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The Complex Nexus: Analyzing the Interplay of Economic Growth, Corruption, Foreign Direct Investment, and Institutions

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A significant component of economic growth (EG) is the enlightenment of the economy. Corruption slows down EG. Human civilization is influenced by corruption, a relic of an ancient occurrence in all countries worldwide. EG is negatively affected by corruption. In the presence of poor institutions, corruption slows the flow of foreign direct investment (FDI). In this analysis, FDI and institutions are studied using panel data. Drisc and Kraay and. fixed effects techniques are used to determine nexus. From 2005 to 2022, 53 developing countries are analyzed. EG is hindered by corruption, while FDIs boost it. In developing countries, more vital institutions contribute to decreasing EG. This suggests that countries should invest in developing strong economic and political institutions to benefit from FDI. Also, countries should focus on reducing corruption to encourage EG. Governments should also create incentives to attract FDI, such as lower taxes, improved infrastructure, and relaxed labor regulations. Finally, countries should put in place measures to protect FDI from political interference and instability.

1. Introduction

FDI, EG, and corruption are interconnected, and this study examines their interactions. These interactions are analytically critical to policymaking in developing economies and in the real world (Bahoo et al., 2023; Ganda, 2022). It has gained much attention in recent years that institutions can enhance growth in developing countries (Stiglitz, 1998; Cohen, 2023). There is no severe detection of rules of regulation or compliance with official directions in economies with weak institutions such as the judicial system and the legislature; political backing is a customary exercise, and civilians need more resources to bring about public reaction against corruption in government (Yahyaoui et al., 2023; Asafo et al.,2023; Ullah et al.,2022). Corruption affects nearly every aspect of social and economic life, especially in developing nations. Institutions understand that the biggest obstacle to EG is corruption, which undermines the foundation of institutions and distorts the rule of law, which further hamper EG (Nguyen & Liu, 2023; Aron, 2000). Economies rely on EG as one of their main pillars. As an epoch progresses, the capacity of a nation to produce goods and services increases. Policymakers must understand the drivers of EG and the ways policies affect them to achieve and sustain exceptional growth rates. Since World War II, real GDP growth has become an essential policy goal for all economies (Craft, 2000; Ullah et al., 2022). Development epistemology can be divided into two main camps. In 1956, Solow presented his Neo-Classical Growth Model. Neo-Classical growth theory suggests that population growth overstates the importance of capital accumulation in driving economic development.

In 1989, Romer and Lucas introduced the Endogenous Growth Theory. According to Endogenous Expansion Theory, economic expansion is driven by population, physical capital, and technology. There have been numerous studies and ideas about long-term growth. A companion study to the original research, Solow-Swan (1956) and Cohen, 2023, is based on the neoclassical theory. The Solow-Swan model predicts that growth rates will be high in countries with exogenous saving rates, technology, population expansion, and technological advancement are progressive. Developed nations have experienced faster EG than developing nations. Emerging nations, however, experience regressive savings, low investment, and low capital accumulation due to low incomes. As a result, inequality in income and population distributions has increased (Hamid et al.,2022).

EG has been hampered by corruption since the 4th century BC, according to philosophers, policymakers, politicians, and economists (Bardhan, 1997; Hamid et al.,2022). A corrupt organization violates rules and regulations and negatively affects EG. It is the misuse of trust to gain extra profit that constitutes corruption. There is often an inference of illegality from the terms of maltreatment. There is no universal agreement on what constitutes illegal corruption; some may view it merely as deceitful or inappropriate. Politics, grand corruption, and bureaucratic corruption all fall into three categories. In order to receive bribes, corruption involves a single party (Okafor et al.,2022). Corruption in politics and bureaucracy is regionalized since it is accepted by more parties to gain favor (Jain, 2001; Hamid et al.,2022). There is a slowdown in expansion due to

corruption. The corruption problem is one of the biggest obstacles to the advancement of society and the expansion of the economy. Eventually, this undermines EG (Chea, 2015) because it distorts laws and regulations.

There are numerous ways in which corruption affects progress. A corruption-related increase in production costs is a result of corruption. Additionally, corruption places additional costs on investors by raising uncertainty about future costs and profits. The reason for lower investment levels is usually a combination of increased expenses and increased uncertainty, which produce less spectacular risk-adjusted returns. It is plausible that corruption is strongly correlated with EG. According to some scholars and government officials, the economic expansion could be aided by corruption. Businesses can circumvent ineffective regulations when administrators use corruption as a grease wheel to entice them to provide more skilled facilities. As a result of corruption, EG is facilitated. Therefore, the proficiency of the economy is improved (Acemoglu, 2007; Yahyaoui et al., 2023).

Because the government's import quotas and permits are so inelastic, corruption thrives on such inelastic demand and distorts entrepreneurs' actions. A further limitation is the need for more resources and credit available to established manufacturers and innovators, according to Murphy et al. (1993) and Yahyaoui et al. (2023). Inputs, productive assets, and investments slow down due to this tendency. Corruption is similar in that people's abilities, skills, expertise, and wealth are used instead of invested in profitable enterprises.

