

Determinants of Unemployment in 5 ASEAN Countries with Population as Moderation

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Abstract

Total unemployment of the workforce that occurred in ASEAN 5 countries, namely Indonesia, Singapore, Thailand, the Philippines, and Malaysia from 2001 to 2021 with the population variable as a moderating variable. The regression analysis in this study uses 2 models. The use of two regression models is intended to compare the test results of the two regression models. The first regression model is used to test the effect of the two independent variables on the dependent variable. While the second regression model is to test the effect of the moderating variables. The results of Partial Testing in this study indicate that Investment has a significant negative effect on unemployment, then GDP Growth has been positive insignificant effect on unemployment and Inflation has a significant positive effect on unemployment. Meanwhile, the Results of the Moderated Regression Analysis Test in this study show that the Population is unable to moderate (weaken) the effect of Investment and GDP Growth on unemployment, but besides that, this study shows that the Population can moderate (strengthen) the effect of Inflation on unemployment.

INTRODUCTION

Unemployment is a persistent problem and requires attention. The term "unemployed" or "unemployed" refers to people who do not have a job at all, are looking for suitable work or people who are trying to get decent work. Unemployment can be defined as people who have reached a certain age and do not have a job, so they look for work to earn wages or benefits.

Unemployment remains a very important issue in ASEAN, where most member countries are still in the development stage. Based on World Bank data, every year, the countries with the highest unemployment rates are Indonesia, the Philippines, and Singapore followed by other countries. In general, this problem is triggered by several similar factors, one of which is population growth that is faster than the creation of available jobs. Therefore, unemployment in ASEAN is still a challenge that must be overcome quickly and effectively to improve the quality of life of the community and increase sustainable economic growth.

Amidst this complexity, governments non-governmental organizations and the private sector continue to seek solutions to reduce unemployment and increase employment opportunities for all. Education, skills training, inclusive employment

policies and economic innovation are part of the strategy to address this unemployment challenge (Utami, 2019).

Table 1. Unemployment, total (% of total labour force) work) in 5 Countries ASEAN.

YEAR	COUNTRY				
	INDONESIA	THAILAND	MALAYSIA	SINGAPORE	PHILIPPINES
2001	6.08	2.6	3.53	3.76	3.7
2002	6.60	2.1	3.48	5.65	3.6
2003	6.66	1.5	3.61	5.93	3.5
2004	7.30	1.5	3.54	5.84	3.6
2005	7.95	1.4	3.53	5.59	3.8
2006	7.55	1.2	3.38	4.48	4.1
2007	8.06	1.2	3.23	3.9	3.4
2008	7.21	1.2	3.32	3.96	3.7
2009	6.11	1.5	3.66	5.86	3.9
2010	5.61	0.6	3.39	4.12	3.6
2011	5.15	0.7	3.05	3.89	3.6
2012	4.47	0.6	3.1	3.72	3.5
2013	4.34	0.2	3.16	3.86	3.5
2014	4.05	0.6	2.88	3.74	3.6
2015	4.51	0.6	3.1	3.79	3.1
2016	4.30	0.7	3.44	4.08	2.7
2017	3.78	0.8	3.41	4.2	2.6
2018	4.39	0.8	3.3	3.65	2.3
2019	3.59	0.7	3.26	3.1	2.2
2020	4.26	1.1	4.54	4.1	2.5
2021	3.83	1.2	4.64	4.64	3.4

Source: WorldBankOpenData

The beginning selection of 5 countries in ASEAN (Indonesia, Thailand, Malaysia, Singapore, and the Philippines) because the 5 countries own similar cultures and similar histories and Once became a colony nation in Europe. In addition, these 5 countries' similarities in location geographical and value marks based on a similar culture also emerged factor important. So that creates a feeling underlying solidarity in the formation of ASEAN countries. Looking at the data above How does stability amount to unemployment in ASEAN? This may be at risk of setbacks in the future as the fourth industrial revolution occurs. ASEAN Member States have moved towards high and skill-intensive export production, which is reflected in a higher production workforce. The changes that occur vary greatly between regions. There is still more demand for high-skilled jobs in Indonesia, the Philippines, Thailand, the Philippines and Malaysia (Fung & LH Nga, 2022)

According to data from Table 1 Total unemployment of the workforce in 5 ASEAN countries obtained from the World Bank for the period 2001-2021, there are five ASEAN countries selected for comparison and have the highest average unemployment rates compared to other countries, namely Indonesia with an average unemployment rate of 5.51 per cent, Singapore with an average

unemployment rate of 4.40 per cent, Malaysia with an average unemployment rate of 3.45 per cent and the Philippines with an average unemployment rate of 3.33 per cent and Thailand with an average unemployment rate of 1.19 per cent, therefore this study uses 5 countries in ASEAN (Susanto & Wildan Pratama, 2021).

