Corruption and Economic Growth: An Empirical Study in 12 Countries

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Abstract

The impact of corruption on economic growth receives excellent attention in empirical studies. Understanding the relationships between corruption concerning the economy is essential to ensure stable economic development. This research article aims to investigate the relationship between corruption and economic growth in 12 countries over 26 years from 1995 to 2020. This research article examines this relationship in the context of the panel data framework. Panel unit root, panel cointegration tests, panel Dynamic Ordinary Least Squares (DOLS) estimation, and panel Vector Error Correction Model (VECM) methodology associated with the Wald test is applied, respectively. The results show that corruption generates a negative effect on economic growth. In other words, a 1 percent rise in the transparency level (low corruption) will enhance the real GDP growth by 0.20 percent in the long run. Short-run and long-run causality runs from corruption to GDP and both variables are cointegrated. The results conclude that lowering the corruption rate is the precondition for continued growth.

Keywords: Corruption, Economic growth, Panel data, Political economy, Dynamic ordinary least squares

Introduction

Classical growth theories claim that economic growth is affected by exogenous and endogenous factors. For the exogenous factor, economic growth can be influenced by the number of labor or the level of technological progress. For the endogenous factor, endogenous growth theory assumes that long-run growth rate output is determined by human capital, knowledge investment, and innovation. However, many attempts try to determine other factors influencing economic growth, such as bribery and corruption (Mauro, 2004; d'Agostino et al., 2016). Mauro (2004) mentioned that the need to pay substantial bribes reduced entrepreneurs' incentives to invest and significantly burdened economic growth.

The role of corruption in economic growth is an interesting and important issue to answer the abovementioned question. Corruption as a political and socio-economic factor has direct and indirect relationships with progress and regress in economic and social development.

Corruption is one of the fundamental problems plaguing the corporate sector to inhibits economic growth and development (Nwoke et al., 2023). Many researchers study the links between corruption and economic growth from different approaches; for example, corruption leads to a decline in investment and economic growth, increased foreign trade restrictions, and public expenditure deterioration (Acaravci et al., 2023). Starting from this issue, this paper focuses on the relationship between corruption and economic growth.

The study's objective is to empirically inspect the relationship between corruption and economic growth for 12 countries over 26 years, using data from the World Bank and Transparency International from 1995 to 2020. The study hypothesizes a negative relationship between corruption and economic growth. Therefore, Perceived Corruption is a significant explanatory variable in the GDP equation.

Using a panel data approach, this study tests the relationship between corruption and economic growth following the model adapted from Solow (1956) and Mauro (1995). The study applies panel unit root, panel cointegration tests, panel Dynamic Ordinary Least Squares (DOLS) estimation, as well as panel Vector Error Correction Model (VECM) methodology associated with the Wald test, which shows a limited study in the literature for the relationship among corruption and economic growth.

The paper is organized as follows. The first section is the introduction. The second section describes the literature review, followed by the model in the third section. The methodology and data are presented in the fourth and fifth sections. The last two sections show the empirical results as well as a conclusion.

Literature review

The relationship between corruption and economic growth is an area of interest in the economic literature. However, the study of the empirical work of corruption and economic growth is limited because corruption is challenging to measure. Most studies conclude a strong relationship between corruption and economic growth. Tanzi (1998) studied the phenomenon of corruption worldwide and showed the incidence of this phenomenon and the damage it brought to economies. Rose-Ackerman (1997) found that corruption tended to distort the allocation of economic benefits leading to less equitable income distribution. A similar study supported by Humphreys et al. (2007) discovered that the growth failures were strong associations between resource wealth and the likelihood of weak corruption.

