Information Management and Business Review (ISSN 2220-3796)
Vol. 15, No. 1, pp. 54-65, March 2023 (SI)

A Verification of Okun's Law: The Case of Southeast Asian Countries

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Abstract: The study investigates the relationship between unemployment and economic growth in selected Southeast Asian countries using annual time series from 2000 to 2020. Panel OLS, fixed effect, and Random effect were performed with an error correction method to ascertain the relationship between explanatory variables and response. The error correction term indicated a long-run relationship between unemployment and economic growth. The study used two models to evaluate the relationship between unemployment and economic growth. Model one explains how economic growth affects unemployment, while model two is devoted to examining the effect of unemployment on economic growth. The test results for model one indicated that the Random effect is the best-fitted model and concluded that economic growth has no significant influence on unemployment. However, Foreign Direct Investments makes a negative influence on unemployment. Further, model two investigates the effect of unemployment on economic growth, where Pooled OLS was selected. According to the test statistics, it can be concluded that unemployment harms economic growth, while Foreign Direct Investments and Inflation have a positive influence on economic growth. However, trade openness makes a negative effect on economic growth. Therefore, it can be concluded that the validity of Okun's law in Southeast Asian countries is limited.

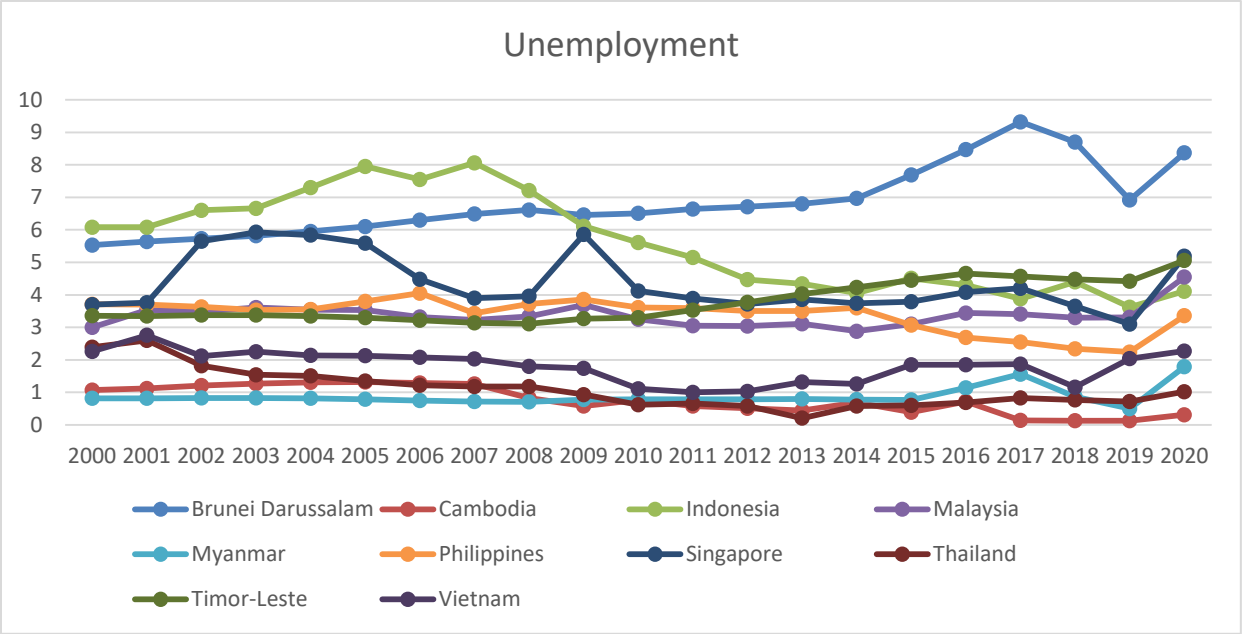
Keywords: *Unemployment, Economic Growth, Okun's law.*

1. Introduction and Background

Unemployment is a multi-faceted economic problem that indicates an imbalance in economic activity. Furthermore, because it influenced society's social structure, it is classified as a social phenomenon. Many scholars claim that economic growth leads to higher employment and lower unemployment (Nebot et al., 2019; Glefer, 2020; Kim et al., 2020; Hjazeen et al., 2021). The economic and social aspects of unemployment contribute to its complexities, needing an in-depth analysis to understand the causes and ramifications and propose effective solutions. Underemployment occurs when people's incomes are insufficient to cover their basic needs (Warsame et al., 2022). There is also "disguised unemployment," in which workers accept positions below their education and experience level (Earle & Sakova, 2000). Hence, unemployment is a universal problem with economic and social consequences. Because the outcome of the changes happens in the labor market is directly linked to domestic production that eventually reveals the economic status of a country because unemployment leads to consuming goods and services without contributing to the production that makes a negative influence on the economic growth of a country (Huang et al., 2020).