Despite this, FDI plays a significant role in economic expansion. Over the past few decades, FDI has been a focus for several nations. By transferring auxiliary money to developing nations without savings, FDI has transformed a large portion of auxiliary money that was previously provided. FDI is not only a means of promoting investments but also a means of supplementing local savings (Bosworth & Collins, 1999; Yahyaoui et al., 2023). Investments increase employment while incomes, savings, and consumption all rise simultaneously. As a result, EG is boosted.

Societies use institutions to start specific tasks by repeating patterns of interaction. It was published in 1976 by King. Rules govern human interactions, the means of enforcing those rules, and the conventions of action that create them (North, 1989; Murshed, 2023). Individuals assemble as institutions to achieve a common goal. Political institutions are essential to EG because they facilitate the understanding and applying economic norms. Income rights and resource transferability are the core of advised economic institutions (Murshed, 2023). Property rights in Western societies and the basis for progress are defined by political institutions (North, 1990; Bahoo et al., 2023). Capital and technological investment decision-making processes are strengthened by economic institutions, which accelerate EG. Economic institutions promote EG by establishing and defending property rights, facilitating transactions, and approving entities.

This research aims to explore the complex relationship between EG, corruption, FDI, and institutions. It aims to identify the underlying factors that influence the interconnectedness of these phenomena. The research will also provide insights into the possible strategies that can be used to address corruption and stimulate EG. This research will contribute to a better understanding of the impact of corruption and FDI on EG, as well as the effectiveness of institutions in mitigating the effects of corruption. Furthermore, it will provide policy makers with valuable guidance on how to improve economic performance. Economic cooperation. By establishing a strong link between corruption and FDI, the work provides a solid foundation for understanding the issue. A more comprehensive picture of EG is provided by examining the relationship between institutions and growth. Institutional measures of corruption are rare. In the next section, we will examine earlier research on corruption.

2. Literature Review

Some studies proposed hypotheses about the relationship between institutions and EG. These studies also suggest that institutions are essential in fostering EG. Institutions can also provide incentives for investors to invest in the economy. They can also help to reduce corruption and improve the efficiency of public policies. Finally, they can create an environment of trust between the government and private businesses. This trust is essential for companies to invest and innovate and for citizens to be willing to work hard and take risks. Institutions can also provide a platform for citizens to express their grievances and for the government to respond (Ganda 2022; Hamid et al., 2022; Bahoo et al. ,2023; Okafor et al. ,2022).

Haydaroglu (2016) argues that institutional mistakes lead to corruption, negatively impacting economic progress and poverty. This study examined the causal relationships between corruption, EG, and independence in selected Sub-Saharan African nations. We also use multivariate cointegration and error correction models along with the Granger causality test. In this study, the period covered is 1996-2014. As shown by the Granger-causality test, EG, freedom, and corruption are negatively correlated over the long run but positively correlated in the short run. It was confirmed by the research that in Sub-Saharan Africa, economic freedom and growth are positively unidirectional Granger causally correlated, but not between growth and corruption.

Shera (2014) examined how corruption affects EG in emerging nations. All civilizations are affected by corruption, a fundamental obstacle to economic expansion. A prevalent expression in many nations is corruption, which affects all economies. A fixed and random effects approach was applied to balanced panel data between 2001 and 2012. Corruption negatively correlated with EG, according to the findings. The relationship between corruption and EG was empirically investigated by Ghalwash (2014) by incorporating the corruption perception index into the growth model for Egypt. Between 1992 and 2012, the study was conducted. Using GMM is the method of choice. Economic expansion is hindered by corruption, according to the findings. A summary of the study demonstrates that corruption negatively impacts EG via various channels, with each channel hurting growth by 70%. A report by Farida (2006) found that corruption undermines the

competency of the public and private sectors, so it is the primary risk to economic progress. Rather than competence, support confers supremacy in roles where support is crucial. Taking a neoclassical approach, assume that corruption lowers people's living standards. In terms of growth, foreign aid is unaffected by corruption. In addition, corruption restricted new investments and caused the capital stock per capita to decrease as the economy experienced negative growth.

Quazi (2014) found that corruption studies dominated FDI studies, resulting in confusion and transaction costs that hinder FDI. In this study, the GLS methodology is applied to panel data (1995-2011) to examine the effect of corruption on FDI in East Asia and South Asia. According to the study, sin has a strong negative impact on FDI. Crime takes time to curb, however. This can be achieved by adopting anti-corruption strategies. The effect of FDI on Georgia's EG was examined by Gursoy (2012) based on his 1997-2011 study. Granger causality and Engle-Granger cointegration tests examine the causal relationship between FDI and EG.

Economic expansion in Georgia is boosted by FDI, according to the findings. The outcomes can be improved by enhancing data manipulation methods and strengthening institutional authority. In his study of Pakistan between 1981 and 2008, Arshad (2011) examined the practical relationship between FDI and productivity using Granger causality and panel cointegration. The results indicate that FDI and production are cointegrated. FDI has a positive impact on long-term production. The data also demonstrate a short-term, two-way relationship between FDI and GDP, confirming a long-term relationship between GDP and FDI. Significant differences exist between sectors and locations regarding FDI's impact on growth. There is a notable result of FDI being able to gradually boost primary sector growth, which then increases FDI's impact on industries.

