**Greasing or Sanding the Wheels? Effect of Corruption on Economic Growth in sub-Saharan Africa**


## ABSTRACT

*Corruption is a pervasive challenge confronting the world more especially countries in sub-Saharan Africa. This paper investigates the effect of corruption on economic growth in the sub-region using data spanning 1998 to 2011. By employing the pooled estimated generalized least squares (EGLS) and two stage least squares (2SLS), we find that corruption is inimical to economic growth through its indirect effect on gross fixed capital formation and labour force. The results are not only robust to controlling for endogeneity using regional blocs of the countries as instruments in the 2SLS estimations but identifies government expenditure as additional pass-through effect of corruption to growth. Our findings suggest that for countries within the sub-region to achieve sustained economic growth, control of corruption must take precedence over the design and implementation of any macroeconomic policy. Campaign against corruption does not only improve on institutional quality but is by far growth–enhancing.*



***Keywords**: Corruption, economic growth, sub-Saharan Africa, Grease the wheels, Sand the wheels*

## INTRODUCTION

Does corruption affect economic growth? What are the direct and indirect pathways through which corruption impact on growth? For the past half century, these questions continue to attract intense discussions in the field of global governance and international diplomacy. This paper seeks to provide some insight into these questions by examining the effects of corruption in the context of sub-Saharan Africa.

In both advanced and emerging democracies, concerns about the implications of corruption on socio-economic development have advanced in an astonishing pace (Akai et al., 2005). It has been argued that corruption may have adverse effects on countries economic performance (Al-Sadig, 2009). Indeed corruption has negative implications on many aspects of a nations development including quality of infrastructure and on productivity of public investment (Tanzi and Davoodi, 1997); income inequality (Li et al., 2000; Gyimah-Brempong, 2002); educational services and healthcare (Gupta et al., 2000); and on levels of economic growth and investment (Mauro, 1995). These evidences have tended to push many international organizations and governments across the globe to look into the direct and indirect causes of corruption and how it could be managed. The World Bank (2011) remarked that corruption is by far the greatest threat to economic and social development by undermining the ideals of rule of law in addition to weakening the institutional foundations upon which a nation can achieve high levels of sustainable human development.

While a plethora of literature has found a negative relationship between corruption and economic growth (Mauro, 1995; Mo, 2001; Pellegrini and Gerlagh, 2004; Aidt, 2009; Méon and Weill, 2010), other studies also suggest that in the short–run, corruption may "counteract government failure and promote economic growth given the exogenously determined suboptimal bureaucratic rules and regulations" (Akai et al., 2005: 4). Indeed, corruption may promote the most efficient firms to by–pass strict and rigid laws and burdensome bureaucratic procedures (Wang and You, 2012). In spite of this, in the long–run, corruption may impact negatively on economic growth as government failure in itself is a function of corruption. It is by far obvious that the literature on corruption seems to agree that the phenomenon is pervasive in developing countries especially sub-Saharan Africa than in advanced countries (Bissessar, 2009). For instance, it is estimated

that corruption leads to about 25% loss of GDP in the region as rent extraction often exceeds the benefits of rent sharing (Sequeira, 2012). Given this concern, researchers, policy makers, development practitioners in general all seem to be more concerned about the long–term effects of corruption in sub-Saharan Africa. In this regard, the effects of corruption on economic growth in sub-Saharan Africa deserve far more nuanced and in-depth analysis.

More importantly, research on the "grease" and "sand" the wheels hypotheses - especially the indirect and direct pathways through which corruption affect growth in the context of sub-Saharan Africa - have been relatively understudied. To our knowledge, there has been little systematic attempt to test these hypotheses using the endogenous growth model in the context of sub-Saharan Africa. In this respect, the contribution of this paper is to amplify the literature by investigating the effects of corruption on growth using a cross-country data spanning 1998–2011. Our paper thus contributes to the literature on the growth consequences of corruption in the context of the sub-region. The novelty of this paper lies in the use of pupil–teacher ratio in measuring the impact of human capital on economic growth. Our results show that corruption significantly reduces economic growth indirectly via gross fixed capital formation and labour force. Controlling for endogeneity using regional bloc dummies as instruments identifies government expenditure as additional transmission channel of the effect of corruption on growth. We conclude that for countries in sub-Saharan Africa to achieve sustained economic growth, control of corruption must take precedence over the design of any macroeconomic policy.

