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The criticality of institutions and the macroeconomy for education outcomes in Africa

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Abstract

This study investigates the significance of the macroeconomy and institutions for educational outcomes in Africa. The annual panel data used in the study covers the period from 1995 to 2016 for 48 African countries. The study shows that the macroeconomy in the form of GDP per capita, natural resources rents, remittances and migration have significant positive effects on educational outcomes while lending interest rate and inflation have significant negative effects. The study further shows that institutions in the form of corruption has significant negative effects on educational outcomes while political stability has significant positive effects. Overall, the study shows that a conducive macroeconomic and institutional environment is critical for education.

Keywords: Macroeconomy; institutions; educational outcomes

JEL Classification: G21, C23, E62, F30, D14, G21, O100

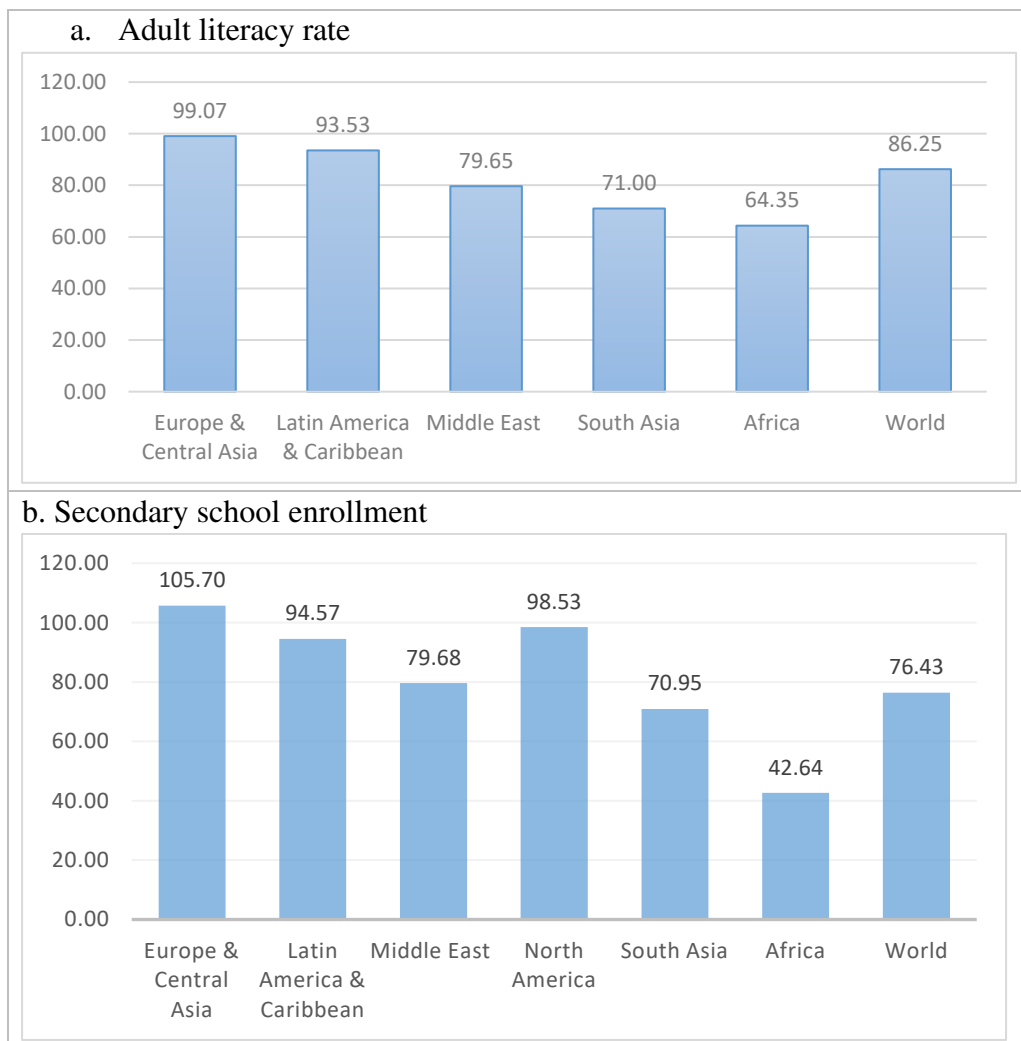
Introduction

What are the effects of the macroeconomy and institutions on educational outcomes? How can a country create an environment conducive to successful educational outcomes such as high enrollment and high literacy? While the answers to these questions have changed fundamentally over the last decades, the relationship between the macroeconomy and institutions and educational outcomes raises a host of issues that deserve careful analysis.

Africa continues to experience high rates of population growth. It is estimated that, between 2017 and 2050, the populations of 26 African countries will expand to at least double their current size, (UNDESA, 2017) providing endless opportunities for economic development, if the talents of this rising youth are harnessed towards the productive sectors of the economy (Goldstone, 2010, Gerland et al, 2014; Omoju and Abraham, 2014; Reed and Mberu, 2014; Evans, 2020a). In 2018, Africa has 1.3 billion people, 16.64% of the total world population, a population density of 43 per square kilometer (113 people per square miles) and median age of 19.4 years. Africa's greatest asset in the coming decades will therefore be in its capacity to sustainably harness this swiftly increasing pool of capital in its people (Reed and Mberu, 2014; Jimenez and Pate, 2017).