Several economies are actively seeking FDI (FDI)to promote economic expansion as a result of globalization, according to Castro's (2008) analysis. In foreign nations, spending decisions are influenced by a range of factors. Even so, the least corrupt nations are more likely to attract FDI because they offer a more conducive environment for investment. A study of 73 countries examined the effects of corruption on FDI (FDI) between 1998 and 2008 using GLS. There is a positive correlation between FDI inflows and the least corrupt nations. To increase FDI inflow, it is crucial to plan for corruption.

Businesses are taking advantage of globalization to invest overseas, and many economies are making a concerted effort to attract FDI. The amount of money you should spend abroad depends on several factors. Since they offer a more welcoming investment environment, the least corrupt nations may attract more FDI. The study examines the impact of corruption on FDI (FDI) in 73 countries between 1998 and 2008. Less corrupt nations receive more FDI (FDI). FDI inflows must be scheduled to increase corruption.FDI boosts EG by providing access to foreign markets, training staff, and introducing new talent. FDI positively impacts the development of the economy. It is still necessary to determine the effects of FDI on EG based on a panel of emerging nations.

We need high-quality institutions to enhance the EG impact of FDI. FDI grows Georgia's economy.

The effects of FDI on EG include the introduction of new talents, training of employees, and access to global markets. The impact of FDI on EG is positive. According to panel smooth regression analysis of an extensive sample of emerging nations, FDI does not necessarily lead to increased EG. High-quality institutions can enhance the impact of FDI on EG. The findings indicate that FDI contributes to the expansion of Georgia's economy. Analysis is conducted with the Generalized Method of Moments and Fixed Effects. From 1995 to 2010, panel data were collected. India, Bangladesh, Pakistan, and Sri Lanka showed positive correlations between institutions and economic expansion. Also, it was concluded that these developing nations need to improve their institutional quality to support progressive EG and development. Alexander et al. (2015) state that corruption hurts FDI (FDI). OLS and gravity models were employed between 1992 and 2011. In countries with low levels of corruption, FDI (FDI) increases, whereas in countries with high levels of corruption, it decreases.

3. Theoretical Framework and Methodology

Classical economists Adam Smith to Marshall recognized high EG rates essentially to capital (Roll, 1938). Improvement in technology and equipment raises the productivity of workers. A higher level of saving and investment causes capital accumulation, enhancing EG. Ramsey (1928) put forward a mathematical theory of savings; the theory states that if saving rates increase to an optimal level, then utility is maximized. Bellman (1957), dynamic programming, the neoclassical EG model (Solow, 1956) optimal growth framework also contribute significantly to EG. Based on the amount of capital available to each individual in the economy, the Solow model examines a scenario where the capital-output ratio varies accordingly. This change is motivated by diminishing returns, which state that a higher per capita stock will increase capital-output ratios. According to the Solow model, variables such as the savings rate have only a level effect on output. In terms of growth rate, it has no effect. According to the basic version of the Solow model, there is a steady-state level of per capita income regardless of the economy's historical starting point (but soon to be extended). Solow's model examines a scenario where the capital-output ratio varies in the economy regarding per capita capital availability. Increasing per capita stock raises the capital-output ratio based on the diminishing returns theory postulate. In particular, the Solow model indicates that variables like the savings rate only have a level-headed impact on production. There is no change in the rate of increase. Based on the basic version of the Solow model discussed so far (and which will soon be expanded upon), the economy must converge to a steady-state level of per capita income regardless of its historical starting point.

Harrod (1939) and Domar (1946, 1947) used Keynes's model to conclude that stable capital-output ratios and savings were necessary for economic expansion. In other words, $g = s/k$. According to Harrod Domar, Formulation K should be four with a growth rate of 5% each year. A nation should save and invest twenty percent of its income. Many nations adopted this

straightforward formula for EG after World War II (Bhattarai, 2009). The expansion of the economy is tainted by corruption. Corruption fundamentally hinders economic progress (Murphy et al., 1993; Rose Ackerman, 1997) due to the inherent uncertainty in the market forces, the increased transaction costs, and the misallocation of resources that accompany corruption.

The study of corruption was previously confined to criminal law, sociology, history, and politics, but it has recently gained prominence in economics (Abed & Gupta, 2004). Determining the extent of corruption and measuring it are complex tasks. The crime of corruption is a crime of calculation, not passion, according to Klitgaard (1996). A standard definition of corruption is when public office is misused or abused for private gain (World Bank, 1997; UNDP, 1999).In UNDP's classification of corruption, spontaneous and systemic corruption are separated. Generally, random corruption is found in society, where solid beliefs and principles are observed.

In contrast, systematic corruption is found in societies where corrupt and inadequate behavior, lack of accountability and too much discretion are predominant. In these societies, corruption has become a way of life (Balboa et al., 2006). Corruption is a widespread process that stabs the fundamental principles of democracy. At the same time, challenging democracy in various ways, such as violating law and order, rules and regulations, norms and code of conduct and corruption, becomes a significant point of discussion for the entire world. The history of Western Political thought explains that the emergence of corruption in politics dates to Greek philosophers such as Aristotle, Plato, Socrates and Polybius (Wallis, 2006). Fundamentally, three phases of corruption evolution can be recognized.