The rest of the paper is organised as follows: Section two and three presents brief theoretical review of the literature on corruption and growth and the research context followed by the methodology and empirical strategy. The penultimate section presents the results and discussions while section six concludes the study with some policy implication.

## CORRUPTION–ECONOMIC GROWTH NEXUS, WHAT DOES THE THEORY SAY?: EXPLORING THE LINKAGES THROUGH THE GREASE AND SAND HYPOTHESES

The debate on the effects of corruption on economic growth has been dominated by two widely recognised strands: the "sand" and "grease" hypotheses. According to Méon and Wiell (2010), these hypotheses are underpinned by the 'moralistic view' of corruption. The two underlying hypotheses are mainly based on the distinction between institutional failures and corruption (Méon and Weill, 2010). Proponents of "grease the wheels" hypothesis argue that due to the economic and developmental benefits of corruption such as efficiency in second best world, it is better to judge the relationship between corruption and economic growth on moral grounds (Leys, 1965; Ney, 1967). Grease the wheels hypothesis has resurfaced in the literature in recent years as empirical evidence suggests that corruption tend to facilitate and speed up transaction processes and therefore increase efficiency and productivity (Aidt 2003; Cuervo-Cazurro, 2006). The "grease the wheels" hypothesis as advanced by the luminary Leff (1964) and later promoted by Leys (1965) and Huntington (1968) who postulate that, in non-performing bureaucratic systems in a second best world, corruption often serve as a 'trouble-saving device' in circumventing cumbersome regulations in transactions which indirectly increases efficiency and economic growth (Leff, 1964; Leys, 1965:215; Huntington 1968; Lui, 1985). Thus, corruption helps in removing distortions associated with non-performing institutions in countries that have a defective or mediocre governance system.

For example, it has been argued that in an inefficient bureaucratic environment, corruption can help bring improvement or quality among civil servants where corruption serves as an incentive (Van Rijckeghem and Weder, 1997; 2001; Méon and Wiell, 2010). Similar views have been expressed by other scholars who argue that low remunerations of civil servants fuels corruption (Gorodnichenko and Sabirianova, 2007; Muttreja, 2012). This implies that despite the low remunerations, corruption tend to help in retaining civil servants on their jobs who contributes positively towards productivity. Recent research by Wang and You (2012) on the effects of corruption on the growth of firms in China indicated that corruption tends to promote the growth of firms and hence economic development. They concluded that corruption has little adverse impact on a firms' growth in areas where there is an underdevelopment of the financial market and that corrupt practices tend to have greater positive impact (Wang and You, 2012). Nevertheless, some studies contradict this finding as payment of bribes has been noted not to

guarantee speedy negotiating times especially with government officials in foreign countries (Kaufmann and Wei, 1999).

On the other hand, supporters of "sand the wheels" hypothesis argue that corruption is deleterious to investment and economic growth such that distortions add up to others instead of neutralising its effects (Mauro, 1995; Tanzi, 1998; Al-Sadig, 2009). Corruption indeed has detrimental effects on economic growth through channels such as bribery which results in the imposition of additional cost especially in countries where there is weak governance system. Proponents of "sand the wheels" hypothesis have therefore drawn on this to advance their course. The burgeoning literature on the nexus of corruption and economic growth has indicated that corruption has detrimental effects on economic growth and development (Mauro, 1995) by 'sanding the wheels' of bureaucratic government through the fuelling of public sector corruption (Blackburn et al., 2006; Méon and Weill, 2010). Bureaucratic corruption arises when bureaucrats use their positions for private gains through means such as extortion and taking of bribes (Dzhumashev, 2014). Additionally, the use of bureaucratic discretionary power over the allocation of resources has a greater tendency of fuelling corruption especially in the public sector. Bureaucratic discretionary power is often influenced by decentralisation (Weingast, 1995).

Moreover, through corrupt practices, the productivity of human and physical capital stands a greater chance of being reduced. This happens when the quality of the resources are degraded as little attention is paid to their maintenance and quality. For example, Bouchard et al. (2012) in their study on the effects of corruption on orthopaedic healthcare in Uganda found that, corrupt practices tend to reduce the quality of care and products, increase the prices of equipment and also reduce access to healthcare. They again maintained that about two-thirds of drugs meant for free public distribution were stolen and unaccounted for by public officials which affects access to and the quality of healthcare provided to the general public. Similar results have been found in the educational system across 18 African countries (Justesen and Bjørnskov, 2014). The effect of corruption on growth is reflected in the reduced level of human capital as access to public goods such as education and healthcare is limited (Reinikka and Svensson, 2004). Implicitly, the

limited access and quality squanders the potentials of individuals, communities and nations (Transparency International, 2013a).

