
Original Paper

Institutions, Development, and Corruption: A Comparative Study of Sub-Saharan Africa and the Middle East and North Africa

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Abstract

This paper explores the impact of the institutional and socioeconomic factors on corruption in the Middle East and North Africa (MENA) and Sub-Saharan Africa (SSA) by employing panel data for the period 2000–2022. Considering corruption as a major impediment to sustainable economic development, this study evaluates the impacts of government effectiveness, democracy, political stability, GDP per capita, young unemployment and literacy on corruption over several time horizons. To assess the robustness of the results, we use panel fixed-effects models and various econometric specifications, in order to isolate short-, medium- and long-term associations. The results indicate that government effectiveness, democracy and GDP per capita are strong drivers of corruption in both regions, with improvements in these parameters resulting in reduced corruption levels. But the impact of political stability, literacy and young unemployment varies between areas and time periods. Political stability reduces corruption in MENA but is positively correlated with corruption in SSA in the short run, although its influence becomes unimportant over longer horizons. In both regions, higher youth unemployment is associated with increased contemporaneous corruption, although its long-run influence remains substantial only in SSA. The results overall emphasize the importance of enhancing government effectiveness, fostering democratic institutions and encouraging sustained economic development as key components of long-term anti-corruption strategies. The observed variations between MENA and SSA further show that strategies to reduce corruption should take into account regional institutional and socioeconomic realities.

Keywords: Corruption; Government Effectiveness; Democracy; Political Stability; Economic Development; MENA; Sub-Saharan Africa; Panel Data

Introduction

Corruption remains one of the most persistent obstacles to sustainable economic development, effective governance, and social welfare across the developing world. Defined broadly as the abuse of public power for private gain, corruption distorts the allocation of public resources, undermines the rule of law, weakens institutional credibility, and erodes public trust in government (Mauro, 1995; Treisman, 2000). Its consequences extend well beyond the immediate misappropriation of funds: corruption discourages both domestic and foreign investment, inflates the cost of public projects, diverts spending away from productive sectors such as health and education, and can entrench inequality by concentrating economic opportunity in the hands of politically connected elites. For regions still working to consolidate stable institutions and diversify their economies, these effects are particularly consequential.

Sub-Saharan Africa (SSA) and the Middle East and North Africa (MENA) are two regions where corruption has featured prominently in both academic research and policy debate, yet the two regions differ markedly in their political, economic, and institutional trajectories. Sub-Saharan Africa is characterized by a wide diversity of political systems, comparatively young democratic institutions, high dependence on natural resource rents in many countries, and governance structures that are still being built or reformed. The MENA region, by contrast, has historically been shaped by a mix of

authoritarian and semi-authoritarian regimes, heavy reliance on oil rents in several economies, and a wave of political upheaval following the Arab Spring that reshaped government effectiveness and political stability across much of the region after 2010. These divergent contexts raise an important empirical question: do the same economic, institutional, and social factors explain corruption in both regions, or does the relationship between governance, development, and corruption operate differently depending on regional context?

The stakes of understanding these dynamics are high. Both regions continue to face pressing development challenges which are ranging from poverty reduction and infrastructure gaps to youth employment and economic diversification, and corruption is widely regarded as one of the central impediments to progress on each of these fronts. Trends over the past two decades add urgency to the question. While corruption levels in Sub-Saharan Africa and the MENA region were broadly comparable at the start of the 2000s, the two regions have since diverged: government effectiveness and corruption control have deteriorated markedly in several MENA countries, particularly in the aftermath of the Arab Spring, while Sub-Saharan Africa has experienced a more modest decline alongside somewhat steadier economic growth. Understanding why these trajectories differ and whether the same underlying factors, such as stronger institutions, economic growth, education, or political stability, can improve governance outcomes in both settings is essential for identifying effective governance reforms. These insights are directly relevant to policymakers, international donors, and multilateral institutions seeking to design more effective governance reforms and anti-corruption programs in these regions.

A substantial body of literature has examined the determinants of corruption, both in global cross-country settings (Treisman, 2000; Mauro, 1995; Paldam, 2002) and within specific regions. Studies focused on Sub-Saharan Africa have emphasized the roles of governance quality, natural resource wealth, foreign aid, and ethnic fractionalization in shaping corruption outcomes (Bhattacharyya & Hodler, 2010; Asongu, 2013; Okada & Samreth, 2012). Research on the MENA region has instead tended to highlight authoritarian political structures, oil rents, and limited political freedoms as central drivers of corrupt practices (Arezki & Gylfason, 2011; Sekkat, 2012; Saadaoui, 2017). While these regional literatures have each contributed valuable insights, they have largely developed in parallel rather than in direct comparison. Few studies have systematically examined whether the determinants of corruption operate similarly or differently across Sub-Saharan Africa and the MENA region using a common empirical framework, a common set of variables, and a common time period. This is a notable gap because both regions share several structural characteristics, including dependence on natural resources in many countries, relatively young or fragile democratic institutions, and ongoing development challenges. At the same time, they differ in political regime type, colonial history, and recent political trajectories.

This paper addresses that gap by providing a systematic, comparative empirical analysis of the determinants of corruption in Sub-Saharan Africa and the MENA region over the period 2000–2022. Using panel data drawn primarily from the World Bank's Worldwide Governance Indicators (WGI), together with economic, social, and labor market data, the paper investigates how institutional quality (government effectiveness, democracy, and political stability), economic development (GDP per capita and development aid), and socio-economic conditions (literacy rate and youth unemployment) relate to corruption outcomes, and whether these relationships differ across the two regions. The analysis employs standard panel data techniques such as pooled OLS, fixed effects, and random effects models, with the Hausman test used to identify the preferred specification. To assess the robustness and timing of these relationships, the paper estimates the model using contemporaneous data, five-year averaged data, and five-year lagged independent variables, allowing for an examination of short-run, medium-run, and long-run effects.

This paper contributes to the existing literature in several ways. First, it offers one of the few direct empirical comparisons of the determinants of corruption in Sub-Saharan Africa and the MENA region within a single, consistent methodological framework, rather than relying on findings drawn from separate studies using different samples, time periods, and corruption measures. Second, by using the WGI corruption estimate rather than the more commonly used Corruption Perceptions Index (CPI), the analysis benefits from a broader set of underlying data sources and more robust cross-national

comparability (Kaufmann et al., 2010). Third, the use of a two-decade panel, together with contemporaneous, averaged, and lagged specifications, allows the paper to move beyond a purely cross-sectional or short-run perspective and to characterize how the relationship between governance, development, and corruption evolves over different time horizons—an issue that has received limited attention in the existing literature. Finally, by excluding the high-income Gulf states from the MENA sample, the analysis focuses on a more comparable set of economies across both regions, improving the validity of the cross-regional comparison.

Taken together, the findings offer both common ground and important points of divergence between the two regions. Across nearly all specifications, government effectiveness, democracy, and GDP per capita emerge as robust, statistically significant determinants of lower corruption in both Sub-Saharan Africa and the MENA region, and these relationships hold not only in the short run but also in the medium run (five-year averages) and the long run (five-year lagged regressors), suggesting that stronger institutions and higher income levels produce durable, rather than merely transitory, improvements in corruption outcomes. Youth unemployment is consistently associated with higher corruption in both regions in the short and medium run, though this relationship persists into the long run only for Sub-Saharan Africa. Development aid shows little relationship with corruption in the MENA region across any time horizon, but is associated with lower corruption in Sub-Saharan Africa in the medium run, consistent with the idea that aid effectiveness depends on the strength of recipient-country governance.

The regions diverge most sharply on the roles of political stability and literacy. Political stability is associated with lower corruption in the MENA region but with higher corruption in Sub-Saharan Africa in the short run, a pattern consistent with the possibility that stability in some SSA countries reflects entrenched, less accountable power structures rather than genuine institutional strength; this divergence fades in the medium and long run, where political stability loses significance in both regions. Literacy similarly cuts in opposite directions: higher literacy is associated with lower corruption in the MENA region in the short run, consistent with education fostering civic engagement and demand for accountability, but with higher corruption in Sub-Saharan Africa, a pattern more consistent with an environment in which weak institutions allow educated individuals to more effectively navigate or exploit corrupt systems; neither relationship, however, remains significant in the long run. These results suggest that while good governance and economic development are universally important drivers of lower corruption, some determinants, particularly political stability and education, operate differently depending on the broader institutional context. This highlights the need for region specific rather than one size fits all anti-corruption strategies.

The remainder of the paper proceeds as follows. The next section reviews the relevant literature on the determinants of corruption, with particular attention to studies focused on Sub-Saharan Africa and the MENA region. The following section describes the data, variables, and empirical methodology used in the analysis. The results section presents and discusses the panel regression findings, first for the pooled sample and then separately for the MENA and SSA regions, across contemporaneous, medium-run, and long-run specifications. The final section concludes with a summary of the main findings and their implications for governance and anti-corruption policy in both regions.

2. Literature Review

Corruption has been an important obstacle to sustainable development and effective governance in both Sub-Saharan Africa and the Middle East and North Africa (MENA) region. There are many studies that investigate the relationship between corruption and country level socio-economic variables. The determinants of corruption display distinct patterns across these regions due to varying socio-political, economic, and institutional landscapes. For example, in Sub-Saharan Africa, factors such as weak governance structures, low economic development, ethnic fractionalization, and reliance on natural resource rents are often highlighted as key drivers of corruption (Bhattacharyya & Hodler, 2010; Asongu, 2013). In contrast, in the MENA region, corruption dynamics are influenced by factors like authoritarian regimes, oil rent, and limited political freedoms (Arezki & Gylfason, 2011; Elbahnasawy & Revier, 2012). This section will explore how these different regional characteristics shape corruption and identify both common and region-specific determinants of corruption based on previous literature.

