full sample case, in the SSA sub-sample, the effect of cereal yield on poverty is negative and significant regardless of econometric specification; and even after controlling for cereal yield, the effect of government effectiveness variable remains negative and significant. Thus, the results in the SSA sub-sample confirm that the increase in agricultural productivity is a channel through which state capacity could contribute to poverty reduction.

The second robustness check consists of changing the period of analysis, by considering the 1999-2014 sub-period. According to available data, Africa's average infant mortality rate was below 130 deaths for 1,000 births live for the first time in 2000 (see Figure 1). Thus, from 2000, the reduction of infant mortality has accelerated, and one may suspect a difference in the results if the analysis focuses on the period during which Africa has experienced an accelerated reduction of infant mortality. To check for this possibility, we run econometric regressions with data covering the 1999-2014 sub-period only. The results in the appendix show that the government effectiveness index still has a negative and significant effect on poverty regardless of econometric specification. The effect of government effectiveness variable remains negative and significant after controlling for cereal yield, which in turn has a negative and significant effect on poverty. Accordingly, changing the period of the analysis does not modify the main conclusions of the paper: administrative capacity is the most important aspect of state capacity for poverty reduction in Africa, and cereal yield is a transmission channel of the effect of state capacity on poverty.

[5] To estimate the models in the SSA sub-sample, we exclude the following countries from the full sample: Algeria, Djibouti, Egypt, Libya, Morocco, and Tunisia. These countries are considered Middle East Northern African countries according to the World Bank country classification.

Table 4. Simultaneous Effects of State Capacity Variables on Poverty Rate in the Sub-Saharan Africa Sub-Sample

VARIABLES	Fixed Effects		System-GMM	
	(1)	(2)	(3)	(4)
	Log (mor)	Log (mor)	Log (mor)	Log (mor)
Gov effectiveness	-0.215***	-0.212***	-0.592**	-0.381
	(3.26)	(3.65)	(2.23)	(1.61)
Pol stability	-0.00067	-0.0519*	-0.0469	0.0465
	(0.02)	(1.85)	(0.40)	(0.67)
GDP growth rate	0.0049	0.0046	0.0093	0.0072
	(1.58)	(1.18)	(1.46)	(0.75)
Log(inflation rate)	-0.0015	-0.024*	-0.088	0.0257
	(0.07)	(1.65)	(0.92)	(0.71)
Log(openness)	-0.061	-0.106*	-0.249*	-0.229**
	(0.95)	(1.81)	(1.71)	(2.06)
Primary education	-0.0017	-0.0005	-0.00375*	-0.0026
	(1.52)	(0.44)	(1.66)	(1.08)
Log(cereal yield)		-0.190***		-0.314**
		(3.29)		(1.96)
Constant	4.536***	5.998***	5.365***	7.943***
	(16.04)	(13.71)	(9.27)	(6.14)
Observations	196	187	196	187
R-squared (adjusted)	0.95	0.95		
Number of countries	44	42	44	42
Sargan-Hansen test[1]			0.717	0.369
AR(1)			0.061	0.073
AR(2)[2]			0.227	0.181

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2]Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

For the third robustness check, we change our proxy for agricultural productivity. In place of cereal yield, we use agriculture value added per worker as our proxy for agricultural productivity. As reported in the appendix, changing the proxy for agricultural productivity does not call into question our main findings: agricultural productivity is a channel through which state capacity affects poverty, and administrative capacity is the most important aspect of state capacity for poverty reduction in Africa.

For the fourth robustness check, rather of changing our measurement of agricultural productivity, we change our proxy for the poverty rate. Instead of under-five infant mortality rate, we use under one-year infant mortality rate as our proxy for the poverty

rate. The results in the appendix confirm our initial findings.

For the last robustness check, we simultaneously change the proxy for agricultural productivity and poverty. The results in the appendix show that our main findings remain robust to such changes.

