

Economic Growth Determinants of Asean Economic Community: Feasible Generalized Least Square Approach

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Abstract. This study aims to analyze the factors determining economic growth in ASEAN countries, which are the ASEAN economic community members as a potential center for world economic growth. The research method applied in this study was a panel data analysis model with a feasible generalized least square approach. The research period was from 2015 – 2019 in all ASEAN member countries: Indonesia, Myanmar, Malaysia, Singapore, Thailand, Laos, Vietnam, Cambodia, Brunei Darussalam, and the Philippines. Testing the data used the Chow and Hausman tests to determine the analysis method: fixed effect, random effect, or common effect. The results of panel data regression estimation with a feasible generalized least square approach uncovered that the variables of the number of the labor force, currency exchange rates, money supply (M1), exports, imports, Gini index, foreign debt, corruption perception index, financial literacy index, and foreign investment (PMA) significantly affected the economic growth of the ASEAN economic community, including develop agriculture sector. Meanwhile, the variables of domestic investment and financing credit did not affect the economic growth of the ASEAN economic community. The conclusion and recommendation from this study's results are each ASEAN country's efforts to encourage economic growth by utilizing its comparative advantages and strategic cooperation to create market opportunities and increase the economic efficiency of the ASEAN economic community.

1 Introduction

The ASEAN region is one of the centers of promising economic growth for the world's economy, which is currently experiencing stagnation due to the COVID-19 pandemic that has hit almost all countries in the world. With the potential for economic wealth, both natural resources and human resources, it is very promising for investment in this strategic area [2-8] Geographically, it is located between two continents, namely Asia and Australia, and two oceans, namely the Indian Ocean and the Pacific Ocean, placing the ASEAN region as a barometer for security and political stability in the Asia-Pacific [22-24] The

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combination of the wealth of natural resources, the abundance of the workforce, political stability and security, and supported by a harmonious culture of society makes the ASEAN region one of the priorities of investors in investing in various economic sectors. The ASEAN region is also a center for trade and financial transactions and services to support the increasing demand for industrial goods and community needs [10, 14, 19] The following table describes the development of the Gross Domestic Product of ASEAN countries:

Table 1. Gross Domestic Product in Selected ASEAN Countries (US\$ Billion)

Year	Country				
	Singapore	Malaysia	Thailand	Indonesia	Philippines
2010	239,809	255,017	341,105	755,094	208,369
2011	255,008	268,517	343,971	801,682	216,408
2012	266,836	283,214	368,884	850,024	231,334
2013	279,272	296,507	378,797	897,262	246,950
2014	290,269	314,318	382,526	942,185	262,626
2015	294,944	330,321	394,514	988,129	279,299
2016	308,640	345,020	408,043	1,037,860	299,267
2017	322,025	364,830	424,635	1,090,480	320,009
2018	333,096	382,129	442,621	1,146,850	340,303
2019	335,359	398,676	452,751	1,204,480	360,859

Source: worldbank.org, processed

The table above exhibits that until 2019, all member countries of the ASEAN economic community experienced an increase in GDP. When viewed from nominal figures, the largest GDP in 2019 was Indonesia. However, when viewed from the size of per capita income, the largest was Singapore. Looking at the GDP development from 2010-2019, the ASEAN region is a potential area in the world economy in developing the primary economic sector, namely food and energy products, and becoming an investment choice for the manufacturing and information technology-based industries. [15-20]

2 Economic Models and Theoretical Frameworks

Economic development is a long-term process to achieve economic prosperity for the whole community due to the interaction between economic and non-economic factors [20, 24] Economic development to improve people's welfare requires an increase in economic growth through production factors to produce goods and services. Economic growth is marked by increased per capita income from year to year, obtained through the gross domestic product (GDP) divided by the total population [16, 27]. Graphically, the process of economic growth is demonstrated by a shift to the top right of the production possibilities frontier, which indicates an increase in the production capacity of goods and services, as shown in the following curve:

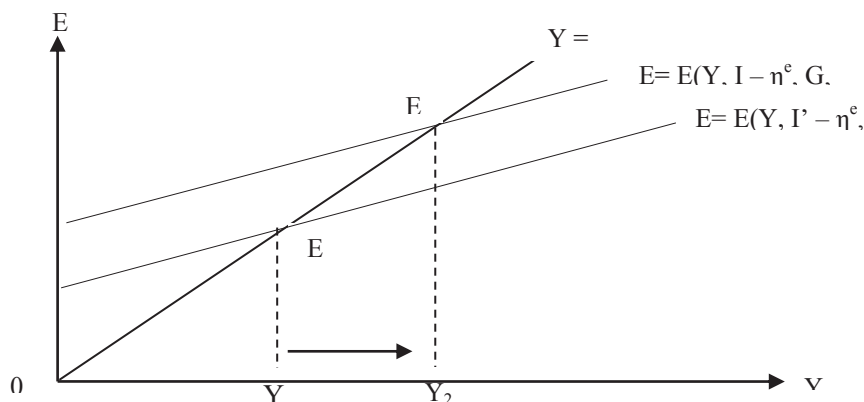


Fig. 1. Economic Growth

Source: David Romer, *Advanced Macroeconomics*, p. 201

The national income generated by an economy can be formulated through a Cobb-Douglass production function as follows:[37]

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha}, \quad 0 < \alpha < 1 \tag{1}$$

In which, K= capital input, L = labor input, A = technology level

Meanwhile, the national output is formed from household consumption expenditure (C), company investment expenditure (I), and government expenditure (G), with δ indicating the amount of capital depreciation so that it can be formulated as:

$$\begin{aligned} K_{t-1} &= K_t + I_t + G_t - \delta K_t \\ &= K_t + Y_t - C_t - G_t - \delta K_t \end{aligned} \tag{2}$$

The amount of wages (w) and the interest rate (r) is determined by the marginal product of the labor and capital inputs, namely: [37]

$$\begin{aligned} w_t &= (1-\alpha) K_t^\alpha (A_t L_t)^{-\alpha} A_t \\ &= (1-\alpha) \left(\frac{K_t}{A_t L_t} \right)^\alpha A_t \\ r_t &= \alpha \left(\frac{A_t L_t}{K_t} \right)^{1-\alpha} - \alpha \end{aligned} \tag{3}$$

Furthermore, the expected household's maximum utility value can be formulated as follows:

$$U = \sum_{k=0}^{\omega} e^{-pt} u(c_t, 1 - \tau_t) \frac{N_t}{H} \tag{4}$$

Where N = total population, H = number of households, p = discount rate. Population growth (n) exogenously can be formulated as follows: [27-31]

$$\ln N = \bar{N} + nt, \quad n < p \tag{5}$$

By including the trend of economic growth and technological development, it is assumed that the economic model is not in shock so that it can be formulated as follows:

$$\ln A_t = \bar{A} + gt + \tilde{A}_t \tag{6}$$

In which: $\ln A_t$ g = technological development level, \bar{A} = the effect of the shock

The formula above explains how economic growth occurs due to changes in the components that make up national income (GNP/GDP), namely consumption and investment, which are marked by an upward shift in the aggregate demand (AD) curve, thus pushing national income to the right from Y_1 to Y_2 . [20-23] Meanwhile, the expenditure approach adds up all expenditures in the economy, comprising household consumption expenditures, corporate investment expenditures, government spending, and the foreign sector, namely exports minus imports, as in the following formula:[39]

Research on the economic growth determinants in ASEAN countries included the independent variables: population (POP), exports (X), foreign investment (FDI), foreign debt (HLN), money supply (JUB), interest rates (r), human development index (HDI), corruption perception index (GPA), financial literacy index (ILK), and energy consumption (KE). Meanwhile, the dependent variable was economic growth. The research model formulation with the dynamic panel data analysis model is:

$$Y_{it} = \alpha + \beta_1(\text{POP})_{it} + \beta_2(\text{X})_{it} + \beta_3(\text{FDI})_{it} + \beta_1(\text{HLN})_{it} + \beta_2(\text{JUB})_{it} + \beta_3(\text{r})_{it} + \beta_1(\text{IPK})_{it} + \beta_2(\text{IPM})_{it} + \beta_3(\text{ILK})_{it} + \beta_1(\text{KE})_{it} + \epsilon_t \quad (7)$$