However, Africa has performed low in all measures of educational outcomes, as educational outcomes indicators are lower in Africa compared to other world regions. As shown in Figure 1, in 2016, adult literacy rate was 64.4% in Africa and 71.0% in South Asia, while in other regions of the world such as Latin America and Caribbean, and Europe and Central Asia, it was 93.5% and 99.0% respectively. A similar picture also emerges from school enrollment rates. Secondary school enrollment was 98.5% in North America, 94.6% in Latin America and Caribbean, and 105.7% in Europe and Central Asia which are far higher compared to 42.6% in Africa. Nonetheless, the statistics are perhaps not surprising considering that government expenditure on education (% of GDP) was 4.5% in Africa compared to 5.1% and 5.3% in Europe and Central Asia, and Latin America and Caribbean respectively.

Figure 1. Educational Outcomes in World Regions (2016)



Source: World Bank (2018)

The low level of educational outcomes has led the continent to the “unskilled trap” where Africa competes on primarily unskilled labor and natural resources (Birdsall, Pinckney, and Sabot, 2001;

Omorogiuwa, Zivkovic and Ademoh, 2014; Ceglowski, Golub, Mbaye and Prasad, 2015). Moving up the value chain to efficiency and innovation-driven economy will require continued, high impact investments in education, and creating the enabling environment for sustainable job creation (Bhargava, Jamison, Lau and Murray, 2001; Adamu, 2003; Nwaogwugwu and Evans, 2019; Lawanson and Evans, 2019). Considering the high rates of population growth in Africa, the continent is supposed to reap the demographic dividend that has benefited most of East Asian economies, taking advantage of the demographic opportunities with a conducive macroeconomy and institutional environment (Bremner et al, 2010; Cai, 2010; Bongjoh et al, 2011).

Many factors underlying the macroeconomy and institutions may influence educational outcomes. However, extant studies have not cast adequate light on this area. Studies on educational outcomes have mostly concentrated on the impacts of educational outcomes on economic growth (e.g., Gennaioli, La Porta, Lopez-de-Silanes and Shleifer, 2012; Hanushek, 2013). This study fills the gap. The objective of this study therefore is to fill the gap and determine the effects of the macroeconomy and institutions on educational outcomes in Africa. Such identification and enquiry is key to any policy effort to understand and anticipate the potentials of the macroeconomy and institutions for educational outcomes in the continent.

The remainder of this work is organized as follows: section 2 deals with the theory and a review of the literature. Section 3 discusses the data and methodology. Section 4 presents the empirical results. Section 5 explicitly provides discussion of the findings while section 6 provides a brief summary and conclusion.