Melvin Okun, in 1962, looked at the statistical relationship between GDP and unemployment. He presents Okun's law by stating that a country's GDP must expand at a 3% rate for one year to produce a 1% drop in the unemployment rate. In contrast, a 1% rise in the unemployment rate reduces the country's domestic production by 2%. However, empirical literature shreds evidence that Okun's law is not valid for all countries, and some scholars have found an insignificant relationship between unemployment and economic growth (Kenton, 2022; Dankumo et al., 2019; Pasara & Garidzirai, 2020). Further, some schools of thought highlight that structural unemployment is one of the prominent factors determining the significance of unemployment towards economic growth (Adham, 2021). Figure 1 and 2 shows the economic growth and the unemployment rate in Southeast Asian countries.

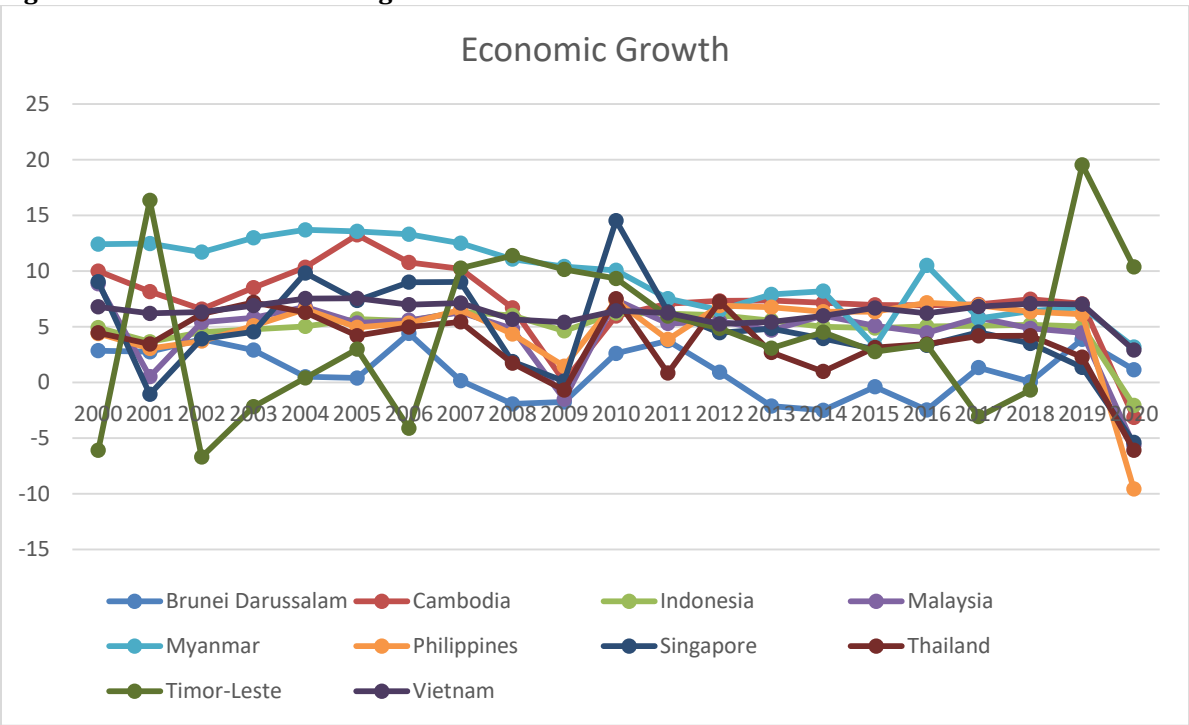
Figure 1: Unemployment Diagram of the Southeast Asian Countries



Source: World Bank

Figure 1 shows the percentage changes in South Asian countries over the 21 years from 2000 to 2020. In 2000, the highest unemployment rate was reported in Indonesia, but it reduced the unemployment rate to 4 percent by 2020. By 2020, the highest unemployment rate was reported by Brunei, and the rate was just over 8%, while Cambodia reported the lowest rate. Further, other countries have managed to maintain under 6%.

Figure 2: Economic Growth Diagram of the Southeast Asian Countries



Source: World Bank

Figure 2 shows the economic growth of Southeast Asian countries. This figure indicates that, in 2000, the lowest

economic growth was reported by Timor-Leste, and it was below negative 5%. However, in 2020, the highest economic growth was reported by Timor. In 2020, the lowest economic rate was reported by the Philippines, and the report rate reached negative 10%. Further, in 2020, most countries reported negative economic growth except Brunei, Vietnam, and Timor-Leste.

According to International Monetary Fund (IMF), October 2022 highlights Southeast Asia becoming the world's dominant economy. J.P. Morgon June 13th, 2022 report claims that South East Asia will be the next hub for multinational companies worldwide. As a result, this research aims to investigate the presence of Okun's rule in Southeast Asian economies by studying the correlation coefficient between unemployment and economic growth, which affects the global economy both directly and indirectly.

Furthermore, the results contribute to the body of knowledge and shed light on the direction of future studies. Apart from the empirical contribution, this study assists the government and policymakers shape and sharpen their policy decision toward sustainable economic policy decisions. The remaining sections of the paper are organized as follows. Section 2 provides a brief overview of Okun's Law hypothesis and past research on the relationship between unemployment and national income. Section 3 describes the data collection and analysis techniques. Section 4 contains the findings and discussion. Section 5 brings the research to a close.