The effect of corruption on income growth is also manifested through a reduction in productivity of resources in addition to a decline in physical capital investment (Gyimah-Brempong, 2002). In investigating the effects of corruption on economic growth, Mauro (1995; 1998) through the use of the ordinary least squares (OLS) found that corruption negatively affects a country's economic growth through a decline in the investment of physical capital. Similar studies have indicated that corruption decreases productivity and increases the number of exit firms (Bliss and Di Tella, 1997; Lambsdorff, 2003). Despite these debates, it is important to state that for an effective evaluation of the nexus of economic growth and development, corruption's institutional endogeneity should warrant more research (Aidt 2009). In what follows we situate our research by examining the direct and indirect pathways through which corruption may influence economic growth by drawing on data from (8) selected sub-Saharan African countries. We have decided to focus on sub-Saharan Africa because corruption is by far all-encompassing in the region as noted earlier.

**RESEARCH CONTEXT**

For sub-Saharan Africa countries, the institutionalisation of corruption has been phenomenal and is mainly manifested through gross mismanagement and the misuse of public resources for private gains. It is therefore not surprising that countries in sub-Saharan Africa perform poorly on the world most recognised measure of corruption – the corruption perception index compiled by the Transparency International. Table 1 below shows the recent performance of 8 selected sub-Saharan Africa countries as published by the Transparency International. A country's rank shows its position relative to other countries included in the survey. The 2011 CPI reveals that Mauritius is the cleanest country in the sub-region ranking 46th out of the 182 countries who participated in the survey, while Kenya and Zimbabwe are the most corrupt nations with both ranking 154th. Evidence from Transparency International's CPI (1998–2013) indicates that no African country has ever been ranked in list of the top 20 least corrupt countries in the world since expert views on corruption was collected by the Transparency International in 1998.

**Table 1: 2011 Corruption Perception Index (CPI) and Rank of Selected Countries**

| Country | Corruption Perception Index (out of 10) | Rank (out of 182 countries) |
|---|---|---|
| Nigeria | 2.4 | 143 |
| Kenya | 2.2 | 154 |
| Zimbabwe | 2.2 | 154 |
| Zambia | 3.2 | 91 |
| Senegal | 2.9 | 112 |
| Ghana | 3.9 | 69 |
| South Africa | 4.1 | 64 |
| Mauritius | 5.1 | 46 |

Source: Transparency International (2013a)

Additionally, according to the 2011 CPI, 10 African countries were named as the last 20 corrupt countries in the world (Transparency International, 2011). For instance, in the 2011 and 2013 CPI, Botswana is the only African country that has been ranked in the top 32 and 30 of the least corrupt countries with a CPI of 6.1 and 6.4 respectively (Transparency International, 2011; 2013b). The increasing persistency of corruption in sub-Saharan Africa has been very alarming for countries such as Somalia, Sudan, Burundi, Chad, Zimbabwe and Angola who recorded a CPI of less than 2.0 in the 2011 CPI (Transparency International, 2011). However, it is worth nothing that the use of the CPI has been challenged with regard to its objectivity in ranking and its failure to recognize political, social and cultural challenges confronting countries. While acknowledging the key role of institutions (for instance rule of law) in economic growth, this paper exclusively centers on the effect of corruption on growth. This is particularly relevant in the light of widespread corruption in sub-Saharan Africa.

## METHODOLOGY AND EMPIRICAL STRATEGY

### DATA SOURCES

Data utilized in this study were taken from different sources spanning 1998 – 2011 for 8 sub-Saharan African countries selected on the bases of data availability throughout the sample period.[1] This paper thus used a balanced data set where data on corruption was gleaned from the Transparency International. The Transparency International through its corruption perceptions index ranks countries and territories based on how corrupt their public sector is perceived to be. A country's score indicates the perceived level of public sector corruption on a scale of 0 to 10, where 0 means that a country is perceived as highly corrupt and 10 means it is perceived as very clean. This scale was changed to 0 (highly corrupt) to 100 (very clean) in 2011. Thus a country's rank shows its position in comparison to the other countries included in the index. Data on real gross domestic product, human capital, gross fixed capital formation, inflation, government expenditure and labour force were sourced from World Bank's (2013) World Development Indicators.

