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National Governance Index, Corruption Index, and Growth Rate—International Evidence from Sub-Saharan and MENA Countries

Omar Al Farooque [1,*], **Ali Hamid** [1] **and Lan Sun** [2]

1 UNE Business School, University of New England, Armidale, NSW 2351, Australia; amhamid73@yahoo.com
2 School of Business and Law, Central Queensland University, Sydney, NSW 2000, Australia; l.sun@cqu.edu.au
* Correspondence: ofarooqu@une.edu.au

Abstract: In an international setting of developing countries, applying advanced statistical estimation approaches such as the system generalized method of moments (GMM), two-stage least square (2SLS) regressions, and cluster analysis, this paper revisits the impact of macro-level governance quality and the corruption index on the economic growth rate. We use cross-country panel data for 40 sub-Saharan and the Middle Eastern and North African (MENA) countries over the period of 2009–2020. The empirical results document the positive and negative effects of the national governance index and the corruption index on the economic growth rate. Additionally, foreign direct investment and population have a positive impact on the economic growth rate and trade openness has a negative impact. The study evaluates the robustness of these associations through a series of tests. These findings have important policy implications for policymakers and regulators in developing countries. In particular, the study recommends the implementation of an anti-corruption campaign and improving country-level governance quality that could encourage increased foreign direct investment for an accelerated economic growth rate. These will further enhance accountability, transparency, the rule of law, social responsibility, the public voice, and government effectiveness.

Keywords: national governance index; corruption index; economic growth rate; sub-Saharan Africa and MENA countries; GMM; 2SLS; cluster analysis

JEL Classification: G38; H41; O10

1. Introduction

The relationship between country-level governance, corruption, and economic growth has received particular attention from academics and policymakers around the world. The macro-governance index has appeared to be a significant measure of good governance in the last two decades. The World Bank has constructed a set of aggregate Worldwide Governance Indicators (WGI), providing public perceptions on six broad dimensions of national governance.[1] Given the high-profile corporate scandals in recent years, macro-level governance has become an important policy issue. It is conceived that good governance plays an effective role in company management, producing reliable financial information, building investor confidence, and attracting investments. Furthermore, good macro-governance also plays a key role in improving economic growth and development. According to the World Bank, national governance indicators such as voice and accountability, political stability and the absence of violence/terrorism, government effectiveness, regulatory quality, the rule of law, and the control of corruption need particular attention to improve the national governance index/rating. Again, corruption (including corrupt, fraudulent, and collusive practices) is one of the important economic deficiencies and is considered a significant barrier to economic growth and political stability in developing countries. Corruption

involves a mix of behaviours that can be termed as the illegitimate use of public resources for private gain (Roberts 2015).

The World Bank defined corruption as the use of public office for private gains and Transparency International (TI) as the abuse of the entrusted power of public office for private gains. TI denoted corruption as behaviour on the part of officials in the public sector, whether politicians or civil servants, in which they improperly and unlawfully enrich themselves or those close to them, by the misuse of public power entrusted to them. Ghahari et al. (2021) contend that corruption and fraudulent, collusive, and corrupt practices related to development result in inefficiencies, inequities, and the diversion of resources, which has considerable detrimental effects on sustainable development (i.e., development that meets the needs of the present without compromising the ability of future generations to meet their own needs). Corruption causes economic inefficiency and instability in economic growth and sustainability. A corrupt country is more likely to fail to undertake constructive socio-economic policies toward sustainable development, such as avoiding adverse institutional/governance effects, offering fairness in the rule of law/judiciary, maintaining the long-term effectiveness of programs and initiatives for economic and social well-being, enhancing the current and future quality of life of citizens, etc.

In recent years, TI data indicates that the corruption perceptions index (CPI)[2] has been widespread in most countries, including sub-Saharan Africa and the MENA countries; however, most of sub-Saharan Africa and the MENA countries have adopted national governance codes. According to Shleifer and Vishny (1993), countries with weak governance are subjected to a high level of corruption. In the MENA economies, corruption is a widespread phenomenon affecting government expenditure and economic growth (Hashem 2014). Therefore, most sub-Saharan Africa and MENA countries, especially those in the MENA region, have reformed their economies as well as established anti-corruption organizations and governance codes to promote social awareness of the danger of corruption and improve their economic growth. Empirical studies suggest that sub-Saharan Africa and the MENA countries with a higher level of corruption can affect rich and poor countries as well as private and public sectors that create an obstruction for most economies in developed and developing countries toward the sustainable growth of their respective economies. Again, empirical studies in the literature on the relationship between governance, corruption, and economic growth provide mixed findings. Most studies show that corruption has a negative impact on growth; however, some other studies argue that corruption might have a positive effect. Moreover, there are various studies on the relationship between corruption and economic growth in the context of developed countries such as the United States, United Kingdom, Germany, Japan, and Australia. However, there are only a few studies in developing countries, especially in sub-Saharan Africa and the MENA countries.

Our paper aims to provide an in-depth analysis of the relationship between corruption, governance practices, and the economic growth rate in sub-Saharan Africa and the MENA countries. Applying multiple statistical methods, it extends previous research that links corruption and governance with the economic growth rate. Our study is important from the perspective of developing countries that are exposed to rampant corruption, poor governance, low economic growth, inadequate food security, deprivation of health care and education, etc. These miserable macro-economic conditions have detrimental effects on the sustainable development of these countries. A total of 17 Sustainable Development Goals (SDGs) were adopted in 2015 as a part of the United Nations (UN) Agenda 2030 (United Nations 2015; Eisenmenger et al. 2020). In particular, SDG8 (i.e., promoting sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all) is most relevant to this study in investigating the economic growth rate of the sample countries from the context of institutional and socio-economic environments relating to national governance and the corruption index. The governance quality and institutional phenomena have received momentum with the emergence of the SDGs (Bebbington and

Unerman 2018), which are aimed at achieving a better sustainable economic development through accomplishing multiple economic and social goals (e.g., growth, zero poverty, zero hunger, quality education, health care, employment, etc.) (United Nations 2015, 2021).