2. Literature Review

Okun's Law, introduced by Arthur Okun in 1962, emphasized the negative relationship between unemployment and economic growth. In accordance with the Okun rule, a country's unemployment rate and GDP growth rate should have a significant adverse correlation when unemployment fluctuates over time. Okun asserts that a 1% increase in unemployment results in a 2% decrease in GDP. Rather, a 1% reduction in unemployment results in a 3% boost in GDP.

Ayesha et al. (2018) stated that Economic status, political stability, and globalization significantly affect a country's unemployment rate. Meanwhile, Dankumo et al. (2019) stated that there is a long-run correlation between political instability, the corruption rate of the country, economic growth, and unemployment. However, there is no significant influence by other factors except political instability, which negatively impacts economic growth. Furthermore, Imran et al. (2015) claimed that unemployment significantly affects economic growth. Confirming the same, Qamar et al. (2016) stated that higher unemployment rates significantly negatively impact GDP per capita. Blazquez and Cantarero (2018) confirmed the negative relationship between unemployment and economic growth in European countries. According to Louail and Benarous (2021), Algeria reveres Okun's law. Dritsakis and Stamation (2018) also laid out a long-term unidirectional causal association between economic growth and unemployment in EU member countries. Alrakhan et al. (2022), on the flip side, confirm the bidirectional negative association between economic growth and unemployment in Indonesia. Hjazeen et al. (2021) discovered a long-run link between unemployment and economic growth in Jordan.

Bayrak and Tatli (2018) said inflation, economic growth, and savings have a negative impact on youth unemployment negatively affect youth unemployment. Butkus et al. (2022) stated that unemployment among the young generation deviates across the economic sector they are dealing with. Furthermore, they stated that changes in the economic sector in which they work impacted unemployment. For example, changes in the construction industry have a greater impact on male employees than on female employees. Butkus et al. (2020) stated that the unemployment rate among males and youth significantly standout with changes in GDP.

Farhat et al. (2021) found that Asian countries follow Okun's Law, while Elhorst and Emili (2022) confirmed that Dutch provinces followed the same. Blinova et al. (2020) stated that a change in production volume makes a dynamic variation in the unemployment rate in Russia. According to Warsame et al. (2022), there is long-run and short-run cointegration between economic growth and inflation and the unemployment rate in Somalia. Further, they stated that inflation gets inconsequential to unemployment in the long run but has a negative association in the short run. Ahiadorme (2020) stated that there is a short-run relationship between unemployment and economic growth in Sub-Saharan countries. Danova and Vozarova (2020) make the same assumption, claiming that there is a short-run direct causal relationship between changes in unemployment and economic development. Farhat et al. (2021) confirmed Okun's law's applicability to Southeast Asian countries. According to Karadzic et al. (2021), Okun's legislation applies to Montenegro.

Soylu et al. (2018), for example, found a correlation between unemployment and economic growth in Eastern European countries. While Conteh (2021) asserted that there is no substantial association between unemployment and economic growth in Liberia. Pasara and Garidzirai (2020) found the opposite. It claims that the unemployment rate does not affect economic growth in the near run. It states that the unemployment rate has no significant influence on economic growth in the short run. However, in the long run, unemployment adversely affects economic growth.

3. Research Methodology

Data and sample acquisition: The analysis includes ten (10) Southeast Asian nations as a sample, including Malaysia, Cambodia, Brunei, Indonesia, Myanmar, the Philippines, Singapore, Timor-Leste, Vietnam, and Thailand, with the sample period encompassing twenty-one years from 2000 to 2020.

Two models were employed in the study to assess the relationship between unemployment and economic growth. At the same time, as generic models, the control variables were foreign direct investments, inflation, and trade openness, which are depicted below.

UNP= ∫ (GDP, INF, FDI, OPN)
GDP= ∫ (UNP, INF, FDI, OPN)

Where; UNP indicates unemployment and GDP represent Economic growth. INF indicates Inflation, while FDI and OPN indicate Foreign Direct Investment and Trade Openness, respectively. Its stochastic form specifies the model:

Model1; $UNP_{it} = \beta_1 - \beta_2 GDP_{it} + \beta_3 INF_{it} - \beta_4 FDI_{it} - \beta_5 OPN_{it} + \varepsilon_{it}$ (3.3)

Model2; $GDP_{it} = \beta_1 - \beta_2 UNP_{it} + \beta_3 INF_{it} + \beta_4 FDI_{it} + \beta_5 OPN_{it} + \varepsilon_{it}$ (3.4)

Data analysis
Data were analyzed with long panel data analysis techniques. According to Okun, the impact of economic growth on unemployment is assessed by the percentage change in the real growth rate over a given time divided by the percentage change in the unemployment rate over the same period. This assumption can be expressed mathematically as follows.