### DESCRIPTION OF VARIABLES

#### DEPENDENT VARIABLE

#### ECONOMIC GROWTH

We used the real gross domestic product per capita (RGDPPC, constant 2005 US$) growth rate to proxy economic growth. An increase in per capita GDP implies increases in productivity and a growth in the economy. It is also used as an indicator of standard of living. Therefore an increase in GDP per capita increases income levels which translates into a higher standard of living and overall level of development. Following the above literature review, effect of corruption on economic growth is of mixed reactions and can take any direction.

#### INDEPENDENT VARIABLES

#### CORRUPTION

[1] These countries are Ghana, South Africa, Nigeria, Kenya, Zimbabwe, Zambia, Mauritius and Senegal. These countries were selected based on availability of yearly CPI data from 1998-2011 compiled by the Transparency International.

In this paper, corruption denotes the use of public office by bureaucrats for personal and private gains. Corruption at the macro–level is known to negatively affect the level of economic growth through a reduction in per capital income, investment in public goods such as education which has consequential effects on human capital. Additionally, it impedes the flow of FDI and also affects investment decisions. Nevertheless, corruption in the context of mediocre governance system can promote efficiency by overcoming cumbersome processes which tends to affects productivity. Moreover, corruption leads to the expansion of firms and also increases the performance of political managers. Thus, results of the effects of corruption are often mixed and its coefficient can assume any sign. We use CPI to proxy corruption in this study.

**HUMAN CAPITAL**

Education is thought to be an investment in human capital. Extant studies (Akai et al., 2005; Aliyu and Elijah, 2008; Ahmad et al., 2012; Castro and Nunes, 2013; Dridi, 2013) have used enrolment as a proxy for human capital where human investment depends on the number of school entrants. However, the use of enrolment (gross enrolment or net enrolment rate) is completely independent of the number of teachers in schools and for that matter quality may suffer if the number of teachers falls while enrolment increases.[2] It is worth noting that an increase in enrolment should be in tandem with quality of education. This paper departs from these traditional studies through its use of secondary pupil-teacher ratio (PTR) as a proxy for human capital. A decline in the PTR implies an improvement in the quality of education and human capital hence a surge in economic growth. We therefore hypothesize a negative relationship between PTR and economic growth.

**INFLATION**

Inflation which reflects percentage changes in the consumer price index increases cost of living and uncertainty in the economy. Increase in inflation results in diverting scarce resources to consumption at the expense of investment. Higher inflation rate inhibits investment because investors would generally prefer to invest in economies with relatively lower degree of business

[2] Gross enrolment rate (GER) measures the number of pupils/students at a given level of schooling irrespective of age as a proportion of the number of children in the relevant age group while net enrolment rate (NER) measures enrolment of the official age – group for a given level of education expressed as a percentage of the corresponding population.

uncertainty. Inflation is therefore used to proxy macroeconomic instability. We therefore expect inflation to negatively impact on economic growth.

**GROSS FIXED CAPITAL FORMATION (% of GDP)**

Gross fixed capital formation (GFCF) includes land improvements; plant, machinery, and equipment purchases; and the construction of roads. This is used to proxy investment rate. Growth rates of the economy increases in response to an increase in investment rate *ceteris paribus*; hence a positive relationship is anticipated.

**GOVERNMENT EXPENDITURE**

Similar to Easterly and Rebelo (1993) and Levine et al. (2000), this study relies on government final consumption expenditure (% of GDP) as a proxy for macroeconomic stability. Its effect on growth is however mixed and inconclusive. By following the Keynesian proposition, we expect government expenditure to raise economic growth by increasing aggregate demand. However, it could also reduce economic growth because of its preeminent feature of crowding out effect on private investment when government finances its expenditure with taxes leaving businesses with relatively less money to expand their investment. An increase in government expenditure also increases interest rates hence discouraging borrowings for investments purposes.

**MODEL SPECIFICATION AND EMPIRICAL STRATEGY**

This paper draws on the prepositions of the endogenous growth theory as such we posit the following growth equation:

$$Y_{it} = A_{it} K_{it}^{\pi} L_{it}^{1-\pi} \quad (1)$$

where $Y_{it}$ is the aggregate output for country $i$ at time $t$; $K_{it}$ is aggregate capital stock; $L_{it}$ is the quantity of labour; $A_{it}$ which is the total factor productivity which captures growth in output unaccounted for by increase in capital stock and labour; $\pi$ and $1-\pi$ respectively denote the share of capital and labour in aggregate output.

