

Determinants of Economic Growth in ASEAN Countries (2002-2019)

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[*Abstract*]

This study analyzes the effect of macroeconomic indicators such as foreign direct investment (FDI), domestic investment, trade, inflation, unemployment, population, and governance indicators on economic growth and points out the GDP growth rate in 2002- 2019 among ASEAN countries. Data were compiled from the Worldwide Governance Indicators (WGI) and the World Bank, and the effect of variables on GDP was predicted using the pooled ordinary least squares (POLS), fixed effects model (FEM), and random effects model (REM) methods. As a measure of growth, the GDP growth rate has been taken; FDI and domestic investment, trade, inflation, and governance indicators are positively connected and have an influence on economic growth in these ASEAN countries; domestic investment, population, and unemployment have a negative relationship to economic growth. The macroeconomic indicators and institutional stability of the nation have an effect on its economic growth. Comprehensive institutional stability and well-laid macroeconomic policies are required for growth to materialize.

Keywords: economic growth, ASEAN countries, panel analysis.

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I . Introduction

ASEAN is a regional intergovernmental organization composed of ten Southeast Asian countries to foster cooperation, coordination, and facilitation of sociocultural, educational, military, political, security, and economic interconnection between its members and other Asian countries. The ASEAN's main objectives are to promote cultural development, socioeconomic development, and economic growth in the area; to encourage area peace, collaborative effort, and mutual support on matters of common interest, to support training and research facilities with each other; to work collaboratively for better agricultural and industrial utilization to elevate people's living standards; and to stimulate Southeast Asian studies.

There are different levels of economic growth depending on whether a country is emerging or developing. This study provides preliminary empirical evidence for a set of macroeconomic hypotheses about economic growth in a group of ASEAN nations.

Economic growth would be able to lessen the country's reliance on other factors and also provide capital for productive sectors, enhancing the country's economy. The economic growth pace is so energetic for economic development. Thus, it is critical to look into the shape of economic growth and how it responds to macroeconomic changes in the nation since the economy's growth rate is highly significant. Sluggish economic growth could delay investments in productive industries. Every government, developed or developing, has the most crucial task of all: to develop a country's economy and enhance people's lives.

When compared to local assets, FDI has a greater progressive effect on economic growth (Eduardo Borensztein and Jose De Gregorio 1995). FDI always has a positive effect on most countries, but here we would like to analyze whether foreign direct investment has a positive effect in ASEAN countries because most studies show that FDI has a positive and substantial effect on economic growth, but Alfaro and Johnson (2013) verified that FDI is preferable to domestic investment in Malaysia and Indonesia but not in Thailand and the Philippines.

The study demonstrates that FDI is not always beneficial to developing countries.

Blomström et al. (2000) found that large amounts of foreign direct investment alone are not enough to generate economic growth and wealth in host countries. Foreign direct investment and trade are commonly cited as important drivers of growth in developing nations. Meanwhile, independent variables such as FDI, domestic investment, trade, inflation, and unemployment are the determining factors of GDP since they can impact economic growth (Saidin 2012).

According to Kojo Menyah and Wolde-Rufael (2014), Babak Soukhakian (2007), and Yang and Shafiq (2020), trade and the growth of the country's relationship are positive. In Bibi et al. (2014), the 1980–2011 era is examined in connection to the growth rate, foreign direct investment, imports and exports, inflation, and exchange rate. Foreign direct investment, imports, and exports all contribute to economic growth in Pakistan.

Fetahi-Vehapi et al. (2015) found that gross fixed capital formation, foreign direct investment, trade openness, the initial level of GDP per capita, and human capital developments were all positively and significantly associated with economic growth. In contrast, population was found to be negatively and significantly associated with economic growth when a fixed effects panel regression estimation method was used in ten countries in Southeast Europe between 1996 and 2012.

The following are the research's contributions and differences from earlier studies: First, as ASEAN has been expanding not only in economic but also geopolitical importance, most of the nation's leaders in government, business, education, and the nonprofit sector continue to struggle to build positive relationships with ASEAN member nations. Moreover, this association is quite large in Asia and needs to analyze how macroeconomic indicators affect all of its member countries.

Second, there are developed and developing countries in ASEAN countries, as well as many issues of heterogeneity.

Therefore, it is questionable which macroeconomic factors are driving forces that affect economic growth in ASEAN countries. It is crucial to understand the factors that affect economic growth in ASEAN countries. Moreover, existing empirical Asian and ASEAN studies such as Yang and Shafiq (2020), Intisar et al. (2020), and Nguyen (2011) are primarily focused on the efficiency issues produced by macroeconomic indicator changes on economic growth, while ignoring the institutional quality issues generated by policy change effects on regional governments. In this paper, the benefits of FDI, trade, domestic investment, inflation, unemployment, population, and institutional quality on economic growth were explored, including voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and corruption control.

Finally, numerous studies have been conducted to demonstrate the link between macroeconomic indicators and economic growth in ASEAN-4 (Saidin 2012), ASEAN-5 (Thanh 2015), ASEAN-6 (Sofilda et al. 2015), and one country among ASEAN countries (ThuThi Hoang 2010; Hussin et al. 2013). However, there have been few empirical studies on economic growth across the entire ASEAN region. This study fills the gap left by the components in growth empirics because there have been major departures from previous studies.