Previous research conducted by Al-Habees & Rumman (2012), it was found that economic growth has a negative relationship with the unemployment rate, meaning it can be concluded that if the economic growth rate increases, unemployment will decrease. Based on research by Hafiizh P & Pudjihardjo (2015), it provides results that in 2001-2013 investment generally hurt unemployment. The greater the investment, the lower the unemployment rate. This is due to increased investment which contributes to increased labor absorption. This is the effect of investment on the open unemployment rate. This study (Hasmawati et al., 2021), provides results, namely Referring to the results of the study that although investment factors have a positive impact on direct employment, economic growth and inflation do not directly affect employment. Economic growth does not have a direct effect on investment, but indirectly has a relationship between inflation and labour absorption and economic growth.

Based on previous research that examines unemployment in 5 ASEAN countries. In this study, combining previous research variables researchers use the variables of Direct Foreign Investment, GDP Growth and Consumer Price Inflation as independent variables but on the other hand, researchers also add new variables which are Population as moderator variables. Direct Foreign Investment, GDP Growth and Consumer Price Inflation are three factors that affect the population. Direct Foreign Investment can reduce unemployment by creating new jobs and GDP growth can also reduce unemployment because it increases the demand for labour inflation in the short term can reduce unemployment within the scope of the population can increase unemployment if it is unable to absorb labour.

The purpose of this study is to analyze the effect of Foreign Direct Investment, GDP Growth, and Consumer Price Inflation on Unemployment in 5 ASEAN Countries and to analyze the effect of Population in moderating Foreign Direct Investment, GDP Growth, and Consumer Price Inflation in 5 ASEAN Countries.

RESEARCH METHODS

Population and Research Sample

Quantitative research informs data that is numerical and will be analyzed statistically to determine the relationship between research factors. By combining time series and cross-section data, panel data is used to produce secondary data from *the World Bank* using the panel data regression method. This study uses population data from ASEAN countries and uses a sample of 5 countries in ASEAN in the period 2001 - 2021 with the highest impact on the foreign direct investment sector, GDP growth, Consumer price inflation and Population. According to the 5 countries with the highest unemployment rates in ASEAN. The data is measured by looking at the unemployment rate in 5 ASEAN member countries. The data source was obtained from the *World website*.

Sampling was carried out using the purposive sampling method, the criteria used were: to select the sample for this study are as follows:

1. In the 5 ASEAN countries in full have Investment data located in the *World Bank* in the period 2001 – 2021.

2. In 5 ASEAN countries in full has GDP Growth data located in the *World Bank* in the period 2001 – 2021.
3. 5 ASEAN countries in particular have Inflation Rate data located at *Worldbank* in the period 2001 – 2021.

Table 2 Population and Sample

No	Country	Criteria				Sample
		1	2	3	4	
1.	Indonesia	√	√	√	√	1
2.	Philippines	√	√	√	√	2
3.	Malaysia	√	√	√	√	3
4.	Thailand	√	√	√	√	4
5.	Singapore	√	√	√	√	5

Based on the method *purposive sampling* was taken according to the criteria above and from amount overall data, in get study a total of 5 countries. So the number sample in This research is 5 countries multiplied by 21 years of observation study so the obtained sample study a total of 105 countries.

Table 3 Population and Sample Criteria

Information	Amount
Population research registered with the <i>Worldbank</i> in the period 2001-2021	21
Number of Samples Obtained	5
Number of Observation Samples = 5 samples x 21 years of observation	105

Data collection technique

The method used For data collection, namely purposive sampling. For a more understanding research topic, research is done by doing studies bibliography and obtaining data from books, journals, websites, and other sources used as reference or guide study.