We will focus on studies not only about Africa and Middle East, but also other regions to have a wholistic view of the topic.

One of the most important papers in the field is Treisman (2000), which performs a comprehensive cross-country analysis and identifies key determinants of corruption. Study uses data from transparency international corruption perception index for 64 countries between 1996 and 1998. Treisman (2000) performs cross-sectional regression analysis to discover the relationship between corruption and various explanatory variables such as income levels, historical factors, and democratic institutions. Paper shows that hi income level is associated with lower levels of corruption and this implies that wealthier nations tend to have better governance and lower incentives for corrupt practices. The paper also stresses the significance of historical factors and argues that countries with British colonial heritage, which have a stable democratic history on average have lower corruption level. In addition, Democratic institutions, such as free elections and a free press, were also found to be significant determinant of corruption. Although the study was global in scope, the findings of it is quite relevant for regions such as Sub-Saharan Africa and MENA where weak institutions and economic underdevelopment generate environments favorable to higher levels of corruption. Overall, Treisman's work highlights the complex interplay between economic, historical, and political factors in shaping corruption across countries. Another seminal study which examines the corruption in cross country context is Mauro (1995). The paper specifically focuses on the relationship between corruption and economic growth, with a particular focus on how corruption affects institutional quality. By using cross country data set for 67 countries and covering 20-year period from 60s to 80s, the paper performs a regression analysis to quantify the impact of corruption on economic growth rates, investment, and public expenditures. Mauro (1995)'s finds that countries with higher levels of corruption tend to experience weaker economic growth, mainlt due to reduced levels of private and public investment. The author argues that corruption discourages private sector investment by increasing uncertainty and costs, and it also distorts public investment, as funds are often channeled into less productive, large-scale projects. The results of the paper have important implications for African countries because the continent have been struggling with the institutional challenges and governance issues. The paper claim that improving institutional quality (i.e reducing bureaucratic red tape, strengthening legal systems, and increasing government accountability) can considerably increase economic growth. In another study Asongu (2013) studies the effectiveness of corruption-control institutions across African countries by evaluating whether improving governance quality reduces corruption. The paper uses Corruption Perception Index (CPI) as the dependent variable and various determinants such as governance quality, economic freedom, and social development as independent variables. Asongu (2013) utilizes cross-sectional data on African countries and applies econometric techniques to analyze how these variables correlate with perceptions of corruption. The findings suggest that higher levels of governance quality are associated with lower level of corruption. In addition, the study emphasizes the importance of economic freedom and argues that countries with freer markets experiences lower corruption because reduced government intervention lowers opportunities for rent-seeking behavior. The paper also argues that social development indicators, such as education and health outcomes, also play a role in corruption level of a country as countries with higher levels of human capital tend to exhibit better governance and reduced corruption. Okada and Samreth (2012) studies the relationship between foreign aid and corruption in sub-Saharan Africa and offers new insights into how governance structures shape this relationship., The authors assess whether the inflow of foreign aid decreases or increases corruption by using a sample of African nations and panel data analysis after controlling for the institutional quality of the recipient countries. The results suggest that in countries with strong governance (i.e., effective law enforcement, transparency, and accountability) foreign aid lowers corruption by providing resources that improve public sector functioning and governance capabilities. However, in countries with weak governance, foreign aid can have the opposite effect, fueling corruption as funds are often misallocated or diverted by corrupt government officials. Based on the results, foreign aid in poorly governed nations may create opportunities for rent-seeking behavior and increase corruption levels. Therefore, governance quality becomes very relevant in determining whether foreign aid has a positive or negative impact on corruption, especially in the African context. Bhattacharyya and Hodler (2010) focuses on the relationship between natural resource wealth, democratic institutions, and corruption using a panel dataset from 44 African countries. The paper

examines on how the abundance of natural resources such as oil, minerals, and other commodities, can lead to higher levels of corruption, especially in countries with weak democratic institutions. By employing a panel data regression technique, and controlling for various institutional and economic variables, they find that resource-abundant African countries experiences more corruption due to the increased opportunities for rent-seeking and misappropriation of funds. However, the authors note that the effect of natural resource wealth on corruption depends on the strength of democratic governance. Abundant natural resource wealth exacerbates corruption as there are fewer checks on the use of public funds in countries with weak or non-existent democratic institutions. On the contrary, in countries with stronger democratic frameworks, the existence of independent judiciary, free media and transparent electoral systems mitigates the corrupting influence of natural resources. Therefore, based on the results of Bhattacharyya and Hodler (2010) it can be argued that that while resource wealth poses challenges, improving the quality of democratic institutions can significantly reduce the potential for corruption in African nations. Kebede (2019) analyzes corruption in African nations by focuses on the effect of governance quality and economic growth. By using panel dataset of 46 African countries, the study examines how variations in governance structures, economic performance, and political stability impact corruption levels. The findings of Kebede (2019) demonstrate that countries with stronger governance systems lowers the levels of corruption. In contrast, weak governance allows corrupt practices to flourish, undermining economic development and growth. The paper also emphasizes the role of economic growth in moderating corruption, suggesting that nations with level of GDP growth are generally have lower levels of corruption, as economic stability reduces the need for rent-seeking behaviors. Moreover, the research points out that more stable countries experience lower level of corruption due to predictable and effective governance, which reduces the opportunities for officials to engage in corrupt activities.

There are some other studies also focus on corruption in Africa and in the Middle East and they have explored the relationship between corruption, institutional quality, governance, political stability, and natural resource wealth. For example, Musila (2015) shows how weak institutions and poor governance contribute to widespread corruption across African countries. The study argues that the political instability and ineffective legal systems allow corrupt practices to become common, especially when the accountability mechanisms are absent. Similarly, Geda and Kibret (2002) demonstrates that economic growth and development are significantly affect corruption, with weak governance structures being a key channel for corruption. Sekkat (2012) examines the relationship between natural resource wealth and corruption in the MENA region. The study finds that rent-seeking behavior associated with resource abundance in oil-rich nations worsens corruption, when governance structures are weak. This finding supports the findings of Saadaoui (2017), which studies the role of political institutions in controlling corruption across the MENA region. Saadaoui shows that stronger political institutions, including checks on executive power and political freedoms, are important for decreasing corruption because weak institutions allow leaders to engage in unchecked corrupt practices. In Sub-Saharan Africa, the interaction between political stability and corruption has also been examined. Iweala et al. (2017) performs a dynamic panel analysis presenting that political instability creates environments where corruption increases, as frequent political changes disrupt governance and accountability. Asongu (2012) adds another dimension to the discussion by investigating the effect of foreign aid on corruption in Sub-Saharan Africa. The study finds that foreign aid, when not carefully monitored, often exacerbates corruption in countries with weak institutions, as aid is frequently misallocated or tapped off by corrupt officials. Overall, these studies together emphasize that corruption in Africa and the Middle East is driven by a combination of institutional weaknesses, political instability, and natural resource wealth, all of which create opportunities for corrupt practices to stay in the absence of effective governance.

In a recent paper Fayad (2024) investigates the relationship between corruption and economic growth in the MENA region, with a particular focus on the period from 2000 to 2021. Utilizing a dynamic panel data analysis, the study incorporates various corruption indicators such as the Corruption Perception Index (CPI), a customized corruption index (CCI), and the Control of Corruption index (CC-WGI), alongside GDP per capita as a measure of economic growth. The analysis is framed within an extended Solow growth model, incorporating key variables such as labor, capital, and corruption. The study uses the ARDL Bounds method to explore both short- and long-term relationships between

corruption and economic growth. The findings reveal that while corruption does not appear to significantly affect economic growth in the short run, the customized corruption index positively influences long-run growth in certain models. However, the CPI and CC-WGI indicators did not show significant long-term effects on GDP. The study emphasizes the widespread nature of corruption in the MENA region and highlights that despite its detrimental impact on economic development and political stability, anti-corruption efforts in countries like Saudi Arabia and Tunisia offer promising steps toward increased transparency and governance. These insights contribute to the broader debate on whether corruption hinders or promotes growth, particularly in developing regions like MENA. In another recent study, Njangang et al. (2024) contributes significantly to the literature on the intersection of corruption and socio-economic outcomes by investigating the impact of different types of political corruption—executive, legislative, and judicial—on hunger in African countries. While previous research has explored the determinants of hunger and the effects of corruption separately, this paper uniquely bridges these two strands by focusing on how political corruption exacerbates food insecurity. Using a panel of 45 African nations and employing the sequential linear panel dynamic estimator, the analysis finds that higher levels of corruption at the executive, legislative, and judicial levels are associated with increased hunger with executive corruption having the biggest effect. This study is among the first to empirically demonstrate how the distribution of political power across social groups can moderate the relationship between corruption and hunger. Bonga-Bonga and Kirsten (2024) is another recent study that investigates the role of institutions and ethnicity in determining corruption for the African continent. The authors use Afrobarometer dataset from 2019 to 2021 for 34 African countries and investigate the relationship between ethnicity and individual corruption experiences at individual level and controls for institutional quality. The authors argue that there is a threshold level of institutional quality at which corruption is mitigated or shifts from extortive corruption to collusive corruption. More specifically, it is argued that when institutional quality is low extortive corruption prevails and when it is high collusive corruption becomes more common.

