An Empirical Study of ASEAN Economic Growth

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Abstract. Amid the Covid-19 Pandemic, the economic growth all countries plummeted. To analyze these countries' economic growth development, necessary for analyzing factors that affect the economic growth, both are the long and the short term. This study aims to analyze the overview conditions the economic growth of Asean countries, then to analyze the influence of macroeconomy variables, such as foreign direct investment (FDI), free trade/open economy, and inflation on the economic growth be it is long and the short term. Methods used in this case are quantitative and qualitative approach. The quantitative approach is using Error Correction Model, and the graphical analysis is used to describe qualitative approach. Some of Asean countries such as Thailand, Indonesia, Malaysia, Singapore are taken as a sample due to macroeconomy variables of Philippines fail the stationary level test stage, in the meantime, there is no cointegration indicated variable for Vietnam. So, there are negative the economic growth for some Asean countries, Thailand is −6,08%, Indonesia is −2,07%, Malaysia is −5,58%, and Singapore is −5,39%. For the economic growth of Indonesia in the short and long term, none of the foreign direct investment (FDI), free trade, and inflation can significantly affect the economic growth. In the long and short term, Malaysia is impacted by FDI, and the open economy is clearly positive. At the same time, inflation is negative but not significant. The long term, economic growth of Singapore, no independent variables can affect the economic growth of Singapote. In the meantime in the short term, only inflation has a significant positive impact. In the long term, the economic growth of Thailand is not influenced by these three variables, meanwhile in the short term, FDI has a positive significant effect on the economic growth of Thailand.

Keywords: ASEAN · Economic Growth · Error Correction Model

1 Introduction

ASEAN is an association of Southeast Asian countries that organizes cooperation in the region. Currently, the countries that are members of the ASEAN organization are Indonesia, the Philippines, Malaysia, Singapore, Thailand, Brunei Darussalam, Vietnam, Laos, Cambodia, Myanmar, Bangladesh, Palau, Papua New Guinea, the Republic of China, and Timor Leste [1]. The economies of ASEAN countries currently occupy important positions in the global economy, especially during the 2008 economic crisis.

I. Ifdil (Ed.): PSSHERS 2021, ASSEHR 690, pp. 275–286, 2023.
https://doi.org/10.2991/978-2-494069-33-6_34

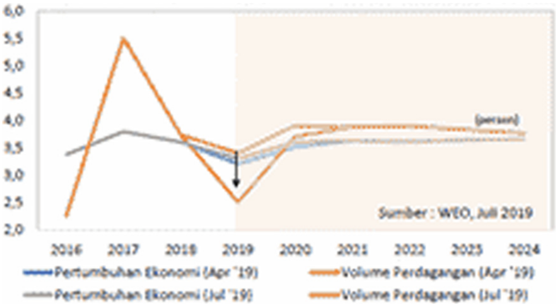

Fig. 1. Economic Growth and Interntional Trade Volume Source: Ministry of National Development Planning, 2019

Table 1. Economic Growth in Asean Countries in Q2 2020

No	Countries	Economic Growth (%)
1	Vietnam	0,36
2	Indonesia	-5,32
3	Thailand	-12,2
4	Singapura	-13,2
5	Philippines	-16,5
6	Malaysia	-17,1

Source: National Secretary of Asean-Indonesia, 2020

Beginning in the United States, the global economic crisis has spread to several countries in the world, including countries in East Asia and Southeast Asia. The economic downturn occurred as a result of reduced trade volume which had an impact on the industrial sector.

Amidst this case, the economies of East Asia and Southeast Asia were able to emerge from this crisis. Indonesia is one of the South East Asian countries that contribute significantly to economic growth [2]. However, after the global economic crisis that occurred in 2008, there are still countries that have not been able to fully recover their economies, including countries in Europe and East Asia. This certainly has an impact on the economic growth of countries in ASEAN, wherein 2017 and 2018, the economic growth of ASEAN countries was able to reach 5.3% and 5.1%, respectively. However, in 2019, this number decreased to 4.9%. This situation was exacerbated by the COVID-19 pandemic of early 2020. The ASEAN countries have experienced considerable economic decline. The following is a description of six (six) ASEAN countries with the fastest-growing economies in early 2020:

Based on the data listed above, ASEAN countries, which usually provide the highest contribution to economic growth, experienced negative growth in the second quarter of 2020. Indonesia's economic growth contracted to −5.32%. Followed by Singapore, Thailand, and the Philippines. Meanwhile, Vietnam is still stable with 0.36% growth. The country with the lowest economic growth was Malaysia, which was −17.1%.