Based on the empirical framework, Mauro (1997) used cross-country regressions to study the relationship between corruption and economic growth, and his result showed that there is a statistical significance that corruption lowered economic growth. Aghion et al. (2016) employed an endogenous growth model to analyze the relationships between taxation, corruption, and economic growth. Their empirical results showed that reducing corruption provided the most significant potential impact for welfare gain through its impact on the use of tax revenues. Shera et al. (2014) estimated the impact of corruption on economic growth across 22 developing countries from 2001 to 2012. Their panel data analyses revealed a statistically significant negative relationship between corruption and economic growth. Mo (2001) applied the ordinary least squares estimations and found that a 1 percent increase in the corruption level reduced the growth rate by about 0.72 percent. Likewise, the empirical results represented by d' Agostino et al. (2016) were estimated on a comprehensive panel of 106 countries using an endogenous growth model. They confirmed that the interactions between corruption and investment substantially negatively impacted economic growth. Consistent Mauro (1995) employed a cross-section of countries to study the links between corruption and investment rate. He found that corruption was strongly negatively associated with the investment rate, lowering economic growth.

Several studies about the impact of corruption on long-run economic growth incorporated the role of political freedom as a determinant of the relationship. Méndez and Sepúlveda (2006) found that corruption was harmful to economic growth for the case of free countries, instead showed the positive impact on economic growth in countries with less political freedom. Correspondingly, Aidt et al. (2008) employed a threshold model to investigate the relationships between corruption and economic growth. Their results proved that corruption substantially affected growth in a regime with high-quality political institutions; however, it did not affect growth in a regime with low-quality institutions.

On the other hand, Shao et al. (2007) studied the quantitative relation between corruption level and a country's wealth. They found a negative correlation between corruption and long-term economic growth. Less corrupt countries exhibited significant economic growth, while more corrupt countries displayed insignificant (or negative growth rates). Similar to Mauro (1995) and Mauro (2004) argued that richer countries tended to be perceived as having lower corruption since there was a close association between corruption and slow growth.

According to previous studies, this study is unique in two different ways; first, it includes a unique set of variables such as corruption, capital, unemployment, and consumption in the GDP. Second, studies on the corruption effect of 12 countries on economic growth by considering each continent, such as Australia, America, Asia, and Europe, are minimal; thus, this study bridges these gaps.

Model

In this study, the panel data approach examines the relationship between corruption and economic growth. To investigate the relationship between corruption and economic growth, a framework based on the aggregate production function is adopted. The growth model of corruption in the following is modified from the Solow Growth Model (1956) and Mauro (1995), where Capital (K), Total Unemployment (L), Total Consumption (T), and Perceived Corruption (P), as separate inputs in GDP equation. In this research article, I restrict my analysis to four indicators of GDP growth. I choose these four factors for two reasons: first, they are assessed dependently on macroeconomic variables such as capital, unemployment, and consumption and independently of macroeconomic variables such as corruption. Second, this study adopts a more eclectic approach since Solow's model deliberately ignores some important aspects of macroeconomics, such as corruption. To develop a model, the attempt will describe the long-run evolution of the economy. The relationship among these variables can be written as follows:

$$\mathrm{GDP} = f(K, L, T, P) \tag{1}$$

$$\mathrm{GDP}_{it} = \alpha_{it} + \alpha_{1i}K_{it} + \alpha_{2i}L_{it} + \alpha_{3i}T_{it} + \alpha_{4i}P_{it} + \mu_{it} \tag{2}$$

Where:

GDP = ln of Gross Domestic Product of country *i* in the period *t* at a constant price of 2015 (USD).

K = ln of Gross Fixed Capital of country *i* in the period *t* at a constant price of 2015 (USD).

L = ln of Total Unemployment of country *i* in the period *t* represents as a percentage of the total labor force.

T = ln of Total Consumption of country *i* in the period *t* at a constant price of 2015 (USD).

P = ln of Perceived Corruption of country *i* in the period *t* represented by the scores of transparency level (higher scores higher transparency level).

Methodology

This study applies the methodology of econometrics using statistical and mathematical models to test. As described in the following, the panel analysis is chosen because the data used in this study is panel data which includes two dimensions such as cross-sectional and longitudinal data. The advantages of panel data contain more information, variability, and efficiency than pure time series data or cross-sectional data and are widely used in social science and econometrics (Hsiao, 2007).

