Avalaible online at http://journals.ums.ac.id, Permalink/DOI: 10.23917/jep.v24i1.21426

Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan, 24 (1), 2023, 141-160

Do Corruption and Institutions Contribute to the Economic Growth in ASEAN Countries During 2000-2018?

Dwi Prasetyani[1], Malik Cahyadin[1], Yong Sze Wei[2], Amelia Choya Tia Rosalia[3]
[1]Faculty of Economics and Business, Universitas Sebelas Maret
[2]Fakulti Ekonomi dan Pengurusan, Universiti Teknologi MARA
[3]Faculty of Economics and Business, Universitas Negeri Semarang
Corresponding Author: dwiprasetyani_fe@staff.uns.ac.id

Received: June 2022 | Revised: September 2022 | Accepted: June 2023

Abstract

This study attempts to estimate the impact of corruption and institutions on economic growth in ASEAN countries during 2000-2018. The corruption perception index and six indicators of institutions are utilized. The basic empirical model is derived from the theory of the Solow Growth Model. Two econometrics techniques were employed: statics panel data and panel-vector autoregression. The findings exhibit that the corruption perception index does not contribute to economic growth. Conversely, some institutional indicators (voice and accountability and control of corruption) significantly impact economic growth under random effects model estimation. Moreover, the quality of regulation and the fight against corruption have a significant impact on economic growth in terms of panel-vector autoregression. Therefore, governments should strengthen anti-corruption institutions and raise the standard of institutions on both a national and an ASEAN level.

Keywords: corruption, institutions, economic growth, Solow Growth Model
JEL classification: E02, E13, O33, O43.

How to Cite: Prasetyani D., Cahyadin M., Wei Y. S., Rosalia A. C. T. (2023). Do Corruption and Institutions Contribute to the Economic Growth in ASEAN Countries During 2000-2018?, 24(1), 141-160. doi:https://doi.org/10.23917/jep.v24i1.21426

DOI: https://doi.org/10.23917/jep.v24i1.21426

1. Introduction

During the last few decades, discussions and empirical studies have been carried out on the relationship between corruption and economic growth. In many countries, policymakers have attempted to control corrupt practices in public institutions, such as establishing anti-corruption institutions. Furthermore, the quality of public institutions and distortions of economic policies can lead to corrupt practices. It means that the contribution of institutional quality is significant in the economy, including corrupt behaviour. The negative impact of corruption on the economy and social life can occur in the short- and long-run. Empirically, Ahmad et al. (2012) estimated corruption and institutions' impact on economic growth in 71 developed and developing countries during 1984-2009. The results showed that corruption and institutions significantly affect economic growth, while the relationship between corruption and economic growth were inverted U-shaped.

This study employs the empirical study by Ahmad et al. (2012). However, some explanatory variables are defined differently, such as the ICT development index and six institutional indicators. The empirical model utilizes the Statics Panel and Panel-Vector Autoregression (Panel-VAR). Therefore, the institutional indicators and Panel-VAR significantly contributed to this study. Besides, the ASEAN member countries are set by considering the phenomenon of high corruption

level and inadequate institutional quality. Other empirical research conducted by Huang (2016) shows that during 1997-2013 corruption did not significantly affect economic growth in eleven out of thirteen Asia-Pacific countries. In contrast, the findings for two countries in Asia-Pacific, namely South Korea and China, show that corruption has a significant and positive effect on economic growth. The findings mean that corruption can encourage economic growth in various countries. On the other hand, Gründler & Potrafke (2019) found that corruption significantly and negatively effect on economic growth for 175 countries during 2012-2018. They also described that the negative impact of corruption occurs due to the low quality of governance and political institutions.

This study aims to estimate the effect of corruption and institutions on economic growth in ASEAN countries during 2000-2018. Technically, there are two specific objectives: (a) estimating the effect of the corruption perception index on economic growth and (b) estimating the effect of institutional indicators on economic growth. Furthermore, there are ten countries as members of ASEAN become a research sample. The countries face various cases of corruption and relatively poor institutional quality. Besides, the estimation model is formulated following the empirical studies conducted by Huang (2016) and Ahmad et al. (2012). The Solow Growth Model will be used to explain the construction of the empirical model.

Corruption has two pieces of evidence: a significant and insignificant impact on economic growth. An empirical study of 53 countries in 2003-2012 explains that corruption has no significant effect on economic growth, but the religiosity index has a significant and negative impact (Chase & Chase, 2014). (Ben Ali & Sassi, 2016) exhibit that an increase in income will encourage an increase in corrupt practices. At the same time, efficient political freedom will reduce corruption in Middle Eastern and North African countries during 1984-2013. In contrast, during 1996-2018, 54 countries exhibited that economic growth and corruption had a positive and bidirectional relationship in developing countries and a negative and unidirectional relationship in developed countries (Qureshi et al., 2021). It also shows that corruption and foreign direct investment have a bidirectional relationship in developed and developing countries.

Theoretically, there is no universal definition of corruption, so there is no uniqueness in the definition and measurement of corruption. Classical Political Theory translates corruption as a process of weakening the system at the macro level by twisting certain main points in the institutional system (Vannucci, 2015). Meanwhile, at the micro level, Vannucci (2015) describes corruption as a social practice that appears in a special relationship. Empirically, a principal-agent model can explain the relationship between corruption and economic indicators such as investment (Zheng & Xiao, 2020). They identify three main policies for preventing corruption: strengthening monitoring, increasing compensation, and enhancing accountability.

The issue of corruption is also one of the main concerns for governments in the ASEAN region. ASEAN has 10 member countries, eight of which have similar domestic economic characteristics such as macroeconomic indicators. These countries have also prevented and reduced corrupt practices in government institutions, such as establishing an anti-corruption institution.

The economic growth in several ASEAN countries during 2000-2018 was fluctuating. The World Bank shows that several ASEAN countries have an average economic growth above 6%, such as Myanmar (9.07%) and Cambodia (6.02%). In contrast, the other countries have an average economic growth below 4%, such as Indonesia (3.90%), Malaysia (3.28%), Philippines (3.60%), Singapore (3.42%) and Thailand (3.47%). Additionally, there is a link between corruption and economic growth. The results of the correlation indicate that: (a) the correlation between economic growth and the perception corruption index during 2000-2011 is about -0.33, while (b) the correlation between economic growth and the perception corruption index during 2012-2018 is about -0.50. These results express that there is an improvement in controlling the level of corruption in ASEAN countries. The relationship between corruption and economic growth is also unfavourable. Simply put, corruption can be detrimental and a threat to economic growth.

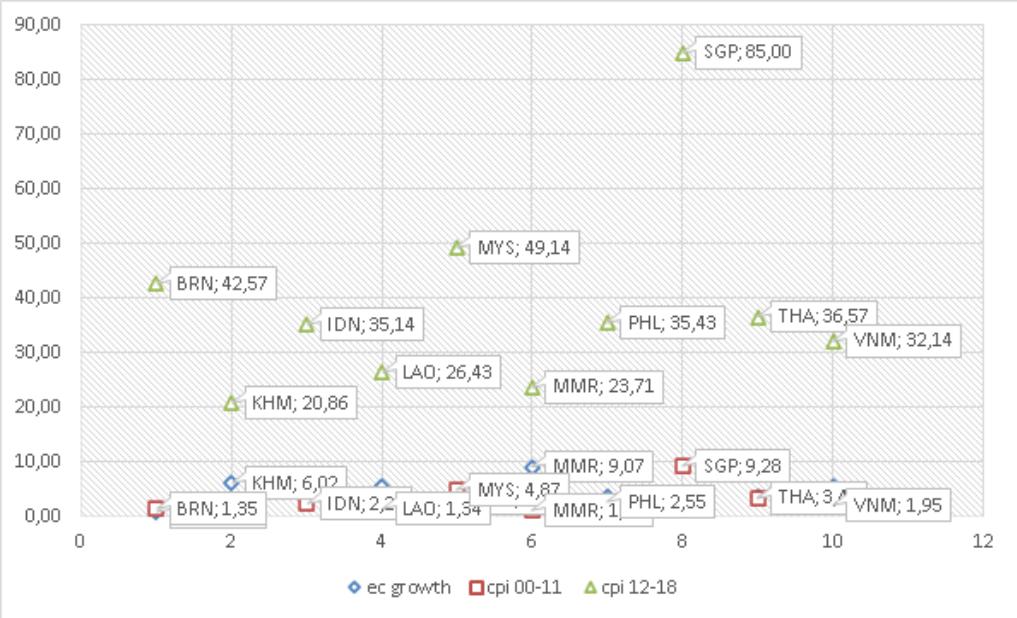

Figure 1. Economic Growth (%) and Corruption Perception (Index) in ASEAN Countries, 2000-2018 (An Average Value)

Source: The World Bank and Transparency International (processed)

Note: BRN = Brunei Darussalam; KHM = Cambodia; IDN = Indonesia; LAO = Lao PDR; MYS = Malaysia; MMR = Myanmar; PHL = Philippines; SGP = Singapore; THA = Thailand; and VNM = Vietnam.