4.3. Policy Implications

This paper finds two main results. The first main finding is that state capacity and particularly administrative capacity is important for poverty reduction in Africa. The second one is that agricultural productivity is a channel through which state capacity could contribute to poverty reduction. These two findings suggest that a high priority should be given to the improvement of the capacity of state to design and implement sound policies, including policies for the enhancement of agricultural productivity in order to be more effective in the fight against poverty in Africa. Improving agricultural productivity requires a range of policy interventions (from land rights policies to agriculture services extension, including seed and fertilizer distribution as well as transportation and transformation of agricultural products) that African countries must master by developing strong state capacity for the design and implementation of sound policies.

In addition to our variables of interest (state capacity and agricultural productivity), the paper finds that education and trade openness could also contribute to poverty reduction. This suggests that investing in education access and quality should also be the priority of African policy makers in their efforts to fight against poverty. Likewise, African governments should pursue efforts for more trade openness; this can contribute to reduce poverty. In that sense, the African Continental Free Trade Agreement (AfCFTA), signed by 44 African countries in Kigali, Rwanda, in March 2018 is encouraging. This initiative aims at creating a tariff-free continent that can support local businesses growth and boost intra-African trade. It could accelerate poverty reduction through industrialization and jobs creation.

The paper does not find a significant effect of economic growth on poverty reduction. This may reflect the quality of economic growth that African countries experienced over the past years. Although other factors have contributed, Africa's recent growth has been driven by the mining sector. However, mining is an enclave sector, and might not generate enough jobs for the population's needs. Thus, African countries should strive in diversifying their economies for higher and inclusive economic growth that will contribute to poverty reduction.

5. CONCLUSION

In this paper, we analyze the effect of state capacity on poverty in Africa. We consider two proxy variables that capture two different aspects of state capacity: the

government effectiveness index, capturing administrative capacity, and the political stability index, a proxy for coercive capacity. We pursue two objectives: (1) identifying the most important aspect of state capacity for poverty reduction; and (2) identifying the channel through which state capacity could affect poverty in Africa.

Using four-year averages panel data from 53 African countries spanning from 1995 to 2014, we find that each of the aforementioned indicators of state capacity negatively affects poverty rate. However, administrative capacity would be the most important aspect of state capacity for poverty reduction in Africa. Not only does the proxy variable for administrative capacity (i.e., the government effectiveness index) have a larger negative effect on the poverty rate, but also its coefficient remains negative and significant, when the effects of the two proxy variables are simultaneously estimated.

We also find a negative and significant effect of cereal yield (our proxy for agricultural productivity) on poverty; suggesting that increased agricultural productivity contributes to poverty reduction in Africa. After controlling for cereal yield, the coefficients associated with the state capacity proxy variables decline, but the coefficient of the government effectiveness index remains negative and significant. Thus, the results suggest that cereal yield is a channel through which state capacity could affect poverty in Africa.

We also control for other variables that have the potential to affect poverty. Among these variables, we find that trade openness and primary education enrollment rate have negative effects on poverty, and depending on econometric specification the effects of these variables are significant.

The results in this paper suggest that, in order to be more effective in the fight against poverty, a high priority should be given to the ability of state to design and implement sound policies, including policies for the improvement of agricultural productivity in Africa. Another policy implication of the paper's findings is that education and trade openness are pathways to poverty reduction in Africa. Therefore, African governments should strive to invest more in education, and they should also encourage trade openness in order to reduce poverty.