3. Theory and Review of Literature

The capabilities approach is an economic theory conceived by Amartya Sen in the 1980s as an alternative approach to welfare economics. It revolves around people as human being and views development as expansion of their capabilities. It aims to enhance people's well-being by expanding their capabilities. It emphasizes not only how people actually function but also their having capabilities, to achieve outcomes that they value and have reason to value (Robeyns, 2005; Sen, 2005; Nussbaum, 2011). The capabilities approach therefore aims to enhance people's well-being by expanding their stock of skills, education and experience which is the domain of human capital.

Human capital theory is closely associated with human resources management and labour economics. In the theories of labour economics, the standard approach is to view human capital as a set of attributes that increase a worker's productivity (Acemoglu, 2008). Within this standard approach, there are various ways of human capital:

- i. Becker's view: Human capital is directly beneficial in production, as it increases a worker's productivity in different duties, organizations, and contexts. While the character of educational outcomes can be said to be complex, however it can be represented by the stock of knowledge or skills which is a component of the production function (Becker, 1994).

- ii. Gardner's view: Human capital is multi-dimensional, and emphasizes physical vs. mental abilities as differentiated skills. Gardner's multiple-intelligences theory highlights how many prodigies and virtuosos were unskilled in other fields (Gardner, 1996).
- iii. Schultz/Nelson-Phelps view: Human capital is the capacity to adapt. Educational outcomes is valuable in dealing with disequilibrium situations, or with situations requiring workers to adapt to a changing environment.
- iv. Bowles-Gintis view: Human capital is viewed as the capacity to work in organizations and adjust to life in a capitalistic and hierarchical society. The role of schools is to inculcate the right philosophy and approach to life.
- v. Spence view: Measures of human capital are more measures of aptitude/competency than attributes used in the production process.

In many applications, human capital would be a blend of these approaches (Acemoglu, 2008). Therefore, human capital is the capability and proficiency of people to change raw materials and capital into goods and services (Son, 2010; Wright and McMahan, 2011; Ployhart and Moliterno, 2011; Ployhart, Nyberg, Reilly and Maltarich, 2014). Examples of these abilities are numeracy, literacy, analytical and cognitive skills which can be learned through education. From the macroeconomy perspective, the accumulation of educational outcomes increases returns to capital; expands labor productivity; expedites technological innovations; and makes growth more sustainable, which, in turn, supports poverty reduction. Educational outcomes therefore plays critical roles in economic growth and poverty reduction. Thus, at the macro level, educational outcomes can be regarded as a key factor in in the production function (Lee and Mason, 2010; Manuelli and Seshadri, 2014).

The general finding in the literature is that individuals with more education tend to have better employment opportunities, higher incomes, and more productivity than those who are less educated (Son, 2010; Ardichvili, Zavyalova and Minina, 2012; Manuelli and Seshadri, 2014; Evans et al, 2018). These findings provide a strong rationale for government policy to be oriented towards investment of substantial portions of their resources in educational outcomes, with the expectation that higher benefits will accrue over time. In this context, "education is deemed an investment, equipping individuals with knowledge and skills that improve their employability and productive capacities, thereby leading to higher earnings in the future" (Son, 2010, p.1).

Using data for 146 countries over 60 years, Son (2010) showed that a wide gap exists in educational outcomes accumulation between industrialized and developing countries. The average working-age adult in industrialized countries has 11 years of schooling compared with less than 6 years in sub-Saharan Africa and South Asia. While educational outcomes have been converging over the past six decades (i.e. educational outcomes accumulation is faster in developing countries than in industrialized countries), estimates of time to convergence showed that it may take decades for poor countries to catch up with the 2010 levels of educational outcomes of rich countries. In South

Asia, it will take almost 30 years for the region to catch up with the 2010 levels of educational outcomes in industrialized countries, based on its historical performance during 1950–2010.