Several factors can be considered to assess the short- and long-term economic growth of ASEAN countries. These include foreign investment (FDI), open trade/open economy, gross fixed capital formation, and the rate of inflation. Mentioned above, team is interested to scrutinize the economic growth of Asean countries by using Error Correction Model Approach to look at the short and long term effect by the factors analyzed.

2 Literature Review

Pramasty and Rosintan [3] studied the determination of economic growth in seven ASEAN countries from 1996 to 2013. Panel data regression is used as an analytical tool, where the independent variables used in this study are foreign debt, FDI, and inflation, while economic growth is the dependent variable. Indications of the results found that aggregate foreign debt, FDI, and inflation have a significant negative effect on economic growth in 7 ASEAN countries. Partially, it was found that in Indonesia, Thailand, and the Philippines only the inflation has a significant effect on economic growth. In Malaysia, the variables that have a significant effect on economic growth are FDI and inflation. Meanwhile, in Vietnam, Cambodia, and Laos, none of the independent variables affect economic growth.

Aprilia and Hariyanti [2] in their study of Determinants of Economic Growth in ASEAN Countries, used panel data regression using time series data from 1995–2012 and Cross-section data with 6 observations (6 countries). The dependent variable used in this study is economic growth while the independent variables are FDI, Openness, Gross Fixed Capital Formation, and inflation rate. Based on the results of his research, it was found that the variables of FDI, Openness, Gross Fixed Capital Formation affect the economic growth of the six ASEAN countries in a significantly positive manner, while the inflation rate variable affects the economic growth of the six ASEAN countries significantly negative.

Sattarov [4] on Inflation and Economic Growth: Analyzing the Threshold Level of Inflation Case Study of Finland 1980–2010. The dependent variable in this study is economic growth while the independent variable is inflation. The data in this study are time-series data from 1980 to 2010. By using the estimation of the ECM model, in his research, it was found that in the long term inflation and economic growth in Finland have a positive relationship.

3 Method

This research is using secondary data which starts from 2011 to 2020. The descriptive analysis method in this study is used to answer the first objective, namely to find out how the overall economic growth conditions in ASEAN countries before or during Covid19 pandemic, by formulating and collecting data, then presented in the form of a graph. Furthermore, to answer the second research objective, the ECM (Error Correction Model) model equation is used. ECM is a model used to look at the short-term and long-term effects of the independent variable on the dependent variable. According to Sargan, Engle, and Granger [5], ECM is a technique for correcting short-term to long-term imbalances and can explain the relationship between the independent variable and the dependent variable for the past or the future.

ECM is adjustment model in modification imbalance of short term towards long term [6]. Kindly find the equation of long term model below:

$$\boldsymbol{EG} = \alpha + \boldsymbol{\beta 1 FD1} + \boldsymbol{\beta 2 OE} + \boldsymbol{\beta 3 Inf} + \boldsymbol{\mu i} \tag{1}$$

where:
∝: Intercept.
EG: Economic Growth.
FDI: Foreign Direct Investment.
OE: Open Economy.
Inf: Inflation.
μi = Error term.

Meanwhile, Co-integration is a movement along similar wave whereby μi (error term) stationary caused by Y_t that cancel out X_t trend simultaneously. For instance:

$$\boldsymbol{\mu i} = \boldsymbol{Yt} - \boldsymbol{\beta} 0 - \boldsymbol{\beta} 1 \boldsymbol{Xt} \tag{2}$$

The principal requisite regression that co-integrated in which every variable cointegrated in similar ordo (order). In the meantime, other requisite to be sufficient regression the μi must be stationary.

In conducting a stationary test, several things must be done. The first is to scrutinize the variables through the unit root test at the level. If at the level all the variables are significant, then the ECM model cannot be used, but if one of the variables is not significant at the level and significant at the 1st difference or 2nd difference level, then the ECM model can be used in research.

Integration Degree Test, is a continuation of the unit root test as a consequence of the non-fulfillment of the assumption of stationarity at zero degrees. This test is very important to do for each variable in order to know the stationery of the research data. And to find out how many times the data must be different to a certain degree in order to produce a stationary variable. All existing variables will be different to a certain degree until all variables are stationary at the same degree.