For all these reasons, this study strives to afford insight into the elements that predominantly define economic growth in ASEAN nations. Research questions are whether foreign direct investment, domestic investment, trade, population, inflation, voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and corruption control have a positive impact but the unemployment rate does not.

This research's goal is to study the elements that influenced ASEAN countries' economic growth from 2002 to 2019. The appropriate econometric model and variables are used in this research to clarify this. Panel regression with a fix effect was applied to achieve this objective. According to this study, FDI,

trade, inflation, unemployment rate, corruption control, political stability and absence of violence, and voice and accountability influence ASEAN member nations' economic growth. Population and domestic investment demonstrate a substantial negative effect on economic growth. This research offers various policy ideas that can be implemented in ASEAN countries.

The findings will be used to develop policy recommendations for enacting relevant policies that will boost economic growth in ASEAN countries. This study will look at success criteria based on international practice and the current situation in ASEAN countries to assist governments in achieving their objectives more quickly.

II . Literature Review

Economic growth is defined as a country's rise in goods and services, which can result in increased consumption, according to Hussin and Saidin (2012). Economic growth, they added, comprises a rise in the economic ability to produce of goods and services over time. The happiness and prosperity of billions of people worldwide depend heavily on economic growth.

An occurrence linked to a significant component of an economy rather than a particular population is referred to as a macroeconomic factor. The characteristic could be a main environmental, economic, or geopolitical event that has an important effect on the economy of a nation. When assessing growth rate, there are many relationships among macroeconomic issues, such as FDI, inflation, gross domestic product, population growth, unemployment, government spending, imports, exports, unemployment, interest rate, and so forth. Such economic success elements are taken into account by governments, corporations, and customers. Macroeconomic variables may be advantageous, disadvantageous, or neutral. According to Acemoglu (2012), the role of associations in economic growth is a new area of research in economic growth theory. He concludes that labor is more effective at organizing economic activity and enabling the use of existing

technologies than individual labor. ASEAN is one of the most appealing organizations among the others. This study not only underlines the importance of organizations, but also adds to the growth of knowledge on standardization as both a driver and a stumbling block to economic growth.

Chirwa and Odhiambo (2016) show that fiscal policy, foreign direct investment, investment, trade, foreign aid, the development of human capital, demographics, monetary policy, demographics, natural resources, reforms, and geographic, regional, political, and financial factors are among the main macroeconomic drivers of economic growth in developing nations, and trade, financial, and technological factors, as well as physical capital, demography, monetary policy, fiscal policy, human capital, and commerce, are the main macroeconomic factors linked to economic growth in developed countries.

2.1. GDP growth (annual %)

In this study, the figures are based on constant local currency at market rates and the annual percentage GDP growth rate. GDP is determined by adding together the total gross value contributed by all domestic producers, subtracting some product duties, and adding some subsidies not reflected in the product value. It is considered without accounting for asset depreciation or the deterioration and depletion of natural resources. Economic growth is measured by the rate at which each ASEAN nation's GDP grows. Divide the difference between this year's GDP and the previous year's GDP by the previous year's GDP and multiply by a factor of a hundred to get the GDP growth rate.

For instance, a comparison of the GDP growth rates for 2010 and 2009 might demonstrate the economic expansion in 2010. As a result, the economy expanded in 2010 if the 2010 growth rate of GDP was greater than the 2009 growth rate, and vice versa.

Meanwhile, independent variables such as FDI, domestic investment, trade, inflation, and unemployment are the determining factors of gross domestic product since they can impact economic growth (Saidin 2012).

According to Hussin et al. (2013), the causes of Malaysia's economic growth are examined, and indicators of economic growth include gross fixed capital formation, foreign direct investment, trade openness, and public development spending. According to the study, foreign direct investment and trade openness have a significant but short-term unfavorable influence on economic growth.

Economic growth also aids a nation's efforts to eradicate poverty and raise the standard of living for its population. In this study, the dependent variable is GDP growth rate because it can indicate a country's economic growth.

2.2. Foreign direct investment (FDI) (% of GDP)

A net influx of capital applied to purchase a long-term managerial stake in an enterprise working in a different nation than the investor's investment is known as a foreign direct investment. The net influx of foreign capital into the reporting economy is depicted in this data, which is divided by GDP.

Eduardo Borensztein and Jose De Gregorio (1995) argued that FDI is a vital way of spreading awareness. It adds more to economic growth than domestic investment.

Numerous studies have examined the relationship between FDI, trade-related factors (exports, imports, openness to trade, trade restrictions), and growth (Boldeanu and Constantinescu 2015). Researchers have presented their studies not only within one country, but also for regions via a variety of methods to analyze the FDI and GDP connection. FDI enhances economic growth in India and China (Agrawal and Khan 2011).

Thu Thi Hoang (2010) investigated how FDI affects Vietnam's growth rates. They made use of panel data from 1995 to 2006 and demonstrated that FDI significantly impacted Vietnam's growth rates.

According to Asghar, Nasreen, and Rehman (2011), foreign direct investment and economic growth have had a positive association in Asian nations from 1983 through 2008. Song and Wu

(2012) investigated and concluded that FDI, government spending, and population increase all had a favorable effect on economic growth in ten Asia-Pacific nations from 2009 to 2018.