By dividing equation (1) by $L_{it}$ and taking the natural logarithm of both sides gives:

$$In\left[\frac{Y_{it}}{L_{it}}\right]$$
$$= In\left[\frac{A_{it}K_{it}^{\pi}L_{it}^{1-\pi}}{L_{it}}\right] \quad (2)$$

$$y_{it}$$
$$= \beta_{1it}$$
$$+ \beta_2 k_{it} \quad (3)$$

where $y_{it}$ is output per person; $k_{it}$ is capital stock per person while $\beta_{1it}$ is the total factor productivity.

As opposed to the neoclassical growth theory, endogenous growth literature (Lucas, 1988; Barro, 1990; Rebelo, 1991) suggests that long-run economic growth measured by $y_{it}$ is determined by forces internal to the economic system. However, determination of $y_{it}$ does not only depends on capital and labour but also contingent on institutional factors affecting growth via the total factor productivity channel. This channel argues that such institutional factors affect growth by inducing opportunities and incentives for the adoption of modern technology to boost production.

This paper adopts the Barro (1990) model because of its flexibility in allowing the inclusion of various sources of growth. Following this, we include an institutional variable – corruption- in the total factor productivity hence positing the following equation:

$$\beta_{1it} = \lambda_0 + \lambda_1 COR_{it} + \varphi_j W_{it} + v_i + \delta_t + \varepsilon_{it}$$
(4)

where $COR_{it}$ is the level of corruption for country *i* at time *t*; $W_{it}$ is a vector of control variables including inflation; human capital, government expenditure and labour participation rate; $v_i$ is the unobserved country-specific time invariant fixed effect; $\delta_t$ is time effect common to all countries while $\varepsilon_{it}$ is the idiosyncratic error term. By substituting equation (4) into (3), we obtain:

$$y_{it} = \lambda_0 + \beta_2 k_{it} + \lambda_1 COR_{it} + \varphi_j W_{it} + v_i + \delta_t + \varepsilon_{it}$$
(5)

$i$ = 1, 2, ……, 8 and $t$ = 1, 2, ……, 14

A potential endogeneity problem may arise in our estimations as economic growth may cause corruption or vice versa. For instance, higher economic growth may increase bribes and/or kick-backs hence making corruption more lucrative.

However, increase in corruption could also demand channeling of much resource to its control at the expense of investment in productive areas of the economy. Thus corruption would be correlated with the error term and our estimations would be biased if this is overlooked. To reduce endogeneity and understanding that past corrupt practises affect current growth, we lag $COR_{it}$ by one period thus giving equation (6) below:

$$y_{it} = \lambda_0 + \beta_2 k_{it} + \lambda_1 COR_{it-1} + \varphi_j W_{it} + v_i + \delta_t + \varepsilon_{it}$$
(6)

A number of empirical studies have found that corruption has significant effect on government expenditure (Tanzi and Davoodi, 1997; Haque and Kneller, 2008), on human capital (Kaufmann et al., 1999, Rajkumar and Swaroop, 2008) and on investment (Mauro, 1997; Brunetti and Weder, 1998; Rock and Bonnett, 2004). In addition to estimating the direct effect of corruption on growth and following from the above studies, we estimate the indirect effects or channels through which corruption affects growth by including interaction terms of corruption and some explanatory variables including gross fixed capital formation, labour force participation rates, government expenditure and human capital. With the exception of corruption, all our variables are in logs. To control heteroskedasticity, we employ the pooled estimated generalized least squares (EGLS) while allowing cross-section weights. Because of estimation in the GLS, there could be unobserved heteroskedasticity hence we report White's (1980) heteroskedasticity–consistent standard errors which does not assume any prior determination of heteroskedasticity and normality of errors (Asteriou and Hall, 2011).

We note the robustness of the EGLS results using the two-stage least squares (2SLS) as an alternative model specification. Instrumental variables are crucial in obtaining consistent estimates when endogeneity is suspected. As argued earlier, corruption as an institutional problem is endogenous and therefore need to be instrumented for. Hence, we need to find variables that are correlated with corruption, but uncorrelated with all the unobserved factors affecting growth in growth model. Specifically, we need to find variables that affect growth indirectly only via their direct effect on corruption. Differences in location of countries may foster corruption because for countries within the same sub-region, public officials in different blocs favour their own group at the expense of countries in other blocs. It is thus possible that differences in country locations are directly related to growth. Thus, regional blocs provide good candidates for our instrumental variables. The instruments used are the following regional dummies; WA = dummy for West African countries; EA = dummy for Eastern African countries; and SA = dummy for Southern African countries. The CPI is regressed on the instruments together with the control variables and the predicted value of corruption is then used as the instrumental variable in the estimations.