This paper contributes to the existing literature by providing a comparative analysis of the determinants of corruption in Sub-Saharan Africa and the MENA region using a comprehensive dataset from 2000 to 2022. Although previous studies have examined corruption within each region separately, few studies have thoroughly compared the role of both institutional and economic variables across these two regions. This study includes economic variables like GDP per capita and Gini coefficients, institutional variables such as government effectiveness and democracy level, and social variables such as education level. Therefore, this study provides a comprehensive understanding of how both governance structures and economic conditions interact to influence corruption. This dual approach bridges gaps in the literature, which often examines one of these factors only. In addition, although most of the existing literature relies on cross-sectional data, this paper uses a two-decade-long panel dataset and this allows for the investigation of temporal trends, offers insights into how corruption dynamics have evolved in response to changing political and economic landscapes. Our paper's regional focus also adds to the understanding of corruption in oil-rich and resource-dependent economies, where institutional quality plays a pivotal role in shaping corruption outcomes. Our research extends the discussion introduced by scholars like Treisman (2000) and Asongu (2013) by offering empirical evidence that highlights both commonalities and region-specific differences in the determinants of corruption, contributing to policy debates on governance reforms in Africa and the Middle East. Finally, this paper relies on the corruption estimates from the World Bank's Worldwide Governance Indicators (WGI) unlike Asongu(2000) and Treisman (2013) which uses Corruption Perceptions Index (CPI). WGI is preferable to the CPI in empirical studies because the WGI offers a more comprehensive and nuanced approach. While CPI relies heavily on perceptions, which can be biased, the WGI incorporates data from a variety of sources, including surveys and expert assessments, providing a broader and more accurate reflection of corruption. The WGI also includes margins of error for its estimates, allowing for more robust statistical analysis. Additionally, its longer time series and integration with other governance indicators make it ideal for analyzing corruption trends and cross-national comparisons (Kaufmann et al., 2010).

3. Data and Methodology

In this paper we focus on Sab-Saharan Africa and MENA regions to investigate the determinants of corruption. We exclude countries with populations less than one million. In addition, we exclude Gulf

countries (UAE, Saudi Arabia, Kuwait, Bahrain, Qatar, and Oman) because these countries have unique characteristics that differentiate them from other nations in the MENA region. Their high reliance on oil revenues, centralized governance, and distinct socio-economic structures might skew the analysis of corruption determinants. Additionally, their smaller, more homogenous populations and the strong role of the ruling elite in controlling economic and political institutions may make it harder to compare them meaningfully with Sub-Saharan African countries, which generally have different governance dynamics and economic drivers. Our study covers periods from 2000 to 2022.

3.1 Data: Dependent and Independent Variables

The main dependent variable in this study is the Corruption Index, which is obtained from the World Bank's Worldwide Governance Indicators (WGI). The Corruption Index measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as the "capture" of the state by elites and private interests. The corruption index takes a value between -2.5 and +2.5, where -2.5 shows the worst corruption performance and +2.5 shows the best corruption performance. The WGI aggregates multiple sources, including expert assessments and surveys, providing a comprehensive measure of corruption perception and governance quality. It is widely used in empirical research for cross-country comparisons and longitudinal analysis of governance trends. The composite indicators in WGI are derived from more than 30 distinct data sources, capturing governance perceptions from a broad range of survey respondents and expert evaluations worldwide. Comprehensive information regarding the data sources, the method of aggregation, and the interpretation of these indicators is detailed in Kauffman et al. (2010).

One of the key independent variables in this study is government effectiveness, as measured by the World Governance Indicators (WGI). Government effectiveness reflects the ability of a government to provide high-quality public services, formulate and implement sound policies, and manage resources effectively. It is a crucial determinant of corruption as studies suggest that well-functioning governments are more likely to combat corruption because they establish robust institutional frameworks that prevent the misuse of power and resources (Kaufmann et al., 2011). Higher government effectiveness often correlates with greater administrative efficiency, transparency, and accountability, all of which are vital in reducing opportunities for corrupt practices (Mauro, 1995). Moreover, governments that effectively deliver public goods and maintain stability are less likely to experience corrupt behavior, as efficient bureaucracies can act as checks on misuse of power. Triesman (2000), Sung (2004) and Kauffman (2002) are some of the other studies that use government effectiveness as independent variable in determining corruption level in cross-country studies.

Using democracy as an independent variable to determine corruption is a common approach in governance and political economy literature (Lederman et. al.(2005), Sung (2004)) . Democratic systems are often assumed to be better at curbing corruption because they feature institutional checks and balances, transparency, and accountability mechanisms. Democratic governments tend to be more responsive to citizens' demands for clean governance, and the electoral process provides a mechanism for removing corrupt officials from power. Furthermore, democratic norms and institutions, such as a free press and active civil society, can expose and challenge corrupt practices, thereby reducing opportunities for corrupt behavior (Sandholtz & Koetzle, 2000). In this paper we use voice and accountability from the World Governance Indicators as a proxy for democracy because it captures key elements of democratic governance, including the extent to which citizens can participate in selecting their government, as well as the freedom of expression, freedom of association, and a free media. It reflects the functioning of democratic institutions and processes, making it a useful indicator for studies investigating the impact of democracy on corruption. Voice and accountability is used as a proxy in corruption studies in the literature (Lederman (2005) and Bhattacharyya and Hodler (2010)).

GDP per capita is another important independent variable we use in this study. The use of GDP per capita as a determinant of corruption is widely supported in the literature. As a proxy for economic development, higher GDP per capita is linked to better institutional quality, stronger governance, and reduced opportunities for corrupt behavior. Wealthier countries tend to invest more in law enforcement, transparency, and accountability mechanisms, leading to lower levels of corruption (Treisman, 2000; Paldam, 2002). Moreover, the modernization hypothesis suggests that as countries develop

economically, corruption declines due to improved legal and political norms (Lipset, 1959). Empirical studies, such as Mauro (1995) and Montinola and Jackman (2002), consistently show a negative relationship between GDP per capita and corruption, making it a robust predictor in corruption models. Data for GDP per capita (current US \$) is obtained from the world bank.

Development aid is another independent variable that is used in this study. Aid can create opportunities for rent-seeking, as political elites may misappropriate funds for personal gain, reducing the effectiveness of aid in promoting development. Moreover, high levels of aid dependency can weaken institutional accountability, as governments rely on external assistance rather than domestic revenues, diminishing the need to address corruption or pursue meaningful reforms. Tied aid, with its associated conditionalities, can further promote corrupt practices through inflated procurement contracts and inefficient resource allocation. Empirical research suggests that while aid can have a positive impact in countries with strong institutions, it often exacerbates corruption in poorly governed states. Studies by Svensson (2000) and Knack (2004) demonstrate how aid can erode institutional development, while Djankov et al. (2008) highlight that corruption increases when there is a lack of oversight, making development aid an important determinant of corruption in such contexts. We use net official development assistance and official aid received (constant 2021 US\$) from the World Bank.

Education, is a key determinant in understanding corruption, as higher levels of education empower citizens to hold governments accountable and demand transparency. Educated populations are more likely to be aware of their rights, engage in civic activities, and resist corrupt practices. In this paper we use literacy rate as another independent variable. The data for literacy rate is obtained from the World Bank. Literacy enhances people's ability to access and understand information, contributing to a culture of accountability and reducing the opportunities for corruption to thrive. Furthermore, a well-educated populace strengthens institutional quality by fostering democratic norms and supporting anti-corruption policies. Empirical studies, such as those by Uslaner and Rothstein (2016), have shown that higher literacy rates are associated with lower levels of corruption, emphasizing education's critical role in curbing corrupt behavior. Thus, education and literacy are essential independent variables in corruption analyses due to their influence on fostering transparency and reducing the appeal or success of corrupt activities.

The next independent variable used in this study is political stability of a country. Political stability is a crucial determinant of corruption, as frequent changes in government, political unrest, or weak governance structures can create environments conducive to corrupt behavior. In unstable political contexts, institutions may be weakened, and rule of law eroded, making it easier for public officials to engage in corrupt practices without fear of punishment. Political instability often leads to uncertainty, where politicians and bureaucrats may take advantage of their temporary positions to extract rents, fearing the loss of power or control. Empirical research by Aisen and Veiga (2013) supports this, showing that political instability is significantly associated with higher levels of corruption. Additionally, unstable regimes may prioritize consolidating power over institutional reforms or anti-corruption efforts, further embedding corrupt practices within the political system. Thus, political instability is an essential independent variable in corruption models due to its role in undermining institutional integrity and governance structures. We use Political Stability and Absence of Violence/Terrorism index from the WGI and it measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.

Youth unemployment is another significant determinant of corruption, and it is used as another independent variable in this study. As high levels of joblessness among young people can foster frustration, disillusionment with institutions, and a sense of exclusion from the economic and political system. This creates fertile ground for corrupt practices, both from individuals seeking alternative means of income and from political elites exploiting the unemployed youth for personal gain or power consolidation. Unemployed youth may be more susceptible to engaging in corrupt activities, such as bribery or illicit work, to overcome economic hardships. Moreover, governments under pressure to address high youth unemployment may resort to corrupt means, such as patronage networks or nepotism, to create jobs or distribute resources. Empirical evidence, such as the study by Saha, Gounder, and Su (2009), highlights that high unemployment rates are associated with increased

corruption, emphasizing that youth unemployment undermines social stability and encourages corrupt practices. We obtain youth unemployment rate from International Labour Organization (ILO).