The macro-economic governance indicators as a set of institutional quality factors, (such as voice and accountability, political stability and the absence of violence/terrorism, government effectiveness, regulatory quality, the rule of law, and control of corruption) become pivotal and a key driving force toward sustainable economic development. A reliable institutional quality setting benefits the economy's cause as it acts for the public good, and all organizations that use these elements are benefited, which ultimately accelerates the economic growth rate (Acemoglu 2006; Acemoglu and Robinson 2008). Governance quality indicates that when countries control their institutions, fight corruption, and expand free trade, they achieve better economic performance (Leitão and Capucho 2021). However, most of the sub-Saharan African and the MENA countries have some common characteristics such as a weak infrastructure, low per capita private consumption, high unemployment rate, a mass poverty level on the economic front, and poor macro-economic, institutional, governance settings and enforcement on the national front. Since these countries have lagged behind in bringing the stability of the economic and social aspects referred to in the SDGs, our study will shed light on the obstacles to achieving the 'economic sustainability' of these countries and then reflect on the UN-promoted global initiatives against continuous threats to sustainable economic development. Based on these findings, it will also provide policy directions and strategies to implement and promote that would have positive implications at the economic and social levels for sustainable growth and development.

This study significantly differs from prior studies and contributes to the literature as follows. First, to our best knowledge, in an international sample of 40 sub-Saharan African and MENA countries, this study is the first attempt to measure macro-level national governance (aggregate indicators of six broad dimensions of governance: voice and accountability, political stability and the absence of violence/terrorism, government effectiveness, regulatory quality, the rule of law, and control of corruption) and examines whether the national governance index and corruption index are affecting the economic growth rate (i.e., GDP growth rate). Second, it investigates the relationship between national governance, corruption, and the economic growth rate for the first time, to the best of the authors' knowledge, using multiple advanced econometric methods (e.g., OLS, random effects, system GMM, and 2SLS regression methods) to document unbiased and robust findings, which is different from the existing literature. Third, unlike the prior literature, this study applies 'cluster analysis' by identifying three groups of countries from the sample to provide additional insights into the relationship between national governance, corruption, and the economic growth rate. Fourth, there is mixed findings in the literature on the relationship between corruption, governance, and the economic growth rate. This paper thus provides a more comprehensive examination of this relationship in sub-Saharan Africa and the MENA countries. It also added the effect of macro-level governance and the corruption index on the economic growth rate in these countries by identifying the national governance index for improving economic growth.

Using across country panel data of 40 sub-Saharan African and MENA countries for the period 2009–2020, the generalized method of moments (GMM) system regression results show that the governance index has a significant positive effect on the economic growth rate in sub-Saharan Africa and the MENA countries, indicating that the macro-governance is pivotal to the economic growth in this region. The results also show that the corruption perceptions index has a significantly negative effect on the economic growth rate. Furthermore, the results show that an increase in foreign direct investment and the population growth rate have a significant positive impact on the economic growth rate in sub-Saharan Africa and the MENA countries, while trade openness reveals the deterrent effect on the economic growth rate. Several countries have stepped up their efforts to fight corruption and our study further calls for the implementation of the anti-

corruption campaign and the need for governance to restrain corruption. The analysis of the association between corruption, governance, and the economic growth rate for sub-Saharan Africa and the MENA countries would be useful to the policymakers and other developing countries.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature relating to the relationship between corruption, governance, and the economic growth rate. Section 3 describes the data and methodology. Section 4 presents empirical results and discussions of the study including the robustness test and supplementary analysis. Finally, Section 5 concludes the paper.

2. Literature Review on National Governance, Corruption, and Economic Growth

National governance is a vital element of economic growth and the effect of country-level governance on economic growth has been widely studied in both developed and developing countries. For example, Morck et al. (2005) argued that the influence of country-level governance may be distinct from foreign direct investment opportunities. Claessens (2006) also found that a country with a weak governance environment may have imperfect effectiveness for its growth prospects. Adeoye (2009) documented that macro-level governance has a positive impact on improving foreign direct investment. Elbahnasawy and Revier (2012) affirmed that the rule of law is highly correlated with reduced corruption, thus suggesting that a better quality of law enforcement reduces corruption. Tiwari (2010) examined the influence of governance and its various components on economic growth in a cross-country framework. The results reveal that governance is significantly negatively related to economic growth. Hillier et al. (2011) investigated the linkage between country-level governance and R&D. Their results indicate that country-level governance has a significant positive effect on research and development investment. Klautzer (2013) documented that open free trade is positively related to good governance practices. Diallo (2017) suggested that countries with a high level of macro-governance have better economic growth, and therefore good national governance plays a crucial role in improving economic growth in developing countries. Boţa-Avram et al. (2018) examined the causal relationship between macro-level national governance, economic growth, and the sustainable development of 136 countries over the period 2006–2015. They report consistent findings that better governance has a significant positive effect on economic growth.