Analysis Model

There are several independent variables used in the linear regression model. Several regressions are selected as analyses because there are several variables. Regression to find out how close the relationship and influence of variable X is to variable Y and variable X to variable Y which is moderated by variable Z, using the linear regression function and moderated regression. Researchers will utilize the Microsoft Excel 2021 application to obtain clearer results and the SoftwareEviews 10 application. The data analysis method with panel data, the formula is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z \dots\dots\dots(1)$$

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \alpha_3 \dots\dots\dots(2)$$

β_0 = Intercept; $\beta_1, \beta_2, \beta_3$, = Coefficient; Y = Total unemployment of the labour force (%); X_1 = Foreign direct investment, net inflow of GDP (%) / *Foreign Direct Investment, net inflows (%) of Gross Products Domestic*; X_2 = Gross domestic product growth each year/ *Gross Products Domestic Growth (annual %)*; X_3 = Annual

consumer price inflation (%) / *inflation, consumer price (annual %)*; *Z = Population growth each year Population (annual %)*; *X1 Z = Foreign direct investment × Population moderation*; *X2 Z = Gross domestic product growth × Population moderation*; *X3Z = Consumer price inflation × Population moderation*; *e = Standard error*.

Data Analysis Techniques

Data management in this study uses a regression analysis method consisting of a classical assumption test with a normality test and a multicollinearity test. Then the best model selection test and moderation regression analysis where the relationship between the independent variable and the dependent variable can be influenced by the presence of another variable called a moderator.

RESULTS

Classical Assumption Test

Multicollinearity, heteroscedasticity, normality, autocorrelation, and linearity tests are some types of classical assumption tests that are commonly used as requirements before conducting further research. OLS linear regression is a model used to determine how two or more variables operate together, commonly known as the standard least squares method in English. Several requirements must be met for the regression model so that the prediction model is valid as a prediction tool.

Table 4. Normality Test Results.

Test	Prob.
Normality	0.602426

Normality

It is known from the test results using the Jarque -Bera test and it can be seen that the probability is above 0.05, which means that it can be stated that this model is normally distributed.

Multicollinearity Test

To find out whether the independent variables are correlated, a multicollinearity test can be used. Pairwise correlation is the tool of choice for multicollinearity testing. Here are the decisions of the multicollinearity test hypothesis:

Table 5. Results Test Multicollinearity with Test Jarque-Bera

	Y	X1	X2	X3	Z
Y	1	0.149097	0.170950	0.481033	0.167583
X1	0.149097	1	0.146382	-0.317798	-0.109515
X2	0.170950	0.146382	1	0.231291	0.094930
X3	0.481033	-0.317798	0.231291	1	0.163572
Z	0.167583	-0.109515	0.094930	0.163572	1

It is known from the table above that with multicollinearity testing there is no data above the value of 1, so the model does not contain multicollinearity.

Best Model Selection

Table 6. Chow, Hausman Test Results

Testing	Prob.	Description
Chow Test	0.0000	The FEM model is better
Hausman test	0.0000	The FEM model is better

Chow Test Results

Based on the testing of the table above, it can be seen that the probability value of the results of the Chow test using the fixed model effect obtained a result of 0.0000 which shows that the value is below 0.05 so that it can be obtained that the FEM model test results are better than the CEM model.

Hausman Test Results

above test, it can be seen that the probability value of the Chow test results using the fixed model effect obtained a result of 0.0000 which shows that the value is below 0.05 so that it can be obtained that the Fixed test Effect Model (FEM) is better than Random model Effect Model (REM). Thus, after conducting 2 tests to determine the best model, the FEM model was selected because the 2 tests have proven that the FEM model is the best.

Best Estimation Test Results

Table 7. Regression results using FEM.