Various studies have delved into educational practices in different parts of the world. For example, Ardichvili et al (2012) showed that, in terms of educational outcomes capacity, Brazil and Russia are ahead of China and India. However, during the last decade the governments of China and India have initiated impressive national programs, which include significant investment and government regulations in diverse areas as primary, secondary education and higher education, vocational education and training, especially in science and technology. According to the authors, while Brazil and Russia have targeted programs in some of these areas, they lack comprehensive long-term strategies and coordinating efforts of various agencies and constituencies.

In the literature, there are diverse studies on the effects of different macroeconomic factors on educational outcomes. For example, Calero, Bedi and Sparrow (2009) showed that remittances increase school enrollment and decrease incidence of child work, especially for girls and in rural areas in Ecuador. Furthermore, they found that aggregate shocks are associated with increased work activities, while remittances are used to finance education when households are faced with these shocks. Heckman and Carneiro (2003) demonstrated the role of cognitive and non-cognitive skills formed early in the life cycle in accounting for family, racial and ethnic background gaps in schooling. They found that most of the gaps in college attendance and delay are as a result of early family factors and that children from better families and with high ability earn higher returns to schooling. They showed that “only a limited role for tuition policy or family income supplements in eliminating schooling and college attendance gaps. At most 8% of American youth are credit constrained in the traditional usage of that term” (p. 1143).

Yang (2005) found that the estimated elasticity of Philippine-peso remittances with respect to the Philippine/foreign exchange rate is 0.60. These positive income shocks lead to enhanced educational outcomes in origin households. Favorable migrant shocks lead to greater child schooling, reduced child labor, and increased educational expenditure in origin households. Salas (2014) found that international remittances have a positive effect on the likelihood to send children to private schools. Acharya and Leon-Gonzalez (2014) also found that remittances help severely credit-constrained households enroll their children in school and prevent dropouts. They also that remittances can help households that face less severe liquidity constraints increase their investment in quality education.

Korpi and Clark (2017) showed that those receiving large pecuniary returns from migration are primarily those moving to the larger metropolitan areas and those with higher education. Heylen, Schollaert, Everaert and Pozzi (2003) found that rising inflation basically spurs educational outcomes and that a robust negative effect is observed only at extremely high inflation rates which may be 100%; for inflation rates below 15%, the effect of rising inflation seems insignificant. Philippot (2010) showed that natural resource abundance is negatively related to public spending on education and school enrollment rates. Araj and Mohtadi (2018) showed that natural resource

rents, when distributed as lump-sum transfers to individuals, distort the incentive to invest in tertiary education. Hanushek (2013) showed that improvements in long run growth are closely associated with the level of cognitive skills of the population. Breton (2015) found that every year of average adult schooling attainment raises GDP/adult directly or indirectly by 20%, and weekly hours worked have an output elasticity of 0.5. Squicciarini and Voigtländer (2015) found that initial literacy levels are associated with development and that upper-tail knowledge raises productivity in innovative industrial technology.. The major gap in the literature therefore is to determine the effects of the macroeconomy and institutions on educational outcomes in Africa. No other study has explored this in the literature.

4. Data & Methodology

3.1 The Data

The annual panel data used in this study covers the period from 1995 to 2016 for 48 African countries¹. The data on GDP per capita (Gdpc), lending interest rate (Intr), bank credit as % of GDP (Cred), inflation (Infl), natural resources rents as % of GDP (Natr), gross capital formation as % of GDP (Infr), remittances as % of GDP (Rem), and migration (Mgr) are sourced from World Bank (2017) database. Data on government effectiveness (Geff), regulatory quality (Regq), corruption (Corr) and political stability (Pols) are collected from Economist Intelligence Unit (2016).

3.2 The Model

Consistent with Sen's capabilities approach and existing studies in the literature (e.g., Bildirici et al, 2005, Oketch, 2006; Shuaibu and Oladayo, 2016), the model for the study can be specified as:

$$Edu_{it} = \tau_0 + \tau_1 M_{it} + \tau_2 I_{it} + \xi_{it} \quad (1)$$

Where Edu is educational outcomes, M is the macroeconomy; I is institutions, and ξ are the residuals

The proxies of the variables are in line with the literature. There are many proxy measures of educational outcomes, such as literacy rates (Azariadis and Drazen 1990); years of schooling (Cohen and Soto 2007); school enrollment rates (Mankiw et al. 1992); and test scores (Hanushek and Woessmann 2009). All the above are used in this study except years of schooling and test scores on which data are not available.