In the first phase, corruption is substantial and does not severely affect EG. Corruption occurs in more significant business and upper government circles in this phase. However, it does not drastically hamper legislative work and mostly happens beneath the surface (Alatas, 1980). As corruption progresses in the second stage, it permeates daily concerns and becomes inevitable. Rules and regulations are violated, and black markets habitually are embellishment. Corruption becomes a complicated public issue and is fundamentally in public interactions. In the third phase, corruption is not only harmful to society but this affects other factors such as economic freedom, government size, income distribution and inflation; therefore, as a result, corruption sands the wheel of EG (Dimant, 2013). When efforts are made to combat corruption, the battle will start from the upper level of government. The garbage from the upper floors should be shoved toward the ground floor when cleaning a house. It is also imperative that the state's top echelons lead the fight against corruption. (Amundsen, 1999).

3.1 Data

This study gathers data from the Fraser Institute of Economic Freedom, Freedom House, International Transparency Corruption Perception Index (CPI), and World Development Indicators (WDI). An analysis of panel data is conducted in this study. The cross-country study uses data from 53 developing nations.

Panel data sets are comprised of individuals' cross-sectional and time series data. You should have information about the GDP, employment, savings, and pay rates across a few nations over time (let us say ten years). Data collected from panels are more accurate and illuminating than those collected from cross-sections, time series, and pooled data. Comparatively, the panel dataset concerns the units' behavior over time. Panel data is also called micro panel data or longitudinal data. Explanation power of panel data is higher than that of other data types when it comes to explaining the model (Gujarati, 1978).

3.2 Pooled OLS

The pooled OLS is based on the assumption that the slope of coefficient and intercept are same across the time and entities. The regression equation of the pooled OLS is as follows

$$Y_{it} = \alpha_1 + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \mu_{it}$$

Although pooled OLS is simple but its results are poor and that is a naive approach because in developing countries there is always heterogeneity and there is diversity in their structural characteristics.

3.3 Fixed Effects Approach

The usage of fixed-effects approach in each and every time is only concerned in exploring the influence of variables that differ over time. In fixed effects model, intercept term is treated as different for each group. Generally, fixed effects model assumes that each country differ in its intercept term (Demitrios, 2011). Fixed Effects discover the association between predictor and outcome variables within a unit. Fixed effects approach is based on the assumption that slope coefficients are constant and intercept term varies across the countries and every country has its own specific intercept. The regression equation of fixed effect approach is as follows.

$$Y_{it} = \alpha_{1i} + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \mu_{it}$$

The subscript i with intercept term showing that each country has its own intercept and may or may not changes across courtiers. The intercept of each country does not vary across entities, which are time invariant.

3.4 Random Effect Approach

The basic theme of Random effect is that the intercept term across countries selected randomly Random effects model assume that each country differ in its error term (Demitrios, 2011). The following is the regression equation for Random Effects model

$$Y_{it} = \alpha_1 + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \varepsilon_i + \mu_{it}$$

Since $\omega_{it} = \mu_{it} + \varepsilon_i$

Then $$Y_{it} = \alpha_1 + \alpha_2 X_{2it} + \alpha_3 X_{3it} + \omega_{it}$$

Compounded error terms are the sum of time series and cross section error terms and are unit-specific. There is also an error correction model called the Random Effect Model. (Gujarati, 1978)

3.5 Hausman Test

A Housman Test can be used to determine whether to adopt a Fixed Effect or Random Effect model after post-estimating the result. Following the calculation of Fixed Effect and Random Effect models, the Housman Test is conducted. When the Chi square test has a significant probability value (less than 1%, 5%, or 10%), the Fixed Effect method is suitable for estimating the study. In the absence of significant results from the Chi Square test, the Random Effect method should be used (Mehmood, 2014).

4. Discussion on Results

After post-estimating the results, a Housman Test can be used to determine whether to use a Fixed Effect or Random Effect model. A Housman Test is conducted after the Fixed Effect and Random Effect models have been calculated. A Fixed Effect method is suitable for estimating a study when the Chi square test has a significant probability value (less than 1%, 5%, or 10%). The Random Effect method should be used in the absence of significant Chi Square results. This study aims to examine the relationship between economic growth, corruption, FDI, and institutions. Poor political and financial institutions impede the inflow of FDI and economic development. The period 2005-2022 is examined using panel data techniques. Various data sources, including WDI, Freedom House, and Fraser Institute of Economic Freedom, are used to collect the data. Empirical estimations are based on four models. The study's results suggest that corruption has a negative and significant effect on economic growth, whereas FDI and institutions have a positive and significant impact. The study proves that political institutions play an essential role in economic development.