Panel unit root tests

The basic feature of the panel unit root test is described in the following. Consider an AR(1) process:

$$y_{it} = \rho_i y_{it-1} + x_{it}\delta_{it} + \epsilon_{it} \quad (3)$$

Where:

i is cross-section series and $i = 1,2,\dots,N$; t is time periods and $t = 1,2,\dots,T$; x_{it} is optional exogenous regressors which may consist of constant, or a constant and trend; ρ_i and δ_i are parameters to be estimated; ϵ_{it} represents the white noise or the error term; y is a nonstationary series or contains a unit root when $|\rho| \geq 1$; and y is a (trend-) stationary series when $|\rho| < 1$.

Panel cointegration tests

The cointegration test is based on an examination of the residuals of spurious regression, and two panel cointegration tests are employed in this study.

Kao test

The Kao (1999) test specifies cross-section-specific intercepts and homogeneous coefficients during the first stage. Kao's panel cointegration in the bivariate case can be represented as:

$$y_{it} = \alpha_i + \beta x_{it} + \epsilon_{it} \quad (4)$$

Where:

i represents the cross-section series and $i = 1,2,\ldots,N$; t represents the time periods and $t = 1,2,\ldots,T$; α_i represents the parameters to be estimated; ϵ_{it} represents the white noise or the error term; and y and x are assumed to be integrated of order one, *e.g.* I(1).

Johansen test

Johansen (Maddala & Wu, 1999) test as the combined individual tests using the results of the individual independent tests (Fisher, 1932). It is an alternative approach to testing for cointegration in panel data by combining tests from individual cross-sections to obtain a test statistic for the full panel (Maddala & Wu, 1999).

The Chi-squared statistic for the panel can be expressed as:

$$-2\sum_{i=1}^{N}\log(\pi_i) \rightarrow \mathrm{X}^2 2N \quad (5)$$

Where:

i is cross-section series; π_i is the p-value from an individual cointegration test for cross-section i. X^2 is the value derived from p-values for Johansen's cointegration trace test and maximum eigenvalue test proposed by Mackinnon, Haug, & Michelis (1999).

Panel dynamic ordinary least squares

This study proceeds with estimating the long-run relationship using the pooled Dynamic Ordinary Least Squares (DOLS) estimator suggested by Kao & Chiang (2001). The pooled DOLS estimator uses ordinary least squares to estimate an augmented cointegrating regression equation as described in the following:

$$Y_{it} = \mathrm{X}'_{it}\beta + \sum_{j=-q_1}^{r_i}\Delta\mathrm{X}'_{it+j}\delta_i - \nu_{1it} \quad (6)$$

Where:

i is cross-section series and $i = 1,2,\ldots,N$; t is time periods and $t = 1,2,\ldots,T$; X_{it} and Y_{it} are the data purged of the individual deterministic trends; δ_i the short-run dynamics coefficients.

Panel vector error correction model

A Vector Error Correction (VEC) model is a restricted VAR designed for use with nonstationary series known to be cointegrated. The VEC model under a two-variable system with one cointegration and no lagged difference terms is:

$$\Delta y_{1,it} = \alpha_1\left(y_{2,it-1} - \beta y_{1,it-1}\right) + \epsilon_{1,it} \quad (7)$$

$$\Delta y_{2,it} = \alpha_2\left(y_{2,it-1} - \beta y_{1,it-1}\right) + \epsilon_{2,it} \quad (8)$$

Where:

i is cross-section series and $i = 1,2, \dots, N$; t is time periods and $t = 1,2, \dots, T$. The Error Correction Term (ECT) is in the only right-hand side variable and $ECT = 0$ in long-run equilibrium; $ECT \neq 0$ when y_1 and y_2 deviate from the long run equilibrium. α_1 and α_2 are the coefficients represent the speed of adjustment of the i-th endogenous variable towards the equilibrium.