$$\Delta U_t = \alpha + \beta \Delta \log Y_t + \Delta \epsilon_t$$

Where the symbol Δ indicates the absolute change from the previous period, α denotes the constant, β denotes the Okun coefficient, Ut indicates the unemployment rate at time t, Y_t is the economic growth rate (log since we're talking about percentage changes), and ε_t indicates the error term. If economic growth is zero, the intercept equals the change in unemployment. A high intercept value indicates that eliminating unemployment will be more difficult, or that more growth would be required to avert further unemployment. If many countries are included, the formula must be adjusted.

$$\Delta U_{it} = \alpha \sum_{i=1}^{n} \beta_{it} C_i + \sum_{i=2}^{n} \beta_{it} C_i \Delta Y_{it} + \Delta \varepsilon_{it}$$

In equation 3.6, $\Delta U_{i,t}$ is the change in the country's i unemployment at year t, C_i is the country's i dummy variable (other than for country 1 to avoid perfect collinearity) andΔY_{it} is output growth for country i in period t. Because rapid output growth is associated with a declining unemployment rate, whereas sluggish or negative growth is associated with a rising unemployment rate, this coefficient is typically negative.

Panel unit root testing
Many panel unit root tests are intended to test the null hypothesis of a unit root for each series in the panel. On the other hand, the formulation of the alternative hypothesis is a contentious issue that is heavily dependent on the assumptions made about the nature of the panel's homogeneity/heterogeneity (Pesaran, 2011). The unit root null hypothesis is therefore expressed as follows:

$$H_0; \beta_i = 0 \text{ for all i.}$$

While the alternative hypothesis can be written as

$$H_1; \beta_i < 0$$

One disadvantage of tests based on such alternative hypotheses is that they typically have power even if not all units are stationary; thus, a rejection is not conclusive evidence that all series are indeed stationary. In the case of large N and T, however, panel unit root tests will lack power if the alternative given above is used. A better option for large N and T panels is provided by;

$$H_1; \beta_i < 0, i = 1, 2, \ldots\ldots N_1, \beta_i = 0, i = N_1 + 1, N_1 + 2, \ldots\ldots\ldots N,$$

Because there are many countries (N = 10) and a long period (T = 31 years) in this study, stationarity is tested using the second alternative hypothesis.

Pooled OLS model

Generally, Pooled OLS estimation presents the linear relationship between variables in the pooled data set. Here it assumes that the model presents the linear function and has no endogeneity problem. Moreover, it assumes that data shows homogeneity and no stochastic characteristics in independent variables. Hence, the study followed the pooled OLS to measure the nexus of unemployment and economic growth.

Fixed effect model

The least-square dummy variable is a way of taking into account the uniqueness of each cross-section, in this case, the countries. Allowing the intercept to vary for each sector while presuming that the slope coefficients remain constant across sectors or periods achieves this. Fixed effects models have been applied to social and economic problems. The study uses the fixed effect model to estimate the impact of unemployment on economic growth when all intercept coefficient varies among the countries. The equation is as follows.

$$UNP_{i,t} = \theta_1 + \theta_2 D_{2i} + \theta_3 D_{3i} + \theta_4 D_{4i} + \theta_5 D_{5i} + \theta_6 D_{6i} + \theta_7 D_{7i} + \theta_8 D_{8i} + \theta_9 D_{9i} + \theta_{10} D_{10i} + +\beta_1 GDP_{i,t} + \beta_2 INF_{i,t} + \beta_3 FDI_{i,t} + \varepsilon_{i,t}$$

Where; 10 dummy variables were introduced since the number of cross sections (countries) is ten. while β_1..... β_3 are the coefficients of the independent variables. finally, $\varepsilon_{i,t}$ is the error term.

Random Effect model

Here it assumes that there is an unobserved effect in the model but does not correlate with independent variables. It tests the group and time influence for the error variance. Therefore, the study followed the Random effect model to estimate the relationship between explanatory and response variables.

Breusch – Pagan Lagrange Multiplier Test

This test was performed to examine whether the Pooled Ordinary Least Square method is better than the Panel.

Hausman Test

This test is utilized to distinguish the random effect LS from fixed effect LS models. The alternative hypothesis is to select the fixed effects model. The Hausman test is carried out to examine whether there is a relationship between the unique errors and the model's regressors.

4. Findings and Discussion

The data set spans over twenty-one years, from 2000 to 2020, for 10 Southeast Asian countries, and there were 211 observations. Missing values were adjusted using the interpolation technique. Table 1 summarizes the data set's general attributes, which shows the common description of the variables used in this study.

Table 1: Summary Statistics

	UNP	GDP growth	FDI	INF	OPN
Mean	3.1087	0.0486	5.4326	4.3820	24.3985
Maximum	9.3200	0.1356	29.6904	57.0745	27.2241
Minimum	0.1400	-0.1053	-2.7574	-2.3150	16.6213
Std. Dev	2.2100	0.0377	6.1750	6.7495	2.3548

Source: Author's EViews computation

Table 1 presents the attributes of the data set and shows the Central tendency of dispersion of variables.

Panel Unit Root Test

Using the panel unit root test, the stationarity of the four variables is investigated with four criteria named; PP-Fisher Chi-square, ADF-Fisher Chi-square, Im, Pesaran and Shin W-stat, Levin, Lin & Chu.