4.1 Correlation Matrix Model 1

Table No 1: Correlation matrix of the variables of model 1

	loggdpg	logcpi	logopen	logs	logtax	logimp
loggdpg	1.0000					
logcpi	-0.0844	1.0000				
logope	-0.0109	0.2986	1.0000			
logs	0.0697	-0.0101	-0.1905	1.0000		
logtax	-0.0811	0.1879	0.3013	0.0901	1.0000	
logimp	-0.1085	0.1574	-0.0169	0.1862	-0.1100	1.0000

The econometric version of the model is as follows

$$Loggdpg_{it} = \alpha_0 + \alpha_1 Logcpi_{it} + \alpha_2 Logopen_{it} + \alpha_3 Logs_{it} + \alpha_4 Logimp_{it} + \alpha_5 Logtax_{it} + \mu_{it}$$

In this model the relationship between EG, corruption (CPI), Trade openness (open), saving (s), imports (imp) and taxes (tax) is evaluated. The results are given in table 2.

Analyses are conducted using OLS, fixed effects, D and K with fixed effects. Imports, actual interest rates, trade openness, and FDI evaluate EG. FDI has a significant impact at 5%. The positive coefficient of FDI means an increase in FDI by 1% will increase EG by 18%. According to Hansen et al. (2005), EG is boosted by FDI. A favorable effect of FDI on EG is reported by Nadine et al. (2011). Eatzaz and Anis (2003) used a fixed effect model to present their results. FDI positively impacts EG, although it could be more substantial in emerging nations. The OLS estimate process is unaffected by trade openness. Moreover, both D and K fixed effects models show significant and positive coefficient signs, indicating that trade openness boosts EG. There is no savings from the fixed effect model and the D & K with fixed effects in OLS estimation. However, the coefficients for all calculations are positive, indicating that saving and EG are positively correlated. Emerging nations, however, cannot accelerate their EG through savings. The coefficient sign indicates a negative relationship between EG and actual interest rates, and imports are significant in all estimations.

Table No 2: Growth and Corruption

Loggdpg	OLS	FE	D and K with FE
Logcpi	(0.116)	(0.633)	(0.511)
	-0.1822	-0.0982	-0.0982
Logopen	(0.54)	(0.000)*	(0.000)
	0.0353	0.8353*	0.8353*
Logs	0.054	0.102	(0.014)
	0.0906	0.1709	0.1709*
Logimp	(0.013)	(0.048)	(0.019)
	-0.0546*	-0.2736**	-0.2736*
Logtax	(0.72)	(0.981)	(0.981)
	0.0364	-0.005	-0.005
constant	(0.000)	(0.163)	(0.091)
	2.5164*	4.1646	4.1646***

P values are in parentheses* p < 0.01, ** p < 0.05, *** p < 0.10

4.2 Diagnostic Tests for Model 1

Different diagnostics tests are applied and the results are in accordance with required standard.

Table No 3: Tests for Panel Data Method Model 1

Hausman test	**Wooldridge Test for Serial Correlation**	**Modified Wald Test for Group Wise Heteroskedasticity**
Hypothesis H0= difference in coefficients not systematic H1= difference in coefficients systematic	Hypothesis H**o:** No First Order Serial Correlation H**1:** Yes First Order Serial Correlation	Hypothesis $H_0 : \sigma_i^2 = \sigma^2$ for all i $H_1 : \sigma_i^2 \neq \sigma^2$ for all i
Decision	Decision	Decision
Prob>chi2 = 0.0168	F(1, 51) = 14.044	chi2 (53) = 38574.60
At 1% Fixed Effect is preferred	Prob > F = 0.0005	Prob>chi2 = 0.0000

Ramsey Test for Model Specification Tests
Hypothesis H**o:** Model has no omitted variables
Decision
F(3, 479) = 1.87
Prob > F = 0.1346

According to Table 3, several tests are conducted on panel data. There are several tests, including Hausman's. As the Chi-Square test indicates, a fixed effect is suitable for estimation when it is significant at a 1% significance level. Our model detects serial correlation at the % significance level based on the Wooldridge test since the F test is essential. We also found that our model was heteroskedastic when we applied the modified Wald test for heteroskedasticity. FE can eliminate auto and hetero concerns using the D & K standard error test, which removes auto and hetero concerns.

4.3 Correlation Matrix model 2

Table No 4: Correlation matrix of the variables

	loggdpg	logfdi	logopen	logs	logri	logimp
loggdpg	1.0000					
logfdi	0.1561	1.0000				
logopen	-0.0229	0.2479	1.0000			
logs	0.0694	0.0141	-0.2400	1.0000		
logri	-0.0664	0.0540	-0.2655	-0.1487	1.0000	
logimp	-0.1489	-0.0653	-0.0263	0.1905	-0.1882	1.0000

The econometric version of the model is as follows

$$Loggdpg_{it} = \beta_0 + \beta_1 Logfdi_{it} + \beta_2 Logopen_{it} + \beta_3 Logs_{it} + \beta_4 Logri + \beta_5 Logimp + \mu_{it}$$

The relationship of EG and FDI through control variables trade openness, savings, real interest rate and imports is estimated in this model. The results are given in table no 5.