Transparency International (TI) has published a Corruption Perception Index (CPI) with two score categories, namely: a score before 2012 ranged between 0-10 whereas a score after 2012 ranged between 0-100. A Score of 0 indicates that the corrupt practices level in a country is high, while a score of 10 or 100 describes that the corrupt practices level is low. During 2000-2011 Singapore has a low level of corrupt practices, with a score of around 9.28. Furthermore, during 2012- 2018 there are three countries with relatively low level of corrupt practices, namely: Brunei Darussalam is about 42.57, Malaysia is 49.14 and Singapore is 85.00.

This study contributes to the existing literature includes selecting six institutional indicators published by the World Bank in the form of World Governance Indicators (WGI). The six indicators are Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Quality Regulation, Rule of Law, and Control of Corruption. This study is also contributing to empirical estimation, namely: Statics Panel and Panel-VAR. Besides, on the policy implication side, the governments of ASEAN member countries are expected to be able to control the level of corruption and improve the quality of institutions both at the country level and the ASEAN level.

Controlling the level of corruption and improving the quality of institutions are expected to drive economic growth in the long run. Some empirical findings confirm that corruption has a negative impact on economic growth while the quality of institutions has a positive effect for 106 countries from 1996-2010 (d'Agostino et al., 2016). They select institutional indicators including political stability and quality regulation. Nwazonobi & Apah (2018) exhibit that religion is an important factor in controlling corruption to boost the economy. They suggest that religious leaders should put more emphasis on developing moral character and moral integrity. As a result, the government does not need to exert much effort at great expense to combat corruption and economic growth can be increased more readily (Brianzoni et al., 2018). In the present work, we propose an economic model regarding

the relationship between corruption in public procurement and economic growth. We extend the benchmark model by introducing endogenous labour force growth, described by the logistic equation. The results of previous studies, such as [2] and [3], show that countries are stuck in one of the two equilibria (high corruption and low economic growth or low corruption and high economic growth.

Alfada (2019) describes that there is an adverse effect of corruption on economic growth at the level of a country in ASEAN, namely Indonesia. The study estimates the threshold effect of corruption on economic growth at the provincial level in Indonesia during 2004-2015. The findings exhibit that all provinces in Indonesia face problems with corrupt practices. Several provinces with corruption levels above the threshold have experienced problems in efforts to improve the local economy.

Corruption can also determine a significant and negative impact on economic growth by considering information and communication technology (ICT) (Erum & Hussain, 2019). They found that during 1984-2016 for 43 countries of the Organization of Islamic Corporation (OIC) have faced a negative impact of corruption on economic growth in both low and high ICT diffusion. Besides, the countries still obtain the low quality institutions, low-quality the rule of law, finite political stability, restricted transparency and accountability, and narrow ICT investment. The corruption and financial development also have long-run relationships for 142 countries during 2002-2016 (Song et al., 2021). The finding illustrates that corruption does not only direct impact on economic growth but also on the financial sector, which has relatively suffice technology and information capabilities.

This study is organized into several parts. The first part describes an introduction that discusses the study issues, empirical gaps, objectives and study contributions. The second part explains the data and method, namely: Statics Panel and Panel-VAR. The third part expresses the results and discussion, which will show the results of econometric estimations and explore the discussion. However, the fourth part discusses the conclusion and policy implications. The last part is references.

2. Research Method

2.1 Data

Economic growth is the change in the value of annual GDP in percentage units. It becomes the dependent variable (Huang, 2016; and Gründler & Potrafke, 2019). Table 1 describes all the variables used in this study.

Several explanatory variables were determined under the Solow Growth Model Theory, namely: labour and capital. Capital is proxied by domestic investment and foreign investment. This study separates the two types of investment to identify the specific impact of investment as sources of economic growth. Furthermore, the contribution of technology to economic growth is explained by the ICT Development Index.

Corruption and institutions will be assessed by the Corruption Perception Index (CPI) and six governance indicators. The six governance indicators cover Voice and Accountability, Political Stability and Absence of Violence / Terrorism, Government Effectiveness, Quality Regulation, Rule of Law, and Control of Corruption.

Table 1. Description of Research Variables

Variable	Definition	Source
Countries	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.	10 countries
GDP growth (gdpg)	GDP growth annually in %.	The World Bank
Total Labor Force (tlf)	Number of labor force in person.	The World Bank
Total Domestic Investment (tdi)	Gross fixed capital formation in current US$.	The World Bank

Variable	Definition	Source
Total Foreign Direct Investment (tfi)	Foreign direct investment, net inflows (BoP) in current US$.	The World Bank
Information and Communication Technology Development Index (idi)	The IDI is a composite index that reflect changes and compares in different levels of ICT development across countries. The higher score indicates the higher level of ICT development in a country.	International Telecommunication Union
Corruption Perception Index (cpi)	Corruption perception index (CPI) is a composite index that assess the level of corruption in a country. Before 2012 the index has a score from 0 - 10 (0 equals high level of corruption while 10 equals low level of corruption). Since 2012 the index has a score from 0-100 (0 equals high level of corruption while 100 equals low level of corruption).	Transparency International
Voice and Accountability (va)	Reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)	The World Bank
Political Stability and Absence of Violence/ Terrorism (pst)	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	The World Bank
Government Effectiveness (ge)	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	The World Bank
Regulation Quality (rq)	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	The World Bank
Rule of Law (rl)	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	The World Bank

Variable	Definition	Source
Control of Corruption (cc)	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance).	The World Bank

2.2 Empirical Model

The Solow Growth Model builds a theory of economic growth based on four variables, namely: output (Y), capital (K), labour (L) and knowledge or effectiveness of labour (A) (Romer, 2012). Mathematically, the basic equation for the Solow Growth Model is as follows:

$$Y(t) = F(K(t), A(t), L(t)) \quad (1)$$

The assumption of concern in the growth theory above is the properties of production function. In simple terms, a production function can reflect the Cobb-Douglas approach as follows:

$$F(K,AL) = K^{\alpha}(AL)^{\beta}\ ,\ \alpha+\beta=1 \quad (2)$$

This study selects a Corruption Perception Index (CPI) (Huang, 2016; and Gründler & Potrafke, 2019). Besides, the institutional variable is an extension of the empirical study of Ahmad et al. (2012), Huang (2016) and Gründler & Potrafke (2019). It means that this study utilizes all institutional indicators in the World Governance Indicators (WGI) publication.

Equation (2) will be transformed into a data panel estimation model. The basic concept of data panel has been described by Gujarati (2003). There are three types of data panels, namely: pooled OLS, fixed effects, and random effects. The benefits of panel data cover providing more informative data, more variability, reducing the collinearity between variables, and more efficiency. The panel estimation model to be tested is arranged in two categories. First, an estimation model that reflects the effect of the corruption perception index on economic growth in ASEAN countries. Second, an empirical model to estimate the effect of institutional indicators on economic growth.

Ahmad et al. (2012), Huang (2016) and Gründler & Potrafke (2019) employ the Solow Growth Model to estimate the effect of corruption and institutions on economic growth. This study develops the previous empirical model in the form of six institutional indicators. It means that the main contribution is described by the different types of institutions. Technically, this study selects Statics Panel and P-VAR for ASEAN member countries during 2000-2018. These econometric techniques provide a better analysis and understanding of the impact of corruption and institutions on economic growth. It means that the estimation results deliver a beneficial impact for policymakers in ASEAN countries to control corrupt practices and improve the quality of institutions.