Again, the consensus in the literature is that corruption is more prevalent in economies with high poverty, economic and political insecurity, and ineffective rule of law (Iwasaki and Suzuki 2012; Kayed and Hassan 2011). However, whether a relationship exists between corruption and economic growth is arguable among different studies. Mo (2001) studied the impact of corruption on investment, human capital, governance, and economic growth. The results report that for every one percent increase in the corruption level, the economic growth will reduce by 0.72 percent. Moreover, any increase in the corruption level will lead to a decrease in human capital and private investment. Drury et al. (2006) investigated the relationship between corruption, democracy, and the economic growth of more than 100 countries over the period from 1982 to 1997. The results show that corruption has a significant negative relationship with economic growth. Mobolaji and Omoteso (2009) examined the relationship between corruption and economic growth in transitional economies including Russia, Slovakia, Mongolia, the Czech Republic, China, Hungary, and Vietnam. Again, the results show that corruption has a negative impact on the economies of the countries operating in the transnational market. This study draws attention to the government—there is a need for policy reforms to strengthen accountability and attack bureaucracy in developing countries. Using a sample of 67 developing countries over the period of 1980–1983, Mauro (1995) documented that corruption has a significantly negative effect on economic growth and it also reduces investment. Similarly, Mauro (1996, 1998) revealed that corruption reduces investment in the education sector. Other studies such as

Campos et al. (1999) and Wei (2000) also confirm that corruption has a negative effect on investment.

In Africa, Gyimah-Brempong (2002) and Baliamoune-Lutz and Ndikumana (2007) reported that a higher level of corruption has a negative impact on economic growth and a positive impact on income inequality. d'Agostino et al. (2014) examined the relationship between government spending, corruption, and economic growth and found that the interaction between corruption and both investment and military spending has a significant negative effect on economic growth. Ghoneim and Ezzat (2014) used panel data to examine the relationship between corruption and economic growth for 15 MENA countries over the period 1998–2009, and they also revealed that corruption has a negative effect on economic growth. Similar results were found in South and East Asia and the Pacific region by Yerrabati and Hawkes (2015). In contrast, some researchers have argued that corruption can be economically desirable in certain circumstances where a more efficient provision of public services can be provided without going through cumbersome regulations. For example, Leff (1964) suggests that corruption might promote economic growth; some practices of corruption such as speed money or bribes allow people to avoid bureaucratic problems and improve the performance of government employees. Bardhan (1997) found that many corrupted countries have experienced rapid growth rates. In addition, studies that confirmed that corruption has a positive impact on economic growth are those of Paldam (2002), Treisman (2000), Pande (2007), Podobnik et al. (2008), Aidt (2009), Braguinsky (1996), Brunetti et al. (1998), and Huang (2016).

3. Data, Model and Methodology

The primary objective of this paper is to examine the possible effects of the macro-level governance index and corruption perceptions index on the economic growth rate. This paper uses a panel regression for a sample of 40 countries in sub-Saharan Africa and the MENA region from the period 2009 to 2020. The corruption perceptions index was established in sub-Saharan Africa and the MENA region at the beginning of 2009, and these countries are selected due to their corruption perceptions index being among the world's highest. Table 1 presents the list of counties included in this study and the sample period.

Table 1. Sample Distribution.

	List of Countries	Sample Period
1	Algeria	2009–2020
2	Bahrain	2009–2020
3	Botswana	2009–2020
4	Cameroon	2009–2020
5	Congo, Rep.	2009–2020
6	Cote d'Ivoire	2009–2020
7	Egypt	2009–2020
8	Ethiopia	2009–2020
9	Gambia	2009–2020
10	Ghana	2009–2020
11	Iran	2009–2020
12	Iraq	2009–2020
13	Jordan	2009–2020
14	Kenya	2009–2020
15	Kuwait	2009–2020
16	Lebanon	2009–2020
17	Libya	2009–2020
18	Madagascar	2009–2020

Table 1. *Cont.*

	List of Countries	Sample Period
19	Malawi	2009–2020
20	Mali	2009–2020
21	Mauritius	2009–2020
22	Morocco	2009–2020
23	Mozambique	2009–2020
24	Namibia	2009–2020
25	Nigeria	2009–2020
26	Oman	2009–2020
27	Qatar	2009–2020
28	Saudi Arabia	2009–2020
29	Senegal	2009–2020
30	Sierra Leone	2009–2020
31	South Africa	2009–2020
32	Sudan	2009–2020
33	Syria	2009–2020
34	Tanzania	2009–2020
35	Tunisia	2009–2020
36	Uganda	2009–2020
37	United Arab Emirates	2009–2020
38	Yemen	2009–2020
39	Zambia	2009–2020
40	Zimbabwe	2009–2020

We model GDP growth as a function of the corruption perceptions index and macro/national governance index. In line with the literature, the dependent variable is the average GDP per capita growth rate and the independent variables are the governance index and corruption index. We control for foreign direct investment, trade openness, inflation, education level, population, and life expectancy. These are annual data collected for each country. Our data are drawn from a number of sources. The regression model is expressed as

$$\text{GDP\_growth rate}_{it} = \alpha + \beta_1 \text{MGOV}_{it} + \beta_2 \text{CPI}_{it} + \beta_3 \Sigma X_{it} + \beta_4 D_t + \mu_{it} \tag{1}$$

where GDP_growth rate is the dependent variable with *i* and *t* indicating country and year, respectively. The main independent variables of interest include the macro-governance index (MGOV) and CPI measuring the level of corruption. *X* is the control variables and, in line with the previous literature, we control for foreign direct investment, trade openness, inflation, education level, population, and life expectancy (Khobai et al. 2018; Chang and Ying 2008; Brueckner and Lederman 2015; Keho 2017; Rigobon and Rodrik 2005; Vamvakidis 2002; Vlastou 2010; Ulaşan 2015; Polat et al. 2015; Lawal et al. 2016; Freckleton et al. 2012). D_t is the dummy variable included to control for year-specific effects that may affect the economic growth rate in all countries in a particular year and μ is the error term. Table 2 summarizes the variables and data sources utilized in this study. The detailed model is expressed as

$$\begin{aligned} \text{GDP\_growth rate}_{it} = \alpha &+ \beta_1 \text{MGOV}_{it} + \beta_2 \text{CPI}_{it} + \beta_3 \text{FDI}_{it} + \beta_4 \text{OPEN}_{it} + \beta_5 \text{INFL}_{it} \\ &+ \beta_6 \text{EDUC}_{it} + \beta_7 \text{POP}_{it} + \beta_8 \text{LIFE\_EXP}_{it} + \beta_9 D_t + \mu_{it} \end{aligned} \tag{2}$$