Table 2: Panel Unit root test

OPN		INF		FDI		GDP		UNP		
I1	I0	I1	I0	I1	I0	I1	I0	I1	I0	tests
-5.2106 (0.0000)	-1.5768 (0.0574)	-11.4249 (0.0000)	-4.1652 (0.0000)	-12.9599 (0.0000)	-3.8821 (0.0001)	-9.3217 (0.0000)	-0.6921 (0.2444)	-5.5845 (0.0000)	-1.0395 (0.1493)	Levin, Lin &chu
-7.1042 (0.0000)	-2.1731 (0.0149)	-12.6824 (0.0000)	-4.3783 (0.0000)	-12.2461 (0.0000)	-4.5069 (0.0000)	-10.2815 (0.0000)	-2.7234 (0.0032)	-8.0482 (0.0000)	-0.4629 (0.3217)	Im, Pesaran and Shin W-stat
80.5065 (0.0000)	36.5717 (0.0060)	156.961 (0.0000)	60.4698 (0.0000)	150.747 (0.0000)	60.7507 (0.0000)	125.271 (0.0000)	45.7779 (0.0009)	136.570 (0.0000)	28.4093 (0.1000)	ADF-Fisher Chi square
94.2579 (0.0000)	15.394 (0.6347)	854.642 (0.0000)	79.3155 (0.0000)	369.345 (0.0000)	73.0397 (0.0000)	177.002 (0.0000)	47.2073 (0.0005)	92.1003 (0.0000)	22.4026 (0.3191)	PP-Fisher Chi-square

Source: Author's EViews computation

According to Table 2, The Levin, Lin & Chu unit root test shows that UNP, GDP, FDI, and OPN are stationary at first difference while INF is stationary at its level. The Im, Pesaran, and Shin, W-stat show that only UNP is stationary at first difference while the rest of the variables are stationary at their level series. The ADF-Fisher Chi-square shows that UNP and FDI are stationary at first different while the rest are stationary at level. Finally, the PP-Fisher Chi-square shows that UNP, FDI, and OPN are only stationary at first difference while the other variables are stationary at level.

Model 1: Examine the effect of Economic growth on Unemployment

Multi Collinearity test

Multicollinearity was measured with the Variance Inflation Factor (VIF) and tolerance ratio (1/VIF). Based on the results shown in Table 3, it is confirmed that there is no multicollinear issue in the data set.

Table 3: Multi-collinearity Test

Variable	VIF	1/VIF
GDP	1.25	0.799
INF	1.33	0.750
FDI	1.09	0.919
OPN	1.38	0.730
Mean VIF	1.26	

Source; Author's STATA computation

Pooled Ordinary Least Squares

The study used the Pooled OLS method to estimate the relationship between dependent and independent variables; the test statistics are shown in Table 4.

Table 4: Pooled least squares

Variables	coefficients	St. Error	t-stat	probability
C	2.6362	1.9203	1.37	0.171
GDP	-17.0715	4.4801	-3.81	0.000
FDI	-0.0197	0.0254	-0.77	0.439
INF	-0.0328	0.0258	-1.27	0.204
OPN	0.0636	0.0753	0.85	0.399

Source; Author's EViews computation

Table 4 shows the test results for pooled least square, and the coefficients of GDP indicate that gross domestic production adversely affects unemployment. However, there is no significant effect of other variables on unemployment. Then the study followed the fixed effect model to examine the relationship, and the results are shown in Table 4.

Fixed effect model

Fixed effect estimation was performed to evaluate the nexus between unemployment and explanatory variables.

Table 5: Fixed effect

Variables	Coefficients	Std. Error	t-Statistics	Probability
C	5.1265	1.3306	3.85	0.000
GDP	-0.2673	1.8182	-0.15	0.883
FDI	-0.0573	0.0200	-2.86	0.005
INF	-0.0011	0.0102	-0.12	0.907
OPN	-0.0691	0.0534	-1.30	0.197
Prob > F test vale	0.000			

Source: Author's EViews computation

Table 5 indicates the result of the fixed effect analysis. The probability values confirm that only Foreign Direct Investment significantly influences unemployment. To select the best-fitting model, the study followed the Breusch Pagan LM test and the F value of the fixed effect. F value confirms that the fixed effect is more fitting than the pooled effect model. Further, Table 6 indicates the results from the Breusch Pagan LM test.

Table 6: Breusch Pagan LM test

Effects Test	statistics	probability
Chi-square	19.17	0.0000

Source; Author's EViews computation

Table 6 confirms that the fixed effect model is the best method to explain the relationship between variables since the probability value is less than 0.05.

Random Effect model

The study moves forward with random effects to select the best-fitting model from fixed and random effects. The Random effect test results are shown in Table 7.