The proxy for the macroeconomy are GDP per capita (Gdpc), lending interest rate (Intr), bank credit as % of GDP (Cred), inflation (Infl), natural resources rents as % of GDP (Natr), gross capital formation as % of GDP (Infr), remittances as % of GDP (Rem), and migration (Mgr).

The proxy for institutions are government effectiveness (Geff), regulatory quality (Regq), corruption (Corr) and political stability (Pols). Detailed rationale for the choice of these variables

¹ The list of countries is in the appendix.

can be gleaned from studies such as Evans (2016), Olaniyi (2018), Carreon, Villegas and García (2019), and Khan, Ju and Hassan (2019).

3.3 Estimation technique

A three-step procedure is followed in the estimations. The first step is the Elliot, Rothenberg and Stock Point Optimal (ERS) unit root test. The second step is Phillips-Ouliaris test for cointegration. The third step is the estimations using fully modified ordinary least squares (FM-OLS). FM-OLS was developed by Phillips and Hansen (1990). The method has advantages of eliminating sample bias and correcting for endogeneity and serial correlation (Narayan and Narayan, 2004, Evans, 2015; Olaniyi, 2018; Evans, 2019). Detailed mathematical derivations can be found in Phillips and Hansen (1990).

4. Empirical Analysis

Considerable evidence abides in the literature that time series data are often non-stationary, a property which, if ignored in estimation, may lead to spurious regression (Nelson and Plosser, 1982; Chatfield, 2016). This study uses the ERS test, which is more computationally robust than the traditional unit root tests (e.g., Augmented Dickey-Fuller, 1979; Phillips-Perron, 1988; Olaniyi, 2017). Table 1 summarizes the results of the ERS test. The results show that some variables are stationary at $I(0)$ and some at $I(1)$, meaning that the variables are a mix of $I(0)$ and $I(1)$ and appropriate for the FM-OLS approach. Traditional cointegration tests such as the Johansen cointegration method may not be appropriate for this study because it is based on vector error correction model. The most appropriate test for this study is single-equation cointegration tests such as Phillips-Ouliaris test. Phillips and Ouliaris (1990) provided the test's detailed mathematical derivation. The results of the Phillips-Ouliaris test for cointegration are shown in Table 2. All of the Phillips-Ouliaris test for cointegration reject the null hypothesis that the series are not cointegrated.

Table 1. Elliott-Rothenberg-Stock Unit Root Test

	Intercept		Trend & Intercept	
	I(0)	I(1)	I(0)	I(1)
<i>Alr</i>	7.23	2.94*	7.45	2.26**
<i>Exed</i>	7.92	3.32***	7.75	1.62*
<i>Ser</i>	5.32	0.22*	5.65	1.90*
<i>Cred</i>	24.31	3.08***	31.01	2.59**
<i>Rem</i>	4.23	1.17*	4.39	1.44*
<i>Mgr</i>	7.91	3.34***	7.84	1.60*
<i>Infl</i>	77.09	1.39*	80.41	2.21**
<i>Gdpc</i>	10.84	2.63**	8.98	16.79*
<i>Intr</i>	2.72**	1.94**	7.34	0.40*
<i>Infr</i>	15.81	3.72***	10.71	1.42*

<i>Geff</i>	7.51	0.34*	7.10	1.67*
<i>Regq</i>	3.51***	0.34*	3.02	2.04**
<i>Corr</i>	3.23	1.16*	3.37	1.41*
<i>Pols</i>	4.67	1.42*	3.45	2.26**
	1% level	1.87		
Test	5% level	2.97		
critical	10% level	3.91		
values:				

Note: * significant at 1%; ** significant at 5%; *** significant at 10%. Lag length is selected using Spectral OLS AR based on SIC, maxlag=9.