Variables Name	Definition	Symbols	Predicted Sign	Sources
GDP growth rate	Annual percentage growth rate of GDP per capita; GDP per capita is gross domestic product divided by midyear population.	GDP_ Growth rate	Dependent Variable	World Bank
Governance quality Index	Average of six indicators developed by World Governance Institute of the World Bank: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law and control of corruption. The average value lies between −2.5 to +2.5.	MGOV	+	The Worldwide Governance Indicators (WGI)
Corruption Perceptions Index	CPI takes value from 0 to 10, where 10 means the least corrupted country and 0 means the most corrupted country.	CPI	+/−	Transparency International
Foreign Direct Investment	Foreign direct investment, net inflows of capital expressed as percentage of GDP for country i at time t.	FDI	+	World Bank
Trade	Trade expressed as percentage of GDP for country i at time t.	OPEN	+	World Bank
Inflation Rate	Inflation rate for country i at time t.	INFL	−	World Bank
Education Level	The education level of the country measured by the log of secondary schools' enrolment numbers for country i at time t.	EDUC	+	World Bank
Population	Population growth rate for country i at time t.	POP	−/+	World Bank
Life Expectancy	The average period that a person may expect to live for country i at time t.	LIFE_EXP	+	World Bank

Descriptive Analysis

Table 3 presents descriptive statistics for all the variables. As reported in the table, the mean and median value of the economic growth rate is 4.78 and 4.92, respectively. The highest economic growth occurred in Qatar with a growth rate of 19.59 and the lowest economic growth rate of −17.67 is observed in Zimbabwe.[3] The average value of governance indicators including voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption lies in the range between −2.5 to +2.5 in the data set. The mean value of the governance index (MGOV) of the sample countries is only around −0.46. The highest and lowest governance index scores are 0.87 and −1.76, being Mauritius and Iraq, respectively. The corruption perceptions index (CPI) has reached 3.41, which shows clearly that corruption is a phenomenon in sub-Saharan Africa and the MENA countries. Kenya seems to have the highest corruption perceptions 0.20 (0 means the most corrupted country)

and Qatar has the lowest 7.70 (10 means the least corrupted country). The average number of logged secondary school enrolment numbers (EDUC) is 13.69. The mean foreign direct investment (FDI) is 3.88 and the mean trade openness is 79.36. The mean for foreign direct investment (FDI) is 3.88. For the population growth (POP), trade openness (OPEN), inflation rate (INFL), and life expectancy (LIFE_EXP), the descriptive statistics show that the mean (median) population growth is 0.86 (0.95), the mean (median) of trade openness is 79.36 (89.54), the mean (median) inflation is 1.90 (2.08), and the mean (median) life expectancy is 63.63 (62.68).

Table 3. Descriptive Statistics of Variables.

Variables	Mean	Std. Dev.	Median	Min	Max	Skewness	Kurtosis
GDP_Growth rate	4.78	4.47	4.92	−17.67	19.59	−1.30	9.05
MGOV	−0.46	0.63	−0.46	−1.76	0.87	0.13	2.29
CPI	3.41	1.33	3.00	0.20	7.70	0.82	2.95
FDI	3.88	3.91	2.90	−4.38	23.54	1.99	7.94
OPEN	79.36	29.89	75.24	19.12	178.16	0.64	3.11
INFL	1.90	1.06	2.08	−2.66	4.64	−1.22	5.63
EDUC	13.69	1.25	13.63	10.86	16.21	−0.13	2.41
POP	0.86	0.62	0.95	−1.83	2.87	−0.40	6.32
LIFE_EXP	63.63	9.78	62.68	40.70	79.37	−0.18	1.80

4. Empirical Results and Discussion

For a panel dataset, OLS estimations may be unreliable and meaningless if there occurs heterogeneity across firms (Hsiao 2003). By allowing variable intercepts, the fixed effects and random effects models can take into account the heterogeneity across firms. The choice between these models is based on the Hausman Test (Cameron and Trivedi 2009). The results of the Hausman Test show that the *p*-value is insignificant; thus, it is safe to use the random effects model. Therefore, initially, we use the pooled OLS approach as a base estimation, and the random effects panel regression to control for the heterogeneity problem.

The OLS regression results in Table 4 show that the governance index (MGOV) has a significant positive effect on the GDP growth rate at a 1% level of significance. On the other hand, corruption (CPI) shows negative signs and an insignificant effect on the GDP growth rate. These findings indicate that macro-level governance is sufficient to ensure growth despite the existence of corruption. Regarding the control variables, foreign direct investment (FDI), population growth rate (POP), and life expectancy (LIFE_EXP) appear to have significant positive effects on GDP growth rate as per expectation. In contrast, trade openness (OPEN) shows a significant negative effect on the GDP growth rate, suggesting that openness in trade is not driving the economic interest of sub-Saharan African and MENA countries.

Table 4. OLS and Random Effects Regressions Examining the Effects of Governance and Corruption on Economic Growth Rate.