## RESULTS AND DISCUSSIONS

This section presents our results based on the data obtained. The results are presented in the light of the existing literature on corruption and economic growth.

**Table 2: Descriptive Statistics**

| | RGDPPC | GFCF | GOVEXP | PTR | INFL | COR | LABFOR |
|---|---|---|---|---|---|---|---|
| Mean | 1.975893 | 20.31857 | 49.49714 | 29.07580 | 10.55393 | 6.760714 | 67.98125 |
| Median | 2.610000 | 21.50500 | 18.45500 | 28.40500 | 7.810000 | 6.850000 | 68.90000 |
| Maximum | 12.42000 | 46.92000 | 138.4300 | 65.86000 | 80.75000 | 9.000000 | 86.70000 |
| Minimum | -17.95000 | -7.950000 | 9.490000 | 6.000000 | -27.05000 | 4.500000 | 51.50000 |
| Std. Dev. | 4.054476 | 9.651089 | 44.98544 | 15.89959 | 11.53047 | 1.101380 | 10.88222 |
| Obs. | 112 | 112 | 112 | 112 | 112 | 112 | 112 |

The Table above shows the descriptive statistics of the pooled sample. The average real GDP growth rate for the sampled countries over the period is 1.98%. The rather low growth rate confirms their low income levels. Average corruption level within the sub-region is high as the mean CPI stands around 7 – a value closer to 10 (most corrupt) than 0 (most clean). The standard deviation of corruption variable suggests low variation in the level of corruption prevailing in the sampled countries as the maximum recorded CPI was 9 with 4.5 was the lowest. On the control variable, average labour force participation rate was highest (67.98%) while the mean government expenditure as a percentage of GDP was 49.5% over the sample period. The latter however has a high variability across the country given the maximum (138%) and minimum (9%) value.

**Table 3: Pooled EGLS and 2SLS Estimation Results**

| | Pooled EGLS | | 2SLS | |
|---|---|---|---|---|
| | Direct Effects (Column 1) | Indirect Effects (Column 2) | Direct Effects (Column 3) | Indirect Effects (Column 4) |
| Constant | 1.116200<br>(1.743463) | 1.124963<br>(1.412603) | 0.681487<br>(0.750721) | 0.724643<br>(0.538174) |
| COR(-1) | -0.705636***<br>(-1.725366) | -0.719911<br>(-1.414672) | -0.428242<br>(-0.732398) | -0.465429<br>(-0.538823) |
| LGFCF | 0.153362<br>(0.717483) | 2.452871**<br>(2.198974) | 0.067648<br>(0.267169) | 2.562513**<br>(2.204072) |
| LINFL | -0.053512<br>(-0.472063) | -0.032740<br>(-0.265072) | -0.012296<br>(-0.094519) | -0.039415<br>(-0.320872) |
| LLABFOR | 0.502875**<br>(2.598822) | 2.106039**<br>(2.276604) | 0.462531**<br>(2.605526) | 2.143443**<br>(2.179073) |
| LGOVEXP | -0.098193<br>(-0.729161) | 0.818421<br>(1.461325) | -0.015852<br>(-0.100304) | 0.986225<br>(1.794000) |
| LPTR | -0.446510*<br>(-3.050219) | -0.903597<br>(-1.053144) | -0.378895**<br>(-2.118969) | -0.933214<br>(-1.101228) |
| LCORGFCF | | -3.156605**<br>(-2.371549) | | -3.170962***<br>(-2.325347) |

| | | | | |
|---|---|---|---|---|
| LCORLABFOR | | -2.284957***<br>(-1.928521) | | -2.289281***<br>(-1.873885) |
| LCORGOVEXP | | -0.911074<br>(-1.593166) | | -1.039827***<br>(-1.829935) |
| LCORPTR | | 0.766580<br>(0.800690) | | 0.852223<br>(0.889404) |
| R-squared | 0.327252 | 0.400794 | | |
| Adjusted R-squared | 0.274830 | 0.318711 | 0.312628 | 0.389119 |
| VIF | 1.486440 | 1.6688751 | 0.262333 | 0.310801 |
| Durbin-Watson stat | 1.638356 | 1.789039 | 1.454816 | 1.636980 |
| F-statistic | 6.242643 | 4.882790 | 1.524693 | 1.732123 |
| Prob(F-statistic) | 0.000022 | 0.000022 | 16.21582 | 14.96843 |
| Wald Test, $\chi^2$ [*p*-value] | 52.327041<br>[0.00000] | 99.94665<br>[0.00000] | 0.000021<br>49.4389147[0.0000] | 0.000015<br>51.74[0.00000] |