Sofilda et al. (2015) examined the variables influencing capital inflows of FDI into the six ASEAN nations between 2004 and 2012 (Indonesia, Malaysia, Singapore, Thailand, the Philippines, and Vietnam). To identify the variables influencing FDI in the six ASEAN countries, this study uses panel data analysis. The gross domestic product, global competitiveness, interest rate, currency rate, and trade openness are the elements that influence foreign direct investment.

Besides, Sofilda et al. (2015) found out that ASEAN has risen in prominence as an investment destination and regional manufacturing base during the previous two decades. Natural resources, as well as favorable demography and regional residents' increasing purchasing power, hold promise. As a direct consequence, inflows of foreign direct investment (FDI) have been steadily rising year after year. In terms of growing their own potential, this is tremendously beneficial to ASEAN countries.

According to Iamsiraroj (2016), FDI's total impact is positively related to economic growth and vice versa. He also stated that the significant factors affecting foreign direct investment in a country are economic freedom, labor force, and trade openness. An open economy and trade openness attract FDI.

FDI is one of the most significant sources of financing for a nation, specifically for unindustrialized countries. Moreover, FDI is a critical tool for transferring technology from developed countries to developing countries. By shifting assets, enhancing management, and shifting technologies to increase a nation's economy, this investment greatly contributes to its development. In addition, a remarkable occurrence is currently taking place among ASEAN countries, in which several multinational corporations are shifting their core manufacturing operations there. The ease and attraction of investing in ASEAN countries vary substantially, and ASEAN desires to attract more foreign investment.

2.3. Gross Capital formation (% of GDP)

Gross capital formation was formerly known as gross domestic investment, as expenses on accompaniments to the economy's fixed assets are defined by World Bank. Fixed assets include land expansions; manufacturing works, tools, and tools buying; highway structure, and other comparable constructions like schools, workplaces, clinics, not-publicly inhabited apartments, and profitable and industrialized constructions. Businesses store inventory to account for unanticipated changes in production or sales. Feldstein (1994) found a strong negative link between FDI and domestic investment in cross-sectional research in OECD countries. Desai, Foley, and Jr. (2005a) implied that more foreign investment leads to more domestic investment and mentioned that there are positive relationships.

Examining the economic development and gross fixed capital formation for Malaysia, Indonesia, Thailand, and the Philippines from 1981 to 2008, Saidin (2012) used a pooled model, a fixed effects model, and a random effects model and discovered that each of the ASEAN-4 nations' GDP growth is positively and significantly impacted by gross fixed capital creation.

2.4. Trade (% of GDP)

The World Bank describes trade as the overall amount of goods and services that are imported and exported as a share of GDP. International trade, according to Frankel and Romer (1999), is an instrument for economic progress.

Anaman (2004) discovered that Brunei's exports grew significantly faster than expected long-run economic growth rates. The role of trade in economic growth is still controversial. Researchers, such as Barro (2015) and Frankel and Romer (1999) found a positive relationship between trade and economic growth, while Rodriguez and Rodrik (2000) found that trade cannot guarantee faster economic growth. Furthermore, according to Sofilda, Amalia and Hamzah (2015), the country's exports and imports are booming, and it has become more involved in international trade.

Although trade plays an important role in economic growth, its impact on growth is still debated. Some economists discovered that trade and economic growth have a favorable relationship, while others did not find any link at all, according to Khalilov and Yi (2018). According to relevant studies, developing countries may not obtain the full profits of trade due to a lack of absorptive ability and inefficient institutions. The amount of profit that a country makes from trade is determined by a variety of economic policy instruments, including liberal economic policies, education, infrastructure, geographical location, institutional quality, and a favorable business environment. His study found no consistent results for openness, fertility, and government growth spending. For example, in Central Eastern European countries, openness was a critical element in controlling growth, whereas, in the former Soviet Union countries, it was not. Differing fiscal and monetary policies, the quality of administration, different exchange-rate systems, and an adverse competitive climate for exporters and importers could all be contributing factors.

2.5. Inflation, GDP deflator (annual%) and unemployment, total (% of total labor force) (modeled ILO estimate)

The annual growth rate of the implied GDP deflator is used to estimate the percentage change in prices across the economy. The proportion of current local currency GDP to constant local currency GDP is known as the GDP implicit deflator. Unemployment refers to the proportion of the labor force that is unemployed yet searching for a job.

In OECD countries, Grier and Tullock (1989) discovered no positive correlation between inflation and growth and a significant negative correlation between inflation fluctuation and growth.

Barro (1996) concluded that rising inflation is associated with slower economic growth. Regarding the effects of inflation and growth, they have a positive relationship, but unemployment and growth have a negative relationship. According to Barro (2015), inflation has a slightly negative influence on economic growth. Thanh (2015) asserts that when inflation rates exceed a cutoff point

of 7.84%, inflation and economic growth have a significant negative association in ASEAN-5 countries, and that rising inflation then starts to impede GDP growth.

However, inflation had a minor impact on GDP and unemployment in India from 2011 to 2018, and the link is negative. Inflation was found to have an insignificant effect on GDP and unemployment, with an undesirable correlation (Singh 2018) .