We present summary statistics in table 1 below. The mean level of corruption is -0.61 for the Sab-Saharan African and MENA region, and this number indicates that corruption is a significant problem as more negative number implies more corruption. The smallest corruption value is -1.85 and it belongs to Somalia in 2008, the highest value is 1.24 and it belongs to Botswana in 2003. Government effectiveness has a mean value of -0.77 (again, a more negative number implies worse government effectiveness). The minimum value for government effectiveness is -2.44 and it belongs to Somalia in 2014, while the maximum value is 1.24 and it belongs to Mauritius in 2014. GDP per capita has a mean value of 5990\$ with a minimum value of 420\$ and maximum value of 30965\$. The minimum value belongs to Democratic Republic of Congo in 2001, while the maximum value belongs to Libya in 2008. Literacy rate has a mean of 65% with a minimum value of 14.38 (Niger in 2001) and a maximum value of 98.42(Jordan 2021). Youth unemployment has a mean of 17% with a minimum value of 0.47% (Niger 2011) and a maximum value of 52.6% (Libya 2020). The mean value of Democracy is -.73 with a minimum value of -2.23 (Eritrea 2019) and a maximum value of 0.98 (Mauritius 2000). Political stability has a mean of -0.78 with a minimum value of -3.31 (Somalia 2008) and a maximum value of 1.20 (Namibia 2008). Finally (net) development aid has a mean value of 1\$ billion with a minimum value of -145\$ million and a maximum value of 27.4\$ billion.

Table 1. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Corruption	1,166	-0.70	0.58	-1.85	1.24
Gov't Effectiveness	1,166	-0.77	0.62	-2.44	1.15
GDPPC(current US\$)	1,181	5990.51	7879.51	420.32	30965
Literacy Rate	241	65.52	20.85	14.38	98.42
Youth Unemployment	1,219	17.09	13.48	0.47	52.60
Democracy	1,166	-0.73	0.71	-2.23	0.98
Political Stability	1,166	-0.78	0.92	-3.31	1.20
Development Aid	1,206	1080000000	1550000000	-145000000	2740000000

In table 2 below we present correlation matrix. Given the nature of variables used in this study, some independent variables are highly correlated with each other. Therefore, we will adopt progressive approach in regression, meaning that we will include each variable at a time, to the effect of each variable separately and mitigate multicollinearity problem.

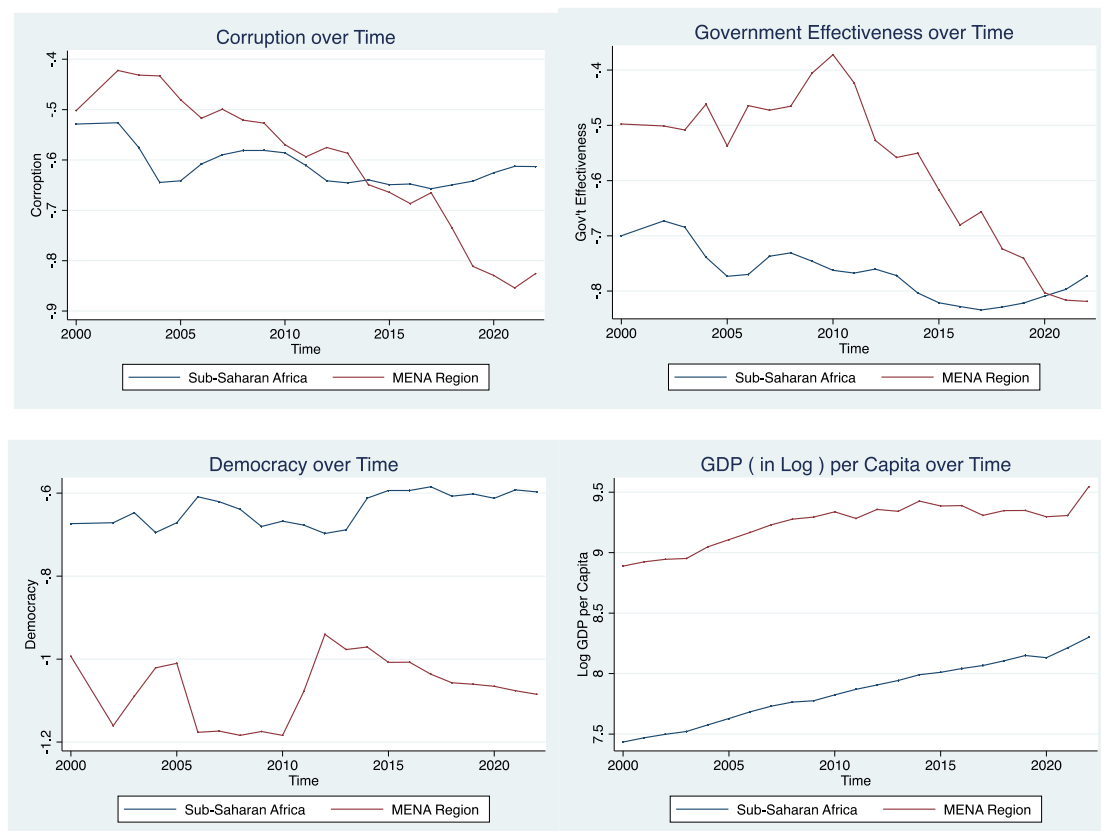
Table 2. Correlation Matrix

	Corruption	GDPPC	Develop. Aid	Gov't Effect.	Political Stability	Literacy Rate	Youth Unemp.	Democracy
Corruption	1.00							
GDPPC(current US\$)	0.33	1.00						
Development Aid	-0.17	-0.16	1.00					
Gov't	0.80	0.49	-0.13	1.00				

Effectiveness								
Political Stability	0.59	0.25	-0.43	0.58	1.00			
Literacy Rate	0.32	0.47	0.11	0.41	0.07	1.00		
Youth Unemp.	0.40	0.41	0.01	0.38	0.05	0.68	1.00	
Democracy	0.54	0.02	-0.10	0.56	0.56	0.06	0.05	1.00

Figure 1 demonstrates the trends over time in key variables. We observe a significant decline in corruption index (implying more corruption) for MENA region, and a slight decline for Sub-Saharan Africa region. Although corruption level was similar for both regions in 2000, MENA region seems to have a bigger corruption problem around 2020. Government effectiveness also declines for both regions over time, but the decline after 2010 is dramatic for MENA region. This is associated with the Arab Spring movement that started after 2010 and resulted in frequent government changes. Democracy level for Sub-Saharan region stayed stable over time, while it fluctuated for MENA region. Arab Spring movement causes the spike around 2010 for MENA region, but undemocratic processes afterwards cause the gradual decline from 2012 on. GDP per capita follows an upward trend for both regions, but the increase is steeper for Sub-Saharan Africa region.

We also present the trend in corruption and government effectiveness for selected countries. Egypt and Iran is chosen from MENA region, and South Africa and Nigeria is chosen from Sub-Saharan Africa for comparison. Out of four countries, South Africa has the lowest corruption level, while Nigeria has the highest. However, corruption gets better for Nigeria but gets worse for South Africa over time. For Egypt, corruption stays stable over time, while for Iran it gets worse slightly. Government effectiveness has highest value (best) for South Africa and has lowest value (worst) for Nigeria. Over time, it becomes worse for South Africa, while it is stable for other three countries.



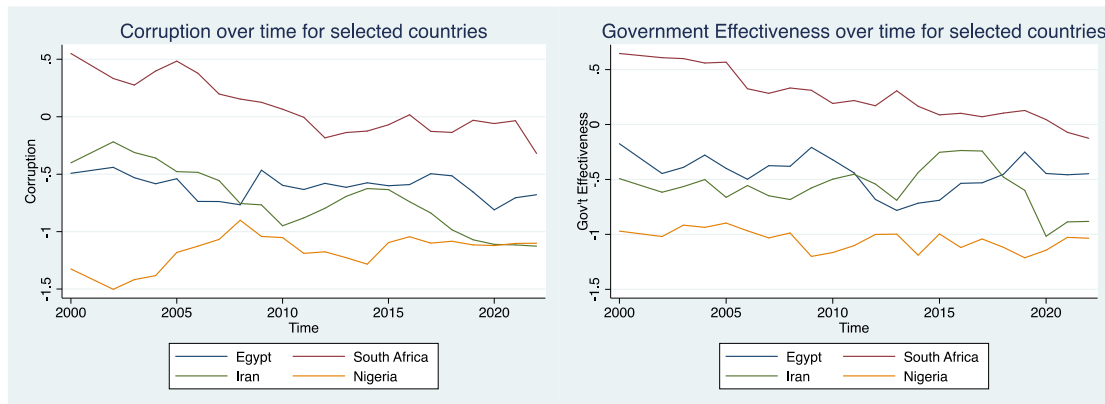


Figure 1. Trends over time

3.2 Methodology

To examine the relationship between corruption and the independent variables, I will utilize standard panel data techniques. These techniques are particularly advantageous in analyzing data across multiple countries over time, allowing for the control of unobserved heterogeneity and providing more reliable estimates of the relationships being studied. Specifically, the models employed include pooled OLS, Fixed Effects and Random Effects. Pooled OLS method estimates a general model without considering individual heterogeneity between countries. While it provides a straightforward approach to assessing the overall impact of the independent variables on corruption, it may ignore important variations across countries. As such, pooled OLS can lead to biased estimates if there are unobserved factors that differ across countries but remain constant over time. Fixed Effects (FE) Model is used to control for country-specific characteristics that do not vary over time (e.g., geographic location, cultural norms), the fixed effects model will be applied. This approach is particularly useful for addressing time-invariant factors that might influence corruption, as it effectively removes the influence of these constant characteristics from the analysis. By focusing on the changes within countries over time, the fixed effects model allows for a clearer understanding of how variations in the independent variables relate to changes in corruption levels. This model is particularly well-suited for situations where the primary interest lies in the effects of variables that change over time within each country. Random Effects (RE) model estimates the effects of both time-variant and time-invariant variables while assuming that country-specific effects are uncorrelated with the explanatory variables. The random effects approach is beneficial when it is believed that the individual differences between countries can provide meaningful insights rather than simply adding noise to the data. By allowing for the inclusion of time-invariant variables, the random effects model offers a more comprehensive view of the factors influencing corruption, particularly in contexts where the interaction between static and dynamic variables is significant.