The panel data model of the effect of the corruption perception index (CPI) on GDP growth (GDPG) in ASEAN is as follows:

$$GDPG_{it} = \alpha_0 + \beta_1 LTLF_{it} + \beta_2 LTDI_{it} + \beta_3 LTFI_{it} + \beta_4 LIDI_{it} + \beta_5 CPI_{it} + u_{it} \quad (3a)$$

The α_0 is the intercept. The β_1, β_2, β_3, β_4, and β_5 are the parameters/slope of the equation. The values of $\beta_1 - \beta_5$ are >0. Moreover, the "i" is the cross-section of ASEAN 10 countries, while the "t" is the period from 2000-2018.

Equation (3a) expresses the Pooled OLS estimation model. GDPG represents economic growth, while LTLF, LTDI, LTFI and LIDI are logarithm variables of the explanatory variables in the Solow Growth Model (see Equation 2). TLF is the total labour force, while TDI, TFI and IDI are a domestic investment, foreign investment

and ICT development indicators (IDI) as proxies of knowledge, respectively. Equation (3a) will be formulated into the fixed effects model (FEM) and random effects model (REM) estimation model. The FEM estimation model can be explained by Equation (3b), while the REM estimation model is shown by Equation (3c).

$$GDPG_{it} = \alpha_{0+} \alpha_1 D_{ni} + \beta_1 LTLF_{it} + \beta_2 LTDI_{it} + \beta_3 LTFI_{it} + \beta_4 LIDI_{it} + \beta_5 CPI_{it} + u_{it} \quad (3b)$$

$$GDPG_{it} = \alpha_0 + \beta_1 LTLF_{it} + \beta_2 LTDI_{it} + \beta_3 LTFI_{it} + \beta_4 LIDI_{it} + \beta_5 CPI_{it} + w_{it} \quad (3c)$$

Equation (3b) is well-known as the Least-Squares Dummy Variable (LSDV) model represented by the D (dummy) variable. Meanwhile, REM assumes that the term of error (w) is the sum of the random error (ε) and the term of error contained in the Pooled OLS and FEM (u) estimates. Thus, the term of error REM is where $w = \varepsilon + u$.

Equations (3a) - (3c) will be employed to explain the first objectives. However, the second objective will be expressed by Equation (4a) - (4c). The separation of explanatory variables considers two things: (a) the effect of the corruption perception index on economic growth and (b) the impact of institutional indicators on economic growth. It means that this study is going deeper into the analysis and contribution of corruption control policies and strengthening institutional quality in the ASEAN countries. The empirical equation of Statics Panel Data for the second objective is as follows:

$$GDPG_{it} = \alpha_0 + \beta_1 LTLF_{it} + \beta_2 LTDI_{it} + \beta_3 LTFI_{it} + \beta_4 LIDI_{it} + \beta_5 VA_{it} + \beta_6 PST_{it} + \beta_7 GE_{it} + \beta_8 RQ_{it} + \beta_9 RL_{it} + \beta_{10} CC_{it} + u_{it} \quad (4a)$$

The α_0 is the intercept. The $\beta_1 - \beta_{10}$ are the parameters/slope of the equation. The values of $\beta_1 - \beta_{10}$ are >0. Moreover, the "i" is the cross-section of ASEAN 10 countries, while the "t" is the period from 2000-2018. The period is set following the publication of the World Government Indicator (WGI). It means that the data of institutional indicators are available and open access until 2018.

Equation (4a) expresses the Pooled OLS estimation model. There are six institutional indicators that are thought to affect the economic growth of ASEAN member countries. The six indicators are Voice and Accountability (VA), Political Stability and Absence of violence (PST), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), and control of corruption (CC). These indicators are published by the World Bank in World Governance Indicator (WGI). Furthermore, Equation (4a) will be formulated into the fixed effects model (FEM) and random effects model (REM) estimation model. The FEM estimation model can be explained by Equation (4b), while the REM estimation model is shown by Equation (4c).

$$GDPG_{it} = \alpha_{0+} \alpha_1 D_{ni} + \beta_1 LTLF_{it} + \beta_2 LTDI_{it} + \beta_3 LTFI_{it} + \beta_4 LIDI_{it} + \beta_5 VA_{it} + \beta_6 PST_{it} + \beta_7 GE_{it} + \beta_8 RQ_{it} + \beta_9 RL_{it} + \beta_{10} CC_{it} + u_{it} \quad (4b)$$

$$GDPG_{it} = \alpha_0 + \beta_1 LTLF_{it} + \beta_2 LTDI_{it} + \beta_3 LTFI_{it} + \beta_4 LIDI_{it} + \beta_5 VA_{it} + \beta_6 PST_{it} + \beta_7 GE_{it} + \beta_8 RQ_{it} + \beta_9 RL_{it} + \beta_{10} CC_{it} + w_{it} \quad (4c)$$

Gujarati (2003) also provides an explanation of the Vector Auto Regression (VAR) estimation. This study employs VAR to estimate the impact of corruption perception index and institutional indicators on economic growth in ASEAN during 2000-2018. The VAR model does not emphasize the Solow Growth Model. However, the VAR model concerns on causality between study variables. The general model of VAR expresses the composition of explanatory variables, which includes the lagged dependent variable and one or more vector variables. In addition, VAR is a-theoretic estimation model. Therefore, this study sets the VAR model by adding a cross-sectional dimension. It means that the model can be known as Panel-VAR.

Panel-VAR estimation modelling of this study consists of 10 cross-sections and 19-time series. It provides a large data covering time series and cross-sectional dimensions. Besides,

the Panel-VAR benefits for explaining the dynamic behaviour of economic variables and is less demanding in a large time. Therefore, the Panel-VAR can be written in accordance with the basic concept of VAR as described by Gujarati (2003) as follows:

$$GDPG_{it} = \alpha_1 + \sum_{j=1}^{k} \beta_j \, GDPG_{t-j} + \sum_{j=1}^{k} \gamma_j CPI_{t-j} + \sum_{j=1}^{k} \theta_j INS_{t-j} + u_{1it} \quad 5a$$

$$CPI_{it} = \alpha_2 + \sum_{j=1}^{k} \beta_j \, GDPG_{t-j} + \sum_{j=1}^{k} \gamma_j CPI_{t-j} + \sum_{j=1}^{k} \theta_j INS_{t-j} + u_{2it} \quad 5b$$

$$INS_{it} = \alpha_3 + \sum_{j=1}^{k} \beta_j \, GDPG_{t-j} + \sum_{j=1}^{k} \gamma_j CPI_{t-j} + \sum_{j=1}^{k} \theta_j INS_{t-j} + u_{3it} \quad 5c$$

INS is institutional indicators such as VA, PST, GE, RQ, RL and CC. The k is the maximum lag length that can be measured from the AIC and SIC calculations. Meanwhile, the u is the stochastic error terms or impulses or innovations or shocks.

3. Results and Discussion

3.1 Results

3.1.1 Descriptive Statistics

Descriptive statistics explains the distribution of data. There are several components of descriptive statistics, including the mean, median, maximum, minimum and normality test. Normality test can be assessed by the Jarque-Bera under the assumption that the probability value is not significant. It means that the data is normally distributed. A detailed explanation of the descriptive statistics of all study variables is shown in Table 2.

During 2000-2018 the mean of GDP growth for ASEAN countries was about 4.45%. Meanwhile, the median, maximum and minimum are 4.61%, 12.79% and -3.70%, respectively. The condition indicates that the level of economic growth in the ASEAN countries tends to vary and fluctuate, and the distribution of economic growth data is not normal.

The corruption variable shown by the CP) can be categorized into two measurement periods: 2000-2011 and 2012-2018. The descriptive statistics of CPI during 2000-2011 for the mean, median, maximum and minimum were 2.94, 2.12, 9.28 and 1.17, respectively. However, during 2012-2018 the mean, median, maximum, and minimum of CPI were 38.70, 35.29, 85.00 and 20.86, respectively. The condition delivers a signal that most ASEAN countries face a low level of control over corruption.

The institutional indicators consist of six indicators that reflect the quality of governance with a value between -2.5 (weak) to 2.5 (strong). It denotes that a country's governance is of high quality if the institutional indicator has a higher value that is close to or equal to 2.5. Numerous empirical studies have outlined why institutions in ASEAN nations typically have poor quality.