Panel wald test

The Wald test estimates a test statistic based on unrestricted regression. The Wald statistic determines how close the unrestricted estimates come to fulfilling the restrictions under the null hypothesis. In the case of a linear regression model, the Wald statistic can be written as:

$$W = (Rb - r)'(Rs^2(\mathrm{X}'\mathrm{X})^{-1}R')^{-1}(Rb - r) \quad (9)$$

Where:

R is a known $q \times k$ matrix; r is a $q - vector$; q is the number of restrictions under the null hypothesis; b is the vector of unrestricted parameter estimates; and s^2 is the usual estimator of the unrestricted residual variance.

Data

The study employs a balanced panel to investigate the secondary data from 1995 to 2020. The data are converted to logarithms which allow presenting the relationships between variables in an equation. Table 1 represents the data for calculation collected from World Bank and Transparency International. According to equation (2) above, the relationship between GDP to Gross Fixed Capital (K) is positive because the higher the gross domestic fixed investment, the higher the economic production will be. Instead, a negative relationship exists between Total Unemployment (L) and GDP since an increase in unemployment will slow economic growth. Total Consumption (T) is directly related to the GDP because the greater consumption rate denotes a larger level of production and economic growth. Likewise, faster economic growth, an upper transparency level, or a lower corruption rate (P).

Table 2 shows 12 countries under investigation, such as Colombia, Indonesia, China, India, Malaysia, Italy, United States, France, Japan, Australia, Denmark, and New Zealand, ranking from highly corrupt to very clean, respectively. These countries are selected because each country is representative of a different continent, such as Australia, America, Asia, and Europe, and there is abundantly available data that includes all years of study (1995 – 2020).

Table 3 shows the descriptive statistics of the data.

Table 1 Variables, sources, and expected signs

Variable	Description	Source	Expected Sign
GDP	Gross Domestic Product in real prices	World Bank	Dependent Variable
K	Gross Fixed Capital in real prices	World Bank	Positive (+)
L	Total Unemployment	World Bank	Negative (-)
T	Total Consumption in real prices	World Bank	Positive (+)
P	Perceived Corruption (Transparency Level)	Transparency International	Positive (+)

Table 2 Countries under investigation

Australia	AUS
China	CHN
Colombia	COL
Denmark	DNK
France	FRA
India	IND
Indonesia	IDN
Italy	ITA
Japan	JPN
Malaysia	MYS
New Zealand	NZL
United States	USA

Table 3 Descriptive statistics of variables

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
1. The Logarithmic Form of Real Gross Domestic Product					
LNGDP	312	27.70	1.45	25.36	30.63
2. The Logarithmic Form of Gross Fixed Capital					
LNK	312	25.76	1.74	21.22	29.08
3. The Logarithmic Form of Total Unemployment					
LNL	312	1.75	0.46	0.53	3.02
4. The Logarithmic Form of Total Consumption					
LNT	312	27.37	1.46	24.87	30.42
5. The Logarithmic Form of Perceived Corruption					
LNP	312	3.99	0.45	2.83	4.61

Source: Own calculation

Empirical results

Four steps are conducted in this study to examine the existence of long-run and short-run relationships among the variables in equation (2). Unit root tests examine the first step to verify the order of integration for the variables. The unit root tests are needed because the applied panel cointegration tests are valid only if the variables have the same order of integration. Otherwise, all series must be integrated into the same order before conducting the next steps. Step two examines the panel cointegration relationship using the Kao (1999) and Johansen (Maddala & Wu, 1999) tests. In the next step, the panel Dynamic Ordinary Least Squares (DOLS) approach is employed to examine the long-run structural coefficients. Vector Error Correction Model (VECM) associated with the Wald test is conducted in the last step to examine the existence of both short-run and long-run causations.

Panel unit root tests

The study employs Levin, Lin & Chu t*, Augmented Dickey-Fuller (ADF), and Phillips-Perron (PP) to describe the results of panel unit root tests, as shown in Table 4. The tests for each variable are performed in tests including neither intercept nor trend. The first and second half of the table show the results of panel unit root tests in levels and in the first differences for all the variables, respectively.