APPENDIX

Table A1. Summary Statistics

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
Infant mortality rate	265	107.11	54.01	14.05	262.07
Government effectiveness	265	-0.72	0.63	-2.32	0.95
Political stability	265	-0.57	0.93	-3.25	1.06
Cereal yield	255	1412.56	1225.4	148	7957
Primary education (gross)	245	94.73	24.85	29.20	145.41
Log (inflation rate)	246	1.85	1.22	-1.68	9.41
Log (openness)	250	4.25	0.49	2.97	6.10
Growth rate	258	4.99	5.65	-8.02	64.45

Table A2. Separate Effects of State Capacity Variables on Poverty Rate Using the Data Over the 1999-2014 Sub-Period

VARIABLES	Fixed Effects				System-GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.165*		-0.202***		-0.523**		-0.321**	
	(1.93)		(2.71)		(2.10)		(1.99)	
Pol stability		-0.0632		-0.092***		-0.176		-0.0686
		(1.60)		(2.67)		(1.10)		(0.74)
GDP growth rate	0.0009	0.0008	-0.0008	0.00016	0.0122**	0.0125	0.0145	0.0087
	(0.41)	(0.33)	(0.23)	(0.04)	(2.18)	(1.58)	(1.19)	(0.55)
Log(inflation rate)	-0.020	-0.0256*	-0.0223	-0.0279**	0.0057	0.0205	0.0388	0.0297
	(1.38)	(1.68)	(1.59)	(1.96)	(0.18)	(0.48)	(1.03)	(070)
Log(openness)	-0.0941*	-0.0916*	-0.101*	-0.0887	-0.113	-0.178	-0.0697	-0.273
	(1.84)	(1.80)	(1.85)	(1.04)	(0.65)	(1.16)	(0.49)	(1.61)
Primary education	-0.00065	-0.0011	0.0005	6.11e-05	-0.0033	-0.0060***	-0.00397	-0.00296
	(0.55)	(0.95)	(0.52)	(0.06)	(1.46)	(2.82)	(1.54)	(0.44)
Log(cereal yield)			-0.144**	-0.144***			-0.239*	-0.282*
			(2.53)	(2.66)			(1.75)	(1.70)
Constant	4.555***	4.690***	5.499***	5.595***	5.158***	5.396***	6.272***	7.574***
	(18.11)	(20.20)	(12.50)	(13.56)	(7.66)	(8.04)	(6.19)	(5.14)
Observations	180	180	172	172	180	180	172	172
R-squared (adjusted)	0.97	0.97	0.97	0.97				
Number of countries	49	49	47	47	49	49	47	47
Sargan-Hansen test[1]					0.695	0.780	0.408	0.116
AR(1)					0.001	0.009	0.017	0.007
AR(2)[2]					0.361	0.721	0.485	0.956

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A3. Simultaneous Effects of State Capacity Variables on Poverty Rate over the 1999-2014 Sub-Period

VARIABLES	Fixed effects		System-GMM	
	(1)	(2)	(3)	(4)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.128	-0.140*	-0.605**	-0.427*
	(1.54)	(1.82)	(2.40)	(1.69)
Pol stability	-0.0331	-0.0589*	-0.041	0.0592
	(0.91)	(1.79)	(0.26)	(0.62)
GDP growth rate	0.00098	1.21e-05	0.0109	0.0118
	(0.42)	(0.001)	(1.52)	(1.22)
Log(inflation rate)	-0.0218	-0.0239*	0.0117	0.0384
	(1.45)	(1.73)	(0.31)	(0.96)
Log(openness)	-0.0898*	-0.0882*	-0.240*	-0.197*
	(1.82)	(1.65)	(1.66)	(1.78)
Primary education	-0.00076	0.00043	-0.0036	-0.003
	(0.65)	(0.48)	(1.59)	(1.47)
Log(cereal yield)		-0.145***		-0.237*
		(0.0541)		(1.77)
Constant	4.560***	5.477***	5.056***	6.711***
	(18.21)	(13.18)	(8.69)	(6.06)
Observations	180	172	180	172
R-squared (adjusted)	0.97	0.97		
Number of countries	49	47	49	47
Sargan-Hansen test1			0.642	0.484
AR(1)			0.040	0.014
AR(2)2			0.203	0.248