Analyses are conducted using OLS, fixed effects, D and K with fixed effects. EG is evaluated in relation to imports, real interest rates, trade openness, and FDI. FDI has a significant impact at 5%. The positive coefficient of FDI means an increase in FDI by 1% will result in an increase in EG by 18%. EG is boosted by FDI, according to Hansen et al. (2005). A favorable effect of FDI on EG is reported by Nadine et al. (2011). Eatzaz and Anis (2003) used a fixed effect model to present their results. EG is positively impacted by FDI, although it is not very substantial in emerging nations. The OLS estimate process is unaffected by trade openness. Moreover, both D and K fixed effects models show significant and positive coefficient signs, indicating that trade openness boosts EG. There is no savings from the fixed effect model and the D & K with fixed effects in OLS estimation. The coefficients for all calculations, however, are positive, indicating that saving and EG are positively correlated. Emerging nations, however, cannot accelerate their

EG through savings. The coefficient sign indicates a negative relationship between EG and real interest rates, and imports are significant in all estimations.

Table No 5: Growth and FDI

Loggdpg	OLS	Fixed effect	D & K with FE
Logfdi	(0.001)	(0.000)	(0.021)
	0.1171*	0.1832*	0.1832**
Logopen	(0.103)	(0.01)	(0.002)
	-0.117	0.618*	0.618*
Logs	(0.237)	(0.197)	(0.137)
	0.05628	0.1337	0.1337
Logri	(0.018)	(0.0007)	(0.002)
	-0.0863*	-0.1174*	-0.1174*
logimp	(0.000)	(0.002)	(0.014)
	-0.08012*	-0.3994*	-0.3994*
constant	(0.000)	(0.006)	(0.035)
	3.7051*	7.99541*	7.99541**

P values are in parentheses * p < 0.01, ** p < 0.05, *** p < 0.10

4.4 Diagnostic Tests for Model 2

Table No 6: Tests for Panel Data Method

Hausman test	**Wooldridge Test for Serial Correlation**	**Modified Wald Test for Group Wise Heteroskedasticity**
Hypothesis	Hypothesis	Hypothesis
H0= difference in coefficients not systematic	H**o:** No First Order Serial Correlation	$H_0 : \sigma_i^2 = \sigma^2$ for all i
H1= difference in coefficients systematic	H**1:** Yes First Order Serial Correlation	$H_1 : \sigma_i^2 \neq \sigma^2$ for all i
Decision	Decision	Decision
Prob>chi2 = 0.0024	F(1, 48) = 3.941	chi2 (53) = 18194.59
At 1% Fixed Effect is preferred	Prob > F = 0.0529	Prob>chi2 = 0.0000
	Ramsey Test for Model	

Specification Tests
Hypothesis
H**o:** Model has no omitted variables
Decision
F(3, 408) = 0.88
Prob > F = 0.4539

In Table no 6, the panel data approach utilizes a variety of tests. Hausman's test is applied. Chi-Square test indicates significant results at 1% significance level, which indicates that fixed effects are suitable for estimation. Our model contains serial correlation when the Wooldridge test is applied, since the F test is significant at a 10% significance level. According to the results of the chi-square test, our model also exhibits heteroscedasticity using the Modified Wald Test for Group Wise Heteroskedasticity. To eliminate auto and hetero concerns, we apply the D & K standard error test with FE. In addition, the model is well-specified according to the Ramsey test.

4.5 Correlation Matrix Model 3

Table No 7: The Correlation Matrix of The Variables

	loggdpg	logcpi	logfdi	logpr	logopen	logs	logri	logimp
loggdpg	1.0000							
logcpi	-0.1174	1.0000						
logfdi	0.1561	0.1816	1.0000					
logpr	-0.0601	-0.3434	-0.1247	1.0000				
logopen	-0.0229	0.2857	0.2479	-0.2876	1.0000			
logs	0.0694	-0.0249	0.0141	0.0422	-0.2400	1.0000		
logri	-0.0664	-0.0574	0.0540	0.1544	-0.2655	-0.1487	1.0000	
logimp	-0.1489	0.1886	-0.0653	-0.1115	-0.0263	0.1905	-0.1882	1.0000

The econometric version of the model is given as follows

$$Loggdpg_{it} = \gamma_0 + \gamma_1 Logfdi_{it} + \gamma_2 Logcpi_{it} + \gamma_3 Logpi_{it} + \gamma_4 Logs_{it} + \gamma_5 Logopen_{it} + \gamma_6 Logri_{it} + \gamma_7 Logimp_{it} + \mu_{2it}$$

A variety of tests are used in the panel data approach. This test is based on Hausman's. According to the Chi-Square test, fixed effects are suitable for estimation at 1% significance level. Since our F test is significant at a 10% significance level, our model contains serial correlation when the Wooldridge test is applied. We also found heteroscedasticity in our model using the Modified Wald Test for Group Wise Heteroskedasticity based on the results of the chi-square test. The D&K standard error test with FE eliminates auto and hetero concerns. According to the Ramsey test, the model is also well-specified.