Table 4 displays the null hypothesis that each variable has a unit root that cannot be rejected at the level. This demonstrates that all the variables are non-stationary in their levels. However, after applying the first difference of each variable, all statistics of these five variables meet the requirements of the study and can reject the null hypothesis at the 0.01 level of significance. So, all the variables are stationary for the 99 percent confidence interval. This represents that all the variables are stationary in their first differences. As a result, all these variables are integrated into order one, i.e.; I(1).

Panel cointegration tests

Having the same order of integration for all variables, I(1), the panel cointegration tests are validated to check a long-run equilibrium relationship among these variables. The Kao (1999) test and Johansen (Maddala & Wu, 1999) test are employed to verify that the variables are cointegrated.

Table 5 presents the Kao cointegration test result. The Kao test shows evidence of panel cointegration among the variables at a 0.01 significance level since the null hypothesis of no cointegration is rejected.

The Johansen cointegration, as shown in Table 6, confirms panel cointegration. This is because both the trace and max-eigen tests can reject the null hypothesis of no cointegration at a 0.01 significance level. Moreover, both the trace and max-eigen tests show at least four cointegrated equations because the null hypothesis of at most 4 cointegrated equations cannot be rejected.

Therefore, the Kao and Johansen test results confirm no spurious estimation. Statistical solid evidence in favors panel cointegration among Perceived Corruption, Gross Fixed Capital, Total Consumption, Total Unemployment, and real GDP.

Table 4 Panel unit root tests results

Method	***GDP***			**Δ*GDP***		
	Statistic	**Prob.**	**Obs**	**Statistic**	**Prob.**	**Obs**
Null: Unit Root (Assumes Common Unit Root Process)						
Levin, Lin & Chu t*	14.0509	1.0000	297	-4.54889***	0.0000	283
Null: Unit Root (Assumes Individual Unit Root Process)						
ADF – Fisher Chi-square	1.84091	1.0000	297	84.5864***	0.0000	283
PP – Fisher Chi-square	0.57520	1.0000	300	81.5493***	0.0000	288
Method	***K***			**Δ*K***		
	Statistic	**Prob.**	**Obs**	**Statistic**	**Prob.**	**Obs**
Null: Unit Root (Assumes Common Unit Root Process)						
Levin, Lin & Chu t*	4.07288	1.0000	291	-9.52123***	0.0000	287
Null: Unit Root (Assumes Individual Unit Root Process)						
ADF - Fisher Chi-square	4.50956	1.0000	291	124.253***	0.0000	287
PP – Fisher Chi-square	3.34440	1.0000	300	126.008***	0.0000	288
Method	***L***			**Δ*L***		
	Statistic	**Prob.**	**Obs**	**Statistic**	**Prob.**	**Obs**
Null: Unit Root (Assumes Common Unit Root Process)						
Levin, Lin & Chu t*	-0.79752	0.2126	298	-10.5145***	0.0000	286
Null: Unit Root (Assumes Individual Unit Root Process)						
ADF - Fisher Chi-square	14.6388	0.9309	298	138.428***	0.0000	286
PP – Fisher Chi-square	14.5160	0.9341	300	149.744***	0.0000	288
Method	***T***			**Δ*T***		
	Statistic	**Prob.**	**Obs**	**Statistic**	**Prob.**	**Obs**
Null: Unit Root (Assumes Common Unit Root Process)						
Levin, Lin & Chu t*	10.1224	1.0000	296	-4.62281***	0.0000	286
Null: Unit Root (Assumes Individual Unit Root Process)						
ADF - Fisher Chi-square	0.99718	1.0000	296	57.4583***	0.0001	286
PP – Fisher Chi-square	0.36800	1.0000	300	56.1861***	0.0002	288
Method	***P***			**Δ*P***		
	Statistic	**Prob.**	**Obs**	**Statistic**	**Prob.**	**Obs**
Null: Unit Root (Assumes Common Unit Root Process)						
Levin, Lin & Chu t*	-1.18069	0.1189	290	-14.7576***	0.0000	278
Null: Unit Root (Assumes Individual Unit Root Process)						
ADF – Fisher Chi-square	14.6285	0.9312	290	222.066***	0.0000	278
PP – Fisher Chi-square	15.8550	0.8932	300	245.509***	0.0000	288

Note: *** indicates the rejection of the null hypothesis at a 0.01 significance level. △ is the first-difference operator.