Shrikant Krupasindhu Panigrahi et al. (2020) investigated whether unemployment, inflation, and interest rates had substantial long run impacts on GDP in ASEAN 5 countries from 1995 to 2018. Moreover, Cahyadin & Ratwianingsih (2020) explore that selected ASEAN nations' unemployment rates vary somewhat but generally go down. The unemployment rate in Thailand and Indonesia is comparatively high.

Net exports, unemployment, inflation, and investment have all had an impact on Austria's gross domestic product, according to Xurmatovich (2020). Many factors, both directly and indirectly, influence the change in GDP. Economists tend to focus on unemployment, inflation, investment, and export and import rates because it's difficult to account for all of them when computing GDP. However, because theory does not always accurately reflect reality, it is crucial to investigate the impact of Australia's unemployment rate on GDP. According to a study published in the journal *Austrian Facts* in 2018, the unemployment rate increased between 2014 and 2016, but GDP expanded at a nearly comparable rate. Notwithstanding, it would have been a mistake to conclude that an increase in the rate of unemployment really does have an optimistic effect on real GDP, because a rise in the unemployment rate does not imply a decrease in the unemployed; rather, it simply informs us about the labor force percentage that is unemployed. An increase in the number of employed individuals may increase GDP, as more people working means higher overall spending. However, due to another demographic factor, employee unit gains were substantially smaller than population growth resulting in higher unemployment rates.

2.6. Total Population

The total population is built on the de facto definition of population, which calculates all residents without considering legal status or citizenship. The values shown are midyear estimations.

Kyaw (2019) found that in developing nations, income per capita would rise dramatically with slower population growth. Conversely, Spengler (2017) found that large populations encourage greater specialization and increased investments in knowledge. Ridzuan et al. (2018) examined gross domestic investment, foreign direct investment, trade opportunities, and population growth variables influencing growth in the ASEAN-5 nations of Malaysia, Indonesia, Thailand, the Philippines, and Singapore and found this link between GDP and its independent variables (FDI, GDI, TO and POP) from 1970 to 2013. The results demonstrated that these countries have long-term co-integration and concluded that each of the criteria included in this research was crucial for fostering growth in the ASEAN-5 nations.

2.7. Institutional indicators for economic growth

A nation's economic growth may be impacted by institutional stability and macroeconomic policy. Voice and accountability, rule of law, and government effectiveness were significant in 50 African nations applying fixed and random factors from 1996 to 2010 (Gangi and Abdulrazak 2012). Moreover, Gangi and Abdulrazak (2012) mentioned that economic growth in Latin American nations is positively influenced by investment, population, and political stability. The institutional quality that a nation experiences have an impact on corruption in addition to growth.

According to Asamoah, Mensah and Bondzie (2019), sub-Saharan African nations' institutional quality is evaluated based on their ability to manage corruption and provide the rule of law and political stability. The writers demonstrated that institutional qualities all have negative average values. Although they significantly contribute to increased investment, trade openness, and growth, institutions' quality is not directly observed.

Tilak (2014) expressed that the Asian region's various countries are geographically connected and contiguous with one another. They are also a homogeneous group in terms of sociopolitical, historical, and, to some extent, economic and educational backgrounds, essentially being heirs to some shared cultural and civilizational heritage rich in history, and the traditions of this common heritage can still be found in these countries.

In this paper, when examining ASEAN nations, we will measure institutional quality as the average of six governance indicators, including voice and accountability, government effectiveness, political stability and the absence of violence, rule of law, regulatory quality, and control of corruption. These indicators have a scale from -2.5 to 2.5, where a positive sign indicates a high level of institutional quality and a negative sign indicates a low level of institutional quality. An atmosphere that is conducive to doing business would be produced by improved institutional quality.

III. Model and Data

3.1. Model

To demonstrate our findings, we used POLS, FEM, and REM methods to demonstrate the significance of the specified variables for the economic development of the ASEAN nations. Our estimated model is:

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_3 K_{it} + \beta_4 T_{it} + \beta_5 INF_{it} + \beta_6 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCOR_{it}) \\
 & + \beta_{13} (VA_{it}) + e_{it} + u_t
 \end{aligned}
 \tag{1}$$

$$i=1,2,\dots,10, \quad t=1,2,\dots,18$$

Where GDP positions for growth rate of gross domestic product, foreign direct investment (% of GDP) is FDI, gross capital formation (previously known as gross domestic investment) (% of

GDP) is K, T is exports and imports of goods and services (% of GDP), INF is GDP deflator (annual percent), and UNEM is unemployment (% of total labor force), lnPOP is population, total, PSAV is political stability and absence of violence, RQ is regulatory quality, GE is government effectiveness, VA is voice and accountability, RL is rule of law, and CCORR is corruption control.

3.1.1. Pooled Ordinary Least Squares

In order to discover the elasticity of the dependent variable with respect to the explanatory variables,

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_2 K_{it} + \beta_2 T_{it} + \beta_2 INF_{it} + \beta_2 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCorr_{it}) \\
 & + \beta_{13} (VA_{it}) + uit
 \end{aligned}
 \tag{2}$$

Here we expect that the $uit \sim iid(0, \sigma u^2)$ is error term; that is freely dispersed with a zero average and constant variance. For the purpose of our analysis, it is also supposed that error terms are normally distributed.