To determine the most suitable model for each region, the Hausman test will be used. This test evaluates the appropriateness of the fixed effects versus the random effects model by examining whether the unique errors are correlated with the regressors. A significant result indicates that the fixed effects model is more appropriate, suggesting that unobserved factors may indeed be correlated with the independent variables. Conversely, a non-significant result supports the use of the random effects model, indicating that the assumption of uncorrelated individual effects holds true for the analysis.

The baseline regression model can be specified as follows:

$$\begin{aligned} Corruption_{it} = & \beta_0 + \beta_1 GDPPC_{it} + \beta_2 DevelopAid_{it} + \beta_3 GovEffect_{it} + \beta_4 PolStability_{it} \\ & + \beta_5 LiteracyRate_{it} + \beta_6 YouthUnemp_{it} + \beta_7 Democracy_{it} + \alpha_t + \epsilon_{it} \end{aligned}$$

Where, i denotes the country, t denotes the time period, α_i represents the country-specific effects (fixed or random), ϵ_{it} is the error term. To analyze potential differences between the Sub-Saharan Africa and MENA regions, we will run the regressions separately for each region. This will allow for the

identification of distinct regional dynamics in the factors influencing corruption. Most of the variables in the given specification are persistent over time, so there is a small variation over time. Considering that there are missing observations for some countries for some years, we calculate 5-year averages for dependent and independent variables and run the same specification with 5-year averages in addition to main specification above. Specifically, I calculate the averages for periods 2000-2005, 2005-2010, 2010-2015, 2015-2020. This will allow us to have a robustness check and recognize the fact that some variables are persistent and take time to change. The econometric specification with the averages is as follows:

$$\begin{aligned} \text{CorruptionAvg}_{it} &= \beta_0 + \beta_1 \text{GDPPCAvg}_{it} + \beta_2 \text{DevelopAidAvg}_{it} + \beta_3 \text{GovEffectAvg}_{it} \\ &+ \beta_4 \text{PolStabilityAvg}_{it} + \beta_5 \text{LiteracyRateAvg}_{it} + \beta_6 \text{YouthUnempAvg}_{it} \\ &+ \beta_7 \text{DemocracyAvg}_{it} + \alpha_t + \epsilon_{it} \end{aligned}$$

It is important to ensure the validity of econometric models in analyzing the relationship between corruption and its determinants. There can be some issues that invalidate the results such as heteroscedasticity and autocorrelation. Heteroscedasticity problem occurs if the variance the error terms varies across observations. In panel data, residuals may be correlated within units across time (serial or autocorrelation). For example, the level of corruption in one country may be correlated with its own level of corruption in the previous year. Standard errors calculated without accounting for this correlation can be biased, leading to incorrect statistical inferences (e.g., overestimating the significance of coefficients). By clustering on the panel variable (e.g., country), the cluster-robust standard errors approach allows for within-cluster correlation of the residuals. This means that the residuals can be correlated over time within the same country but are assumed to be independent across countries. Therefore, cluster-robust standard errors adjust for potential issues like autocorrelation and heteroscedasticity within clusters (Cameron & Miller, 2015).

3.2.1 Endogeneity of Independent Variables

Endogeneity, a common challenge in econometric models, arises when independent variables are correlated with the error term, leading to biased and inconsistent estimates. This can stem from various sources, such as reverse causality, omitted variable bias, or measurement error. When studying the determinants of corruption, it is particularly important to account for the bidirectional relationship between corruption and socio-political, economic, and institutional variables. Many of the independent variables in this study are likely to be endogenous. While they may influence corruption, corruption itself can impact them as well. For instance, low levels of economic development may foster corruption, but corruption is also known to hinder development. Similarly, better democracy might limit corruption, yet corrupt officials may create obstacles to undermine democracy. A large or overly regulated state could offer more opportunities for corruption, while low wages may incentivize officials to accept bribes. However, corrupt politicians may deliberately expand the size of the state to increase their gains and grant themselves higher salaries. Lastly, political instability could heighten incentives or reduce opportunities for corruption, but corruption itself can provoke public unrest, challenges to the regime, or even external intervention, contributing to instability. One common approach to mitigate the endogeneity issue is the use of lagged independent variables, specifically lagging democracy, government effectiveness, GDP per capita, and literacy rate. This method leverages past values of these variables to isolate their effects on current corruption levels, reducing the potential for reverse causality and measurement bias (Seldadyo & de Haan, 2006).

The use of lagged independent variables is well-supported in empirical research as a method for addressing endogeneity, particularly in studies on corruption. Altunbaş and Thornton (2012) apply lagged governance and economic variables in their study of corruption, finding that lagged variables effectively capture the long-term effects of institutions and economic development on corruption. Similarly, studies by Treisman (2000) and Paldam (2002) have used lagged economic and institutional variables to explore the determinants of corruption, concluding that past values of these variables provide robust and consistent estimates, mitigating the endogeneity issue. Furthermore, the dynamic nature of corruption and its determinants makes the use of lagged variables particularly relevant in panel data models. As corruption often evolves slowly over time, its relationship with institutional,

economic, and educational variables is better captured through the use of lagged indicators, allowing for the identification of long-term trends and causal relationships. The specification with the lagged variables is as follows:

$$\begin{aligned} \text{CorruptionAvg}_{it} &= \beta_0 + \beta_1 \text{GDPPCAvg}_{i,t-5} + \beta_2 \text{DevelopAidAvg}_{i,t-5} + \beta_3 \text{GovEffectAvg}_{i,t-5} \\ &+ \beta_4 \text{PolStabilityAvg}_{i,t-5} + \beta_5 \text{LiteracyRateAvg}_{i,t-5} \\ &+ \beta_6 \text{YouthUnempAvg}_{i,t-5} + \beta_7 \text{DemocracyAvg}_{i,t-5} + \alpha_t + \epsilon_{it} \end{aligned}$$

This equation will be estimated with fixed/random effects as before.

4. Results and Discussion

In this section we will present the regression results and corresponding relationships between corruption and its covariates implied by regression output. Our starting point is standard panel data regression models such as OLS, fixed and random effects. Hausman test will be used to determine the suitable model between fixed and random effects. In Table A1 in the appendix, we present OLS fixed and random effects results when all variables are included in the regression. Pooled OLS ignores the panel nature of our data; therefore, it is not the model we choose. Hausman test results is presented in Table A2 in the appendix, and it implies that fixed effect should be preferred to random effects. Thus, our preferred panel data model throughout the paper is fixed effects.

In all regressions we control year fixed effects by including year dummies and present results with three different specifications. In model 1 we only include institutional variables (Government Effectiveness, Democracy and Political Stability), in model 2 we add economic variables (GDPPC and Development Aid), in model 3 we add socio-economic variables (literacy rate and youth unemployment). This approach may help us isolate the effect of the primary independent variable (Government Effectiveness) by controlling for confounding factors that might otherwise bias the estimates.

4.1 Contemporaneous Regressions

Our starting point is contemporaneous fixed effect regressions (Table 3), where both corruption and its covariates are from time t . This specification implies that the effect of independent variables on corruption is immediate. In other words, when there is an improvement in institutional or economic variables for a given year, corruption improves for the same year. WGI corruption estimate takes value between -2.5 and +2.5, and a higher value means lower corruption. Therefore, a positive coefficient of variables imply a decrease in corruption. Model 1 reveals the effect of institutional variables on corruption, and we see that all three variables are positive and significant at 1% level. This means when government effectiveness, democracy and political stability improves, corruption becomes less common. For example, if government effectiveness increases by 1 unit (say from -0.5 to 0.5) corruption improves by 1 unit. Out of three institutional variables, which have the same unit of measurement, government effectiveness is the biggest effect on corruption. In model 2, GDP per capita and Development Aid is added. Government effectiveness and democracy are still positive and significant, and newly added GDP per capita is positive and significant. Political stability becomes insignificant, and a reasonable explanation for this is its high correlation with GDP per capita. Higher GDP per capita is associated with lower corruption. A one percent increase in GDP per capita is associated with a 0.00227-unit improvement (increase) in corruption. Development aid is found to have no significant effect on corruption. Okada and Samreth (2012) find development aid may increase or decrease corruption for SSA countries depending on how strong the governance is. In model 3 youth unemployment and literacy rate is added, and they are negatively and significantly related to corruption estimate. This implies that higher youth unemployment reduces corruption estimates (worse corruption) as expected. As labor market become more competitive, unemployed youth may become vulnerable to engaging in corrupt activities, either as a means of survival or as an alternative to formal employment. Also, without legitimate employment opportunities, some youths may turn to informal economies or criminal enterprises where corruption is rampant. Higher literacy rate is associated with worse corruption, meaning that the higher is the literacy rate in a country the worse corruption is. As literacy rates increase, people may become more aware of corruption and are better able to recognize and report

corrupt activities. In model 3 government effectiveness, democracy, and GDP per capita stays significant demonstrating a robust relationship between these variables and corruption.