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A4. Separate Effects of State Capacity Variables on Poverty Rate Using the Agriculture Value Added per Worker Variable

VARIABLES	Fixed Effects				Sysstem-GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.181***		-0.163**		-0.448*		-0.620**	
	(2.74)		(2.04)		(1.76)		(2.66)	
Pol stability		-0.0349		-0.0836**		-0.121*		-0.126
		(0.92)		(2.02)		(1.68)		(1.03)
GDP growth rate	0.0046	0.00398	0.00862*	0.00827*	0.0109	0.0141**	-0.0064	0.0076
	(1.49)	(1.19)	(1.71)	(1.69)	(1.47)	(2.06)	(0.45)	(0.67)
Log(inflation rate)	-0.0058	-0.0116	0.0147	0.0132	0.0592*	0.0478	-0.00078	0.0038
	(0.32)	(0.56)	(0.73)	(0.60)	(1.65)	(1.04)	(0.01)	(0.07)
Log(openness)	-0.0605	-0.0524	-0.023	0.0013	-0.150	-0.077	-0.425*	-0.116
	(0.95)	(0.81)	(0.30)	(0.02)	(0.79)	(0.49)	(1.65)	(0.66)
Primary education	-0.0014	-0.0022*	-0.00202*	-0.00282**	-0.00575**	-0.00673**	-0.0018	-0.0127
	(1.25)	(1.89)	(1.70)	(2.35)	(2.29)	(2.66)	(0.68)	(1.34)
Log(ag_va/worker)			-0.0632	-0.120*			-0.228***	-0.314***
			(1.05)	(1.80)			(2.85)	(3.66)
Constant	4.437***	4.612***	4.701***	5.154***	4.962***	5.037***	7.804***	8.311***
	(16.38)	(10.03)	(8.06)	(8.44)	(7.72)	(7.64)	(9.16)	(8.86)
Observations	219	219	198	198	219	219	198	198
R-squared (adjusted)	0.96	0.96	0.96	0.96				
Number of countries	49	49	46	46	49	49	46	46
Sargan-Hansen test[1]					0.294	0.617	0.517	0.818
AR(1)					0.001	0.001	0.006	0.052
AR(2)[2]					0.364	0.774	0.273	0.964

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A5. Simultaneous Effects of State Capacity Variables on Poverty Rate Using the Agriculture Value Added per Worker Variable

VARIABLES	Fixed Effects		System-GMM	
	(1)	(2)	(3)	(4)
	Log(mor)	Log(mor)	Log(mor)	Log(mor)
Gov effectiveness	-0.196***	-0.0994	-0.583**	-0.481
	(3.02)	(1.33)	(2.46)	(1.38)
Pol stability	0.0141	-0.0541	-0.044	0.165
	(0.41)	(1.37)	(0.28)	(0.97)
GDP growth rate	0.0048	0.00856*	0.0098	0.00128
	(1.52)	(1.78)	(1.46)	(0.11)
Log(inflation rate)	-0.0042	0.0143	0.0402	0.0327
	(0.22)	(0.66)	(1.04)	(0.59)
Log(openness)	-0.0639	-0.00478	-0.212	-0.314
	(1.07)	(0.06)	(1.56)	(1.21)
Primary education	-0.0014	-0.00236**	-0.00453*	-0.0038*
	(1.22)	(2.02)	(1.82)	(1.86)
Log(ag_va/worker)		-0.0986		-0.258***
		(1.49)		(3.22)
Constant	4.441***	4.923***	5.008***	7.789***
	(16.74)	(7.76)	(9.08)	(7.51)
Observations	219	198	219	198
R-squared (adjusted)	0.96	0.96		
Number of countries	49	46	49	46
Sargan-Hansen test[1]			0.534	0.575
AR(1)			0.022	0.002
AR(2)[2]			0.228	0.665

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A6. Separate Effects of State Capacity Variables on Poverty Rate Using the Infant Mortality (less than one year) Rate Variable