However, when we regress the pooled ordinary least squares (POLS) model, we do not distinguish different countries and treat one country as the same as the others. The individuality of each country is included in the error term, and thereby we consider this term the composite error term $uit = \gamma_i + eit$, and thereby we consider this term the composite error term. In this case, our model can be written as follows:

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_2 K_{it} + \beta_2 T_{it} + \beta_2 INF_{it} + \beta_2 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCorr_{it}) \\
 & + \beta_{13} (VA_{it}) + \gamma_i + eit
 \end{aligned}
 \tag{3}$$

Where γ_i is not directly observable and is an unobserved effect, which can be an unobserved country effect and/or an

unobserved time effect. As a result, it is quite possible that the γ_i term, which is part of the term of error, may be connected to some of the right-hand side variables in the model. Due to this, the estimated coefficients of POLS may be biased and inconsistent, which violates one of the main expectations of typical linear regression models that the term of error is uncorrelated with regressors. We handle these POLS problems with the fixed effect model (FEM), random effect model (REM), or error component model (ECM) methods.

3.1.2. Fixed Effect Model

In the FEM method, among the cross-sections, we allow for heterogeneity by assigning each entity its own intercept:

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_2 K_{it} + \beta_2 T_{it} + \beta_2 INF_{it} + \beta_2 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCorr_{it}) \\
 & + \beta_{13} (VA_{it}) + \text{uit}
 \end{aligned}
 \tag{4}$$

Although the intercept term may differ across the cross-sections, it does not vary over time.

3.1.3. Random Effect Model

In the case of the REM, as a substitute for handling the intercept term ($\beta_1 i$) as fixed, we suppose that it is a random variable with a mean value of β_1 . The intercept term for each country can be expressed as $\beta_1 i = \beta_1 + \alpha_i$. Based on these assumptions, we may illustrate REM as

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_2 K_{it} + \beta_2 T_{it} + \beta_2 INF_{it} + \beta_2 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCorr_{it}) \\
 & + \beta_{13} (VA_{it}) + \alpha_i + \text{uit}
 \end{aligned}
 \tag{5} \text{ or}$$

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_2 K_{it} + \beta_2 T_{it} + \beta_2 INF_{it} + \beta_2 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCorr_{it}) \\
 & + \beta_{13} (VA_{it}) + \varnothing_{it}
 \end{aligned}
 \tag{6}$$

where $\varnothing_{it} = ai + uit$. So, the compound error term \varnothing_{it} contains two components, which are as the cross-section error part, and as the collective cross-section and time-series component. We assume here that $ai \sim iid(0, \sigma 2\alpha)$ and $uit = iid(0, \sigma 2u)$.

\varnothing_{it} is not correlated with any of the right sides control variables in the model, according to the key assumptions of the classical linear regression model. Since is a factor of \varnothing_{it} , it is quite probable that \varnothing_{it} may relate to some control variables. In this case, the coefficients of REM may be biased and inconsistent. The Hausman test discusses this part and chooses the appropriate one between FEM and REM.

3.2. Data

The World Bank Indicators and Worldwide Governance Indicators (WGI) were used to generate the data used in this paper. The period covered in this research is only 18 years 2002-2019, and the analysis is focused on ASEAN countries.

The characteristics listed have been determined to be the most important predictors of economic growth in ASEAN countries. The dependent variable is the growth rate of GDP in ASEAN countries, FDI (percent of GDP), domestic investment (percent of GDP), trade of goods and services (percent of GDP), inflation, GDP deflator (annual percent), and unemployment rate (percent of labor force), Population, voice and accountability, political stability and the absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption are the independent variables.

Using the statistical software Stata 15 package, we estimated our model using POLS (pooled ordinary least squares), FEM (fixed effect model), and REM (random effect model) approaches, and chose the one that best fit the data.

3.3. Factors of Economic Growth

Established on the prior lessons cited in the review of literature, the most significant variables of economic growth and their indexes were selected.

<Table 1> Variables List

Variable	Description	Predicted Effect
GDP	GDP growth rate (annual %)	Dependent Variable
FDI	Foreign direct investment (% of GDP)	Independent Variables (+)
K	Gross capital formation (%of GDP)	Independent Variables (+)
T	Trade (% of GDP)	Independent Variables (+)
INF	Inflation, GDP deflator (annual %)	Independent Variables (+)
UNEM	Unemployment, total (% of total labor force) (ILO estimate)	Independent Variables (-)
lnPOP	Population, total	Independent Variables (+)
VA	Voice and Accountability	Independent Variables (+)
PSAV	Political stability and Violence Absence	Independent Variables (+)
CCORR	Corruption Control	Independent Variables (+)
GE	Government Effectiveness	Independent Variables (+)
RQ	Regulatory Quality	Independent Variables (+)
RL	Rule of Law	Independent Variables (+)