Table No 8: Growth, Corruption, FDI and Political Institutions

Loggdpg	OLS	FE	Drisc and Kraay with FE
	(0.000)	(0.000)	(0.000)
Logfdi	0.1235*	0.2041*	0.2041*
	(0.007)	(0.84)	(0.84)
Logcpi	0.3275*	-0.0393	-0.03929
	(0.031)	(0000)	(0000)
Logpoli	-0.148**	-0.7347*	-0.7347*
	(0.213)	(0.108)	(0.108)
Logs	0.05877	0.1646	0.1646
	(0.17)	(0.021)	(0.006)
Logopen	-0.0976	0.5224**	0.5424*
	(0.038)	(0.02)	(0.003)
Logri	-0.0755**	-1.009**	-1.009*
	(0.002)	(0.003)	(0.001)
Logimp	-0.0721*	-0.4049*	-0.4049*
	(000)	(0.002)	(0.004)
Constant	3.9727*	9.1825*	9.1825*

P values are in parentheses * p < 0.01, ** p < 0.05, *** p < 0.10

The D and K models, OLS, and fixed effect models are used to conduct the analysis. It is assessed how FDI, corruption, and EG relate to political institutions. With a fixed effects model, trade openness, FDI, political institutions, real interest rate imports, and corruption are significant in D and K, while savings and corruption are not. EG is negatively correlated with the coefficient indicators of corruption, imports, and the real interest rate of political institutions. Conversely, savings, trade openness, and FDI all promote EG. The findings show that although a 1% rise in FDI boosts EG by 20%, a 1% increase in corruption impedes it by 30%. According to the coefficient of political institutions, a 1% increase in political institution performance slows EG by 85%. According to Zouhaier and Karim (2012), weak political structures and low EG are related to developing nations' slow EG. OLS estimates demonstrate that FDI, political institutions, and

savings are significant, while trade openness, corruption, and savings are not. It is possible to obtain nearly identical results when using D&K with fixed effects and Fixed Effects.

4.6 Diagnostic Tests For model 3

Different diagnostics tests are applied and the results are in accordance with required standard.

Table No.5.9 Tests for Panel Data Method

Hausman test	**Wooldridge Test for Serial Correlation**	**Modified Wald Test for Group Wise Heteroskedasticity**
Hypothesis	Hypothesis	Hypothesis
H0= difference in coefficients not systematic	H**o:** No First Order Serial Correlation	$H_0 : \sigma_i^2 = \sigma^2$ for all i
H1= difference in coefficients systematic	H**1:** Yes First Order Serial Correlation	$H_1 : \sigma_i^2 \neq \sigma^2$ for all i
Decision	Decision	Decision
chi2 = 29.88	F(1, 48) = 4.139	chi2 (53) = 13184.54
Prob>chi2 = 0.0000	Prob > F = 0.0475	Prob>chi2 = 0.0000

Ramsey Test for Model Specification Tests
Hypothesis
H**o:** Model has no omitted variables
Decision
F(3, 406) = 0.84
Prob > F = 0.4735

The panel data method is tested using different tests in table 9. It is tested using the Hausman test. At a 1% significance level, the Chi-Square test shows that the fixed effect is appropriate for estimation. We apply Wooldridge's serial correlation test, and the F test indicates that serial correlation exists in our model at a 5% significance level. Our model also demonstrates heteroscedasticity based on the modified Wald test for group wise heteroskedasticity and the chi-square test. Thus, to eliminate auto and hetero issues, we use D & K standard error tests with FE, which provide more consistent results. Model specification is performed using the Ramsey test. Furthermore, the model is well-defined.

4.7 Correlation Matrix Model 4

Table 5.10 The correlation matrix of the variables

	loggdpg	logcpi	logfdi	logei	logopen	logtax
loggdpg	1.0000					
logcpi	-0.0752	1.0000				
logfdi	0.1621	0.2355	1.0000			
logei	-0.0961	0.5704	0.3106	1.0000		
logopen	-0.0049	0.2874	0.2806	0.1216	1.0000	
logtax	-0.0931	0.1912	0.2914	0.4315	0.2962	1.0000

The econometric version of model is given as follows

$$Loggdpg_{it} = \eta_0 + \eta_1 Logfdi_{it} + \eta_2 Logcpi_{it} + \eta_3 Logei_{it} + \eta_4 Logopen_{it} + \eta_5 Logtax_{it} + \mu_{3it}$$

The relation between EG, Corruption and FDI with control variables trade openness and tax through economic institutions is estimated. The results are given in table 11.

D and K models with fixed effects are used as well as OLS, fixed effects, and D and K models with fixed effects. Comparing EG, corruption, and FDI (FDI) with economic institutions is discussed. Taxation and corruption are not significant in the D & K Model with fixed effects, whereas trade openness, FDI, and economic institutions are. Despite corruption's negative correlation with economic institutions, EG is adversely affected by corruption. EG and FDI are positively correlated, as indicated by the positive coefficient sign. EG increases by 18% when FDI increases by 1%, according to the coefficient of FDI. Consequently, corruption impedes EG by 1%, while economic institutions are more effective by 1.41%. In a 2012 study by Karim and Ouhaier, the authors considered whether weak economic institutions might contribute to the slow growth of developing nations' economies. A positive correlation exists between trade openness and EG, while a negative correlation exists between tariffs and EG. D and K with fixed effects are more consistent than fixed effects model results because the d and k standard error tests eliminate

auto and hetero problems. While this is true, both sets of tests produced almost identical results. Trade openness, corruption, FDI, and taxes are critical factors in OLS estimations. EG negatively correlates with trade openness, taxes, corruption, and economic institutions. In terms of EG, FDI has a positive effect.