Independent Variables	Dependent Variable: GDP Growth Rate	
	OLS	**Random Effects**
MGOV	2.081 ***	2.309 ***
	(4.23)	(3.54)
CPI	−0.345	−0.212
	(−1.53)	(−0.88)
FDI	0.140 ***	0.135 **
	(2.63)	(2.30)

Table 4. *Cont.*

Independent Variables	Dependent Variable: GDP Growth Rate	
	OLS	Random Effects
OPEN	−0.023 ***	−0.0242 **
	(−2.66)	(−2.11)
INFL	0.182	0.075
	(0.96)	(0.37)
EDUC	0.208	0.384
	(1.06)	(1.34)
POP	1.893 ***	1.983 ***
	(5.82)	(4.60)
LIFE_EXP	0.044 *	0.0485
	(1.92)	(1.40)
Year Dummy	Yes	Yes
No. of Observation	480	480
Adjusted R-squared	0.144	
F Test	4.84	
F Test *p*-value	0.000	
VIF	1.78	
Wald Chi^2		66.73
Wald Chi^2 *p*-value		0.000
Hausman Test *p*-value		0.478

Note: ***, **, * represent statistical significance at 0.01, 0.05, and 0.10 levels, respectively; *t*-stat is shown in the parenthesis.

The regression results of random effects regression in Table 4 show that the macro-level public governance index (MGOV), foreign direct investment (FDI), and population growth rate (POP) still have significant positive effects on the GDP growth rate, while the corruption perceptions index (CPI) has a negative but insignificant effect on the GDP growth rate. Trade openness (OPEN) also has a significant negative effect on the GDP growth rate. These findings are exactly similar to the OLS findings as reported earlier, except for life expectancy, which shows no significant effect on the GDP growth rate in random effects estimates.

Furthermore, to address the endogeneity/simultaneity problem between the variables of interest, especially when the form of autocorrelation and heteroscedasticity are unknown, we investigate the relationship between the corruption perceptions index, governance index, and economic growth rate by using the generalized method of moments (GMM). Table 5 shows that the Hansen Test of over-identification (27.19) is not rejected with a *p*-value of 0.983. As such, this study cannot reject the hypothesis that the instruments used are valid. Furthermore, the findings of the AR (1) and AR (2) tests show no first- or second-order serial correlation (AR (1) test *p*-value is 0.000 and AR (2) test *p*-value is 0.732).

Table 5. System GMM Regression Examining the Effects of Governance and Corruption on Economic Growth Rate.

Independent Variables	Dependent Variable: GDP Growth Rate
	System GMM
MGOV	3.037 ***
	(3.84)
CPI	−0.927 ***
	(−3.60)
FDI	0.233 ***
	(5.54)
OPEN	−0.040 ***
	(−3.77)

Table 5. *Cont.*

Independent Variables	Dependent Variable: GDP Growth Rate
	System GMM
INFL	0.183
	(1.47)
EDUC	−0.837 *
	(−1.94)
POP	0.642 **
	(2.07)
LIFE_EXP	0.033
	(0.51)
L.GDP growth rate	0.350 ***
	(7.88)
Year Dummy	Yes
No. of Observation	393
Adjusted R-squared	
F Test	
F Test *p*-value	
VIF	
Wald Chi^2	
Wald Chi^2 *p*-value	
Hausman Test *p*-value	
Hansen Test	27.19
Hansen test *p*-value	0.983
AR(1)	−4.01
AR(1) *p*-value	0.000
AR(2)	−0.34
AR(2) *p*-value	0.732

Note: ***, **, * represent statistical significance at 0.01, 0.05, and 0.10 levels, respectively; *t*-stat is shown in the parenthesis.

The findings of the dynamic system GMM model in Table 5 show that the governance index (MGOV) has a significant positive impact on the GDP growth rate at a 1% level of significance, suggesting that for every one unit increase in the governance index the GDP growth rate of the economy will increase by 3.04 points. This finding is consistent with the OLS and random effects findings. It implies that better governance practices can accelerate a higher level of the economic growth rate. This also suggests that the national governance index is complementary to fostering economic growth and, simultaneously, could have more positive influences on the economic growth rate. The findings are useful for sub-Saharan Africa and the MENA countries to promote the role of effective national governance practices in restoring investor confidence as well as contributing to sustainable economic growth. This result is consistent with those of Diallo (2017) and Boţa-Avram et al. (2018). However, unlike the OLS and random effects findings in Table 4, the results of the system GMM approach in Table 5 show that the corruption perceptions index (CPI) has a significantly negative effect on the GDP growth rate at a 1% level of significance as per expectation, indicating that for every one unit increase in the corruption perceptions index the growth rate of the economy will lower by 0.927 points. This result is consistent with those of Mauro (1995) and Méon and Sekkat (2005).

Regarding the control variables, foreign direct investment (FDI) retains a significantly positive relationship with the GDP growth rate. This implies that foreign direct investment has brought more advanced technology into sub-Saharan Africa and the MENA countries and has improved their management practices, which is reflected in the growth of the economy. The positive relationship between FDI and the GDP growth rate in sub-Saharan Africa and the MENA countries might be due to the new legal environment that has become favourable to foreign investors with more incentives, and more guarantees and protection for investors. This result is consistent with the results of Borensztein et al. (1998) and

Khaliq and Noy (2007). With respect to the trade openness (OPEN) variable, the result of the system GMM reveals a significant negative effect on the economic growth rate, similar to the OLS and random effects findings reported earlier. This result is consistent with the findings of Vlastou (2010), Polat et al. (2015), and Lawal et al. (2016). Therefore, openness in trade remains a hindrance to the economic growth rate of sub-Saharan Africa and the MENA countries as it does not play a positive role in improving the GDP growth rate in these countries. Again, population growth (POP) has a significant positive relationship with the economic growth rate. A potential inference could be that the increase in population growth in these countries tends to encourage competition between companies to set up a new business, which improves economic growth.

4.1. Robustness Test

To ensure the robustness of our findings, we implemented the 2SLS and instrumental variables to further examine the endogeneity concern of corruption measure and governance index. Following the previous studies by Brenton-Rule et al. (2016), Anheier et al. (2018), Berger et al. (2020), Mselmi (2020), and Minto (2020), we collected instrumental variables including corruption control (CPIW), government effectiveness (GOVEFF), political stability (PS), regulatory quality (RQ), the rule of law (RL), voice and accountability (VOICACC), carbon dioxide emissions per capita (CO_2), and government consumption expenditure (GCEX). We then applied 2SLS to estimate corruption and governance as a function of the instrumental variables and control variables in the first-stage regression, and, in the second stage, to estimate GPD growth as a function of the corruption and governance predicted from the first stage.