3.4. Descriptive Statistics for ASEAN countries

The data is explained with the following tables and figures to offer a thorough description of practical proof for this work. For ASEAN countries, statistical information is presented in Table 2. The results show a high GDP growth rate of 14.52, a low of -2.50, a standard deviation of 3.07, and an average of 5.67. FDI (% of GDP) has a high of 32.16 and a low of -2.75 with a standard deviation of 5.97 and an average of 5.39. Similarly, domestic investment (% of GDP) has a high of 41.065 and a low of 10.43 and an average of 25.24 with a standard deviation of 6.34. Furthermore, trade (% of GDP) has a high of 437.32, a low of 0.167, a standard deviation of 96.33, and a

mean of 122.3, while inflation has a high of 41.50, a low of -22.09, and is below the standard. The standard deviation is 7.038 and the average is 5.38. The unemployment rate has a high of 9.316 and a low of 0.393 with a standard deviation of 2.166 and an average of 2.95. Population has a high of 19.416 and a low of 12.756 with a standard deviation of 1.796 and nm average of 16.932. Voice and accountability have a high of 0.321 and a low of -2.233 with a standard deviation of 0.685 and an average of -0.759. Political stability and absence of violence has a high of 1.615 and a low of -2.094 with a standard deviation of 0.929 and an average of -0.159. Control of corruption has a high of 2.325 and a low of -1.672 with a standard deviation of 1.004 and an average of -0.274. Government effectiveness has a high of 2.436 and a low of -1.617 with a standard deviation of 1.010 and an average of 0.107. Regulatory quality has a high of 2.260 and a low of -2.344 with a standard deviation of 1.012 and an average of -0.045. Rule of law has a high of 1.878 and a low of -1.739 with a standard deviation of 0.880 and an average of -0.202.

<Table 2> ASEAN countries’ Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GDPgr	180	5.666	3.074	-2.508	14.52
FDI	180	5.528	6.048	-1.320	32.169
K	180	25.702	6.175	10.437	41.065
T	180	122.083	96.764	0.167	437.326
INF	180	5.139	6.608	-22.091	41.508
UNEM	180	2.937	2.213	0.393	9.316
lnpop	180	16.932	1.796	12.756	19.416
VA	180	-0.759	0.685	-2.233	0.321
PSAV	180	-0.159	0.929	-2.094	1.615
CCORR	180	-0.274	1.004	-1.672	2.325
GE	180	0.107	1.010	-1.617	2.436
RQ	180	-0.045	1.012	-2.344	2.260
RL	180	-0.202	0.880	-1.739	1.878

Note: Calculations for each variable were created on a real data source with Stata software15

IV. Results, Empirical Analysis and Related Discussions

4.1. Unit Root Test for ASEAN nations

This check is the first step in the inquiry, and it has been completed, allowing the data examination to continue. The results of these tests show that the stationary series is free of unit root issues. The steady nature of the variables employed in the investigation is ensured by this experiment. Levin-Lin-Chu test is also beneficial, and results exist in table-3. The results show that non-stationary variables become stationary at a specific level, and at the first difference, stationary becomes I(I). As a result, a unit root problem does not have and can be used for further research.

<Table 3> Test of Unit Root for ASEAN nations

Variables	Levin, Lin, and Chu (H0: Unit Root)			
	I(0)		I(1)	
GDPgr	-6.235	-2.145***		
FDI	-7.317	-4.247***		
K	-3.586	-1.063	-9.636	-3.977***
T	-3.107	-0.632	-10.818	-6.167***
INF	-6.933	-2.425***		
UNEM	-4.788	-2.122***		
LnPOP	-4.272	-4.287***		
VA	-4.386	-1.837***		
PSAV	-6.685	-3.842***		
CCORR	-4.635	-1.780***		
RQ	-2.789	-0.349	-10.543	-4.833***
RL	-4.167	-1.357***		
GE	-3.707	-0.484	-13.499	-9.386***

Note: ***, **, and * show levels of significance at 1%, 5% and 10%.

4.2. Co-integration Test for ASEAN nations

The following stage analyzes the long-run link between FDI, domestic investment, trade, inflation, unemployment, population, and governance indicators by testing variables from the unit root.

The Kao co-integration test outcomes reveal that the null hypothesis is rejected and that there is co-integration, as seen in Table 4. As a result, from 2002 to 2019, we can extract the long-term association between the variables. If the variables are stationary and co-integrated, this research can predict levels of variable regression without fear of encountering a bogus regression.

<Table 4> Co-integration (Kao) test for ASEAN countries

Ho: no co-integration Ha: co-integration	Statistic	Probability
Modified Dickey - Fuller t	-6.095	0.000
Dickey-Fuller t	-6.0331	0.000
Augmented Dickey - Fuller t	-3.1751	0.000
Unadjusted modified Dickey - Fuller t	-10.008	0.000
Unadjusted Dickey - Fuller t	-6.986	0.000

Note: ***, **, and * show levels of significance at 1%,5% and 10%.