Table 2. Summary of Descriptive Statistics

	GDPG	TLF	TDI	TFI	IDI	CPI	VA	PST	GE	RQ	RL	CC
Mean	4.445	28839242	4.51E+10	8.44E+09	1.994	16.115	-0.714	-0.171	0.091	-0.054	-0.215	-0.265
Median	4.609	18948133	2.44E+10	2.50E+09	1.555	4.050	-0.563	-0.014	0.000	-0.106	-0.357	-0.491
Maximum	12.788	1.33E+08	3.36E+11	9.78E+10	8.080	87.000	0.468	1.615	2.437	2.261	1.845	2.326
Minimum	-3.702	157089.0	0.000	0.000	0.000	0.000	-2.233	-2.095	-1.618	-2.344	-1.739	-1.673
Std. Dev.	3.032	32940893	6.53E+10	1.57E+10	2.316	21.084	0.694	0.919	0.985	1.004	0.869	0.981
Skewness	0.075	1.606	2.732	3.441	0.866	1.617	-0.431	0.068	0.553	0.156	0.631	1.248
Kurtosis	4.336	4.966	11.025	15.845	2.692	5.196	2.035	2.065	2.784	3.136	2.883	4.112
Jarque-Bera	14.308	112.239	746.263	1681.151	24.471	120.977	13.245	7.062	10.039	0.914	12.729	59.109
Probability	0.001	0.000	0.000	0.000	0.000	0.000	0.001	0.029	0.007	0.633	0.002	0.000
Sum	844.634	5.48E+09	8.58E+12	1.60E+12	378.770	3061.900	-135.604	-32.517	17.196	-10.199	-40.832	-50.272
Sum Sq. Dev.	1737.786	2.05E+17	8.05E+23	4.63E+22	1013.580	84018.15	91.067	159.583	183.322	190.479	142.792	181.814
Observations	190	190	190	190	190	190	190	190	190	190	190	190

Source: Secondary Data (processed)

The descriptive statistics on institutional indicators reveal that the five institutional indicators have a mean and median negative (VA, PST, RQ, RL and CC) while the GE is positive but at a level of around 0. The condition illustrates that, in general, the quality of institutions in the ASEAN needs to be improved. This institutional quality improvement is expected to be able to encourage the improvement of domestic and regional economic conditions, both in the short and long run. Furthermore, institutional indicators that have a maximum value close to 2.5 covers Government Effectiveness (GE) and Control of Corruption (CC), reaching 2.44 and 2.33, respectively. It could be a positive signal that the governments of ASEAN countries have been able to promote the effectiveness of policies and state institutions for the better. In addition, they try to eliminate and minimize corrupt behaviour.

3.1.2 The Main Result

- **Unit Root Test**

Gujarati (2003) has explained that the stationarity test has been widely used in time series data analysis which is better known as unit root test. The stationarity test commonly employed is the Dickey-Fuller (DF) method. The DF test emphasizes that the error term, ut, is uncorrelated. However, if it is correlated, the stationarity test can utilize the Augmented Dickey-Fuller (ADF) method. Moreover, the DF test assumes that it is independent and normally distributed, while the ADF assumes that there is a possibility of serial correlation. An alternative method is Phillips and Perron (PP). The PP test with a nonparametric statistics approach will solve serial correlation problems.

The panel data stationarity test will emphasize the stationarity test for individual variables both at the level and at the 1st difference. There are three stationarity tests, namely: Im, Pesaran & Shin (IPS), Augmented Dickey-Fuller (ADF)-Fisher, and Phillips-Perron (PP)-Fisher. The results of the stationarity test for all variables are expressed in Table 3.

At the level, both intercept and intercept & trend indicate that GDP growth has been stationary. Another variable that is also stationary at the level is the ICT Development Index (IDI). Meanwhile, total foreign investment (TFI) is only stationary at a level with an intercept & trend under the PP-Fisher method. The stationary results also confirm that all institutional indicators (VA, PST, GE, RQ, RL and CC) are stationary at the level of both the intercept and intercept & trend. In contrast, the corruption perception index (CPI) is not stationary at level.

Furthermore, better results can be found in the 1st difference stationarity test. The results show that all variables are stationary. It means that the variables other than GDP growth already have stationarity at I(1) or are cointegrated. However, this condition still requires further testing under cointegration tests such as Johansen test.

The findings in the stationarity test can serve as a basis for consideration that the panel data estimation and VAR can be estimated. The benefit of stationarity is a robust estimation of both static panel data and Panel-VAR. Therefore, it is possible to generalize the estimation results to explain the study objectives, and the estimation results can provide unbiased estimation parameters.

Table 3. Summary of Panel Unit Root Test

Individual Root	Level						1st Different		
	Intercept			Intercept & Trend			Intercept		
	IPS	ADFF	PPF	IPS	ADFF	PPF	IPS	ADFF	PPF
GDPG	-3.331 (0.000)	46.070 (0.000)	68.494 (0.000)	-2.536 (0.006)	40.603 (0.004)	59.918 (0.000)	-	-	-
TLF	1.144 (0.874)	14.057 (0.828)	17.569 (0.616)	-0.507 (0.306)	32.393 (0.039)	12.667 (0.891)	-1.995 (0.023)	36.010 (0.015)	45.085 (0.001)
TDI	4.387 (1.000)	8.129 (0.991)	4.372 (0.999)	0.513 (0.696)	18.022 (0.586)	13.796 (0.841)	-2.058 (0.020)	33.938 (0.027)	139.945 (0.000)

Individual Root	Level						1st Different		
	Intercept			Intercept & Trend			Intercept		
	IPS	ADFF	PPF	IPS	ADFF	PPF	IPS	ADFF	PPF
TFI	3.386	11.431	20.149	-0.438	26.459	43.157	-6.224	77.317	409.457
	(0.999)	(0.934)	(0.449)	(0.331)	(0.151)	(0.002)	(0.000)	(0.000)	(0.000)
IDI	-2.624	34.921	59.916	-4.111	50.195	76.614	-7.590	91.160	278.658
	(0.004)	(0.021)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CPI	2.593	5.339	4.3176	-0.279	19.581	14.238	-5.214	63.823	101.223
	(0.995)	(0.999)	(0.999)	(0.390)	(0.484)	(0.818)	(0.000)	(0.000)	(0.000)
VA	-14.072	564.721	46.728	-16.789	98.742	44.905	-19.608	604.473	220.415
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
PST	-4.573	64.844	78.745	-6.521	80.374	80.487	-9.295	112.258	706.189
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GE	-6.877	109.412	50.854	-9.949	112.611	63.087	-9.898	118.691	501.442
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RQ	-5.310	67.567	76.623	-12.846	111.723	73.675	-13.347	180.005	408.351
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
RL	-10.014	167.126	60.493	-18.674	134.469	47.846	-13.626	174.367	234.634
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CC	-11.013	331.551	53.726	-15.759	112.153	49.073	-12.182	353.108	265.723
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Source: Authors' estimation

Note: IPS is Im, Pesaran & Shin W-stat; ADFF is ADF - Fisher Chi-square; PPF is PP - Fisher Chi-square; the value of unit root tests reflect t-statistics and () denotes probability values.

- **Statics Panel Estimation**

This study estimates Equations (3a) - (3c) and (4a) - (4c). These equations are estimated using Pooled OLS, Fixed Effects Model (FEM) and Random Effects Model (REM). The three methods are standard techniques in static panel data analysis. Table 4 describes the estimation results of the static panel about the effect of corruption perception index and institutional indicators on economic growth in ASEAN during 2000-2018.

The findings of the Model 1 (Equation 3a until 3c) show that the Breusch-Pagan (BP) Lagrange Multiplier (LM) test is about 14.00 and significant at α of 1%. Further, the Hausman test is about 12.07 and significant at α of 5%. Thus, both FEM and REM can be used to explain the study objectives. The findings on the FEM estimation are divided into two dummy effects, namely cross-section and period (time series). The results of the FEM-cross section indicate that economic growth is determined by both domestic and foreign investment (LTDI and LTFI). LTDI has a negative impact on GDP growth. Besides, the results of the FEM period exhibit that economic growth is impacted by both LTDI and LTFI, whereas the ICT development index (LIDI) has a negative effect on GDP growth. The REM estimation describes that economic growth is driven by labour force (LTLF), LTDI, LTFI, and LIDI. Hence, statistically, the empirical findings of the Solow Growth Model have been expressed in ASEAN countries during the study period. Similarly, the finding is explained by Pooled OLS estimation. An increase in domestic investment will lead to a decline in economic growth. The governments in ASEAN countries should concern on the source of domestic investment. The negative impact of domestic investment on economic growth drives a risk signal that the domestic economy did not stimulate by local investors. In contrast, the findings of Model 1 are not able to provide significant results on the relationship between CPI and economic growth (GDPG) in ASEAN countries during the study period.