Table 6 reports the results of 2SLS. In the first-stage regression, corruption and governance are treated as endogenous and regressed on a set of instrumental variables and control variables, respectively. The second-stage regression replaces the governance and corruption by their predicted values from the first-stage regression; that is, the predicated governance measure (P_MGOV) and corruption measure (P_CPI). The Hausman test shows that there is no concern of an endogeneity issue when the instrumental variables are used in the second-stage regression. The White tests also indicate that our results are robust estimates against heteroscedasticity errors.

Table 6. 2SLS Regression Examining the Endogeneity of Governance and Corruption on Economic Growth Rate.

Independent Variable	First-Stage		Second-Stage
	Dependent Variable		Dependent Variable
	CPI	MGOV	GDP Growth Rate
Intercept	2.967 ***	−0.411 *	−0.828
	(4.42)	(−1.84)	(−0.27)
P_MGOV			1.882 ***
			(2.78)
P_CPI			0.141
			(0.38)
Instruments:			
CPIW	1.033 ***		
	(5.81)		
GOVEFF	0.174		
	(0.89)		
PS	−0.103		
	(−1.31)		

Table 6. *Cont.*

Independent Variable	First-Stage		Second-Stage
	Dependent Variable		Dependent Variable
	CPI	MGOV	GDP Growth Rate
RQ	0.332 **		
	(2.26)		
RL	0.082		
	(0.42)		
VOICACC		0.638 ***	
		(27.26)	
CO_2		0.017 ***	
		(8.16)	
GCEX		0.005	
		(1.58)	
Control variables:			
FDI	−0.007	−0.001	0.149 ***
	(−0.69)	(−0.21)	(2.78)
OPEN	0.005 ***	0.001 **	−0.028 ***
	(3.11)	(1.98)	(−3.08)
INFL	−0.033	−0.010	0.192
	(−0.89)	(−0.75)	(1.02)
EDUC	0.029	−0.073	0.285
	(0.70)	(−5.12)	(1.38)
POP	0.150 **	0.008	1.764 ***
	(2.15)	(0.30)	(5.28)
LIFE_EXP	0.002	0.018 ***	0.030
	(0.44)	(8.92)	(1.24)
Year Dummy:	YES	YES	YES
No. of Observation	393	393	393
Adjusted R-square	0.642	0.792	0.139
F-statistic	71.46	183.98	4.89
	($p < 0.0001$)	($p < 0.0001$)	($p < 0.0001$)
White test	80.39	96.90	130.74
	(0.3734)	(0.00)	(0.7603)
Hausman test			2.88
			($p = 0.9687$)

Note: ***, **, * represent statistical significance at 0.01, 0.05, and 0.10 levels, respectively. *t*-stat is shown in the parenthesis.

The results show that the governance measure (P_MGOV) has a positive impact on the GDP growth rate, significant at less than 1%. This finding is consistent with those of the OLS, random effects, and GMM estimations. Again, the positive correlation suggests that good governance can improve the economic growth rate. Nonetheless, there is no evidence suggesting that the corruption measure is associated with the GDP growth rate. The coefficient on the predicated governance measure (P_CPI) is positive but insignificant. Among the control variables, foreign direct investment (FDI) and population growth (POP) retain significantly positive relationships with the GDP growth rate. This implies that foreign direct investment and population growth encourage economic growth in sub-Saharan Africa and the MENA countries. However, trade openness (OPEN) has a significantly negative association with the GDP growth rate, suggesting that openness in trade does not necessarily play a positive role in improving economic growth in sub-Saharan Africa and the MENA countries. These findings are mostly similar to those of the GMM estimation.

4.2. Supplementary Analysis

We are also concerned as to whether the effects of corruption and governance on economic growth rates vary across countries. Thus, we adopted a country 'cluster analysis'

to further examine the effects of corruption and governance on the economic growth rate by country clusters. Consistent with Everitt et al. (2001) and Ghahari et al. (2021), we used the K-means algorithm (i.e., machine learning technique) to determine the meaningful clusters, and the process generated three clusters. The procedure requires computing canonical variables and transforming the corruption and governance data to have equal variance. *k*-means clustering aims to partition the *n* observations into *k* sets of clusters so as to minimize the sum of the squared error. Table 7 shows the canonical variables that transformed from the raw data of corruption and governance and lists the member countries in each cluster. Based on the previous descriptive statistics, the country clusters are consistent with our expectations. Table 7 shows the list of countries within their corresponding clusters 1, 2, and 3.

Table 7. Country Cluster Analysis. (The K-means algorithm is used to determine the meaningful clusters. The procedure requires computing canonical variables and transforming the corruption and governance data to have equal variance. K is a parameter that defines the number of clusters. Given a set of observations $(x_1, x_2, \ldots, x_n)$, each observation is a *d*-dimensional real vector, *k*-means clustering aims to partition the *n* observations into *k* sets of clusters so as to minimize the sum of squared error (SSE), that is, $SSE = \sum_{i=1}^{K} \sum_{X \in C_i} \| X_j - \mu_i \|^2$ μ_i is the mean of points in a cluster C_i).