4.3. Test of Multicollinearity

Table 5 shows the multicollinearity test. These concerns show that CCORR, RQ, GE, and RL have multi-collinearity problems; therefore, we remove some of these variables from the model and perform another regression. Unfortunately, there are once again multi-collinearity problems; hence, GE is once again penalized. All of the variable values in this table are fewer than ten. In our investigation, the multi-collinearity issue will not exist if the value of these variables is less than ten. As a result, our regression equation is once again as follows:

$$\begin{aligned}
 GDP_{it} = & \beta_1 + \beta_2 FDI_{it} + \beta_3 K_{it} + \beta_4 T_{it} + \beta_5 INF_{it} + \beta_6 UNEM_{it} + \beta_7 (\ln POP_{it}) \\
 & + \beta_8 (PSAV_{it}) + \beta_9 (GE_{it}) + \beta_{10} (RQ_{it}) + \beta_{11} (RL_{it}) + \beta_{12} (CCorr_{it}) \\
 & + \beta_{13} (VA_{it}) + e_{it} + u_t
 \end{aligned}
 \tag{7}$$

<Table 5> Test of Multicollinearity

Variable	VIF	VIF
FDI	3.01	2.8
T	5.91	5.41
K	1.80	1.75
INF	1.25	1.22
UNEM	2.67	2.39
lnpop	6.19	4.67
VA	8.62	4.57
RL	55.65	
RQ	35.94	
GE	35.42	
CCORR	26.00	8.85
PSAV	6.07	4.8

Note: Calculations for each variable were created on a real data source with Stata 15 software

4.4. Pooled Regression Estimation, Fixed Effect and Random Effects Estimation, and Hausman Test Results

As already noted, the regression was applied to 10 ASEAN countries from 2002 to 2019. By using the Stata 15 statistical software program, we used the pooled ordinary least squares (POLS), fixed effect model (FEM), and random effect model (REM) approaches and selected the one that best fit the data.

4.4.1. Pooled Regression Estimation, Fixed Effect and Random Effects Estimation of the ASEAN Countries

First, we pooled and estimated the effect of discussing factors, and the methods were applied in sequence to find the most appropriate one. Firstly, we regressed our model using the POLS method. In POLS, we assumed that the coefficients of regression were identical for all nations. That is, there is no dissimilarity between the nations—one nation is as worthy as any other. So, heterogeneity among countries has been ignored, and the individualism of each country is included in the disturbance term, and we call this the unobservable, or heterogeneity effect in econometrics. Due to this

reason, the term error may be connected to some of the explanatory variables that are included in POLS. This is the major problem with the POLS method.

Furthermore, there may be collinearity, autocorrelation, and/or heteroscedasticity problems in our data since it has both a time series and cross-sectional nature problems, which interrupt the important assumptions of the classical linear regression model. Due to these problems, we checked the necessary tests in our study; fortunately, our estimated coefficients of POLS may not be biased and consistent. Moreover, to allow heterogeneity among cross-sections, we applied the FEM and REM methods. In FEM, we allowed for heterogeneity among cross-sections by permitting each country to take its own individual intercept value. In REM, the cross-section differences are random rather than fixed, and the individual differences in the intercept values of each country are reflected in the error term. Below, we show the results of POLS, FEM, and REM. In econometrics, it is known that if REM is appropriate, then it is preferred. One of those reasons is that REM is a generalized least-squares (GLS) estimation while FEM is a least-squares estimation, and for this reason, GLS has a smaller variance than the least squares estimation. We applied the Hausman test to choose an appropriate test between REM and FEM. The null hypothesis here is that the REM and FEM estimators do not change significantly, and the random effects do not correlate with one or more regressors. Based on the joint test, the Hausman test rejects the null hypothesis. Even if the H_0 (null hypothesis) were true, the probability of attaining a χ^2 value of 69.66 or greater would be practically 0.000. So, this implies that we should use FEM in this case.

4.4.2. Hausman Test

This check is used to decide which of the fixed effect and random effect models is the most appropriate. Both models are intended to bolster the removal of heterogeneity concerns that plague the majority of investigations. Researchers are frequently perplexed as to which model to use when they have access to reliable panel data. This test determines the researchers' choice. If the p value is less

than 0.05, we should use the fixed effect model. When the p value is greater than 0.05, the random effect model outperforms the fixed effect model. Here, the value of significance of the Chi-square probability is equal to 0.000 when the model is examined using the Hausman test, making the fixed effects model the best one to estimate. Therefore, the fixed effect model is now appropriate in this situation.

<Table 6> Regression Results

	POLS	FEM	REM
FDI	0.143***(0.048)	0.156***(0.064)	0.413***(0.048)
K	0.006(0.037)	-0.032(0.037)	0.006(0.037)
T	-0.003(0.004)	0.003***(0.008)	-0.003(0.004)
INF	0.147***(0.029)	0.083***(0.030)	0.147***(0.029)
UNEM	-0.672***(0.121)	-0.031(0.250)	-0.672***(0.121)
lnPOP	0.130(0.209)	-7.930***(3.110)	0.130(0.209)
VA	1.188***(0.542)	0.338(1.027)	1.188***(0.542)
PSAV	-0.142(0.410)	0.423(0.602)	-0.142(0.410)
CCORR	-0.181(0.515)	1.425(1.270)	-0.181(0.515)
constant		139.884***(52.874)	4.956(3.154)
Hausman test	<i>Chi square</i>	69.66	<i>p – value-0.000</i>
R-squared	0.46	0.46	0.46
Number of observations	180	180	180

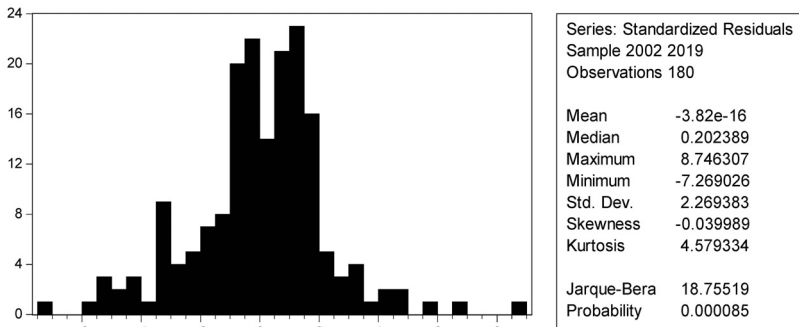
Note: ***, **, and * show levels of significance at 1%,5% and 10%.