Model 2 (Equation 4a until 4c) provides the results of the effect of institutional indicators on economic growth. The BP LM test and Hausman test indicate values were about 24.60 and 32.58,

respectively. Both values/tests are significant at α of 1%. It means that FEM or REM can express the second objective. The FEM-cross section finds that labour force (LTLF), LTDI, and LTFI have a significant effect on GDP growth. Economic growth will slow down as domestic investment, and the number of workers both rise, whereas institutional indicators have little bearing on economic expansion. In contrast, the FEM period informs that LTLF), LTDI, LTFI, LIDI, and institutional indicators (control of corruption, CC) have a significant effect on GDP growth. LTDI and LIDI have a negative effect, while LTLF, LTFI and CC have a positive effect on GDP growth. Then, REM provides the finding that GDP growth is determined by the labour force, domestic and foreign investment, and some institutional indicators. Voice and Accountability (VA) and Corruption Control (CC) are two institutional indicators that can accelerate ASEAN's economic growth. Indeed, REM affirms that during the study period, institutional indicators significantly influenced ASEAN's economic growth.

In general, the adjusted R-square provides a value range between 39%-67% in the estimation results of Models 1 and 2. It explains there are other variables that are considered explanatory variables to determine ASEAN's economic growth. Furthermore, the F-statistics for all estimation models informs that simultaneously all independent variables have a significant effect on GDP growth during the study period.

Dzhumashev (2014) noted some critical issues regarding corruption-economic growth nexus. The issues cover there is no clear relationship between corruption level and economic growth by incorporating an institutional quality, the government size does not reflect the ability of government policy to restrain corruption level and stimulate economic growth, and the corruption level is connected to the level of economic development. Malanski & Póvoa (2021) added that the different levels of economic freedom provide a significant impact on corruption-growth nexus.

Table 4. Summary of Statics Panel Result

Variables	Pooled OLS		FEM-Cross Section		FEM-Period		REM	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
C	-1.877 (-0.764)	-3.670 (-1.272)	-17.278 (-0.332)	102.234 (3.706)***	-2.026 (-0.915)	-3.148 (-1.115)	-2.948 (-1.095)	-2.967 (-1.238)
LTLF	0.313 (2.002)**	-0.029 (-0.115)	0.881 (0.265)	-6.640 (-3.520)***	0.093 (0.624)	0.436 (2.032)**	0.313 (1.879)*	0.588 (2.938)**
LTDI	-0.449 (-6.649)***	-0.439 (-6.839)***	-0.418 (-6.172)***	-0.428 (-5.133)***	-0.369 (-6.075)***	-0.448 (-5.598)***	-0.445 (-6.875)***	-0.514 (-6.535)***
LTFI	0.699 (3.854)***	0.962 (4.353)***	0.871 (3.537)***	0.862 (4.064)***	0.841 (4.844)***	0.500 (2.621)**	0.733 (3.895)***	0.431 (2.798)**
LIDI	-3.211 (-4.998)***	-1.830 (-2.551)**	-1.618 (-1.428)	0.151 (0.109)	-3.770 (-6.537)***	-4.015 (-3.094)***	-2.989 (-4.440)***	-0.274 (-0.415)
CPI	0.011 (1.155)		-0.004 (-0.388)		-0.017 (-1.261)		0.009 (0.958)	
VA		-0.161 (-0.323)		-0.788 (-1.101)		-0.495 (-1.045)		-0.818 (-1.865)*
PST		-0.245 (-0.676)		-0.001 (-0.002)		0.297 (0.863)		0.222 (0.650)
GE		-0.973 (-1.034)		0.667 (0.578)		-1.077 (-1.301)		-0.847 (-1.058)

Variables	Pooled OLS		FEM-Cross Section		FEM-Period		REM	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
RQ		-0.793 (-0.972)		0.841 (0.847)		-0.790 (-1.108)		-0.007 (-0.010)
RL		1.507 (1.214)		0.232 (0.171)		-0.992 (-0.935)		-1.446 (-1.378)
CC		-0.571 (-0.878)		-0.335 (-0.286)		1.526 (2.535)**		1.355 (2.238)**
Adj. R-Square	0.5537	0.5965	0.6044	0.4695	0.6733	0.5150	0.4900	0.3951
F-statistics	24.82***	15.19***	11.48***	9.71***	15.13***	7.96***	19.45***	13.85***
Observation	178	178	178	178	178	178	178	178

Source: Authors' estimation

Note: () denotes t-statistics; ***, ** and * denotes significant levels at the 1%, 5% and 10%, respectively.

Some empirical studies found that corruption has a significant and positive effect on economic growth. For example, Ahmad, Ullah & Arfeen (2012) analyzed the impact of corruption and institution on economic growth during 1984-2009 in 71 developed and developing countries. The findings demonstrate that while corruption and institutions have a significant negative impact on economic growth, capital has a significant and positive impact. The correlation between corruption and economic growth is inverted U-shaped. Furthermore, Huang (2015) estimated the effect of corruption on economic growth during 1997-2013 in thirteen Asia-Pacific countries. The results explain that corruption has a significant and positive impact on economic growth in South Korea, while in China, economic growth has a significant and positive impact on corruption. However, in the eleven countries of the Asia-Pacific region, there is no significant correlation between corruption and economic growth. Directly, corruption has a significant and positive impact on economic growth (Cieslik & Goczek, 2018). But on the other hand, economic growth generated through investment is also significantly and adversely impacted by corruption. It demonstrates how investment, particularly foreign investment, can be used to control corruption. Economic growth is significantly and favourably impacted by political indicators as well.

Gründler & Potrafke (2019) show that corruption has a significant and negative effect on per capita GDP. The results inform that increasing corrupt practices will undermine the domestic economy. Similarly, the finding made by Saha & Ali (2017) that a non-linear estimation model can express the significant impress of per capita GDP and institutions on corruption. The non-linear estimation results show a negative effect on corruption. Furthermore, the estimated effect of corruption can also be analyzed from the threshold effect. Alfada (2019) found that provinces in Indonesia have a level of corruption below the threshold effect of 1,765 points will be able to promote progressive economic growth, while the level of corruption above the threshold effect will hamper the local economy.

- **Panel-VAR Estimation**

Vector Auto Regression (VAR) is a-theoretic estimation method. It is employed to explain the causality between corruption and institutional indicators on GDP growth in ASEAN countries during 2000-2018. There are some steps to utilize VAR. The first step is to test the stationarity of data and determine the lag length. The results of the stationarity test are described in Table 3.

Meanwhile, the results of the lag length confirm that the Akaike Information Criterion (AIC) score is about 4.45 on lag 1. The Hannan-Quinn information criterion (HQ) and Final Prediction Error (FPE) also demonstrate that lag 1 is the optimal lag. Thus, the lag length in the VAR estimation is lag 1.

The empirical findings with GDP growth (GDPG) as the dependent variable inform that only two institutional indicators have a significant effect, namely: Regulatory Quality (RQ) and Control of Corruption (CC). It expresses those institutions play an important role in economic growth and corruption perception index (CPI) does not have a significant impact.

Similarly, when the CPI and institutional indicators become the dependent variables. The empirical findings show that these variables do not have a significant relationship with economic growth in ASEAN countries.

Hence, the hypothesis clarifies that corruption has a relationship with economic growth is rejected. The governments of ASEAN countries should strengthen efforts to eradicate the level of corruption and improve the quality of institutions in order to increase economic growth significantly.