Cointegration is used to obtain a long-term relationship between variables so that it can be used in an equation, in the cointegration test the method used is the Johansen Cointegration Test method which is used in a single equation that is unidirectional. Basically, this test uses the Augmented Dickey Fuller (ADF) method which consists of two stages. First, regress the equation of the dependent variable with the independent variable through the OLS method and from the regression, the residual (u) is obtained. Second, perform the ADF test on the residuals with the same hypothesis as the previous ADF hypothesis.

If the null hypothesis is rejected (significant) then the variable u is stationary or in this case a linear combination between variables is stationary. This shows that although the variables used are not stationary. But in the long run, these variables tend to be in equilibrium. It is assumed that y is the dependent variable and the independent variables are x1, x2, x3 with the equation:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + u \tag{3}$$

where u residual.

4 Results and Discussion

4.1 An Overview of ASEAN Economic Growth

To answer the first objective, which is to analyze ASEAN countries' overall economic growth conditions before or during the Covid-19 pandemic, it will be presented in graphical form. The following is an overview of the economic growth of 4 ASEAN countries before and after the Covid-19 pandemic. Source: Processed, 2021.

Figure 2 shows the economic growth conditions of 4 ASEAN countries from 2000 to 2020. Through the graph, we can see that, of the four ASEAN countries, the highest economic growth occurred in 2010 which was 14.526% in Singapore, while the highest economic growth was in Singapore. The lowest economy occurred in 2020, which was −6.087% in Thailand. The economic growth of Indonesia in 2008 was the highest growth throughout 2000 to 2020 with an increase of 6.1%. The economic sector with the highest growth was the Transportation and Communications Sector with 16.7% and the lowest was in the Mining and Quarrying Sector 0.5%. Meanwhile, economic growth without oil and gas in 2008 reached 6.5%. In 2009 the economic growth of ASEAN countries decreased below 1%, in line with the global financial crisis which affected all countries in the world. The impact of the Covid-19 pandemic during 2020 had a major influence on economic growth in ASEAN countries. Based on Fig. 2, it can be seen that economic growth in each country is in a negative position. Each country economic

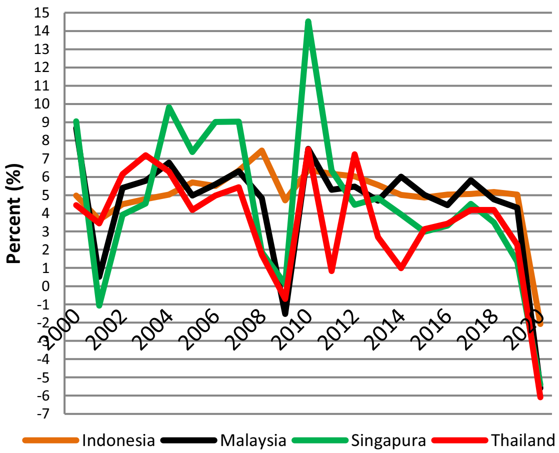

Fig. 2. Economic growth of 4 ASEAN countries before and after the Covid-19 Source: Processed, 2021

Table 2. Indonesia long-term estimation results

Variable	Coeffiecient	t-Stat	Prob.
C	3.773221	1.909604	0.0743
FDII	4.12E-11	1.469510	0.1611
PTI	0.020319	0.497714	0.6255
INFI	0.009521	0.115246	0.9097
Adj R^2		−0.019792	
F-stat		0.877083	
Prob(F-stat)		0.473619	

Table 3. Malaysia long-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	−7.263953	−2.043358	0.0578
FDIM	5.23E-10	3.492294	0.0030
PTM	0.053703	3.060237	0.0075
INFM	−0.299737	−0.706397	0.4901
Adj R^2		0.373311	
F-stat		4.772684	
Prob(F-stat)		0.014619	

growth during the Covid-19 pandemic (2020) was Indonesia by (−2.07%), Malaysia by (−5.588), Singapore by (−5.391), and Thailand by (−6.087). Among the four countries, the highest decline occurred in Thailand, on the contrary, Indonesia was the country with the lowest decline.