VARIABLES	Fixed Effects				System-GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)
Gov effectiveness	-0.145***		-0.178***		-0.503**		-0.386**	
	(2.63)		(3.73)		(2.47)		(2.61)	
Pol stability		-0.0436		-0.0865***		-0.144**		-0.118
		(1.37)		(3.52)		(2.17)		(1.55)
GDP growth rate	0.00419	0.00353	0.00453	0.00366	0.00953	0.0126**	0.0128	0.00723
	(1.60)	(1.29)	(1.36)	(1.08)	(1.63)	(2.09)	(1.29)	(0.57)
Log(inflation rate)	-0.00537	-0.0116	-0.0173	-0.0319**	0.0450	0.0321	0.0323	0.0297
	(0.35)	(0.64)	(1.59)	(2.34)	(1.52)	(0.90)	(1.27)	(0.92)
Log(openness)	-0.0394	-0.0290	-0.0747	-0.0648	-0.141	0.00336	-0.0659	-0.174
	(0.70)	(0.50)	(1.60)	(1.33)	(0.84)	(0.02)	(0.62)	(1.17)
Primary education	-0.00092	-0.0015	1.64e-05	-0.0005	-0.00367**	-0.00534***	-0.00298*	0.00019
	(0.97)	(1.56)	(0.02)	(0.62)	(1.96)	(2.89)	(1.71)	(0.03)
Log(cereal yield)			-0.150***	-0.153***			-0.183*	-0.238*
			(3.24)	(3.29)			(1.86)	(1.77)
Constant	3.985***	4.099***	5.130***	5.278***	4.350***	4.219***	5.787***	6.565***
	(16.83)	(16.94)	(14.31)	(14.13)	(8.13)	(7.55)	(7.82)	(5.56)
Observations	219	219	210	210	219	219	210	210
R-squared (adjusted)	0.96	0.96	0.96	0.96				
Number of countries	49	49	47	47	49	49	47	47
Sargan-Hansen test[1]					0.581	0.653	0.431	0.211
AR(1)					0.004	0.002	0.023	0.034
AR(2)[2]					0.435	0.684	0.488	0.640

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A7. Simultaneous Effects of State Capacity Variables on Poverty Rate Using the Infant Mortality (less than one year) Rate Variable

VARIABLES	Fixed Effects		System-GMM	
	(1)	(2)	(3)	(4)
	Log(infm)	Log(infm)	Log(infm)	Log(infm)
Gov effectiveness	-0.134**	-0.124***	-0.503**	-0.354*
	(2.56)	(2.65)	(2.54)	(1.82)
Pol stability	-0.0101	-0.0546**	-0.083	0.0024
	(0.34)	(2.46)	(0.59)	(0.03)
GDP growth rate	0.0041	0.00418	0.0077	0.0101
	(1.56)	(1.30)	(1.36)	(1.29)
Log(inflation rate)	-0.0065	-0.0262**	0.0276	0.0348
	(0.38)	(2.12)	(0.90)	(1.17)
Log(openness)	-0.0369	-0.0697	-0.114	-0.0934
	(0.57)	(1.47)	(0.94)	(0.94)
Primary education	-0.00095	-4.71e-05	-0.00336*	-0.00297
	(1.01)	(0.05)	(1.84)	(1.58)
Log(cereal yield)		-0.153***		-0.184*
		(3.41)		(1.74)
Constant	3.983***	5.158***	4.184***	5.939***
	(16.73)	(14.65)	(8.94)	(6.71)
Observations	219	210	219	210
R-squared (adjusted)	0.96	0.96		
Number of countries	49	47	49	47
Sargan-Hansen test[1]			0.610	0.498
AR(1)			0.014	0.011
AR(2)[2]			0.460	0.593

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A8. Separate Effects of State Capacity Variables on Poverty Rate Using the Infant Mortality (less than one year) Rate and the Agriculture Value Added per Worker Variables