Variables	Coefficient	Std. error	t-Statistic	Prob.
C	3.773256	0.271695	13.88783	0.0000
X1	-0.084615	0.029443	-2.873797	0.0050
X2	0.021941	0.026671	0.822643	0.4127
X3	0.151736	0.038766	3.914140	0.0002
Z	-0.212811	0.097967	-2.172277	0.0323
Indonesia	1.059625			
Philippines	-0.597107			
Malaysia	0.069498			
Thailand	-2.701007			
Singapore	2.307987			
Root MSE		0.758110	R-squared	0.798923
Mean dependent variable		3.551524	Adjusted R-squared	0.782167
SD dependent var		1.698750	SE of regression	0.792850
Akaike information criterion		2.455452	Sum squared residual	60.34674
Black criterion		2.682934	Log-likelihood	-119.9112
Hannan-Quinn criter .		2.547632	F-statistic	47.67875
Durbin-Watson stat		0.750451	Prob(F-statistic)	0.000000

F Test

Proven from the processed results that have been presented previously. The combined impact of the variables of Foreign Direct Investment, GDP Growth, Consumer Price Inflation and Population on unemployment in five ASEAN countries is quite large, as indicated by the F-statistic of 0.0000 or <0.05.

t-test

From the results of data processing, it is clear that X1 (Foreign Direct Investment) has a significant influence on Y (Total unemployment of the labour

force) because its probability value is 0.0050. The findings of data processing show that variable X2 (GDP Growth) does not affect Y (Total unemployment of the labour force) with a probability value of 0.4127. The findings of data processing show that variable X3 (Consumer price inflation) has a significant influence on Y (Total unemployment of the labour force) with a probability value of 0.0002

Adj. R- Squared

R Squared, or 79.96%, is calculated using these figures. The dependent variable Unemployment is influenced by the independent variables of Investment, Gross Domestic Product, Inflation and Population by 79.96% at once. At the same time, factors not included in this study cause the remaining variance.

Cross Section by Country

Indonesia : 3.773256 + 1.059625 = 4.832881

$$Y = 4.832881 * C - 0.084615 * X1 + 0.021941 * X2 + 0.151736 * X3 - 0.212811 * Z \dots\dots\dots (3)$$

Malaysia: 3.773256 - 0.069498 = 3.703758

$$Y = 3.703758 * C - 0.084615 * X1 + 0.021941 * X2 + 0.151736 * X3 - 0.212811 * Z \dots\dots\dots (4)$$

Singapore: 3.773256 + 2.307987 = 6.081243

$$Y = 6.081243 * C - 0.084615 * X1 + 0.021941 * X2 + 0.151736 * X3 - 0.212811 * Z \dots\dots\dots (5)$$

Thailand: 3.773256 - 2.701007 = 1.072249

$$Y = 1.072249 * C - 0.084615 * X1 + 0.021941 * X2 + 0.151736 * X3 - 0.212811 * Z \dots\dots\dots (6)$$

Philippines: 3.773256 - 0.597107 = 3.176149

$$Y = 3.176149 * C - 0.084615 * X1 + 0.021941 * X2 + 0.151736 * X3 - 0.212811 * Z \dots\dots\dots (7)$$

Based on the numbers, Singapore has constituents the biggest compared to any other country, which shows that when investment is foreign direct, growth GDP and Inflation price consumers slow down, and unemployment increases.

Population Regression as a Moderating Variable

Table 8. Results of the moderation regression test

Variables	Coefficient	Std. Error	t-Statistic	Prob.
X1Z	-0.021554	0.012705	-1.696467	0.0931
X2Z	0.054979	0.031547	1.743780	0.0847
X3Z	-0.127168	0.046608	-2.728483	0.0000

In the interaction between Foreign Direct Investment and Population, the probability value is 0.0931 > α 0.05, so H1 is rejected which means that the population is unable to moderate (weaken) the influence of Foreign Direct Investment on the Population.

In the interaction between GDP Growth and Population, the probability value is 0.0847 > α 0.05, so H1 is rejected and means that the population is unable to moderate (weaken) the influence of GDP Growth on Population.

In the interaction between Consumer Price Inflation and Population, the probability value is 0.000 < α 0.05, so H0 is accepted and means that the Population can moderate (strengthen) Consumer Price Inflation against the Population.

DISCUSSION

The Impact of Investment on Unemployment

The investment variable has a regression coefficient of -0.084615 according to the results of the Investment Against Unemployment test. So it can be seen that Investment and Unemployment as (Y) have a negative relationship of -0.084615. In addition, for every 1% increase in investment, this coefficient shows that unemployment will decrease by 0.084%.