Country	Canonical Variable (Corruption)	Canonical Variable (Governance)	CLUSTER
Gambia	−1.705	0.871	1
Madagascar	−1.656	0.881	1
Malawi	−1.432	1.078	1
Mozambique	−1.520	1.143	1
Tanzania	−1.934	1.206	1
Zambia	−1.922	1.358	1
Ethiopia	−1.446	−0.644	1
Iran	−1.445	−0.889	1
Uganda	−1.862	0.613	1
Iraq	−2.494	−1.840	1
Sudan	−2.849	−1.647	1
Mali	−1.261	0.818	1
Libya	−1.501	−1.132	1
Congo, Rep.	−1.924	−0.806	1
Cote d'Ivoire	−2.488	−0.735	1
Cameroon	−2.390	0.021	1
Sierra Leone	−1.622	−0.059	1
Kenya	−3.119	1.043	1
Morocco	0.403	0.200	2
Senegal	0.606	0.333	2
Kuwait	1.650	0.944	2
South Africa	1.881	1.268	2
Syria	−0.172	−1.804	2

Table 7. *Cont.*

Country	Canonical Variable (Corruption)	Canonical Variable (Governance)	CLUSTER
Yemen	−0.569	−1.844	2
Egypt	−0.438	−0.243	2
Lebanon	−0.900	−0.017	2
Saudi Arabia	0.973	−0.165	2
Ghana	−0.404	1.685	2
Namibia	−0.309	2.481	2
Algeria	−0.343	−0.845	2
Zimbabwe	−1.042	−2.435	2
Tunisia	1.907	−0.075	2
Mauritius	0.889	3.215	2
Nigeria	1.856	−3.055	2
Bahrain	4.539	−0.776	3
Jordan	4.059	−0.901	3
Oman	5.056	−0.619	3
United Arab Emirates	5.564	−0.094	3
Botswana	5.119	0.694	3
Qatar	4.244	0.771	3

CLUSTER 1: This contains 18 sub-Saharan African and MENA countries demonstrating high corruption and low governance (45% of the sample). These are the poorest countries in the region and most of whom have suffered from war, political/civil unrest, and terrorism, etc.

CLUSTER 2: This contains 16 sub-Saharan African and MENA countries showing average corruption and governance (40% of the sample). These countries represent the majority population of the region; some of them are rich and resourceful countries, while others have suffered from war, political unrest, terrorism, and authoritarian regimes, etc.

CLUSTER 3: This contains 6 sub-Saharan African and MENA countries exhibiting low corruption and high governance (15% of the sample). Most of them are Middle Eastern resourceful and rich countries.

We then re-estimated the GDP growth rate as a function of the corruption perceptions index and macro-level governance index by country clusters. The estimation results in Table 8 are based on the OLS, random effects and fixed effects methods, where the system GMM is replaced by fixed effects due to a reduced sample size of each country cluster. The results in Table 8 show that, by and large, the significance of the association of national governance (MGOV) and corruption (CPI) with the GDP growth rate is driven by countries with high corruption and weak macro-economic national governance. We find a strong positive association between the GDP growth rate and the macro-level governance index (MGOV) exists in CLUSTER 1 and CLUSTER 2 countries. The finding indicates that better governance practice can foster the economic growth rate, and this effect is particularly evident for those countries with weak governance performance. There is also evidence suggesting that the GDP growth rate is negatively associated with the corruption perceptions index (CPI) among CLUSTER 1 countries. Nonetheless, we do not find that the macro-level governance index and corruption perceptions index have any significant impact on the GDP growth rate among CLUSTER 3 countries. As such, policymakers in sub-Saharan Africa and MENA countries, especially CLUSTER 1 and CLUSTER 2 countries with high corruption and weak national governance, should focus on implementing the

anti-corruption campaign and fight against corruption, and improve the country-level governance quality indicators to have better accountability, transparency, rule of law, public voice, political stability, and government effectiveness, etc.

Table 8. OLS, Random Effects and Fixed Effects Regressions Examining the Effects of Governance and Corruption on Economic Growth Rate with Cluster Effect.

Independent Variables	CLUSTER 1			CLUSTER 2			CLUSTER 3		
	OLS	Random Effects	Fixed Effects	OLS	Random Effects	Fixed Effects	OLS	Random Effects	Fixed Effects
Intercept	−4.609	−10.459	−7.415	−14.307	−10.702	−8.765	13.545	13.911	64.345
	(−0.88)	(−1.32)	(−0.52)	(−1.58)	(−1.49)	(−0.25)	(0.65)	(1.30)	(0.54)
MGOV	1.991 **	3.819 ***	2.052	1.621 **	1.912 ***	1.718	1.641	1.353	3.003
	(2.29)	(3.10)	(1.11)	(2.20)	(2.63)	(0.32)	(0.55)	(0.58)	(0.29)
CPI	−0.188	−0.299	−0.875 *	0.389	0.198	−0.003	0.672	0.835	1.061
	(−0.38)	(−0.59)	(−1.66)	(1.36)	(0.57)	(−0.01)	(0.65)	(1.31)	(0.86)
FDI	−0.048	−0.642 **	−0.093	0.385 ***	0.300 ***	0.444 *	0.673 ***	0.632 ***	0.291
	(−0.67)	(−0.85)	(−1.03)	(2.86)	(2.76)	(1.88)	(3.53)	(4.42)	(0.94)
OPEN	−0.011	−0.021	0.052 **	0.037	0.018	0.013	−0.087 ***	−0.084 ***	−0.134
	(−1.07)	(−1.34)	(2.18)	(1.06)	(0.76)	(0.31)	(−3.07)	(−3.43)	(−1.25)
INFL	0.436	−0.083	−0.085	0.403	0.352	0.626	−1.304 *	−1.369 **	−0.551
	(1.53)	(−0.26)	(−0.25)	(1.25)	(1.22)	(1.44)	(−1.90)	(−2.56)	(−0.63)
EDUC	0.635 **	1.018	0.570	0.732	0.551	−0.451	−1.445 **	−1.561 ***	−7.974
	(2.11)	(1.78)	(0.46)	(1.57)	(1.37)	(−0.27)	(−2.56)	(−2.76)	(−0.92)
POP	3.255 ***	3.834 ***	3.87	1.978 ***	1.832 ***	−1.418	2.376 **	2.033 **	−0.189
	(3.06)	(2.78)	(1.61)	(3.23)	(3.14)	(−0.64)	(2.49)	(2.35)	(−0.05)
LIFE_EXP	0.003	0.062	0.038	0.040	0.050	0.248	0.125	0.146	0.542
	(0.08)	(0.84)	(0.20)	(0.78)	(1.24)	(0.57)	(1.00)	(1.41)	(1.03)
L.GDP growth			0.100			0.062			0.020
			(1.49)			(0.50)			(0.12)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observation	216	216	216	192	192	192	72	72	72
Adjusted R-squared	0.123			0.258			0.582		
F Test	3.14			2.02			3.14		
F Test *p*-value	0.001			0.010			0.000		
Wald Chi²		42.44			50.94				
Wald Chi² *p*-value		0.001			0.000				