VARIABLES	Fixed Effects				System-GMM			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)	Log(infm)
Gov effectiveness	-0.145***		-0.130**		-0.503**		-0.617***	
	(2.63)		(1.96)		(2.47)		(3.13)	
Pol stability		-0.0436		-0.0896***		-0.144**		-0.192**
		(1.37)		(2.63)		(2.17)		(2.18)
GDP growth rate	0.00419	0.00353	0.00720*	0.0070*	0.00953	0.0126**	-0.0180	0.00376
	(1.60)	(1.29)	(1.73)	(1.82)	(1.63)	(2.09)	(0.86)	(0.42)
Log(inflation rate)	-0.00537	-0.0116	0.0114	0.0104	0.0450	0.0321	-0.00264	0.00017
	(0.35)	(0.64)	(0.65)	(0.54)	(1.52)	(0.90)	(0.06)	(0.00)
Log(openness)	-0.0394	-0.0290	-0.0202	0.00828	-0.141	0.0034	-0.347	-0.0901
	(0.70)	(0.50)	(0.30)	(0.12)	(0.84)	(0.02)	(1.35)	(0.47)
Primary education	-0.00092	-0.00151	-0.00146	-0.00213**	-0.00367**	-0.00534***	-0.00052	-0.00405**
	(0.97)	(1.56)	(1.43)	(2.12)	(1.96)	(2.89)	(0.22)	(2.38)
Log(ag_va/worker)			-0.0899*	-0.149***			-0.164**	-0.264***
			(1.77)	(2.85)			(2.28)	(4.14)
Constant	3.985***	4.099***	4.519***	4.930***	4.350***	4.219***	6.573***	6.661***
	(16.83)	(16.94)	(9.03)	(9.82)	(8.13)	(7.55)	(7.41)	(9.05)
Observations	219	219	198	198	219	219	198	198
R-squared (adjusted)	0.96	0.96	0.96	0.96				
Number of countries	49	49	46	46	49	49	46	46
Sargan-Hansen test[1]					0.581	0.653	0.869	0.269
AR(1)					0.004	0.002	0.076	0.019
AR(2)[2]					0.435	0.684	0.414	0.500

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A9. Simultaneous Effects of State Capacity Variables on Poverty Rate Using the Infant Mortality (less than one year) Rate and the Agriculture Value Added per Worker Variables

VARIABLES	Fixed Effects		System-GMM	
	(1)	(2)	(3)	(4)
	Log(infm)	Log(infm)	Log(infm)	Log(infm)
Gov effectiveness	-0.134**	-0.0391	-0.503**	-0.334
	(2.56)	(0.68)	(2.54)	(1.26)
Pol stability	-0.0101	-0.0780**	-0.083	0.0240
	(0.34)	(2.42)	(0.59)	(0.20)
GDP growth rate	0.00408	0.00712*	0.0077	0.00426
	(1.56)	(1.85)	(1.36)	(0.46)
Log(inflation rate)	-0.00653	0.0108	0.0276	0.0196
	(0.38)	(0.56)	(0.90)	(0.44)
Log(openness)	-0.0369	0.00589	-0.114	-0.181
	(0.67)	(0.09)	(0.94)	(0.84)
Primary education	-0.000954	-0.00195**	-0.00336*	-0.00303*
	(1.01)	(1.97)	(1.83)	(1.87)
Log(ag_va/worker)		-0.141***		-0.212***
		(2.70)		(3.46)
Constant	3.983***	4.839***	4.184***	6.464***
	(16.73)	(9.32)	(8.94)	(7.63)
Observations	219	198	219	198
R-squared (adjusted)	0.96	0.96		
Number of countries	49	46	49	46
Sargan-Hansen test[1]			0.610	0.679
AR(1)			0.014	0.000
AR(2)[2]			0.460	0.851