This study provides results that investment in 5 ASEAN countries when investment increases, the unemployment rate will decrease. One of the reasons is the long-term impact of investment and the possibility of automation on established businesses. Businesses can reduce their dependence on human labour by investing in automation and robotics. While automation has the potential to increase output and efficiency, it also has the potential to reduce the need for human labour, especially in highly repetitive and routine jobs.

This is in line with research conducted by [\(Giri et al., 1994\)](#) The increase in foreign direct investment can cause unemployment to decrease because when there is an increase in foreign direct investment, there will be many industries or companies. With the many industries and companies due to the increase in the level of foreign direct investment, it will absorb a lot of labour because foreign direct investment is oriented towards labour-intensive.

The Impact of GDP Growth against Unemployment

The investment variable has a regression coefficient of 0.021941 according to the test results of GDP Growth Against Unemployment. So it can be seen that GDP Growth as variable X2 and Unemployment as (Y) have a positive relationship of 0.021941. In addition, for every 1% increase in GDP Growth, this coefficient shows that unemployment will usually increase by 0.02%. Likewise, if there is an increase in unemployment of 0.02%, then GDP Growth will increase by 1%.

This study provides results that GDP growth in 5 ASEAN countries has a positive and insignificant effect, where when GDP growth increases, total unemployment in the workforce will increase. This could be due to uneven economic growth because it is likely concentrated in certain sectors that require skilled workers. In addition, the economy may grow faster but if the workforce does not have the skills needed by the growing industry, many people could remain unemployed.

This is in line with research conducted by [\(Rafika, 2021\)](#). In this study, economic growth will increase because it is not accompanied by an increase in production capacity so unemployment continues to increase along with economic growth.

The Effect of Inflation on Unemployment

The inflation variable has a regression coefficient of 0.151736 according to the test results on Unemployment. So it can be seen that Inflation as variable X3 and Unemployment as (Y) have a positive relationship of 0.151736. In addition, for every

1% increase in Inflation, this coefficient indicates that unemployment will increase by 0.15%. Likewise, if there is an increase in unemployment of 0.15%, Inflation will increase by 1%.

This study provides results that inflation in 5 ASEAN countries has a positive and significant impact, where when inflation increases, the unemployment rate will increase. This could be because, if economic actors (consumers, companies, workers) expect inflation to continue to rise, they may act in ways that worsen inflation. For example, workers may demand higher wages to offset expected inflation, which can encourage companies to raise prices further. At the same time, companies may reduce the number of workers to reduce costs.

A depreciation of a currency can increase the price of imports, leading to inflation. If a country is heavily dependent on imports for raw materials or consumer goods, inflation can increase. A devaluation of a currency can also reduce people's purchasing power, which can reduce consumption and investment, thereby increasing unemployment.

This is in line with research conducted by (Yehosua et al., 2019) In this study, high inflation rates can encourage the central bank to raise interest rates and can cause contractions or negative growth in the real sector.

The Effect of Investment on Unemployment Moderated by Population

The results of *the Moderated Regression Analysis* (MRA) in this study indicate that the Population cannot moderate or increase the impact of investment on the unemployment rate because the probability value is above the significance level. The regression coefficient of the Investment x Population variable (X1Z) is -0.021554. This indicates a negative relationship between Investment (X1) and the unemployment rate (Y) which is regulated by Population (Z) with a coefficient of -0.021554. A 1% increase in Investment x Population is associated with a decrease in the Unemployment Rate of 0.021%. With every 1% decrease in Investment x Population, the unemployment rate will increase by 0.021%.

This study provides results that the population in 5 ASEAN countries is not able to moderate or strengthen the influence of investment on unemployment rates and Population does not act as an independent variable in this study. This shows that these 5 countries are in an uncertain condition where the rise and fall of the Population does not affect the unemployment rate.

Population growth has a complex impact on investment, with a range of factors that can both encourage and discourage investment. Population growth can create new market opportunities and increase employment, but it can also put pressure on resources and infrastructure. Governments and the private sector need to work together to ensure that population growth is balanced with appropriate investment in infrastructure and job creation.