4.2 Long-Term Estimation Results of 4 (Four) ASEAN Countries

Based on the estimation results, it is found that in the long-term the foreign direct investment, open economy, and inflation have a positive relationship direction but do not significantly affect economic growth in Indonesia.

$$\mathrm{PEI_t} = 3,773 + 4,115\mathrm{E} - 11\mathrm{FDII_t} + 0,020\mathrm{PTI_t} + 0,009\mathrm{INFI_t} + \varepsilon$$

In the long term, foreign direct investment and open economy affect on the economic growth significantly positively, while inflation has a negative relationship direction but does not significantly affect economic growth in Malaysia.

$$\mathrm{PEM_t} = -7,263 + 5,234\mathrm{E} - 10\mathrm{FDIM_t} + 0,053\mathrm{PTM_t} - 0,299\mathrm{INFM_t} + \varepsilon$$

Table 4. Singapore long-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	−9.959191	−0.767793	0.4538
FDIS	2.08E-11	0.586739	0.5656
PTS	0.036233	1.089492	0.2921
INFS	0.556869	1.161055	0.2626
Adj R^2		0.127848	
F-stat		1.928402	
Prob(F-stat)		0.165696	

Table 5. Thailand long-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	13.14143	1.616281	0.1256
FDIT	2.12E-10	1.554263	0.1397
PTT	−0.093190	−1.353210	0.1948
INFT	0.498509	1.389687	0.1837
Adj R^2		0.057846	
F-stat		1.388854	
Prob(F-stat)		0.282312	

In the long term, be it is foreign direct investment, open economy, and inflation have a unidirectional relationship for economic growth, but unfortunately, none of them have a significant effect on economic growth in Singapore.

$$\mathrm{PES_t} = -9,959 + 2,078\mathrm{E} - 11\mathrm{FDIS_t} + 0,036\mathrm{PTS_t} + 0,556\mathrm{INFS_t} + \varepsilon$$

In the long term, foreign direct investment and inflation have a positive relationship towards economic growth in Thailand, while the open economy has a negative relationship direction for economic growth in Thailand. However, these three variables do not have a significant effect on economic growth in Thailand.

$$\mathrm{PET_t} = 13,141 + 2,121\mathrm{E} - 10\mathrm{FDIT_t} - 0,093\mathrm{PTT_t} + 0,498\mathrm{INFT_t} + \varepsilon$$

Table 6. Indonesia short-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	0.105289	0.508515	0.6190
D(FDII)	2.42E-11	0.753066	0.4639
D(PTI)	0.065548	1.325256	0.2063
D(INFI)	0.013580	0.256670	0.8012
ECT(-1)	−0.614464	−2.532738	0.0239
Adj R^2		0.321339	
F-stat		3.130702	
Prob(F-stat)		0.049152	

Table 7. Malaysia short-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	0.401341	1.069734	0.3028
D(FDIM)	4.73E-10	5.657502	0.0001
D(PTM)	0.156211	3.609976	0.0028
D(INFM)	−0.163333	-0.755201	0.4626
ECT(-1)	−1.366531	−7.190732	0.0000
Adj R^2		0.867493	
F-stat		30.46041	
Prob(F-stat)		0.000001	

4.3 Short-Term Estimation Result of 4 (Four) ASEAN Countries

In the short term, foreign direct investment, the open economy and inflation are positive but have no significant effect on economic growth in Indonesia.

$$\begin{aligned} \mathrm{D(PEI)_t} = {} & 0,105 + 2,421\mathrm{E} - 11\mathrm{D(FDII)_t} + \ 0,065\mathrm{D(PTI)_t} \\ & + \ 0,0113\mathrm{D(INFI)_t} - \ 0,614\mathrm{ECT}(-1) \end{aligned}$$

In the short term, foreign direct investment and the open economy affect Malaysia's economic growth significantly, positively, while inflation has a negative direction but does not significantly affect economic growth in Malaysia.

$$\begin{aligned} \mathrm{D(PEM)_t} = {} & 0,401 + 4,726\mathrm{E} - 10\mathrm{D(FDIM)_t} + \ 0,156\mathrm{D(PTM)_t} - \\ & 0,163\mathrm{D(INFM)_t} - 1,366\mathrm{ECT}(-1) \end{aligned}$$

In the short term, foreign direct investment and inflation affect the economic growth significantly, positively, while the open economy has a positive relationship direction

Table 8. Singapore short-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	−0.735389	−1.397452	0.1840
D(FDIS)	1.44E-10	3.835794	0.0018
D(PTS)	0.039913	1.656808	0.1198
D(INFS)	1.235593	4.652618	0.0004
ECT(-1)	−1.128034	−6.207820	0.0000
Adj R^2		0.835736	
F-stat		23.89486	
Prob(F-stat)		0.000004	