Source: Own calculation.

Table 5 Kao cointegration test result

Kao Test	t-Statistic	Prob.
ADF	-3.2258***	0.0006

Note: *** indicates the rejection of the null hypothesis at 0.01 level of significance.

Source: Own calculation.

Table 6 Johansen cointegration test result

Hypothesized No. of CE(s)	Fisher Stat.* (From Trace Test)	Prob.	Fisher Stat.* (From Max-eigen Test)	Prob.
None	287.5000***	0.0000	155.6000***	0.0000
At most 1	153.9000***	0.0000	83.7500***	0.0000
At most 2	84.6900***	0.0000	47.9600***	0.0026
At most 3	53.4400***	0.0005	39.0100**	0.0273
At most 4	35.4000	0.0627	35.4000	0.0627

Note: *** and ** indicate the rejection of the null hypothesis at 0.01 and 0.05 levels of significance, respectively.

Source: Own calculation.

Panel dynamic ordinary least squares

To estimate the long-run relationship between corruption and economic growth as well as other variables, the Dynamic Ordinary Least Squares (DOLS) approach is employed. The DOLS is selected because it yields unbiased and asymptotically efficient estimates of the long-run relationship (Stojkoski et al., 2017). The DOLS estimator performs better in panel data samples with small time dimensions than other available estimators (Wagner & Hlouskova, 2009), for example, the non-parametric Fully Modified Ordinary Least Squares (FMOLS) estimator.

The panel DOLS estimation can be written as:

$$GDP_{i,t} = 0.1819K_{i,t} - 0.0621L_{i,t} + 0.6714T_{i,t} + 0.1968P_{i,t} \quad (10)$$

The panel DOLS estimates for the coefficients are reported in Table 7. As expected, Perceived Corruption (P), Gross Fixed Capital (K), and Total Consumption (T) are positive and highly significant since they can reject the null hypothesis at the 0.01 level of significance. On the other hand, Total Unemployment (L) is negative and highly significant since it can be rejected the null hypothesis at the 0.01 level of significance.

According to the panel DOLS results from Table 7, the long-run elasticity of corruption to GDP implies that an increase of 1 percent in the Perceived Corruption (or transparency level), will raise the real GDP by 0.20 percent. Likewise, if the rate of the Gross Fixed Capital increases by 1 percent, the real GDP will grow by 0.18 percent. Similarly, if the Total Consumption goes up by 1 percent, the real GDP will increase by 0.67 percent. Vice versa, a rise of 1 percent in Total Unemployment will decrease the real GDP by 0.06 percent.

Table 7 Panel DOLS estimation results

GDP Modeling				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
K	0.1819	0.0312	5.8373***	0.0000
L	-0.0621	0.0207	-2.9980***	0.0033
T	0.6714	0.0338	19.8596***	0.0000
P	0.1968	0.0394	4.9955***	0.0000
R-squared	0.9999		**Mean dependent var**	27.7207
Adjusted R-squared	0.9997		**S.D. dependent var**	1.4459
S.E. of regression	0.0248		**Sum squared resid**	0.0716
Long-run variance	0.0005			

Note: *** indicates the rejection of the null hypothesis at a 0.01 significance level.

Source: Own calculation.

Panel vector error correction model

Having established that the variables are cointegrated, the causal relationship of the long run can be checked by the Panel Vector Error Correction Model (VECM). Table 8 presents the result of the panel VECM test in the long run. For long-run causality, the lagged error correction term coefficient or ECT is -0.0046, which is statistically significant at 0.05 since it rejects the null hypothesis of no long-run causation. This implies a long-run causality from Perceived Corruption, Gross Fixed Capital, Total Consumption, and Total Unemployment to real GDP. In other words, the speed of adjustment is 0.46 percent annually which means that the whole system returns to the long-run equilibrium at the speed of 0.46 percent annually. This also confirms the cointegration relationship between Perceived Corruption, Gross Fixed Capital, Total Consumption, Total Unemployment, and real GDP.