Table 7: Random effect

Variables	Coefficients	Std. Error	z-Statistics	Probability
C	4.9862	1.4679	3.40	0.001
GDP	-0.3940	1.8340	-0.21	0.830
FDI	-0.0561	0.0200	-2.81	0.005
INF	-0.0016	0.0103	-0.15	0.878
OPN	-0.0634	0.0533	-1.19	0.235

Source: Author's EViews computation

Table 7 illustrates the Random effect model results for the relationship between unemployment and explanatory variables. According to test statistics, only FDI shows a significant relationship with unemployment. Therefore, to select the best model among fixed effect and random effect, the study followed the Hausman test, and the results are shown in Table 8.

Table 82: Hausman Test

Test Summary	Chi-sq stat	probability
FE and RE	6.98	0.1369

Source; Autor's EViews computation

Hausman test values in Table 8 confirm that the random effect is more appropriate than the fixed effect. Hence, the final model to present the relationship between unemployment and explanatory variables is shown below;

$$UNP_{it} = 4.9862 - 0.0561FDI_{it}$$

It found that there is no significant effect of economic growth on the unemployment of Southeast Asian countries. However, foreign direct investment has a negative influence on unemployment. This indicates that when FDI increases in Southeast Asian countries, unemployment gets reduced since it makes more opportunities to start new ventures and projects that generate more and more employment chances for the locals.

Model 2: Evaluate the effect of unemployment on economic growth

Multicollinearity test

The study followed the multicollinearity test when economic growth is the dependent variable and the outcomes are shown in Table 9. Test results confirm that there is no multicollinear issue in the data set.

Table 9: Multi-collinearity Test

Variable	VIF	1/VIF
UNP	1.08	0.925
INF	1.28	0.780
FDI	1.06	0.941
OPN	1.32	0.759
Mean VIF	1.19	

Source; Author's STATA computation

Pooled Ordinary Least Squares

To estimate the effect of unemployment on economic growth, the study first occupied the pooled OLS estimation and Table 10 shows the finding from the data analysis.

Table 10: Pooled least squares

Variables	coefficients	St. Error	t-stat	probability
C	0.1414	0.0287	4.92	0.000
UNP	-0.0043	0.0011	-3.81	0.000
FDI	0.0009	0.0004	2.20	0.029
INF	0.0012	0.0004	3.03	0.003
OPN	-0.0037	0.0011	-3.15	0.002

Source; Author's EViews computation

According to Table 10, all the independent variables show a significant relationship with economic growth, while unemployment has a negative relationship means that while unemployment decreases, economic growth gets increases. Because there is more labor force involvement in economic activities, thus, results in higher growth. However, FDI and Inflation show a positive relationship, which means that economic growth can be achieved when foreign investment increases. Furthermore, when inflation gets high economic growth increases because high prices motivate more and more investors to attract to the market, and production goes up. However, trade openness negatively impacts growth because allowing foreign traders to enter the local market demotivates the

local producers, and the consumers are more attracted to buy high-quality products from foreign suppliers at a lower price. Then the domestic production gets decreases.

Fixed effect model

However, to assess the fixed effect of explanatory variables on economic growth, the study followed the fixed effect model and the results are illustrated in Table 13

Table 11: Fixed effect

Variables	Coefficients	Std. Error	t-Statistics	Probability
C	0.3052	0.0526	5.80	0.000
UNP	-0.0004	0.0008	-0.15	0.883
FDI	0.0015	0.0008	1.90	0.060
INF	0.1409	0.0383	0.55	0.583
OPN	2.9017	1.0299	-5.25	0.000

Source: Author's EViews computation

Table 11 shows no significant effect of unemployment on economic growth. In contrast, FDI and trade openness significantly positively affect domestic production. Therefore, to evaluate the best-fitting model between Pooled OLS and fixed effect, the study followed the Breusch Pagan LM test, and the test results are shown in Table 12.

Table 12: Breusch Pagan LM test

Effects Test	statistics	probability
Chi-square	0.01	0.9192

Source: Author's EViews computation

Table 12 confirms that Pooled OLS is much more appropriate than the fixed effect. However, the study also utilized the random effect to examine whether the Random effect is better than the fixed effect. The results are shown in Table 13.

Random Effect model

The model assumed no correlation between explanatory variables and unobserved effects.

Table 13: Random effect

Variables	Coefficients	Standard Error	z-Stats	P-value
C	0.1913	0.0355	5.38	0.000
UNP	-0.0035	0.0015	-2.37	0.018
FDI	0.0010	0.0005	1.93	0.054
INF	0.0008	0.0004	1.95	0.052
OPN	-0.0057	0.0014	-3.98	0.000

Source: Author's EViews computation

Table 13 illustrates the results for random effect and found that all the variables significantly influence economic growth. Hence, to estimate whether the random effect is more appropriate than the fixed effect, the study followed the Hausman test, and the test statistics are presented in Table 14.

Hausman Test

This test was carried out to determine the optimal model among fixed and random effects.

Table 14: Hausman Test

Test Summary	Chi-sq stat	probability
Cross-section Random	36.56	0.0000

Source: Autor's EViews computation

According to Table 14, the Hausman test confirms that the fixed effect model is much more appropriate to be presented than the random effect model since the probability value is less than 0.05.