Table 2. Phillips-Ouliaris Test for Cointegration

Dependent	tau- statistic	Prob.*	z-statistic	Prob.*
<i>Hum</i>	-3.63	0.97	-26.80	0.91
<i>Corr</i>	-3.64	0.96	-32.00	0.76
<i>Cred</i>	-3.71	0.96	-32.82	0.74
<i>Infl</i>	-3.60	0.97	-26.48	0.92
<i>Gdpc</i>	-4.14	0.87	-30.91	0.80
<i>Rem</i>	-3.42	0.89	-30.37	0.97
<i>Mgr</i>	-3.87	0.81	-28.97	0.81
<i>Geff</i>	-2.75	1.00	-15.86	1.00
<i>Intr</i>	-3.60	0.97	-25.04	0.94
<i>Infr</i>	-3.57	0.97	-28.87	0.86
<i>Natr</i>	-3.23	0.99	-20.37	0.99
<i>Regq</i>	-3.97	0.91	-29.97	0.83
<i>Pols</i>	-3.96	0.91	-28.15	0.88

Notes: *MacKinnon (1996) p-values. Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth)

The FMOLS estimates for the panel of African countries are presented in Table 3 and 4. Different outcomes of the FMOLS regression are provided for each of the educational outcome indicators. This allows checking for robustness of the findings to alternative specifications. The two educational outcomes provide almost identical results in terms of the statistical significance of the macroeconomic and institutional variables. Among the macroeconomic variables, GDP per capita, inflation, natural resources rents, and remittances have significant relationship with secondary school enrollment. In the same vein, GDP per capita, lending interest rate, bank credit, remittances and migration have significant relationship with adult literacy rate. Among the institutional variables, only corruption and political stability have significant relationship with secondary school enrollment and adult literacy rate.

Table 3. The effects of the macroeconomy and institutions on secondary school enrollment
Dependent variable: Secondary school enrollment

Variable	Est.	Std. Error
Macroeconomy		
GDP per capita (Gdpc)	0.73***	0.04
Lending interest rate (Intr)	-0.10	0.30
Bank credit (Cred)	0.01	0.01
Inflation (Infl)	-0.07***	0.04
Natural resources rents (Natr)	0.17**	0.07
Infrastructure (Infr)	0.42	0.55
Remittances (Rem)	0.16*	0.05
Migration (Mgr)	0.07	0.06
Institutions		
Government effectiveness (Geff)	0.17	0.13
Regulatory quality (Regq)	0.25	0.32
Corruption (Corr)	-0.13**	0.05
Political Stability (Pols)	0.71*	0.15
R-squared	0.97	
Adjusted R-squared	0.96	

Note: * significant at 1%; ** significant at 5%; *** significant at 10%.

Table 4. The effects of the macroeconomy and institutions on adult literacy rate
Dependent variable: Adult literacy rate

Variable	Est.	Std. Error
Macroeconomy		
GDP per capita (Gdpc)	0.25*	0.02
Lending interest rate (Intr)	-0.38***	0.22
Bank credit (Cred)	0.13*	0.03
Inflation (Infl)	-0.16	0.18
Natural resources rents (Natr)	0.03	0.03
Infrastructure (Infr)	0.39	0.51
Remittances (Rem)	0.11***	0.06
Migration (Mgr)	0.05**	0.02
Institutions		
Government effectiveness (Geff)	0.49	0.59
Regulatory quality (Regq)	0.15	0.14
Corruption (Corr)	-0.14*	0.02
Political Stability (Pols)	0.21*	0.07
R-squared	0.76	
Adjusted R-squared	0.75	

*Note: * significant at 1%; ** significant at 5%; *** significant at 10%.*

Overall, this study shows that the macroeconomy in the form of GDP per capita, natural resources rents, remittances and migration have significant positive effects on educational outcomes while lending interest rate and inflation have significant negative effects. The study further shows that institutions in the form of corruption has significant negative effects on educational outcomes while political stability has significant positive effects.