*, ** and *** denote significance at 1, 5 and 10% level. The dependent variable is LRGDPPC. ( ) denotes White's (1980) heteroskedasticity–corrected *t*-statistic.

As robust and diagnostic checks, we assessed the existence of multicollinearity using the variance inflation factor (VIF) computed as the inverse of $(1 - R^2)$. There exists a problematic multicollinearity if the VIF exceed 10 (Gujarati and Porter, 2009). However, the values of our VIF generally reveal the absence of multicollinearity in our estimations. The R-squared for all the estimations are at least 0.31 and the rather low *p*-values of the F-statistic show the overall significance of the model. Wald tests are conducted to examine the overall equality of the estimators in our regressions. With *p*-values of 0.0000, we reject the null hypotheses that the coefficients are the same.

We transformed the CPI data by subtracting the index from 10 so that low (high) values of the index mean lower (higher) corruption. By controlling for our explanatory variables selected in line with the endogenous growth theory, Table 2 shows the relationship between corruption and economic growth relying on the EGLS and 2SLS. Specifically, column 1 presents the direct effect of corruption on growth rates in sub-Saharan Africa. Consistent with our hypothesis, our results reveal a negative and significant effect of corruption on economic growth. Per capita GDP growth rates decrease by 0.71% in response to a one-percentage point increase in

corruption. The implication is that corruption significantly erodes both the living standards of residents and the overall level of development in countries with widespread corruption. This finding is consistent with a number of studies including Mauro (1995; 1998), Mo (2001), Farida and Ahmadi-Esfahani (2008) and Dridi (2013).

Turning to our control variables, the sign of the coefficient of pupil–teacher ratio is as expected. Growth rates significantly surge by 0.45% owing to a 1% drop in the ratio. The implication is that, a decrease in this ratio increases teacher contact and content knowledge of pupils hence improvement in quality of education and an increase in human capital. Education as a form of human capital investment yields economic benefits thus contributing to increasing the productive capacity of people and countries at large. The coefficient of labour force is positive and significant implying that increases in the population of the economically active labour force increases labour supply for the production of goods and services hence a surge in growth rates. However, gross fixed capital formation, inflation and government expenditure do not significantly affect growth. Our results are not remarkably different (both in direction and significance) when the 2SLS is used except for corruption (column 3). Although the coefficient is negative corruption losses its direct effect on growth. Consistent with earlier finding, increases and decreases in labour supply and pupil-teacher ratio respectively are growth enhancing. In particular, growth rises by 0.46% and 0.38% in response to increases and decreases in labour force participation rates and pupil-teacher ratio respectively.

While documenting the direct effects of corruption on growth relying on the EGLS, it is imperative to investigate the channels through which corruption affects growth. We do this by including into our model along with *COR*, four (4) synthetic variables: *LCORGFCF*, *LCORLABFOR*, *LCORGOVEXP* and *LCORPTR*. These respectively measure the effect of corruption on economic growth via capital formation, labour force, government expenditure and human capital. Interestingly in this exercise, the effect of corruption on growth losses its significance although still maintains prior sign (column 2). Apart from the coefficient of government expenditure, we did not see any difference in the signs of our variables even after including the indirect channels. Here, the coefficient of capital formation is positive and significant at 5%. The implication is that an increase in capital stock by 1% increases growth by

about 2.5%. The impact of labour force on growth is still positive and significant while the impact of human capital on growth is statistically not different from zero although it has the expected (negative) sign.