Table 8 Panel VECM result

	Long-run
	ECT
Coefficient	-0.0046**
t-Statistic	-2.5453
Prob.	0.0110

Note: ** indicates the rejection of the null hypothesis at a 0.05 significance level.

Source: Own calculation.

Panel wald test

A panel Wald test associated with Vector Error Correction Model (VECM) is estimated to examine the causal relationship. Table 9 shows the result of the panel Wald test in the short run. The Chi-square statistic is significant at 0.01 level for short-run causality, which rejects the null hypothesis of no short-run causation. This indicates a short-run causality from Perceived Corruption, Gross Fixed Capital, Total Consumption, and Total Unemployment to real GDP.

Table 9 Wald test result

Test Statistic	Value	df	Probability
Chi-square	22.5111***	8	0.0041

Note: *** indicates the rejection of the null hypothesis at a 0.01 significance level.

Source: Own calculation.

Conclusions

The practice of corruption severely affects the social, economic, and political behavior of the nation as it affects the economic development process, unemployment issues, social and political stability, and, more importantly, the everyday lives of the general people (Barik & Lenka, 2023). Understanding the gravity of the issue, the primary purpose of this paper is to investigate the relationship between corruption and economic growth. Using a panel data approach, the study analyzes corruption and the growth rate of 12 countries from 1995 to 2020.

According to the empirical results, corruption significantly effects economic growth. This is because the results show a long-run equilibrium relationship between corruption and economic growth, as presented by the panel cointegration tests. The panel DOLS result is significant meaning that an increase of 1 percent in the Perceived Corruption or transparency level will rise the real GDP by 0.20 percent. Moreover, the results from panel VECM and panel Wald tests also show significant causal relationships in both the short and long run.

This can conclude that the empirical results of this study correspond to the conventional belief such as Mauro (1995 and 1997), Aghion et al. (2016), and Shera et al. (2014) presuming that corruption and unemployment rate are always unbeneficial for economic growth as well as investment and consumption are always beneficial for economic growth. Empirical evidence shows a significant negative relationship between corruption and the unemployment rate on economic growth. Moreover, it shows a significant positive relationship between investment and consumption on economic growth. This implies that all variables generate significant effects to enhance economic growth.

Understanding the relationship between corruption and economic growth leads to more efficient policymaking and forecasting. I suggest that policies to reduce corruption would significantly impact economic growth. Therefore, encouraging research and disseminating its findings can provide valuable direction to policymakers (Ahmad, 2012).

Discussion and recommendations

According to research results, the relevant implications should be addressed to the following issues. First, the inhibiting effects of corruption on economic growth must be aware. According to previous studies, we know that corruption is inevitable, but it can be relieved. Since corruption brings inefficiency in the aggregate economic development, thus, the anti-corruption schemes, as represented by the government, will lessen this problem. Hence, this reflects a considerable effect on the aggregate economy. Second, for future research, more variables, such as trade or government expenditure, can be added to the model to capture the whole economy. Third, future works in this area must provide a more complex corruption and economic growth methodology. It should go beyond the simple methodology of corruption to pursue the complexities and nuances. In brief, future research should have captured better results and understanding. Last, the relationship between economic growth and unemployment levels must be clear, particularly regarding the level or percentage rate for one year of GDP to achieve a change in the unemployment percentage rate according to Okun's law.

The empirical findings show that corruption is negatively impacting economic growth. Similarly, in the case of 12 countries, corruption significantly impacts economic growth in both the short and long runs. Even with the prevalence of corruption, there has been no severe interrogation of these anomalies, leading to stultification in the growth and development of the economy (Nwoke et al., 2023). Based on this result, the countries should prioritize intensifying corruption as it is more beneficial for enhancing economic growth.

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