5. Discussion and Implications

The study has shown that inflation has negative effects on educational outcomes. The finding is consistent with Heylen et al (2003) who found that rising inflation basically spurs human capital and that a robust negative effect is observed only at extremely high inflation rates which may be 100%; for inflation rates below 15%, the effect of rising inflation seems insignificant. Higher inflation depresses the use of money, which decreases the marginal product and the output of physical capital, and as a result, the return and output of educational outcomes. High inflation can push talented individuals to financially motivated activities and away from school, undermining the productivity of schooling and, as a consequence, educational outcomes. Inflation can make investing in education less attractive.

Moreover, the negative effects of lending interest rates on educational outcomes is particularly discouraging, although it offers a valuable insight: monetary policy and bank credit is unlikely to change basic education and literacy rates and for that reason, may not necessarily spur educational outcomes in the continent. Lending interest rates are too high; the poor lacks collateral (a story supported by ample anecdotal evidence); and bank credit is allocated to causes other than educational outcomes. The study has also shown that natural resources rents have significant positive effects on educational outcomes. The finding is consistent with Stijns (2006) who showed that mineral wealth makes a positive and marked difference on human capital accumulation. This finding is encouraging. It shows that the extent at which mineral states in Africa tend to spend their mineral revenues on education development projects and programs have significant positive effects on educational outcomes.

Also, the finding that migration has significant positive effects on educational outcomes is consistent with Stark and Dorn (2013) who showed that the prospect of migrating to a developed country induces acquisition of human capital. This is buttressed by the evidence in this study that remittances have significant positive effects on educational outcomes. This finding is also consistent with Salas (2014) who found that international remittances have a positive effect on the likelihood to send children to private schools. Acharya and Leon-Gonzalez (2014) also found that remittances help severely credit-constrained households enroll their children in school and prevent dropouts. They also showed that remittances can help households that face less severe liquidity constraints increase their investment in quality education. This suggest that households receiving remittances are more likely than non-recipients to increase their investment in education.

The study has also shown that corruption has significant negative effects on educational outcomes. The finding is consistent with Boikos (2016) who found that public expenditures due to the presence of corruption have a positive but declining effect on human capital accumulation and that corruption is detrimental to educational outcomes mainly through the deterioration of physical capital investment. The significant negative effects of corruption on educational outcomes could be driven by the misappropriation of funds meant for education. In addition, political stability has significant positive effects on educational outcomes. Individuals and governments may be more eager to invest in education if the political environment is stable and more certain. Demand for education decreases in periods of political turmoil due to uncertain returns on investing in educational outcomes. Individuals and governments are likely to prefer to concentrate their investments in education during more stable political.

6. Concluding Remarks

Considering the findings of the study, any policy effort to develop educational outcomes in Africa will require continued, high impact investments, and creating the enabling macroeconomy and institutions for sustainable job creation. Unfortunately, African countries are not able to adequately invest in educational outcomes due to the lack of resources. In such cases, remittances to those countries can help in this regard through increased investment in education. Considering that this study shows that remittances have significant positive effects on educational outcomes, remittances can therefore be used to increase the financial power of African families and may therefore make more resources available to spend on education.

Concerning natural resources rents, investing in education should not be left as a byproduct of resource booms, as currently obtainable in many African countries. Resource abundance should provide for more than just a fleeting increase in income per capita. In fact, these findings provide a strong rationale for government policy to be oriented towards investment of substantial portions of natural resources rents into education, with the expectation that higher benefits will accrue over time.

The study has also shown that corruption has significant negative effects on educational outcomes. This result suggests that misappropriation of funds meant for education would adversely affect education. To achieve higher standards in different measures of educational outcomes, it would be important for African governments to establish anti-corruption institutions as watchdogs in dispensing education funds. In conclusion, the governments should harness their macroeconomic policies and institutions to promote education.

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APPENDIX

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