Description:

- Y = Economic growth (GDP)
- α = Constant
- $\beta_{1,2,3,\dots,n}$ = Variable coefficient 1,2,3,...n
- POP = Total population
- r = Interest rate
- JUB = Money supply
- X = Export
- IPM = Human Development Index
- KE = Energy consumption
- HLN = Foreign debt
- IPK = Corruption Perception Index
- ILK = Financial Literacy Index
- FDI = Foreign investment
- i = Indonesia, Myanmar, Malaysia, Singapore, Thailand, Laos, Vietnam, Cambodia, Brunei Darussalam, Timor Leste, and the Philippines
- t = 2015-2019

Economic growth is determined by factors that can increase the components constituting the national income, both economically and non-economically [16-22] The increase in consumption expenditure is determined by the national income, defined by the productivity of human resources in terms of the quality of education, health, and skills [40] In addition, the increase in corporate investment spending through the investment climate encourages investors' interest in investing and the ability of the financial sector to channel public savings into real economic sectors. Hence, in this case, investment is established by economic variables, namely the amount of public saving determined by the income and business efficiency of the financial and banking sectors in managing public savings funds to be channeled to the real sector. The intermediation function of banking institutions is regulated by banking management and macroeconomic policies carried out by the monetary authority in controlling the function of financial institutions as institutions that accommodate public funds and distribute them to the real sector [33-35]

3 Analysis Method

The estimation of the regression coefficient in research on the economic growth determinants in the ASEAN economic community region using several economic variables by applying the least square method was formulated as follows:[31]

$$\sum(Y_i - \hat{Y})^2, \text{ where } \hat{Y}_i = a + bX_i \tag{8}$$

The formulation to determine the values of constant (a) and regression coefficient (b) is as follows:[31]

$$\begin{aligned} \frac{\partial}{\partial b} \sum(Y_i - a - bX_i)^2 &= -2 \sum(Y_i - a - bX_i) \\ \frac{\partial}{\partial b} \sum(Y_i - a - bX_i)^2 &= -2 \sum(Y_i - a - bX_i) \\ \sum(Y_i - a - bX_i) &= 0 \\ \sum X_i(Y_i - a - bX_i) &= 0 \\ \sum Y_i &= aN + b \sum X_i \\ \sum X_i Y_i &= a \sum X_i + b \sum X_i^2 \end{aligned} \tag{9}$$

To solve the simultaneous equations with the least-squares approach, the following formula was put together:

$$\begin{aligned} \sum X_i \sum Y_i &= aN \sum X_i + b(\sum X_i)^2 \\ N \sum X_i \sum Y_i &= aN \sum X_i + bN \sum X_i^2 \\ N \sum X_i Y_i - \sum X_i \sum Y_i &= b\{N \sum X_i^2 - (\sum X_i)^2\} \end{aligned} \tag{10}$$

From the above formula, the constant (a) and regression coefficient (b) values could be obtained as follows:[31]

$$\begin{aligned} b &= \frac{N \sum X_i Y_i - \sum X_i \sum Y_i}{N \sum X_i^2 - (\sum X_i)^2} \\ a &= \frac{\sum Y_i}{N} - b \frac{\sum X_i}{N} \end{aligned} \tag{11}$$

The estimation of panel data analysis utilizing the fixed effect model assumes differences between individual times in the data studied. In this study, the Least Square Dummy Variable (LSDV) approach was indicated by the difference in the intercept, defined with the following matrix:[31-35]

$$\begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix} = \begin{bmatrix} a \\ a \\ a \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} + \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} + \begin{bmatrix} X_{1.1} & X_{2.1} & X_{1.1} \\ X_{1.2} & X_{2.2} & X_{1.1} \\ X_{1.3} & X_{2.3} & X_{1.1} \end{bmatrix} + \begin{bmatrix} \beta_1 \\ \beta_1 \\ \beta_1 \end{bmatrix} + \begin{bmatrix} \beta_1 \\ \beta_1 \\ \beta_1 \end{bmatrix}$$