Table 9. Thailand short-term estimation results

Variable	Coefficient	t-Stat	Prob.
C	−0.002451	−0.005693	0.9955
D(FDIT)	3.40E-10	4.468871	0.0005
D(PTT)	0.014837	0.271160	0.7902
D(INFT)	0.430755	1.450063	0.1691
ECT(-1)	−1.050306	−4.597992	0.0004
Adj R^2		0.715920	
F-stat		12.34062	
Prob(F-stat)		0.000166	

for economic growth but does not significantly affect economic growth in Singapore.

$$\begin{aligned} \mathrm{D(PES)_t} = & -0,735 + 1,437\mathrm{E} - 10\mathrm{D(FDIS)_t} + 0,039\mathrm{D(PTS)_t} \\ & + 1,235\mathrm{D(INFS)_t} - 1,128\mathrm{ECT}(-1) \end{aligned}$$

In the short term, foreign direct investment affects Thailand's economic growth in a significantly positive manner, while the open economy and inflation have a positive direction but do not significantly affect economic growth in Thailand.

$$\begin{aligned} \mathrm{D(PET)_t} = & -0,002 + 3,395\mathrm{E} - 10\mathrm{D(FDIT)_t} + 0,014\mathrm{D(PTT)_t} + 0,430\mathrm{D(INFT)_t} \\ & -1,050\mathrm{ECT}(-1) \end{aligned}$$

4.4 Analysis of Long and Short-term Estimation

Based on the results of the study, it was found that the condition of economic growth in Indonesia in the long and short term was not influenced by foreign direct investment, open economy, and inflation, this is in line with research that studied by Rosnawintang et al. [7] (2020) and research by Putri, RNP [8] (2019). Indeed, Indonesia's economy is even less stable. This volatile situation has become a barrier, such as the decline of exports. Of course, lower exports also have an impact on the weakening of Indonesia's trade openness. This economic instability has also triggered the withdrawal of foreign investors from investing in Indonesia, in addition to non-economic factors such as a complicated bureaucracy that also hinders investors from investing because they think it is not efficient. The insignificant effect of inflation on Indonesia's economic growth is due to the inflation rate in Indonesia as well as in Malaysia, Singapore, and Thailand which is still below 10%, this figure is still relatively low to have an impact on economic growth. Judging from the research results, in the long term both Singapore and Thailand have the same conditions as Indonesia, namely between foreign direct investment, an open economy, and inflation, none of which can affect economic growth in that country.

However, in contrast to conditions in Malaysia, in the long term and short term in Malaysia, foreign direct investment and the open economy have a significant positive influence on economic growth in Malaysia. The results of this study are in line with research conducted by Rahmatullah, P et al. [9] and Putri, RNP [8] where in the long term FDI has a significant positive effect on Malaysia's economic growth. Similar to Indonesia, inflation in the long term and short term in Malaysia with a negative relationship direction does not have a significant effect on economic growth in Malaysia, this is in line with research conducted by Rosnawintang, et al. [7], because the inflation rate in Malaysia is still low. in a small number (less than 10%), there is therefore little impact on economic growth. Findings from this study are also consistent with research conducted by Aprilia and Hariyanti [2].

In the short-term period in Singapore, there are two variables with a significant positive effect on Singapore's economic growth: foreign direct investment and inflation. This is in line with research conducted by Rosnawintang, et al. [7] where inflation has a significant positive effect on economic growth. At the same time, the open economy has a positive but not significant impact on economic growth in Singapore. Inflation affects economic growth in the short term through productivity and output levels. Meanwhile, in the long term, none of the independent variables significantly affect economic growth, and this is in line with research conducted by Afifah, I [10] where the open economy affects economic growth positively but not significantly and is also in line with research conducted by Rosnawintang., et al. [7], where long-term inflation has no meaningful impact on economic growth.

In Thailand, in the long term, no independent variables can significantly affect economic growth. The results of this study are consistent with those conducted by Rosnawintang, et al. [7] and Afifah, I [10]. There are many factors, for example, FDI does not have a significant long-term effect on economic growth because FDI interacts in a complex way with various factors in a region before it can contribute to economic growth. Inbound FDI must be able to interact with the labour market to enable it to develop skills and knowledge through technology transfer [11]. Meanwhile, in the short term, the variables that have a significant positive effect are only foreign direct investment, the rest of the open economy and inflation have no significant effect on economic growth. FDI has a significant positive impact in the short term because it can promote one of the economic components, such as exports, as indicated by previous research. Human capital capacity (human resources) also needs to be prepared for FDI to have a positive impact on short-term economic growth.