This is in line with research conducted by Larasati (2023) In this study, the Indonesian population variable in the short term has a negative and insignificant effect on unemployment in Indonesia. In the long term, the Indonesian population variable has a positive and significant effect on unemployment in Indonesia. The Indonesian foreign direct investment (FDI) variable in 1991-2020 in the short term

has a positive and significant effect on unemployment in Indonesia in 1991-2020. In the long term, the Indonesian foreign direct investment (FDI) variable from 1991-2020 had a positive and significant effect on unemployment in Indonesia in 1991-2020.

The Effect of GDP Growth on Unemployment Moderated by Population

The results of *Moderated Regression Analysis* (MRA) in this study indicate that the Population cannot moderate or increase the impact of GDP Growth on total unemployment of the workforce because the probability value is above the significance level. The regression coefficient of the GDP Growth x Population (X2Z) variable is 0.054979. This indicates a positive relationship between GDP Growth (X2) and the unemployment rate (Y) which is regulated by Population (Z) with a coefficient of 0.054979. A 1% increase in GDP Growth x Population is associated with an increase in the Unemployment Rate of 0.054%. Every 1% decrease in GDP Growth x Population, the unemployment rate will decrease by 0.054%.

This study provides results that the population in 5 ASEAN countries is not able to moderate or strengthen the influence of GDP Growth on Unemployment and Population does not act as an independent variable in this study. This shows that these 5 countries are in a stable condition where the rise and fall of the Population does not affect the unemployment rate.

A growing population can be a major driver of GDP growth through increased labour force and market demand. However, without proper planning and investment in infrastructure, education, and health, population growth can also pose significant challenges. Therefore, governments and policymakers need to manage population growth wisely to maximize economic benefits while minimizing potential negative impacts.

The results of this study are in line with (Ramadhan et al., 2017) research which also states that the theory regarding the relationship between economic growth and unemployment can be seen from Okun's law, where the theory states that for every 2 per cent increase in GDP related to potential GDP, the unemployment rate will decrease by around 1 per cent.

The Effect of Inflation Rate on Unemployment Moderated by Population

The results of *Moderated Regression Analysis* (MRA) in this study indicate that the Population can moderate or increase the impact of Inflation on the unemployment rate because the probability value is below the significance level. The regression coefficient of the Inflation x Population variable (X3Z) is -0.127168. This indicates a negative relationship between Inflation (X3) and the unemployment rate (Y) which is regulated by Population (Z) with a coefficient of -0.0127168. A 1% increase in Inflation x Population is associated with a decrease in the Unemployment Rate of 0.012%. With every 1% decrease in Inflation x Population, the unemployment rate will increase by 0.012%.

This study provides results that the population in 5 ASEAN countries can moderate or strengthen the influence of inflation on unemployment rates and

population acts as an independent variable in this study. Showing that the Population variable on inflation influences the rise and fall of unemployment rates.

Population growth has a complex impact on inflation, depending on a variety of factors including aggregate demand, labour supply, government policies, and global economic conditions. While a growing population can increase demand and drive inflation, increasing labour supply and economies of scale can help mitigate inflationary pressures. Governments and policymakers need to consider these dynamics to effectively manage the impact of the population on inflation. This is in line with research conducted by (Purba et al., 2022) This study shows that inflation has a positive and significant effect on the ASEAN5 unemployment rate. This means that increasing inflation can significantly affect the number of unemployed.

CONCLUSION

Research has been conducted in analyzing the influence of Investment, Per and Inflation on the Unemployment Rate with Population as moderation in ASEAN 5 countries in the period 2001-2021. The results of Partial Testing in this study show that Investment has a negative and significant effect on the unemployment rate, then GDP Growth has a positive and insignificant effect on the unemployment rate and Inflation has a positive and significant effect on the unemployment rate.

Moderated Test Results Regression Analysis In this study, it is shown that the Population is not able to moderate (weaken) the influence of Investment and GDP Growth on the unemployment rate, but besides that, this study shows that the Population can moderate (strengthen) the influence of Inflation on the unemployment rate.

Simultaneously Proven from the processed results that have been presented previously. The combined impact of the variables of Foreign Direct Investment, GDP Growth, Consumer Price Inflation and Population on unemployment in five ASEAN countries is quite large, so it can be said that the dependent variable Unemployment is influenced by the independent variables Investment, GDP Growth, Inflation and Population with a large influence.

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