Note: ***, **, * denote significant coefficients at the 1%, 5% and 10% level. The figures in brackets are robust t-statistics. All the estimations include time fixed effects whose coefficients are not reported. [1]Stands for the p-values associated with the Sargan-Hansen test. The p-values are higher than 10, which suggests that the lagged values of the variables that we use as instruments in the system-GMM model are valid. [2] Stands for the p-values associated with the test of absence of autocorrelation of second order. The result shows that there is no such autocorrelation in the data; thereby, validating the use of lagged variables of a minimum of two periods as instruments in the system-GMM model. To limit the number of instruments, we use only the second and third four-year lagged values of the endogenous variables as instruments.

Table A10. List of Countries

Algeria	Equatorial Guinea	Mauritania	Sudan
Angola	Eritrea	Mauritius	Swaziland
Benin	Ethiopia	Morocco	Tanzania
Botswana	Gabon	Mozambique	Togo
Burkina Faso	Gambia	Namibia	Tunisia
Burundi	Ghana	Niger	Uganda
Cameroon	Guinea	Nigeria	Zambia
Cape Verde	Guinea-Bissau	Republic of the Congo	Zimbabwe
Central African Republic	Kenya	Rwanda	
Chad	Lesotho	São Tomé and Príncipe	
Comoros	Liberia	Senegal	
Côte d'Ivoire	Libya	Seychelles	
Democratic Republic of the Congo	Madagascar	Sierra Leone	
Djibouti	Malawi	Somalia	
Egypt	Mali	South Africa	

REFERENCES

Acemoglu, D. (2005), "Politics and Economics in Weak and Strong States," *Journal of Monetary Economics*, 52(7), 1199-1226.

Alesina, A., S. Ozler, N. Roubini and P. Swagel (1996), "Political Instability and Economic Growth," *Journal of Economic Growth*, 1(2), 189-211.

Alesina, A. and R. Perotti (1996), "Income Distribution, Political Instability, and Investment," *European Economic Review*, 40(6), 1203-1228.

Asiedu, E. (2006), "Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability," *World Economy*, 29(1), 63-77.

Besley, T. and T. Persson (2010), "State Capacity, Conflict, and Development," *Econometrica*, 78(1), 1-34.

_____ (2009), "The Origins of State Capacity: Property Rights, Taxation, and Politics," *American Economic Review*, 99(4), 1218-1244.

Birkhaeuser, D., R. Evenson and G. Feder (1991), "The Economic Impact of Agricultural Extension: A Review," *Economic Development and Cultural Change*, 39(3), 607-650.

Blundell, R. and S. Bond (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, 87(1), 115-143.

Byerlee, D., X. Diao and C. Jackson (2005), "Agriculture, Rural Development, and ProPoor Growth, Country Experiences in the PostReform Era," Agriculture and Rural Development Discussion Paper 21. World Bank, Washington DC.

Cunguara, B. and I. Darnhofer (2011), "Assessing the Impact of Improved Agricultural Technologies on Household Income in Rural Mozambique," *Food Policy*, 36(3), 378-390.

Cunguaraa, B. and K. Moderc (2011), "Is Agricultural Extension Helping the Poor? Evidence from Rural Mozambique," *Journal of African Economies*, 20(4), 562-595.

Cuong, N.V. (2008), "Is a Governmental Micro-Credit Program for the Poor Really Pro-Poor? Evidence from Vietnam," *Developing Economies*, 46(2), 151-187.

Dessus, S., S. Herrera and R. de Hoyos (2008), "The Impact of Food Inflation on Urban Poverty and its Monetary Cost: Some Back-of-the-Envelope Calculations," *Agricultural Economics*, 39(S1), 417-429.

Dollar, D. and A. Kraay (2002), "Growth is Good for the Poor," *Journal of Economic Growth*, 7(3), 195-225.