Based on the Chow test results, it is known that the probability value was <0.05, meaning that the valid model for panel data analysis in this study was the fixed effect model. Meanwhile, the Hausman test results revealed a probability value of > 0.05, indicating that the valid model in this study was the random effect model. In addition, the Lagrange Multiplier (LM) test results stated that the probability value was <0.05, signifying that the valid model was a random effect model. [33-35]

4 Empirical Findings

The estimation results of research panel data analysis on the economic growth determinants of the ASEAN economic community with the feasible generalized least square (FGLS) approach are as follows:

Table 2. Panel Data Analysis Model Estimation of Economic Growth Determinants in ASEAN Countries

Dependent Variable:	Feasible Generalized Least Square
	Coefficient
Constant	-10.6613
Probability	0.000
Population	0.9463***
Probability	0.000
Money supply	0.0764
Probability	0.215
Foreign debt	0.0327
Probability	0.609
FDI	0.0418*
Probability	0.063
Export	-0.0035
Probability	0.296
HDI	8.4018***
Probability	0.003
Interest rate	-0.0018
Probability	0.960
Corruption Perception Index	0.0113
Probability	0.354
Financial Literacy Index	0.0003
Probability	0.428
Energy consumption	-0.0003
Probability	0.965
Timedummy2	-0.0560
Probability	0.801
Timedummy3	-0.1339
Probability	0.558
Timedummy4	-0.3359
Probability	0.147
Timedummy5	-0.1330
Probability	0.561
Timedummy6	-0.4052*
Probability	0.085
Timedummy7	-0.6654***
Probability	0.009
Timedummy8	-0.4318*
Probability	0.074
Timedummy9	-0.1315
Probability	0.598
Timedummy10	-0.2007
Probability	0.442
Wald χ^2	893.94***
Probability	0.000
Log Likelihood	-69.8156

Source: World Bank (processed), Description: *** = significant if $\alpha = 0.01$, ** = significant if $\alpha = 0.05$, * = significant if $\alpha = 0.10$

In research on the economic growth determinants in the ASEAN economic community, the dependent variable was economic growth (GDP). In contrast, the independent variables consisted of the population (POP), exports (X), foreign investment (FDI), foreign debt (HLN), money supply (JUB), interest rate (r), corruption perception index (GPA), human development index (HDI), financial literacy index (ILK), and energy consumption (KE). The estimation results by applying the feasible generalized least square (FGLS) model uncovered that there were only six independent variables that showed a significant influence on the economic growth of the ASEAN economic community: population (POP), foreign investment (FDI), human development index (IPM), timedummy year-6, timedummy year-7, and timedummy year-8. These empirical findings indicate that demographic factors are influential on economic growth in the ASEAN economic community. This sociological phenomenon also signifies that the ASEAN economic community member countries could take advantage of the demographic bonus momentum to encourage economic growth, including develop agriculture sectors.[17-24] In addition, the regression coefficient value of the population variable was 0.9463. It means that an increase in the population of one million people will increase economic growth in the ASEAN economic community by 0.946 billion US dollars. This phenomenon also denotes how the ASEAN economic community countries have become centers of world economic growth by taking advantage of their large population. The population strength is mainly to support the small and medium economic sector, which is labor-intensive. Likewise, in the agricultural, plantation, and fishery sectors, it is to process the natural resources results to produce primary products or meet industrial needs. Moreover, the large population is the economic driver of the ASEAN economic community through its involvement in all economic sectors, which are being intensively carried out, such as the infrastructure construction for the education sector, transportation, health, irrigation canals, housing, office buildings, etc. [6-10]

In this study, the foreign investment variable (FDI) had a positive and significant effect on the economic growth of ASEAN countries, with a coefficient value of 0.0327. It means that an increase in foreign investment of one billion US dollars will increase economic growth by 0.0327 billion US dollars. In this regard, the entry of foreign investment in the ASEAN economic community countries is a driver of economic growth in the region because ASEAN countries - except Singapore - face the capital scarcity problem. This phenomenon is a crucial economic development issue in developing countries - including ASEAN countries - to encourage economic growth. Capital scarcity results from a lack of public savings funds entering the money market, both in the banking and capital markets. This condition occurs as some developing countries face the problem of community low-income levels so that the funds that can be saved are relatively small. Another factor is the lack of strength in the financial sector in meeting the community needs to save money in banks and the ability of banks to channel financing funds to the real sector.