In Table 6, according to fix effect estimation, FDI’s coefficient demonstrates a positive and significant trend. If FDI increases, the GDP growth rate increases. If FDI rises by 1 percent, GDP rises by 0.156 percent in these nations. Furthermore, foreign direct investment, trade, inflation, voice and accountability, political stability and the absence of violence, and control of corruption have a progressive association with economic growth. However, domestic investment, population, and unemployment are not. If unemployment decreases by 1 percent, GDP rises by 0.031 percent.

<Table 7> Diagnostic tests for ASEAN countries

Durbin Watson's Serial Correlation Test	
Durbin Watson stat(p-value)	1.221
Test of Normality	
Jarque-Bera(p-value)	0.0008
Test of heteroskedasticity	
Obs* R-Squared(p-value)	0.76

Using the Durbin-Waston test for ASEAN countries, we must determine whether our model is serially correlated. In Table 7, the p-value is greater than 5%; therefore, we cannot rule out the null hypothesis. As a result, residuals lack serial correlation. This is a great model. Here, the p-value is 1.221, which is greater than 0.05. The model is not serially correlated as a result. Moreover, we determine whether our data are normally distributed using Figure 1. The residual is not normally distributed since the p-value is less than the 0.05 level value. Then, using the heteroskedasticity test, we decide whether our variables have constant variance. The p-value is 0.76, which is more than 5%. Residuals are hence homoscedastic (constant variance).



<Figure 1> Normal Distribution Test for ASEAN Countries

V. Conclusion

As noted in the introductory section, the most important responsibility of every government, whether in developed or developing countries, is to develop a country's economy and enhance people's livelihoods. Many studies have been conducted to analyze the elements that play a vital role in maintaining growth. The factors we discussed in this study are important factors that determine economic growth. This study found that some factors are important for the economic growth of ASEAN countries, and we found that foreign direct investment, inflation, trade, and unemployment are significant factors in ASEAN countries' economic growth.

According to our first contribution, ASEAN is expanding in not only economic but also geopolitical importance; this association is quite large in Asia, and we analyzed how macroeconomic indicators affect all their member countries. The study's findings may also shed insight on each nation's economic condition and performance within the ASEAN community. Each member country would be able to contribute to ASEAN's common riches if they were united. The research set out to investigate the causes underlying the diverse patterns of ASEAN countries, as foreign direct investment, trade, and inflation are broadly recognized as key drivers of economic growth. As FDI, trade, and inflation increase, economic growth also increases. And then, according to these data and running the fixed, random effects and Hausman test, FDI, trade, inflation, voice and accountability, political stability and the absence of violence, and control of corruption have a positive association; however, domestic investment, population, and unemployment have a negative association in ASEAN nations.

As mentioned in the second and final contribution, existing empirical Asian and ASEAN studies are focused on macroeconomic indicators and changes in economic growth, while ignoring institutional quality issues, and governance indicators. In this paper, the benefits of FDI, trade, domestic investment, inflation, unemployment, population, and institutional quality on economic growth were explored. Governance indicators such as political

stability and the absence of violence, voice and accountability, and control of corruption also have a positive relationship with economic growth in ASEAN countries. This means that the more countries that maintain the quality of their governance indicators and macroeconomic policies, the better for foreign direct investment, trade performance, and economic growth they will be.

Fixed effect model estimates were recommended for the policy recommendation process, as emphasized by the Hausman test. The findings indicated that FDI, trade, and inflation were the most important factors in economic growth, with a significance level of 5%. According to the anticipated hypothesis, inflation, as does the unemployment rate, has a beneficial influence. The findings have led to the conclusion that people in ASEAN countries spend primarily to protect themselves against macroeconomic uncertainties; they invest as a hedge against future economic risks. The more they invest, the faster their economy grows.

Moreover, increases in trade between ASEAN nations, also brought on by easier access to rich nations' markets, may have a significant impact on the economic outcomes of emerging nations. However, the population coefficient shows that nations can benefit from other indicators but not from their total population. Spengler (2017) found that larger populations support higher specialization and increased knowledge investments. On the other hand, in developing countries, economic growth will rise sharply with slower population growth, according to research by Kyaw (2019). Moreover, according to Fetahi-Vehapi et al. (2015)'s study, in South-Eastern European countries, population was found to be negatively and significantly associated with economic growth between 1996 and 2012.

This report includes policy recommendations for every government to consider to improve economic growth, as well as certain governance indicators and macroeconomic policies that international investors and traders should consider when making investment, export, and import decisions. Furthermore, the outcomes of the study are valuable to policymakers, who may use them to develop effective government guidelines and policies that

would improve the nation's economic growth rate. Further research on all ten ASEAN countries would be highly valuable in the future, as each country has unique characteristics that allow it to impact the world with its economic power.

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