Table No11: Growth, Corruption, FDI and Economic Institutions

Loggdpg	OLS	FE	Drisc and Kraay with FE
	(0.457)	(0.674)	(0.597)
Logcpi	-0.1010	-0.0808	-0.0808
	(0.000)	(0.000)	(0.002)
Logfdi	0.1534*	0.1891*	0.1891*
	(0.040)	(0.072)	(0.001)
Logei	-.7292**	-1.4154***	-1.4154*
	(0.363)	(0.022)	(0.001)
Logopen	-0.0597	0.5126**	0.5156*
	(.256)	(0.145)	(0.197)
Logtax	-.02372	-.0603	-.0603
	(0.000)	(0.078)	(0.001)
Cons	4.8582*	5.5636***	7.1786*

P values are in parentheses * p < 0.01, ** p < 0.05, *** p < 0.10

4.8 Diagnostic Tests for Model 4

Different diagnostics tests are applied and the results are in accordance with required standard. In Table12, Panel data approaches utilize various tests. It is necessary to apply the Hausman test. Using a Chi-Square test with a significance level of 5%, the fixed effect can be estimated. Our model contains serial correlation when the Wooldridge test for serial correlation is used, because the F test is significant at a 1% significance level. The results of the chi-square test show that our model exhibits heteroscedasticity when using the Modified Wald Test for Group Wise Heteroskedasticity. In this way, we eliminate auto and hetero concerns by using the D & K standard error test with FE. Ramsey test determines the proper specification of the model.

Table No 12: Tests for Panel Data Method

Hausman test	**Wooldridge Test for Serial Correlation**	**Modified Wald Test for Group Wise Heteroskedasticity**
Hypothesis	Hypothesis	Hypothesis
H0= difference in coefficients not systematic	H**o:** No First Order Serial Correlation	$H_0 : \sigma_i^2 = \sigma^2$ for all i
H1= difference in coefficients systematic	H**1:** Yes First Order Serial Correlation	$H_1 : \sigma_i^2 \neq \sigma^2$ for all i
Decision	Decision	Decision
chi2 = 10.72	F(1, 52) = 14.796	chi2 (53) = 7163.33
Prob>chi2 = = 0.0571	Prob > F = 0.0003	Prob>chi2 = 0.0000

Ramsey Test for Model Specification Tests
Hypothesis
H**o:** Model has no omitted variables
Decision
F(3, 473) = 0.86
Prob > F = 0.4621

5. Conclusion

A key objective of this study is to determine the relationship between institutions, FDI, and corruption. The fixed effects are calculated with Drisc and Kraay techniques and panel data fixed effects with panel data. During the five years between 2005 and 2014, 53 developing nations were analyzed. In summary, the study came to the following conclusions. EG is negatively affected by corruption according to a variety of control factors and model estimations. Due to this slight change in corruption, the economy has needed to grow faster. Similarly, regardless of the model estimation or the set of control variables used, FDI and EG have a strong and positive relationship. Therefore,

this minor adjustment to FDI gradually increases EG. Furthermore, the results show a negative relationship between political institutions and EG based on the specifications and different combinations of control variables. However, political institutions are more important than corruption. FDI significantly boosts EG in the presence of political institutions. In conclusion, EG is slowed by decreasing political institutions and corruption while gradually increased FDI accelerates it. Corrupt practices and EG are not significantly correlated, according to Model 4. Institutions in the economy severely hamper EG. Emerging nations do not experience the effects of economic institutions on their EG. FDI bolsters EG when economic institutions are present. The economies slow growth results from corruption and no change in economic institutions, whereas FDI gradually accelerates the economy's growth.

One of the main contributions of this research is its clarification of how corruption hinders EG and FDI (FDI) in developing nations with weak political and economic institutions. Nations must reduce corruption to increase EG. Li et al. (2000) and Stevenson (2005) examined the relationship between corruption and economic expansion. Since the government prioritizes increasing trade openness to raise GDP, it is a potent instrument. Doing so makes it easier to access breakthroughs, new technologies, and expanded markets. Due to increased exports of competitive goods and foreign exchange, the economy grows more rapidly. Governments should promote trade liberalization. The expansion of the economy depends on savings. A more significant amount of money should be saved by developing nations. In order to stimulate investment and, ultimately, EG, interest rates should be kept as low as possible.

Further research is needed to explore how these factors interact. It is also essential to consider the impact of these factors on development outcomes, such as poverty reduction and economic growth. Finally, more research is needed to assess the effectiveness of policies and strategies designed to reduce corruption and promote economic growth. This research should also include an analysis of the costs and benefits of different methods and a comparison of different strategies in other countries. Additionally, more research is needed to identify best practices and procedures to incentivize countries to reduce corruption and promote economic growth.

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