In particular, Nairobi (2021) is concerned with the impact of corruption on economic growth for 16 provinces in Indonesia during 2014-2018. The findings reveal that the higher corruption level leads the higher economic growth. In the case of Pakistan, the corruption level impedes economic growth during 1987-2009 (Farooq et al., 2013). Besides, Spyromitros & Panagiotidis (2022) found that in developing countries, the level of corruption stifles economic growth. It implies that corruption has a detrimental effect on economic expansion. On the other hand, corruption has a beneficial effect on economic growth in Latin American nations.

Table 5. Summary of Panel-VAR Estimation

Variables	GDPG	CPI	VA	PST	GE	RQ	RL	CC
C	-3.048 [-0.970]	9.212 [2.676]**	-0.559 [-2.032]**	0.077 [0.201]	-0.075 [-0.366]	0.071 [0.315]	-0.344 [-1.698]	-0.196 [-0.623]
GDPG(-1)	-0.018 [-0.271]							
GDPG(-2)	0.065 [0.962]							
CPI(-1)		0.892 [11.360]***						
CPI(-2)		-0.053 [-0.634]						
VA(-1)			0.224 [3.389]***					
VA(-2)			0.728 [10.211]***					
PST(-1)				0.303 [4.997]***				
PST(-2)				0.612 [9.099]***				
GE(-1)					0.133 [3.554]***			
GE(-2)					0.578 [9.276]***			
RQ(-1)						0.126 [3.132]***		
RQ(-2)						0.556 [9.990]***		
RL(-1)							0.049 [1.063]	
RL(-2)							0.455 [5.479]***	

Variables	GDPG	CPI	VA	PST	GE	RQ	RL	CC
CC(-1)								0.044 [0.770]
CC(-2)								0.811 [8.972]***
GDPG		-0.070 [-0.190]	-0.011 [-1.061]	-0.004 [-0.313]	-0.005 [-0.690]	0.010 [1.186]	0.007 [0.958]	-0.002 [-0.165]
CPI	-0.004 [-0.439]		0.001 [1.209]	0.000 [0.324]	-0.001 [-2.043]**	-0.000 [-0.168]	0.001 [2.064]**	-0.000 [-0.071]
VA	0.065 [0.129]	1.339 [0.522]		-0.067 [-1.026]	-0.013 [-0.362]	0.112 [3.086]***	-0.021 [-0.605]	0.069 [1.302]
PST	0.006 [0.017]	0.1158 [0.061]	-0.114 [-3.537]***		0.004 [0.161]	-0.029 [-1.040]	0.021 [0.818]	-0.012 [-0.299]
GE	-0.170 [-0.176]	-7.199 [-1.477]	-0.344 [-3.905]***	-0.099 [-0.795]		-0.003 [-0.045]	0.171 [2.501]**	-0.078 [-0.763]
RQ	-1.659 [-2.250]**	-1.290 [-0.344]	-0.026 [-0.319]	0.042 [0.389]	0.075 [1.300]		0.018 [0.320]	-0.112 [-1.267]
RL	-0.867 [-0.653]	10.679 [1.608]	0.214 [1.821]	0.057 [0.347]	0.163 [1.838]	0.0617 [0.649]		0.233 [1.727]
CC	1.771 [2.580]**	0.520 [0.149]	0.127 [2.019]**	0.128 [1.491]	0.057 [1.241]	0.117 [2.304]**	0.184 [4.479]***	
Adj. R-square	0.4511	0.737	0.9081	0.9163	0.9827	0.9749	0.9802	0.9679
F-statistics	16.43**	53.753***	186.64***	206.52***	1069.49***	729.79***	932.58***	567.51***
Observa-tions	170	170	170	170	170	170	170	170

Source: Authors' estimation

Note: [] denotes t-statistics; ***, ** and * denotes significant levels at the 1%, 5% and 10%, respectively.

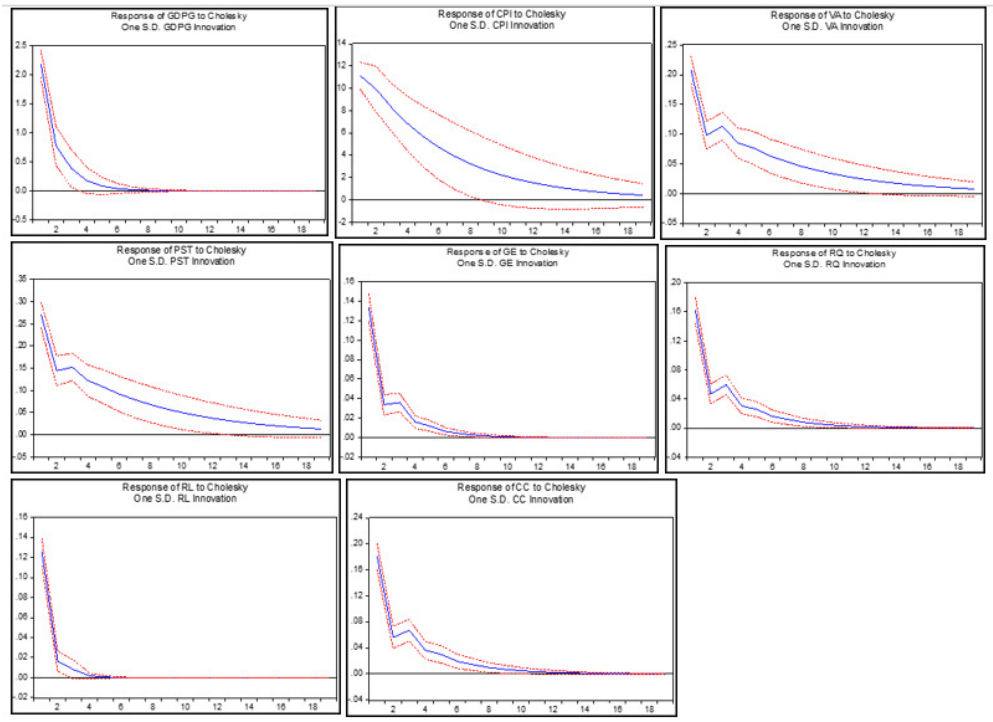

Figure 2. Impulse Response of Corruption and Institutions on Economic Growth in ASEAN Countries during 2000-2018

Source: Authors' estimation

Hereafter, the response between economic growth, CPI and institutional indicators takes several years to have a significant response. In general, the response period for these variables is more than six years, with a total study period of 19 years. In contrast, only the rule of law (RL) has a response of less than 4 years. This indicates that law enforcement efforts can be carried out quickly compared to other institutional indicators.

3.2 Robustness Checks

The corruption perception index during 2000-2018 was assessed by two measurement methods with a time span between 2000-2011 and 2012-2018. It can provide different interpretations of the estimation results of the statics panel data in Table 4. Thus, robustness checking is employed by separating the sample period into two categories: the statics panel during 2000-2011 and the statics panel during 2012-2018. The estimation model was exhibited in Equation (3a) - (3c) and Equation (4a) - (4c).

3.2.1 Statics Panel of Sample Observation during 2000-2011

The empirical findings of the BP LM test and Hausman test in Model 1 confirm that FEM or REM is the best model because the value of the two tests is 15.095 and 26.171, respectively, which are significant at α of 1%. The FEM estimation can be categorized into FEM-cross section and FEM-period. It is utilized to analyze precisely the effects of the dummy-cross section and dummy-time series. A detailed explanation of the estimation results can be seen in Table 6.