Note: ***, **, * represent statistical significance at 0.01, 0.05, and 0.10 levels, respectively; *t*-stat is shown in the parenthesis.

Furthermore, FDI is found to have a significant positive effect on the economic growth rate in Table 8, and the positive effect is mainly driven by CLUSTER 2 and CLUSTER 3 countries. This is consistent with the prediction that the Gulf countries have benefited from the inflows of FDI. Again, as expected, population (POP) has a significant positive impact on the economic growth rate, and this is prevalent among all three clusters in sub-Saharan Africa and MENA countries. However, Table 8 also reveals that, unlike CLUSTER 1 and CLUSTER 2 countries, the GDP growth rate of CLUSTER 3 countries is adversely affected by some factors, such as openness in trade (OPEN), secondary school-level education (EDUC), and inflation (INFL). Such findings suggest that CLUSTER 3 countries should undertake robust macro-economic measures in these factors to overcome the hindrance to the economic growth rate.

5. Conclusions

This study investigates whether governance and corruption have an impact on economic growth in sub-Saharan Africa and the MENA countries. Using across country panel data of 40 sub-Saharan African and MENA countries for the period 2009–2020, the system GMM regression results show that the governance index has a significant positive effect on economic growth in the sub-Saharan African and MENA countries, indicating that the macro-level governance is pivotal to the economic growth in this region. The results also show that the corruption perceptions index has a statistically significant negative effect on the economic growth rate. This result is consistent with the previous studies such as Mauro (1995) who observes the negative relationship between corruption and economic growth and supports the 'sanding the wheels' hypothesis. Furthermore, foreign direct investment is found to have a significant positive effect on the economic growth rate. Sub-Saharan Africa and the MENA countries, in particular the Gulf countries, have benefited from the inflows of FDI. The results indicate that trade openness is significantly negatively related to the economic growth rate. The negative effect of trade openness on the economic growth rate is due to the fact that most of the sub-Saharan African and MENA countries suffer from political instability, violence, a lack of basic democratic rights, rule of law, and rampant corruption that affect trade and economic performance.

Based on the results provided in this paper, there are a number of important policy implications for the policymakers and regulators in sub-Saharan Africa and the MENA countries. First, empirical evidence shows that weak governance indicators tend to have higher corruption levels and low growth in developing countries. Therefore, policy-makers in the sub-Saharan African and MENA countries can also create a new regulatory regime to encourage the national governance indicators to show better political stability, higher social responsibility and accountability, and enhanced transparency and public voice. It is essential to develop a new generation of public policies and operational measures to improve the quality of institutions and raise institutional effectiveness. In particular, imperative measures are needed to develop appropriate institutional and legal infrastructure, improving the regulation and control of countries' institutional environments, property rights, free and fair judiciary, freedom of speech and human rights, control of corruption, etc. In this way, countries can increase their rates of economic growth and harmonize levels of socio-economic well-being. Policymakers should be aware of the adversities and discrepancies of governance indicators and, accordingly, develop strategies and create supporting measures that can contribute toward improving the population's standard of living and achieving the UN's SDGs Agenda for economic and social goals (e.g., growth, zero poverty, zero hunger, quality education, health care, employment, etc.). Second, it is evident that corruption has a negative effect on the economic growth rate as well as on society as a whole. Thus, the governments of sub-Saharan Africa and MENA countries should focus on combating corruption and support anti-corruption organizations to fight against corruption. It is essential to develop effective policies and corruption control measures targeted toward corruption mitigation. The implementation of an anti-corruption campaign and improving country-level governance quality can eventually encourage increased foreign direct investment for an accelerated economic growth rate. Governments and policymakers need to undertake vigorous actions and strategies to eradicate prevalent economic, social, and political inequalities and injustices to build a more sustainable economic development. Notwithstanding this, there are several limitations of this study. The findings may be biased if the model has omitted variables. For example, unemployment or labour force and labour force growth could be considered as additional control variables. Moreover, the results of the paper could be sensitive to the inclusion of certain countries in the sub-Saharan and MENA countries. Again, the model structure could be improved by considering the non-linearity function when modelling. Future research should consider these aspects for further investigations. Finally, a possible structural break could occur in 2020 when the COVID−19 pandemic unfolded, and future research will investigate how the pandemic

has affected the relationship between economic growth, governance and corruption, and its modelling process.

Notes

[1]   The aggregate indicators of six broad dimensions of governance: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption, where scores lie between −2.5 and 2.5, with higher scores corresponding to a higher quality of national governance (see Kaufmann et al. 2006, 2007).

[2]   CPI is based on surveys of business people, local citizens and 'experts' in each country regarding their perceptions of corruption and bribes. The CPI scores on a one to ten scale, where 10 represents the 'most corrupt' and 1 the 'least corrupt' (see Lambsdorff 2005).

[3]   Table 3 reports the summary statistics: country names are not included for the minimum and maximum values.

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