Table 3. Contemporaneous FE Regressions, all countries – Dep. Var.: Corruption

	(1)	(2)	(3)
VARIABLES	Model 1	Model 2	Model 3
Gov't Effectiveness	0.516*** (0.0251)	0.452*** (0.0265)	0.468*** (0.0309)
Democracy	0.146*** (0.0232)	0.145*** (0.0223)	0.186*** (0.0254)
Political Stability	0.0299** (0.0122)	0.0149 (0.0123)	-0.0176 (0.0157)
Development Aid		0.0148 (0.00954)	0.0116 (0.0106)
GDP per Capita		0.227*** (0.0339)	0.360*** (0.0432)
Youth Unemployment			-0.00707*** (0.00197)
Literacy Rate			-0.00603*** (0.00138)
Constant	-0.153*** (0.0302)	-2.240*** (0.330)	-2.721*** (0.395)
Observations	1,144	1,144	1,144
R-squared	0.432	0.402	0.412
Number of Countries	52	52	52
Year FE	YES	YES	YES

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable is WGI corruption estimate. Both dependent and independent variables are from time t . Corruption, Government effectiveness, Democracy and Political Stability range is -2.5 to 2.5, where higher number indicates a better governance. GDP per capita and Development aid are logged. Literacy rate is percentage of population aged 15 and above.

In Table 4 we present contemporaneous regressions separately for MENA and SSA regions, and this will allow us to see differences between two regions in the way covariates affect corruption. For MENA region gov't effectiveness is significant in model 1 and 2, but not in model 3. However, democracy and political stability are significant in all three models. In SSA region gov't effectiveness and democracy are positive and significant in all three models, but political stability is negative and significant. While better political stability is associated with lower corruption in MENA region, it is associated with higher corruption in SSA region. This implies that in some Sub-Saharan African

countries, political stability might be linked to deep-rooted power structures or authoritarian regimes that remain in power by centralizing control. This could reduce accountability and allow corruption to flourish even in stable conditions. In contrast, in the MENA region, political stability may come with stronger governance structures and reforms aimed at reducing corruption. Another explanation could be that political stability in SSA could signify a dominance of elites who benefit from corruption. Stability might allow them to maintain power without facing significant opposition or pressure for reform, thereby increasing opportunities for corrupt practices. On the other hand, in the MENA region, stability may result from reforms or international pressure that curb corruption.

GDP per capita is positive and significant for both regions as expected. Development aid is significant only in model 2 for SSA region and this implies the more development aid a SSA country receives the lower is corruption practices. One possible explanation could be that development aid comes with stringent monitoring mechanisms or governance reforms that target corruption directly. Also, aid may alleviate some of the economic pressures that foster corruption by improving public sector wages or reducing the incentives for corrupt practices. Youth unemployment has a negative and significant coefficient for both MENA and SSA regions. This implies that higher youth unemployment leads to more frequent corruption practices for both regions. Literacy rate has a positive and significant coefficient for MENA region while it has a negative and significant coefficient for SSA region. This implies that higher literacy rate leads to lower corruption practices in MENA region while it leads to higher corruption practices in SSA region. The opposing effect of literacy on corruption in MENA versus SSA regions can partly be explained by differences in the socio-political context and the role of education in each region. In MENA region, a higher literacy rate may be associated with more civic engagement and awareness, empowering citizens to demand greater transparency and accountability from their governments, thereby reducing corruption. This aligns with theories that suggest education enhances political participation and strengthens democratic processes, leading to lower corruption (Treisman, 2007; Lederman et al., 2005). In SSA, however, higher literacy might not have the same effect because of weak institutional frameworks and different socio-economic conditions. If governance structures are weak, educated individuals may use their knowledge and skills to navigate or exploit corrupt systems rather than combat them. This could be linked to a "resource-curse" effect, where increased education doesn't translate into systemic reform but rather fuels elite corruption (Collier & Hoeffler, 2009). In SSA, literacy may equip individuals to work within corrupt systems more efficiently, leading to higher corruption.

Table 4. Contemporaneous FE Regressions, MENA&SSA – Dep. Var.: Corruption

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1 MENA	Model 2 MENA	Model 3 MENA	Model 1 SSA	Model 2 SSA	Model 3 SSA
Gov't Effectiveness	0.185*** (0.0381)	0.156*** (0.0470)	0.0476 (0.0666)	0.621*** (0.0315)	0.512*** (0.0317)	0.537*** (0.0350)
Democracy	0.180*** (0.0313)	0.157*** (0.0340)	0.183*** (0.0366)	0.192*** (0.0317)	0.188*** (0.0299)	0.186*** (0.0319)
Political Stability	0.165*** (0.0191)	0.136*** (0.0257)	0.151*** (0.0411)	-0.0369** (0.0164)	-0.0322** (0.0155)	-0.0380** (0.0173)
Development Aid		-0.0154 (0.0149)	0.00145 (0.0162)		0.0288** (0.0120)	0.0122 (0.0127)
GDP per Capita		0.103* (0.0149)	0.268*** (0.0162)		0.190*** (0.0120)	0.367*** (0.0127)

		(0.0603)	(0.0765)		(0.0418)	(0.0524)
Youth Unemployment			-0.00474*			-0.0119***
			(0.00258)			(0.00266)
Literacy Rate			0.00958***			-0.00861***
			(0.00302)			(0.00151)
Constant	-0.293***	-0.942	-3.303***	-0.0728**	-2.128***	-2.500***
	(0.0488)	(0.641)	(0.794)	(0.0353)	(0.390)	(0.456)
Observations	242	216	205	902	889	744
R-squared	0.732	0.593	0.577	0.419	0.418	0.464
Number of Countries	11	11	11	41	41	41
Year FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable is WGI corruption estimate. Both dependent and independent variables are from time t . Corruption, Government effectiveness, Democracy and Political Stability range is -2.5 to 2.5, where higher number indicates a better governance. GDP per capita and Development aid are logged. Literacy rate is percentage of population aged 15 and above.

4.2 Regressions with 5-year Averages

The next step is to run same set of regressions with 5-year averages¹. This process helps us to tackle with missing observations for some countries for some years. More importantly, corruption is a long-term phenomenon influenced by structural factors, and its response to changes in economic, political, and institutional covariates is not immediate. In other words, corruption levels in a given year typically reflect accumulated practices rather than short-term changes, so averaging over multiple years allows us to capture of these delayed effects. This approach helps smooth out short-term fluctuations or noise that could obscure the relationship between the variables of interest and corruption. Additionally, averaging over longer periods helps mitigate potential endogeneity issues and autocorrelation by allowing time for causality to play out. Studies have shown that institutions, economic development, and political stability affect corruption in a lagged manner, and such impacts may not be evident in yearly data (Treisman, 2000; Brunetti & Weder, 2003). Using longer intervals also aligns with the approach of addressing the persistence of corruption and allows for capturing deeper institutional and economic shifts.

In Table 5 fixed effect regression results are presented for all countries with five-year averages. As usual, model 1 only includes institutional variables while other variables are added in model 2 and model 3. It is seen that government effectiveness and democracy are positive and significant while political stability is insignificant in all three models. This demonstrates that government effectiveness and democracy remain as robust institutional variables in determining the corruption level. GDP per capita is positive and significant in model 2 and 3 implying that it is also a robust determinant of corruption. Development aid remains insignificant as before. Youth unemployment and literacy rate have a negative and significant effect on corruption, same as contemporaneous regressions. Youth unemployment and literacy rate do not only impact corruption practices immediately but also have medium term effect on corruption.

¹ We take averages for periods 2000-2005, 2005-2010, 2010-2015, 2015-2020

Table 5. Five-year average FE Regressions, all countries – Dep. Var.: Corruption(avrg)

	(1)	(2)	(3)
VARIABLES	Model 1	Model 2	Model 3
Gov't Effectiveness(avrg)	0.588***	0.508***	0.562***
	(0.0534)	(0.0569)	(0.0673)
Democracy(avrg)	0.126**	0.135***	0.178***
	(0.0513)	(0.0487)	(0.0551)
Political Stability(avrg)	0.0246	0.00886	-0.0533
	(0.0265)	(0.0265)	(0.0330)
Development Aid(avrg)		0.0308	0.0381
		(0.0245)	(0.0283)
GDP per Capita(avrg)		0.238***	0.379***
		(0.0677)	(0.0827)
Youth Unemployment(avrg)			-0.0109***
			(0.00385)
Literacy Rate(avrg)			-0.00716**
			(0.00287)
Constant	-0.125***	-2.641***	-3.235***
	(0.0475)	(0.724)	(0.841)
Observations	260	253	219
R-squared	0.523	0.509	0.523
Number of Countries	52	52	52
Year FE	YES	YES	YES

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable is WGI corruption estimate. Both dependent and independent variables are five year averages for periods 2000-2005, 2005-2010, 2010-2015, 2015-2020. Corruption, Government effectiveness, Democracy and Political Stability range is -2.5 to 2.5, where higher number indicates a better governance. GDP per capita and Development aid are logged. Literacy rate is percentage of population aged 15 and above.