Table 6. Summary of Statics Panel during 2000-2011

Variables	Pooled OLS		FEM-Cross Section		FEM-Period		REM	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
C	-1.250 (-0.327)	-0.926 (-0.187)	5.825 (0.042)	167.842 (0.996)	0.371 (0.102)	0.323 (0.069)	-1.250 (-0.317)	-1.810 (-0.532)
LTLF	-0.116 (-0.403)	-0.280 (-0.607)	-0.790 (-0.090)	-10.734 (-1.022)	-0.198 (-0.785)	-0.041 (-0.088)	-0.116 (-0.391)	0.443 (1.668)*
LTDI	-0.409 (-4.934)***	-0.4190 (-5.034)***	-0.423 (-4.537)***	-0.424 (-4.561)***	-0.339 (-4.666)***	-0.345 (-4.478)***	-0.409 (-4.781)***	-0.474 (-5.155)***
LTFI	0.979 (2.970)**	1.031 (2.839)**	1.076 (2.508)**	1.026 (1.872)*	0.907 (2.913)**	0.840 (2.217)**	0.979 (2.878)**	0.441 (2.225)**
LIDI	-4.010 (-3.447)***	-2.353 (-1.439)	-2.183 (-0.604)	1.571 (0.386)	-4.533 (-4.443)***	-5.064 (-2.136)**	-4.010 (-3.340)***	0.490 (0.352)
CPI	-0.001 (-0.016)		0.034 (0.329)		0.054 (0.347)		-0.001 (-0.015)	
VA		-0.067 (-0.064)		5.909 (1.432)		-0.346 (-0.370)		-0.673 (-0.939)
PST		-0.224 (-0.317)		-3.527 (-2.055)**		-0.019 (-0.028)		0.565 (1.076)
GE		-1.088 (-0.566)		-1.183 (-0.285)		-0.448 (-0.248)		-0.013 (-0.010)
RQ		-1.127 (-0.770)		-2.854 (-0.662)		-0.506 (-0.376)		-0.370 (-0.366)
RL		1.939 (0.755)		4.751 (0.783)		2.645 (1.096)		-2.654 (-1.648)
CC		-0.481 (-0.412)		-2.285 (-0.787)		-0.705 (-0.687)		1.549 (1.769)
Adj. R-Square	0.4790	0.4909	0.4450	0.4579	0.6385	0.6155	0.4790	0.3071
F-statistics	9.64***	5.53**	3.69**	3.09**	9.30***	6.015**	9.64***	6.37**
Observation	48	48	48	48	48	48	48	48

Source: Authors' estimation

Note: () denotes t-statistics; ***, ** and * denotes significant levels at the 1%, 5% and 10%, respectively.

Model 1 provides an indication that during 2000-2011 the CPI did not have a significant contribution to economic growth in ASEAN countries. However, domestic investment, foreign investment and the ICT development index contributed significantly to GDP growth. Thus, robustness checking for the sample during 2000-2011 cannot clarify the significant contribution of CPI to economic growth.

Furthermore, the BP LM and Hausman tests in Model 2 have values are 27.56 and 35.99, respectively, which are significant at α of 1%. It suggests that both FEM and REM estimations can be utilized to describe the second objective. Empirical findings show that the FEM-cross section found a significant impact of institutional indicators (political stability) on GDP growth. In addition, domestic and foreign investment contributed significantly to economic growth. The FEM-period results inform the significant contribution of domestic investment, foreign investment and the ICT development index to economic growth. The REM results can prove that labour force, domestic investment and foreign investment contribute significantly to economic growth.

3.2.2 Statics Panel of Sample Observation during 2012-2018

The empirical findings explain that the BP LM test and Hausman test on Model 1 are 15.45 and 15.14, respectively, which are significant at α of 1%. Hence, both FEM and REM estimations can explain the first objectives. Further, the results of the BP LM test and Hausman test on Model 2 were 6.79, which is significant at α of 5% and 37.68, which is significant at α of 1%. It means that the FEM and REM estimations can also describe the second objective. Table 7 provides a detailed explanation of statics panel results.

The findings of Model 1 and Model 2 confirm that the CPI did not significantly contribute to GDP growth during 2012-2018. The robustness checking clarifies the hypothesis of the significant impact of corruption on economic growth is rejected. In contrast, the hypothesis of the significant effect of institutional indicators on economic growth is accepted. The institutional indicators cover political stability, government effectiveness, regulatory quality and rule of law.

Statistically, the results in Table 7 are more significant than in Table 6. It confirms that the differences in the sample period will express significantly different findings. For example, the pooled OLS, FEM-period and REM results found the effects of labour, investment and technology on economic growth. In addition, Pooled OLS and FEM-period have found that three institutional indicators contribute significantly to economic growth. The three indicators are Political Stability (PST), Government Effectiveness (GE) and Rule of Law (RL). In contrast, REM estimation informs there were only two significant institutional indicators, namely: PST and RL.

Afonso & de Sá Fortes Leitão Rodrigues (2021) argued that corruption delivered a negative impact on economic growth for 48 countries during 2012-2019. Besides, the private investment can stimulate the corrupt practices. It means that the private sector can lead the higher bribery practices under uncertainty time to sustain their business (Afzali, Colak & Fu, 2021). The corrupt practices also come from the quality of institutions in the government system (Pulido, Poveda & Carvajal, 2020). The lower quality of institutions produces the higher corrupt practices. Saha & Ben Ali (2017) found that the quality of economic freedom and economic growth can reduce the level of corrupt practices in Middle Eastern and North Africa (MENA) during 1984-2013. Moreover, Ben Ali & Gasmi (2017) found that a higher quality of information and communication technology (ICT) diffusion and institutions creates a lower level of corruption.

Table 7. Summary of Statics Panel during 2012-2018

Variables	Pooled OLS		FEM-Cross Section		FEM-Period		REM	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
C	0.937 (0.235)	14.174 (2.076)**	-96.744 (-1.165)	-114.819 (-1.190)	0.808 (0.201)	19.719 (3.085)***	0.744 (0.201)	20.677 (3.218)***
LTLF	0.760 (2.696)**	0.784 (1.900)*	6.975 (1.262)	8.192 (1.314)	0.724 (2.506)**	1.104 (2.887)**	0.744 (2.859)**	1.619 (6.160)***
LTDI	-0.805 (-2.854)***	-1.427 (-3.705)***	-0.780 (-0.681)	-0.705 (-0.540)	-0.718 (-2.531)**	-1.448 (-4.193)***	-0.794 (-2.991)**	-1.436 (-3.691)***
LTFI	0.622 (2.394)**	0.867 (2.611)**	0.509 (1.212)	0.341 (0.695)	0.575 (2.166)**	0.533 (1.703)*	0.633 (2.647)**	0.879 (2.626)**
LIDI	-2.867 (-3.575)***	-5.341 (-4.107)***	-3.814 (-2.336)**	-3.621 (-1.747)*	-3.189 (-3.809)***	-7.273 (-5.538)***	-2.864 (-3.800)***	-5.735 (-4.393)***
CPI	0.009 (0.449)		-0.005 (-0.267)		0.012 (0.592)		0.007 (0.406)	
VA		0.584 (1.055)		0.134 (0.094)		0.613 (1.220)		0.171 (0.320)
PST		-0.939 (-2.544)**		-0.905 (-0.659)		-0.938 (-2.826)**		-0.632 (-1.786)*
GE		2.330 (2.105)**		-0.298 (-0.143)		2.554 (2.558)**		1.418 (1.336)
RQ		-1.863 (-1.778)*		-0.869 (-0.543)		-1.350 (-1.423)		-0.387 (-0.434)
RL		2.290 (1.732)*		2.216 (1.457)		2.805 (2.262)**		2.400 (1.797)*
CC		-0.957 (-1.253)		-0.602 (-0.268)		-0.904 (-1.311)		-0.111 (-0.159)
Adj. R-Square	0.7460	0.7855	0.7925	0.7772	0.7583	0.8303	0.7311	0.7543
F-statistics	29.78***	18.94***	14.37***	9.99**	18.08***	18.13***	27.65***	17.72***
Observation	50	50	50	50	50	50	50	50

Source: Authors' estimation

Note: () denotes t-statistics; ***, ** and * denotes significant levels at the 1%, 5% and 10%, respectively.

3.3 Some Implications

Corruption and institutions are part of the scholarly discussion to enhance economic growth. This study reveals that over the period of 2000- 2018, ASEAN countries obtained an insignificant contribution of corruption to economic growth, while institutional indicators were able to stimulate economic growth. Empirically, Huang (2016) elaborates that the level of corruption does not determine economic growth in eleven out of thirteen Asia-Pacific countries during 1997- 2013. However, Ahmad et al. (2012) stated that institutional indicators could determine the level of economic growth for 71 developed and developing countries from 1984-2009. Therefore, policymakers can emphasize institutional quality improvement to provide a space for long-run economic growth.

The findings of this study can be formulated into policy, practical and social implications. The policy implications prompt policymakers in order to improve public policy governance, and law enforcement and suppress corruption practices. Technically, transparent communication and efficient public policy can facilitate the economic activities of economic agents. This means that economic agents can contribute significantly to the national economy due to the availability and implementation of better public policy.