Furthermore, it was discovered that Pooled OLS outperforms the fixed effect model. Hence, it can be concluded that Pooled OLS is the best-fitting model to interpret the relationship of UNP, FDI, INF and OPN with economic growth. Therefore, the final model can be resented as follows;

$$GDP_{it} = 0.1414 - 0.0043UNP_{it} + 0.0009INF_{it} + 0.0012FDI_{it} - 0.0037OPN_{it}$$

The final equation presents the relationship between GDP and UNP with control variables. According to the equation statistics, unemployment negatively influences economic growth and shows that when unemployment rises by 1 percent, economic growth will decrease by 0.004 percent. Further, inflation positively influences the EG and shows that a one percent increase in inflation boosts the economy by 0.0009 percent. Same as FDI, the one percent increment in FDI increases the EG by 0.0012 percent. However, trade openness negatively influences EG and illustrates that a one percent increase in trade openness makes the economy decrease by 0.0037 percent.

Discussion of Results

This study discusses the nexus of unemployment and economic growth. Moreover, this study also compares how Okun's law is valid in Southeast Asian countries. Therefore, the main objective of this study is to ascertain how unemployment affects economic growth and vice versa. The sample consists of ten (10) Southeast Asia countries and the sample period was 21 years spanning from 2000 to 2020, which was utilized to confirm the applicability of Okun's law in these nations. Following the basic introduction, the study focused on the nexus between economic growth and unemployment. Additionally, this study also explores how unemployment affects economic growth with fixed effect, random effect, and pooled OLS to determine the best-fitting model. In addition, the study's significance is how the findings of this study make the pathway to future research and helps to understand the nexus between economic growth and unemployment.

Two models were utilized, and model 1 described the results for pooled OLS, fixed effect, and random effect models. After undergoing several statist techniques to evaluate the best-fitting model, the Random effect model was selected. According to the Random effect model, foreign direct investment is the only significant variable that influences unemployment. There is a negative influence of FDI on unemployment. However, there is no significant relationship between economic growth and unemployment. This indicates that unemployment does not be subject to the economic growth of Southeast Asian countries.

The second model is utilized to evaluate the impact of unemployment on economic growth with other control variables. According to the test results, Pooled OLS was selected as the best-fitting model. As per Pooled OLS results, all the independent variables (UNP, FDI, INF, and OPN) significantly influence economic growth. Unemployment has a detrimental impact on economic growth in this region. This indicates that, when unemployment increases, economic growth decreases. However, inflation and FDI makes a positive influence on economic growth, while trade openness makes a negative effect on the economic growth of Southeast Asian countries.

Therefore, there is a limitation of Okun's law validity in Southeast Asia in terms of the relationship and the magnitude of the effect of one variable over the other

5. Conclusion and Recommendations

Recommendations: Globally, countries are ranked according to their economic growth, which shows how well they manage their natural and human resources. Therefore, Southeast Asian countries should develop more investment policies to improve the effectiveness and create opportunities for their workforce which leads to improving the economic growth of those nations.

Besides, human capital and Foreign Direct Investments also play a vital role in economic growth. cs. Therefore, governments and policymakers should create a favorable atmosphere that encourages foreign investors to new ventures that add more benefits to the hosting countries because it improves the country's productivity with more employment opportunities. Furthermore, FDI promotes exports and boost the economy while generating benefit via technical innovation (Stanatiou, 2018).

In contrast, global economic recession and depression make high inflation which adversely affects the economic conditions of the nations. Today, most of the nations in Southeast Asia are experiencing significant inflation. Therefore, policymakers should concentrate on strengthening their monetary and fiscal frameworks to tackle inflation. One of the remedies is to have a higher trade openness and improve their export which tends to make a country's currency more stable or less likely to have a currency crisis that controls inflation by boosting both the capability and desire to pay off external debt (IMF, 2002).

Conclusion: Every economy has struggled with unemployment because it is evident that unemployment has consequences for the economic condition. Hence, this study review how unemployment has affected the Southeast Asian economies. As mentioned by Okun's Law, Economic expansion inversely correlates with unemployment. Further, Okun contends that unemployment has a particular impact on economic growth. He said a 1% decline in unemployment translates into a 3% boost in output growth, and a 1% rise in unemployment makes a 2% decrease in the domestic output. However, this varies from country to country; hence it is hard to demonstrate which country has a line with Okun's Law and to what extent it is parallel to Okun's Law.

The results from this research demonstrate that Okun's law validity within Southeast Asian countries is limited due to the lack of a relationship between unemployment and economic growth. Further, the magnitude of one variable's effect on the other does not tally with Okun's law statistics. Further, there is no significant effect of economic growth on unemployment, but unemployment significantly influences economic growth, as Okun mentioned in his theory.

References

Ahiadorme, J. W. (2020). Inflation, Output and Unemployment Trade-Offs In Sub-Saharan Africa Countries. Munich Personal RePEc Archive, No. 101164, Posted 17 Jun.

Alrakhan, D., Susetyo, D. and Azwardi, T. (2022). An Analysis on Inequality, Economic Growth, and Unemployment in Sumatera Island. 7th Sriwijaya Economics, Accounting, and Business Conference (SEABC 2021), 7, 8 March 2022

Ayesha, S. T. (2018). The Impact of Globalization on Unemployment and Economic Growth: Panel Data Analysis for Developing Countries. Bulletin of Business and Economics, 7(3), 122-131.