In Table 6 we present five-year average fixed effects regressions separately for MENA and SSA countries. First three column belongs to MENA countries and last three column belongs to SSA countries. Government effectiveness is positive and significant in model 1 and 1 for MENA countries and in all three models for SSA countries, proving that government effectiveness is a robust determinant of corruption in medium term as well as short term. Democracy is positive and significant in all three models for both MENA and SSA countries. Political stability is positive and significant only in models 1 and 2 for MENA countries. It is negative and significant for SSA countries only in model 3. As argued above political stability may be associated with authoritarian governments which fuel corruption for some SSA countries. However, it is observed that the effect of political stability on corruption is not as strong in the medium run (with five-year average regressions) as it is in the short run (with contemporaneous regressions). GDP per capita is significant only in model 3 for MENA countries, while it is significant for both model 2 and 3 in SSA countries. This shows that GDP per

capita is another robust determinant of corruption in the medium run as well as short run. Development aid, which came out as insignificant in contemporaneous regressions above for MENA countries, is still insignificant. For SSA countries, development aid is positive and significant both in model 2 and 3. This implies development aid reduce corruption in the medium run for SSA countries. Again, this may be associated with more stringent monitoring mechanisms or governance reforms. Youth unemployment loses its significance for MENA countries with five-year average regression as seen in column three of Table 6, while it is still negative and significant for SSA countries. So, for MENA countries youth unemployment becomes not related to corruption in the medium run. For SSA countries, it is associated with higher corruption in the medium run as well as short run. Literacy rate, which was significant in contemporaneous regressions, becomes insignificant for MENA countries in the medium run. This implies that literacy rate is not a factor in determining corruption in the medium run for MENA countries. However, it is negative and significant for SSA countries, and this implies higher literacy rate leads to higher corruption. As argued before, with higher literacy, more individuals may use their knowledge and skills to navigate or exploit corrupt systems.

Table 6. Five-year average FE Regressions, MENA&SSA – Dep. Var.: Corruption(avrg)

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1 MENA	Model 2 MENA	Model 3 MENA	Model 1 SSA	Model 2 SSA	Model 3 SSA
Gov't Effectiveness(avrg)	0.194** (0.0740)	0.160* (0.0933)	0.111 (0.168)	0.731*** (0.0680)	0.595*** (0.0691)	0.612*** (0.0768)
Democracy(avrg)	0.194*** (0.0622)	0.191** (0.0701)	0.224** (0.0872)	0.180** (0.0705)	0.174*** (0.0651)	0.174** (0.0692)
Political Stability(avrg)	0.179*** (0.0384)	0.115* (0.0564)	0.172 (0.134)	-0.0567 (0.0365)	-0.0444 (0.0336)	-0.0656* (0.0362)
Development Aid(avrg)		-0.0589 (0.0383)	-0.0147 (0.0453)		0.0646** (0.0300)	0.0586* (0.0331)
GDP per Capita(avrg)		0.141 (0.121)	0.329* (0.175)		0.169** (0.0828)	0.396*** (0.103)
Youth Unemployment(avrg)			-0.00346 (0.00527)			-0.0196*** (0.00545)
Literacy Rate(avrg)			0.00867 (0.00634)			-0.0110*** (0.00321)
Constant	-0.148* (0.0741)	-0.303 (1.357)	-3.255* (1.722)	-0.0401 (0.0572)	-2.678*** (0.858)	-3.367*** (0.991)
Observations	55	50	37	205	203	182
R-squared	0.829	0.733	0.686	0.509	0.528	0.575
Number of Countries	11	11	11	41	41	41
Year FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable is WGI corruption estimate. Both dependent and independent variables are five year averages for periods 2000-2005, 2005-2010, 2010-2015, 2015-2020. Corruption, Government effectiveness, Democracy and Political Stability range is -2.5 to 2.5, where higher number indicates a better governance. GDP per capita and Development aid are logged. Literacy rate is percentage of population aged 15 and above.

4.3 Addressing Endogeneity Regressions with Lagged Independent Variables

So far, we have implicitly assumed that independent variables are exogenous. As mentioned in methodology section endogeneity (reverse causality) is a potential problem when institutional variables are used as independent variables. Corruption itself may influence institutional variables such as democracy or government effectiveness. In order to tackle this problem, we will use five-year lagged independent variables. This will mitigate the endogeneity problem because current corruption problem cannot affect corruption five years ago. Furthermore, this setting will allow us to see long-term effects of independent variables on corruption. Table 7 presents the fixed effect regression results with 5 year lagged independent variables for all countries. Government effectiveness is positive and significant in all three models, indicating that it has a significant long-term effect on corruption. Similarly, democracy is also positive and significant in all three models. These two governance variables continuously foster an environment of accountability and transparency. Government effectiveness enhances the quality of public administration and policy implementation, limiting the opportunities for corrupt practices by ensuring that regulations are enforced and services are provided efficiently. Over time, better governance structures, supported by strong institutions, create a less corrupt environment as shown by studies like Mauro (1995) and Kaufmann et al. (1999). Similarly, democracy plays a critical role in reducing corruption over the long term by fostering open political competition, protecting freedom of speech, and promoting the role of civil society in monitoring public officials. Democracies allow for sustained external pressures, such as media scrutiny and voter accountability, which gradually reduce corrupt practices, a relationship supported by research from Treisman (2000) and Persson et al. (2003). Political stability is not a significant determinant of corruption in the long-term. One possible explanation for this is that while political stability may reduce corruption in the short-term, its effects may dissipate over time if other structural issues, such as weak institutions or inadequate governance, are not addressed. Political stability can sometimes coexist with entrenched corruption, particularly if political actors in stable regimes use their positions to maintain power and continue corrupt practices without facing significant opposition or accountability.

GDP per capita is also positive and significant implying that it is a robust determinant of corruption in the long-term. The long-term impact of GDP per capita on reducing corruption is strongly supported by both theoretical frameworks and empirical evidence. As countries increase their wealth, they experience structural improvements in governance, legal institutions, and public accountability, which collectively diminish corruption. Higher GDP per capita allows governments to allocate resources towards strengthening anti-corruption measures, such as better-funded judicial systems, enhanced transparency, and more rigorous law enforcement. This finding is supported by studies such as those by Treisman (2000) and Pellegrini and Gerlagh (2008), who find that countries with higher GDP per capita experience long-term reductions in corruption due to improved institutional frameworks. Youth unemployment has a negative and weakly significant coefficient, and this implies higher youth unemployment increases corruption problem in the long term. Unemployment among young people often leads to social discontent, frustration, and a lack of trust in institutions and this can create fertile ground for corrupt practices as young people might engage in or tolerate corruption as a way to navigate economic hardships. In the long term, persistent youth unemployment undermines social stability, weakens governance structures, and exacerbates systemic corruption. Literacy rate is not a significant determinant of corruption in the long term.

Table 7. Lagged Independent FE Regressions, all countries – Dep. Var.: Corruption

	(1)	(2)	(3)
VARIABLES	Model 1	Model 2	Model 3
L5.Gov't Effectiveness	0.314***	0.293***	0.313***
	(0.0740)	(0.0804)	(0.0865)
L5.Democracy	0.143**	0.127*	0.185**
	(0.0654)	(0.0681)	(0.0762)
L5.Political Stability	0.0469	0.0214	-0.000150
	(0.0325)	(0.0360)	(0.0454)
L5.Development Aid		0.0273	0.0424
		(0.0311)	(0.0357)
L5.GDP per Capita		0.256***	0.207**
		(0.0968)	(0.114)
L5.Youth Unemployment			-0.0953*
			(0.0588)
L5.Literacy Rate			-0.00182
			(0.00370)
Constant	-0.327***	-2.117**	-2.240**
	(0.0580)	(0.983)	(1.104)
Observations	208	203	181
R-squared	0.294	0.249	0.270
Number of Countries	52	52	52
Year FE	YES	YES	YES

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable is WGI corruption estimate. Dependent variable is from time t , while independent variables are from time $t-5$. Corruption, Government effectiveness, Democracy and Political Stability range is -2.5 to 2.5, where higher number indicates a better governance. GDP per capita and Development aid are logged. Literacy rate is percentage of population aged 15 and above.

Regressions with lagged independent variables are also performed separately for MENA and SSA region. In Table 8 the fixed effects regression results are presented. As expected, government effectiveness and democracy are positive and significant for all three models for both MENA and SSA regions. Political stability is only significant in model 1 for MENA region. So, we cannot establish a robust relationship between political stability and corruption in the long term. GDP per capita is positive and significant for both regions as well. Youth unemployment is not significant for MENA region, while it is negative and significant for SSA region. In the long term, youth unemployment is not related to corruption for MENA region but it is significantly associated with corruption for SSA region. Over time, sustained high levels of unemployment contribute to a culture of rent-seeking, bribery, and informal economies, intensifying corruption practices across multiple levels of society in SSA region. In contrast, in the MENA region, youth unemployment does not show the same long-term relationship with corruption due to more robust welfare systems or stronger governance frameworks which may

buffer the negative effects of unemployment, prevent its escalation into widespread corruption. Literacy rate is found to have no impact on corruption in the long run for eighter regions.

Table 8. Lagged Independent FE Regressions, MENA&SSA – Dep. Var.: Corruption

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1 MENA	Model 2 MENA	Model 3 MENA	Model 1 SSA	Model 2 SSA	Model 3 SSA
L5.Gov't Effectiveness	0.203*	0.178*	0.402**	0.392***	0.356***	0.415***
	(0.128)	(0.101)	(0.278)	(0.0890)	(0.0949)	(0.102)
L5.Democracy	0.187**	0.168*	0.925***	0.221**	0.197**	0.303***
	(0.0866)	(0.105)	(0.457)	(0.0960)	(0.0974)	(0.109)
L5.Political Stability	0.104*	0.0332	0.0751	-0.0485	-0.0365	-0.0446
	(0.0572)	(0.0939)	(0.141)	(0.0464)	(0.0470)	(0.0524)
L5.Development Aid		0.00241	0.0447		0.0419	0.0277
		(0.0537)	(0.0453)		(0.0384)	(0.0432)
L5.GDP per Capita		0.269**	0.202**		0.158*	0.154*
		(0.117)	(0.106)		(0.108)	(0.104)
L5.Youth Unemployment			-0.000432			-0.0375**
			(0.00699)			(0.0174)
L5.Literacy Rate			0.0142			-0.00455
			(0.0663)			(0.00427)
Constant	-0.351***	-2.831	-2.176	-0.287***	-1.268	-0.623
	(0.101)	(2.392)	(2.167)	(0.0680)	(1.152)	(1.326)
Observations	44	40	32	164	163	149
R-squared	0.660	0.513	0.600	0.273	0.264	0.344
Number of Countries	11	11	11	41	41	41
Year FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Dependent variable is WGI corruption estimate. Dependent variable is from time t , while independent variables are from time $t-5$. Corruption, Government effectiveness, Democracy and Political Stability range is -2.5 to 2.5, where higher number indicates a better governance. GDP per capita and Development aid are logged. Literacy rate is percentage of population aged 15 and above.