Furthermore, the variable human development index (HDI) is an essential factor to encourage the economic growth of the ASEAN economic community. It emphasizes the importance of the quality of human resources as the primary factor to encourage economic growth in ASEAN countries. In this study, the regression coefficient of the HDI variable was 8.4018, indicating that an increase in the HDI index will increase the economic growth of the ASEAN economic community countries by 8.4018 billion US dollars. In this case, the phenomenon of the quality of human resources is a crucial issue in ASEAN countries since the main factor of economic development lies in the quality of human resources, which relies on health, education, and ability aspects to adapt to changes in the global economic environment. However, the low quality of human resources is indicated by many residents in several ASEAN countries who only reach the high school level and have not had time to enjoy educational facilities up to university. For this reason, improving the

quality of human resources through improving the quality of education and health will impact increasing economic productivity, encouraging economic growth in the ASEAN economic community countries. [37-42]

The regression estimation results also disclosed that the dummy variables in the 6th, 7th, and 8th years showed a significant value. It signifies that in the period of the 6th, 7th, and 8th years, there was an increase in the economy in the ASEAN economic community countries. The regression coefficient value of the 6th year dummy variable was -0.4052, and with a constant value of -10.6613, the number was -11.0665. If the antilog value was searched and multiplied by the GDP value, the mean value was 0.976. It means that in the 6th year, the average economy in the ASEAN economic community countries increased by 0.976 billion US dollars. Meanwhile, the regression coefficient value for the 7th year dummy variable was -0.6654, and the mean economic growth of ASEAN countries was -11.3267. If looking for the antilog value and multiply it by the GDP value, the mean value was 1.77, meaning that in the 7th year, the average economy in the ASEAN economic community countries increased by 1.77 billion US dollars. Furthermore, the regression coefficient value of the dummy variable in the 8th year was -0.4318, and with a constant value of -10.6613, the number was -11.0931. If the antilog value was searched and multiplied by the GDP value, the mean value was 1.67. It indicates that in the 7th year, the average economy of the ASEAN economic community countries increased by 1.67 billion US dollars. This phenomenon signifies that the economies of the ASEAN economic community countries are heterogeneous between developed countries, such as Singapore, Malaysia, and Thailand, and still relatively lagging countries, for instance, Cambodia, Vietnam, Laos, and Myanmar. Moreover, ASEAN is a region that has become a crossroads of international trade traffic and is increasingly open to turmoil in the global market. The impact on the ASEAN countries' economies would begin to be felt by the ASEAN economic community countries in the 6th year. Meanwhile, from the 2nd year to the 5th year, it was not shown any influence on the economic conditions of the ASEAN economic community countries. This condition is related to the economic crisis that runs periodically for 4-5 years, as has happened before. In addition, it is also influenced by the burden of foreign debt borne by the ASEAN economic community countries, which are due to pay off the principal and interest. [43-46]

5 Conclusion and Recommendation

Empirical findings from research on the economic growth determinants in ASEAN economic community countries revealed the importance of investment factors and the quality of human resources (HR) as vital factors in promoting economic growth. The development of the quality of human resources through improving the quality of education and training and the opportunity to develop learning experiences in the world of industry and work will increase the human resource capacity of the ASEAN economic community countries, including develop agriculture sector that contribute big contribution on regional economic. In addition, the adaptation of human resources to technology and information development can be a medium to strengthen capacity in seizing existing economic opportunities. On the other side, policies to attract investors, both domestic and foreign, by continuously improving the investment climate through a more accessible and more efficient licensing process, eliminating rent-seeking and corrupt practices, and improving the quality and capacity of infrastructure will have an impact on increasing economic efficiency. Another essential thing is how to optimize the multiplier impact of foreign and domestic investment on local economic potential so that it can influence regional economic growth and equity. Moreover, it is necessary to find a formula to build a synergy between the government and the business world in strengthening the macroeconomic fundamentals

of ASEAN countries in the face of economic disruption, which has the potential to damage the stability and sustainability of economic development in the ASEAN economic community countries. [14, 25, 49]

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