Fan, S., P. Hazel and S. Thorat (2000), "Government Spending, Agricultural Growth and Poverty in Rural India," *American Journal of Agricultural Economics*, 82(4), 1088-1051.

Fan, S., L. Zhang and X. Zhang (2004), "Reforms, Investment and Poverty in Rural China," *Economic Development and Cultural Change*, 52(2), 395-421.

Fearon, J.D. and D.D Laitin (2003), "Ethnicity, Insurgency, and Civil War," *American Political Science Review*, 97(1), 75-90.

Fosu, A.K. (2003), "Political Instability and Export Performance in Sub-Saharan Countries," *Journal of Development Studies*, 39(4), 68-82.

Gollin, D., D. Lagakos and M.E. Waugh (2014a), "The Agricultural Productivity Gap," *Quarterly Journal of Economics*, 129(2), 939-993.

_____ (2014b), "Agricultural Productivity Differences Across Countries," *American Economic Review*, 104(4), 165-70.

Hanson, J.K. and R. Sigman (2013), "Leviathan's Latent Dimensions: Measuring State Capacity for Comparative Political Research," Paper presented at the World Bank Political Economy Brown Bag Lunch Series, March 21, 2013.

Hassine, N.B. and M. Kandil (2009), "Trade Liberalisation, Agricultural Productivity and Poverty in the Mediterranean Region," *European Review of Agricultural Economics*, 36(1), 1-29.

Kaufmann, D., A. Kraay and M. Mastruzzi (2010), "The Worldwide Governance Indicators: A Summary of Methodology, Data and Analytical Issues," World Bank Policy Research Working Paper No. 5430. World Bank: Washington, D.C.

Khandker, S.R. and R.R. Faruqee (2003), "The Impact of Farm Credit in Pakistan," *Agricultural Economics*, 28(3), 197-213.

Litschig, S. and M. Morrison (2013), "The Impact of Intergovernmental Transfers on Education Outcomes and Poverty Reduction," *American Economic Journal: Applied Economics*, 5(4), 206-240.

Mishra, A. and R. Ray (2011), "Prices, Inequality, and Poverty: Methodology and Indian Evidence," *Review of Income and Wealth*, 57(3), 428-448.

Mosley, P. and A. Suleiman (2007), "Aid, Agriculture and Poverty in Developing

Countries," *Review of Development Economics*, 11(1), 139-158.
OECD (2002), "Development Centre Studies: Education and Health Expenditure and Poverty Reduction in East Africa - Madagascar and Tanzania," OECD: Paris.
Powers, E.T. (1995), "Inflation, Unemployment, and Poverty Revisited," *Federal Reserve Bank of Cleveland Economic Review*, 31(3), 2-13.
Pritchett, L. and L.H. Summers (1996), "Wealthier is Healthier," *Journal of Human Resources*, 31(4), 841-868.
Ravallion, M. (1996), "Issues in Measuring and Modelling Poverty," *Economic Journal*, 106, 1328-1343.
Ross, M. (2006), "Is Democracy Good for the Poor?" *American Journal of Political Science*, 50(4), 860-874.
Schneider, K. and M.K. Gugerty (2011), "Agricultural Productivity and Povery Reduction: Linkages and Pathways," *Evans School Review*, 1(1), 56-74.
Tebaldi, E. and R. Mohan (2010), "Institutions and Poverty," *Journal of Development Studies*, 46(6), 1047-1066.
Xin, W. and R. Smyth (2010), "Economic Openness and Subjective Well-Being in China," *China and World Economy*, 18(2), 22-40.
World Bank (2004), "National Strategy and Reform Policy: Case Studies of International Initiatives. Agriculture and Rural Development," Discussion Paper 12, Washington, D.C.: World Bank.
Zaman, H. (2001), "Assessing the Poverty and Vulnerability Impact of Micro-Credit in Bangladesh: A Case Study of BRAC," World Bank Policy Research Working Paper No. WPS 2145.

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