5. Conclusion

In this paper we investigate the determinants of corruption for MENA and SSA region by employing panel data from 2000 to 2022. Sustainable economic development has been a priority for the region one of the impediments in sustainable development has been corruption. Therefore, understanding its determinants is crucial for policy interventions. However, studying corruption empirically presents significant challenges. The potential factors that influence it are often interconnected in complex ways,

with some variables changing rapidly and potentially being both a cause and consequence of corruption. Like other forms of illicit behavior, corruption is difficult to observe directly, forcing researchers to rely on surveys from individuals affected by it. The reliability of such data can be difficult to verify, making the empirical study of corruption even more challenging. The WGI corruption estimate achieves this reliability to some degree as it uses broad base of sources helps capture different perspectives on corruption, making it a comprehensive measure, and it is widely used in cross-country comparisons. By using different econometric specifications, we aim to understand how various institutional and socioeconomic variables affect corruption in the short term, medium and long term. We adopt panel data fixed effect models and use alternative specifications for robustness.

Our starting point is the contemporaneous effect of independent variables on corruption. The results show that both better government effectiveness and democracy reduce corruption, and this result is robust to alternative specifications. While political stability reduces corruption in the MENA region, it has the opposite effect in Sub-Saharan Africa (SSA). In SSA, political stability may indicate entrenched power structures or authoritarian regimes where leaders maintain control through corruption, which can thrive due to a lack of opposition or reform pressures. Stability may consolidate power among elites, allowing corrupt practices to persist. On the other hand, in MENA countries, political stability may result from stronger governance, reforms, or international influence that actively curtail corruption, emphasizing accountability and transparency. GDP per capita is another variable that affects corruption in the same way both in MENA and SSA region. Higher GDP is associated with lower corruption. We also find that higher youth unemployment leads to more corruption in both regions. Our findings also suggest that a higher literacy rate reduces corruption in the MENA region, while it increases corruption in the SSA region. In MENA, higher literacy likely fosters greater civic engagement and awareness, enabling citizens to demand more transparency and accountability from their governments. In contrast, in SSA, weak institutional frameworks may allow educated individuals to exploit corrupt systems rather than challenge them. Thus, in environments with fragile governance, education may provide skills that are used to navigate and manipulate the system, potentially increasing corruption.

In the medium run, government effectiveness, democracy and GDP per capita continues to be significant determinant of corruption for both regions. However, political stability becomes irrelevant for the SSA region, while literacy rate and youth unemployment become irrelevant for the MENA regions. These differences imply that different socio-cultural characteristics of regions causes these differences between regions. In the long run, government effectiveness, democracy and GP per capita remains to be an important determinant of corruption. Political stability loses its significance for both regions, demonstrating that there could be opposing effects on corruption in the long-run, and so overall effect is canceled out. Literacy rate also loses its significance in the long run, while youth unemployment remains significant only for the SSA region.

Overall, our results suggest that, government effectiveness and democracy, and GDP per capita form the backbone of a system that inherently deters corruption over extended periods, leading to a significant long-term reduction in corrupt. Therefore, enhancing government effectiveness, promoting democracy, and boosting GDP per capita are critical strategies for long-term reductions in corruption. Governments, particularly in developing regions, should prioritize strengthening institutional capacity and promoting democratic reforms to ensure transparency and accountability. Investing in good governance, which includes reducing bureaucratic inefficiencies and ensuring that government functions are carried out effectively, can help curb corruption. Additionally, policies that promote economic growth and raise income levels may contribute to reducing corruption over time by reducing incentives for corrupt practices.

References

- Alesina, A., & Angeletos, G. M. (2005). Corruption, inequality, and fairness. *Journal of Monetary Economics*, 52(7), 1227–1244.
- Altunbaş, Y., & Thornton, J. (2012). The determinants of corruption: Unbundling the role of economic, political, and institutional factors. *World Development*, 40(6), 1123–1134.

- Arezki, R., & Gylfason, T. (2011). Resource rents, democracy, corruption, and conflict: Evidence from Sub-Saharan Africa. *Journal of African Economies*, 20(4), 482–514.
- Asongu, S. A. (2012). On the effect of foreign aid on corruption. *Economics Bulletin*, 32(3), 2174–2182.
- Asongu, S. A. (2013). Fighting corruption in Africa: Do existing corruption-control levels matter? *International Journal of Development Issues*, 12(1), 36–52.
- Bhattacharyya, S., & Hodler, R. (2010). Natural resources, democracy, and corruption. *European Economic Review*, 54(4), 608–621.
- Bonga-Bonga, L., & Kirsten, F. (2024). *Corruption and ethnicity on the African continent: The mediating role of institutions* (MPRA Paper No. 121373). University Library of Munich, Germany.
- Elbahnasawy, N. G., & Revier, C. F. (2012). The determinants of corruption: Cross-country evidence. *Economics of Governance*, 13(2), 107–131.
- Fayad, N. M. (2024). The causality between corruption and economic growth in MENA countries: A dynamic panel-data analysis. *International Journal of Finance, Insurance and Risk Management*, 14(1), 28–49.
- Geda, A., & Kibret, H. (2002). *Regional economic integration in Africa: A review of problems and prospects with a case study of COMESA* (ZEF Discussion Papers on Development Policy No. 43).
- Iweala, N. O., Akerlof, G., & Markel, S. (2017). Corruption and development: Exploring the relationship and implications. *Journal of Development Studies*, 53(12), 2054–2069.
- Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). *The worldwide governance indicators: A summary of methodology, data and analytical issues* (World Bank Policy Research Working Paper No. 5430). http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130
- Kebede, A. (2019). Governance and corruption in Africa: A cross-country empirical study. *African Journal of Economic Review*, 7(1), 120–145.
- Kebede, E. (2019). Governance, growth, and corruption in Africa. *Journal of African Development*, 21(1), 101–125.
- Mauro, P. (1995). Corruption and growth. *The Quarterly Journal of Economics*, 110(3), 681–712.
- Musila, J. W. (2015). Corruption and the role of weak institutions in Africa. *International Journal of Development and Economic Sustainability*, 3(4), 39–50.
- Okada, K., & Samreth, S. (2012). The effect of foreign aid on corruption: A quantile regression approach. *Economics Letters*, 115(2), 240–243.
- Paldam, M. (2002). The cross-country pattern of corruption: Economics, culture, and the seesaw dynamics. *European Journal of Political Economy*, 18(2), 215–240.
- Saadaoui, J. (2017). Political institutions, rent seeking, and corruption in the Middle East and North Africa. *Economics of Governance*, 18(3), 183–206.
- Sekkat, K. (2012). Natural resources and corruption: The role of rent seeking. *Journal of Development Studies*, 48(7), 923–938.
- Seldadyo, H., & de Haan, J. (2006). The determinants of corruption: A literature survey and new evidence. *European Journal of Political Economy*, 22(1), 113–132.
- Treisman, D. (2000). The causes of corruption: A cross-national study. *Journal of Public Economics*, 76(3), 399–457.

Appendix

Table A1: Pooled OLS, Fixed and Random Effects Regressions with all Covariates.

	(1)	(2)	(3)
VARIABLES	Pooled OLS	Fixed Effects	Random Effects
Gov't Effectiveness	0.773*** (0.0281)	0.468*** (0.0309)	0.508*** (0.0308)
Democracy	0.0398* (0.0208)	0.186*** (0.0254)	0.176*** (0.0243)
Political Stability	0.111*** (0.0174)	-0.0176 (0.0157)	0.0124 (0.0158)
Development Aid	-0.00409 (0.00963)	0.0116 (0.0106)	0.00625 (0.0104)
GDP per Capita	-0.146*** (0.0173)	0.360*** (0.0432)	0.184*** (0.0322)
Youth Unemployment	0.00784*** (0.00117)	-0.00707*** (0.00197)	-0.00435*** (0.00168)
Literacy Rate	-0.00182*** (0.000659)	-0.00603*** (0.00138)	-0.00436*** (0.00117)
Constant	1.115*** (0.248)	-2.721*** (0.395)	-1.387*** (0.322)
Observations	889	889	889
R-squared	0.769	0.412	
Year FE	YES	YES	YES
Number of Countrycode		51	51

Table A2: Hausman test result

	(b)	(B)	(b-B)	sqrt(diag(V _b -V _B))
	fe	re	Difference	S.E.
Gov't Effectiveness	0.498	0.614	-0.116	0.023
Development Aid	-0.024	-0.041	0.016	0.011
Democracy	0.201	0.147	0.054	0.026
Literacy Rate	-0.007	-0.004	-0.003	0.002
Youth Unemployment	-0.006	0.002	-0.008	0.003
GDP per Capita	0.418	0.037	0.382	0.071
Political Stability	-0.067	0.021	-0.088	0.007

Husman Test $\chi^2(28)=239.51$. Prob> χ^2 = 0.000

Hausman Test Result: Fixed Effect is Preferred