Bayrak, R. H. (2018). The Determinants of Youth Unemployment: A Panel Data Analysis of OECD Countries. The European Journal of Comparative Economics, 15(2), 231-248.

Blazquez F. C., Cantarero P.D. and Pascual S.M. (2018). Okun's Law in Selected European Countries (2005-2017): An age and gender analysis.

Blinova, T. V., Rusanovskii, V. A. and Markov, V. A. (2020). Assessment of the Reaction of Cyclical Unemployment to the Economic Decline and Recovery Growth in Russia, Economic and Social Changes: Facts, Trends, Forecast, 13(6), 184-198

Butkus, M., Matuzeviciute, K., Rupliene, D. and Seputiene, J. (2022). Heterogeneity of Non-linear Growth-unemployment Relationship Across Economic Sectors. Do Gender and Age Matter? *Montenegrin Journal of Economics*, 18(2). 51-59

Butkus, M., Matuzeviciute, K., Rupliene, D. and Seputiene, J. (2020). Does Unemployment Responsiveness to Output Change Depend on Age, Gender, Education, and the Phase of the Business Cycle? Economies, 8, 98

Conteh, K. (2021). Economic Growth and Unemployment: An Empirical Assessment of Okun's Law In The Case Of Liberia. Available At Ssrn 3864474.

Dankumo, A.M., Ishak, S. and Onisanwa, I. D. (2019). Does Okun's Law Explain the Relationship between Economic Growth and Unemployment in Nigeria? Jurnal Ekonomi Malaysia. 53(3), 153 – 161

Danova, M. and Vozarova, I. K. (2020). Regional Disparities in the Relationship between Economic Growth and Unemployment. SciPap, 28(2), 900

Dritsakis, D. P. and Stamatiou, P. (2018). Causal Nexus between FDI, Exports, Unemployment and Economic Growth for the Old European Union Members. Evidence From Panel Data. International Journal of Economic Sciences, 7(2), 35-56.

Earle, J. S., and Sakova, Z. (2000). Business start-ups or disguised unemployment? Evidence on the character of self-employment from transition economies. Labor economics, 7(5), 575-601.

Elhorst, J. P., & Emili, S. (2022). A spatial econometric multivariate model of Okun's law. Regional Science and Urban Economics, 93, 103756.

Farhat, R. N. (2021). Validity And Asymmetry of Okun's Law: Evidence from Asian Economies. Irasd Journal of

Economics, 133 – 142.

Gelfer, S. (2020). Re-evaluating Okun's law: Why all recessions and recoveries are "different". Economics Letters, 196, 109497.

Hjazeen, H., Seraj, M. & Ozdeser, H. (2021). The nexus between economic growth and unemployment in Jordan. Future Business Journal, 7 (1), 42

Imran, M. K. (2015). Unemployment and Economic Growth of Developing Asian Countries: A Panel Data Analysis. Russian Federation European Journal of Economic Studies, Vol. 13, Is. 3, Pp. 147-160.

Karadzic, V., Backovic, T. and Streimikis, J. (2021). Relevance of Okun's Law in Montenegro. Montenegrin Journal of Economics, 17(1), 59-69

Kenton, W. (2022, May 17). Okun's Law. Retrieved From Investopedia: Https://Www.Investopedia.Com/Terms/O/Okunslaw.Asp

Kim, J., Yoon, J. C., & Jei, S. Y. (2020). An empirical analysis of Okun's laws in ASEAN using a time-varying parameter model. Physica A: Statistical Mechanics and Its Applications, 540, 123068.

Louail, B., Benarous, D. (2021). Relationship between Economic Growth and Unemployment Rates in the Algerian Economy: Application of Okun's Law during 1991–2019. Organizations and Markets in Emerging Economies, 12(23), 71–85

Munir, Q., Mansur, K., & Furuoka, F. (2009). Inflation and economic growth in Malaysia: A threshold regression approach. ASEAN Economic Bulletin, 180-193.

Nebot, C., Beyaert, A., & García-Solanes, J. (2019). New insights into the nonlinearity of Okun's law. Economic Modelling, 82, 202-210.

Pasara, M.T. and Garidzirai, R. (2020). Causality E_ects among Gross Capital Formation, Unemployment and Economic Growth in South Africa. Economies, 8, 26

Qamar, U. Z. (2016). Unemployment and Economic Growth of European Union: A Panel Data Analysis. *European Journal of Economic Studies*, 292-298.

Soylu, Ö. B. (2018). Economic Growth and Unemployment Issue: Panel Data Analysis in Eastern European Countries. *Journal Of International Studies*, 11(1), 93-107.

Warsame, A.A., Ali, A.O., Hassan, A.Y. and Mohamed, M.O. (2022). Macroeconomic Determinants of Unemployment in Somalia: The Case of Okun's Law and Phillips Curve. *Asian Economic and Financial Review*, 12(11), 938-949