An open economy does not have a significant effect on economic growth because economic openness reduces social and environmental standards, increases the poverty level of a country, especially developing countries, and increases the country's financial crisis [12].

5 Conclusion

The economic growth conditions of Indonesia, Malaysia, Singapore and Thailand before the pandemic were still in a stable condition but inversely proportional to the time of the Covid19 pandemic, economic growth slumped. The growth numbers for Indonesia, Malaysia, Singapore and Thailand are even negative. In 2020 (year of pandemic), Indonesia recorded economic growth (-2.07%), Malaysia (-5.588), Singapore (-5.391) and Thailand (-6.087). Of the four countries, Thailand recorded the largest drop, while Indonesia recorded the smallest drop.

With respect to Indonesia's short- and long-term economic growth, no foreign direct investment, open economy and inflation can have a significant impact on Indonesia's economic growth.

Long- and short-term Malaysian economic growth is influenced by FDI and the open economy is significantly positive. In the meantime, inflation is negative, but not significant.

Moreover, the long-term economic growth of Singapore, no independent variables can affect the economic growth of Singapore. Moreover, in the short term, only the variable inflation has a significant positive impact.

Finally, in the long term, Thailand's economic growth is not influenced by the three independent variables, while in the short term, only FDI has a significant positive effect on Thailand's economic growth.

Acknowledgement. Faculty of Economics and Business Universitas Jambi.

Author's Contribution. Author and Co-Author analyzed factors that influence the economic growth of Asean Countries.

References

1. Sekretariat Nasional Asean Indonesia. *Asean History,* 2017, http://setnas-asean.id/peranan-indonesia
2. Aprilia., Hariyanti, D,Determinasi Pertumbuhan Ekonomi di Negara ASEAN-6, 2014, *Jurnal Media ekonomi, 2(3), 205–220.*
3. Pramasty, D.E., Rosintan, L., Determinasi pertumbuhan ekonomi di 7 negara ASEAN periode 1996-2013, 2015, *Jurnal Media ekonomi, 23(2), 107–120.*
4. Sattarov, Khayrollo, *Inflation and Economic Growth: Analyzing the Threshold Level of Inflation Case Study of Finland* 1980–2010, 2011, Thesis Faculty of Social Sciences, Umea School of Business and Economics (USBE) Umea University. Sweden

5. Engle, R.F., & C.W.J. Granger, Co-Integration Correction: Representation, Estimation, and Testing, 1987, *Journal Of The Econometric Society, 55(2), 251–276.*
6. Juanda, B dan Junaidi, *Ekonometrika Deret Waktu,* 2012*,* IPB Press: Bogor.
7. Rosnawintang, et. al., Effect of Crude Oil Prices Volatility, the Internet and Inflation on Economic Growth in ASEAN-5 Countries: A Panel Autoregressive Distributed Lag Approach, 2020, *International Journal of Energy Economics and Policy* 11(1), 15–21
8. Putri. R.N.P., *Analisis Pengaruh Keterbukaan Ekonomi Terhadap Pertumbuhan Ekonomi Studi Kasus ASEAN tahun 2007–2017*, 2019, Skripsi Fakultas Ekonomika dan Bisnis Universitas Diponegoro. Semarang
9. Rahmatullah, P, et. al., Exchange Rate, FDI, and Economic Growth in Malaysia: An ARDL – ECM Approach, 2020, *Palarch's Journal of Archaeology of Egypt/Egyptology, 17(7), 8227–8244.*
10. Afifah. I, Pengaruh Keterbukaan Perdagangan, Investasi, Inflasi dan Angkatan Kerja Terhadap Pertumbuhan Ekonomi di 8 Negara ASEAN, 2018, *Jurnal ilmiah Mahasiswa Universitas Surabya* 7(2), 4071–4081
11. Mentari Munyta, et. al., Pengaruh *Foreign Direct Investment* Terhadap Pertumbuhan Ekonomi Di Nusa Tenggara Barat, 2017, *Jurnal Ekonomi Dan Bisnis Indonesia.* 2(2)
12. Dreher, A., The Influence of Globalization on Taxes and Social Policy: An empirical analysis for OECD Countries. 2006, *European Journal of Political Economy. 22(1)*