Practical implications can describe the benefits of institutional indicators for business activities in all economic sectors. These business activities are directed at achieving efficient production levels and sustaining economic growth in the long run. The government's contribution can be translated to create effective governance, law enforcement and control of corrupt practices. Thus, these institutional indicators can significantly stimulate business activities.

Finally, the implications for society are emphasizing public awareness of the process of improving institutional quality to encourage economic growth. For example, public awareness can be directed to support the improvement of the quality of political stability and absence of violence, regulatory quality, and control of corruption. This means that the active participation of society to realize better institutional quality can provide an opportunity to develop economic activity more progressively.

4. Conclusions

Corruption can have a significant or insignificant effect on economic growth. It can also positively or negatively impact economic growth. This means that the effect of corruption on economic growth is inconsistent. Furthermore, the quality of institutions can also contribute to economic growth. Therefore, this study proposes two objectives, namely: to estimate the effect of a corruption perception index on economic growth and to estimate the effect of institutional indicators on economic growth.

The findings indicate that the static panel data model cannot express the significant effect of the corruption perception index on economic growth in ASEAN countries during 2000-2018. Similarly, the Panel-VAR result is also rejecting the hypothesis on the significant impact of corruption on economic growth. Moreover, robustness checking clarifies that a corruption perception index has no significant effect on economic growth in both samples during 2000- 2011 and the samples during 2012-2018. Conversely, some institutional indicators affect economic growth in ASEAN countries. The findings can be exhibited by the results of statics panel data and Panel-VAR. For example, REM elaborates that voice and accountability (VA) and control of corruption (CC) will lead to economic growth in ASEAN countries. Besides, Panel-VAR shows that regulatory quality (RQ) and control of corruption (CC) have a significant effect on economic growth. The findings provide a significant signal that institutional quality can drive economic growth. Thus, the more the institutional quality increases, the more economic growth will be.

Some of the policy implications include, among others, governments in ASEAN countries should strengthen anti-corruption institutions. Increasing the understanding of policymakers and the public about corrupt practices can also be carried out in a sustainable manner. In addition, improving the quality of institutions, such as transparency of public policies, clean and efficient bureaucracy, political stability and security, and control of corruption, should be implemented both at the country level and at the ASEAN level. This condition will support the implementation of ASEAN economic integration in order to strengthen institutional quality.

This study has several limitations. First, this study only sets corruption perception index and six governance indicators as institutional indicators. Further research can consider other institutional indicators. Second, this study employs statics panel data and Panel-VAR. Therefore, further research can use dynamic panel data or panel threshold regression to determine a certain level of corruption and institutions on economic growth.

5. References

Afonso, A., & de Sá Fortes Leitão Rodrigues, E. (2021). Corruption and economic growth: do the size of the government matter? Economic Change and Restructuring. doi:10.1007/s10644-021-09338-4

Afzali, M., Colak, G., & Fu, M. (2021). Economic uncertainty and corruption: Evidence from public and private firms. Journal of Financial Stability, 100936. doi:10.1016/j.jfs.2021.100936

Ahmad, E., Ullah, M. A., & Arfeen, M. I. (2012). 158 Jurnal Ekonomi Pembangunan, ISSN 1411-6081, E-ISSN 2460-9331

Avalaible online at http://journals.ums.ac.id, Permalink/DOI: 10.23917/jep.v24i1.21426 Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan, 24 (1), 2023, 141-160

Does Corruption Affect Economic Growth? Latin American Journal of Economics, 49(2), 277–305.

Alfada, A. (2019). The destructive effect of corruption on economic growth in Indonesia: A threshold model. Heliyon, 5(10), e02649. https://doi.org/10.1016/j.heliyon.2019.e02649

Ben Ali, M. S., & Sassi, S. (2016). The corruption-inflation nexus: Evidence from developed and developing countries. The B.E. Journal of Macroeconomics, 16(1). https://doi.org/10.1515/bejm-2014-0080

Ben Ali, M. S., & Gasmi, A. (2017). Does ICT diffusion matter for corruption? An Economic Development Perspective. Telematics and Informatics, 34(8), 1445–1453. doi:10.1016/j.tele.2017.06.008

Brianzoni, S., Campisi, G., & Russo, A. (2018). Corruption and economic growth with non-constant labour force growth. Communica- tions in Nonlinear Science and Numerical Simulation, 58, 202–219. https://doi. org/10.1016/j.cnsns.2017.07.007

Chase, G., & Chase, G. (2014). Religiosity, Corruption, and Economic Growth. 1(3).

d'Agostino, G., Dunne, J. P., & Pieroni, L. (2016). Corruption and growth in Africa. European Journal of Political Economy, 43, 71–88. https://doi.org/10.1016/j.ejpoleco.2016.03.002

Dzhumashev, R. (2014). Corruption and growth: The role of governance, public spending, and economic development. Economic Modelling, 37, 202–215. doi:10.1016/j.econmod.2013.11.007

Erum, N., & Hussain, S. (2019). Corruption, natural resources and economic growth: Evidence from OIC countries. Resources Policy, 63, 101429. https://doi.org/10.1016/j.resour- pol.2019.101429

Farooq, A., Shahbaz, M., Arouri, M., & Teu- lon, F. (2013). Does corruption impede economic growth in Pakistan? Economic Modelling, 35, 622–633. doi:10.1016/j.econmod.2013.08.019

Gründler, K., & Potrafke, N. (2019). Corruption and economic growth: New empirical evidence. European Journal of Political Economy, 60, 101810. https://doi.org/10.1016/j.ejpoleco.2019.08.001

Gujarati, D. N. (2003). Basic econometrics (4th ed). McGraw Hill.

Huang, C.-J. (2016). Is corruption bad for economic growth? Evidence from Asia-Pacific countries. The North American Journal of Economics and Finance, 35, 247–256. https://doi.org/10.1016/j.najef.2015.10.013

Malanski, L. K. & Póvoa, A. C. S. (2021). Eco-nomic growth and corruption in emerging markets: Does economic freedom matter? International Economics, 166, 58–70. doi:10.1016/j.inteco.2021.02.001

Nairobi (2021). Corruption and Economic Growth at Province Levels in Indonesia. Jejak, 14 (2), 288-295. DOI: https://doi.org/10.15294/jejak.v14i2.25996

Nwazonobi, P. E., & Apah, A. O. (2018). Religion, Corruption and Economy: The Problem of Nigeria in this 21st Century. 4(1), 8.

Pulido, N. R., Poveda, A. C., & Carvajal, J. E. M. (2020). Corruption and institutions: An analysis for the Colombian case. Heliyon, 6(9), e04874. doi:10.1016/j.heliyon.2020.e04874

Qureshi, F., Qureshi, S., Vinh Vo, X., & Junejo, I. (2021). Revisiting the nexus among foreign direct investment, corruption and growth in developing and developed markets. Borsa Istanbul Review, 21(1), 80–91. https://doi.org/10.1016/j.bir.2020.08.001

Romer, D. (2012). Advanced Macroeconomics (4th ed). New York: McGraw Hill.

Saha, S., & Ben Ali, M. S. (2017). Corruption and Economic Development: New Evidence from the Middle Eastern and North African Countries. Economic Analysis and Policy, 54, 83–95. doi:10.1016/j.eap.2017.02.001

Song, C.-Q., Chang, C.-P., & Gong, Q. (2021). Jurnal Ekonomi Pembangunan, ISSN 1411-6081, E-ISSN 2460-9331 159

Avalaible online at http://journals.ums.ac.id, Permalink/DOI: 10.23917/jep.v24i1.21426 Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi dan Pembangunan, 24 (1), 2023, 141-160

Economic growth, corruption, and financial development: Global evidence. Eco-nomic Modelling, 94, 822–830. https://doi. org/10.1016/j. econmod.2020.02.022

Spyromitros, E. & Panagiotidis, M. (2022). The impact of corruption on economic growth in developing countries and a comparative analysis of corruption measurement indicators. Cogent Economics & Finance, 10(1), 2129368. https://doi.org/10.1080/23322039. 2022.2129368

Vannucci, A. (2015). Three paradigms for the analysis of corruption. 1(2), 31.

Zheng, B., & Xiao, J. (2020). Corruption and Investment: Theory and Evidence from China. Journal of Economic Behavior & Organization, 175, 40–54. https://doi.org/10.1016/j. jumbo.2020.03.018