Turning to the transmission channels, the results show that corruption significantly affect economic growth through capital formation and labour force. The coefficient of these transmission channels are negative and significant suggesting that corruption erodes GDP per capita by dragging investment rates as well reducing labour productivity. Instrumenting for endogeneity and investigating the indirect effects of corruption on growth confirm the pass-through linkages of corruption (column 4). Here again, corruption has no direct effect on growth. However, among others if growth rate depends on the share of investment which in turn is contingent on the level of corruption, then the net effect of corruption on growth depends on the relative strength of the positive coefficient (direct effect of gross fixed capital formation) and the negative coefficient of the interaction term (indirect effect). An important finding worth commenting on here is that, not only are the estimated coefficients *LGFCF* and *LCORGFCF* in the two specifications statistically significant, but are also economically significant given the size of the parameter estimates. To the extent that the latter coefficient outweighs the positive gains of the former shows that corruption significantly deteriorates the positive effects of investment by altering the composition and formation of capital towards inefficiencies, awarding contracts to incapable individuals who often do shoddy works, investors or firms at the micro-level conniving with as well bribing corrupt bureaucrats in order to escape some regulatory arrangements. The resultant effect of these metrics well reduces the positive effects of investment on growth. Thus, although investment propels growth, its growth-enhancing effect is lost to corruption.

Corruption also significantly affects growth via labour force participation. The coefficient of the transmission channel is negative – an indication of existence of favouritism and nepotism that fraught the labour market where employment is offered to participants not based on merits but on social tides and ability to pay in order to “get things done”. Thus people with less capability are recruited with its associated deleterious impact on productivity and growth. Accounting for regional dummies in the 2SLS produces an interesting finding – it identifies government expenditure as an additional transmission channel. The coefficient of *LCORGOVEXP* is negative

and significant at 10%. Government expenditure as a ratio to GDP does not have a direct influence on growth but when it interacts with corruption, it strongly reduces growth. A possible elucidation of this is ascribable to corrupt public officials distorting the composition as well misaligning expenditure away from growth-enhancing projects to “boondoggles” which are often of no social and/or economic use.

We interpret this as evidence to mean that corruption effect on growth via government expenditure is largely contingent on location–specific. To the extent that countries in the sample are within a sub-region beset with rent-seeking officials confirms this as they are more likely to execute projects that will inure to their selfish interest. Inflation and government expenditure are not robust determinants of growth although the coefficient of inflation is negative in all the specifications while the coefficients of government expenditure alternate according to the estimation strategy. These notwithstanding, our results reveal the indirect effects corruption has on growth rates. These dynamics imply that less corruption is undoubtedly good for economic growth.

## CONCLUSION AND POLICY IMPLICATIONS

Corruption is a pervasive challenge confronting the world more especially countries in sub-Saharan African. The institutionalization of corruption has been phenomenal, mainly manifested through gross mismanagement as well misuse of public resources for private gains. This paper investigates the effects of corruption on economic growth in some selected sub-Saharan African countries. Results from the estimated generalized least squares (EGLS) reveal that corruption significantly reduces economic growth through its direct effects on GDP per capita and indirectly via gross fixed capital formation and labour force. Instrumenting for endogeneity using regional bloc dummies as instruments in the two-stage least squares (2SLS) confirms the pass-through channels of corruption to growth but also identifies government expenditure as addition transmission channel. In addition to the direct effect on growth, the rather prevalent widespread corruption among these countries sands the wheels of economic growth by lowering investment rates, reduction in labour productivity as well as channeling of public resources by bureaucrats into projects of no economic and/or social use.

In terms of policy relevance, our findings suggest that while investment and labour force induce economic growth, corrupt practices at various stages of capital formation including but not limited to plant and equipment purchasing, construction and award of contracts erode the positive gains from higher capital. This in general may take the poor development of public infrastructure, purchasing of inferior materials with their preeminent long-term deleterious impact of growth. The growth-damaging effect is even more pronounced when corruption pervades the labour market paving the way for unqualified participants. The resultant effect is that weak labour is fed as inputs in the production processes thus lowering productivity and growth more generally.

Following from our key findings on the transmission channels and given the renewed interest of propelling growth in sub-Saharan Africa through prudent macroeconomic management, it is imperative to note that the theory and practice necessary to establish best policies to improve economic growth is at best predictive in the light of widespread corruption. Controlling corruption must take precedence over the design of any macroeconomic policy due in part to its direct effect on growth and indirectly via macroeconomic variables and factors of production. Finally, in addition to government effectiveness and regulatory quality, one cannot discount the effect of attitudinal change on growth. While abhorring corruption may not directly propel growth, its indirect effect nonetheless results in transparency, good governance, and quality execution of projects, higher investment and consequently growth. Not until these are done, growth in sub-Saharan Africa would be a mirage. Campaign against corruption does not only improve on institutional quality but is by far growth–enhancing.

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