Unemployment Issues and Dynamic Determinants for Business Economics Landscape in ASIAN Countries

NORIZA MOHD SAAD[1,*], ARIA FARAH MITA[2]
[1]Faculty of Business and Management,
Universiti Teknologi MARA (UiTM),
18500 Machang, Kelantan,
MALAYSIA

[2]Faculty of Economics and Business,
Universitas Indonesia (UI),
16424,
INDONESIA

**Corresponding Author*

Abstract: - Unemployment issues constitute an unsolved problem across countries, as its determinant factors are dynamic or unstable, especially during the COVID-19 pandemic and the year after. Economic theories, especially the Philip Curve and Structural Unemployment, have highlighted the factors that need to be considered when reviewing any government policy on their labor markets, even though these issues might be reduced but have failed to mitigate the increasing rate of unemployment. This study investigates the relationship between the unemployment rate and its dynamic determinants in Asia regions, and whether such factors have the same impact or differ across selected countries. Secondary data is utilized for unbalanced panel data regressions. The data was collected from CEIC Global Database on, a monthly basis (n= 432 observations) from the year 2021 to 2023 for 9 Asia countries. The pooled regression result is consistent with the Philip Curve theory whereby GDP and inflation exacerbated the unemployment rate, while the individual panel for both regression, fixed effect and random effect, shows that the unemployment rate for Singapore and Japan follows the Structural Unemployment model.

Key-Words: - Unemployment, Dynamics Determinants, Business Economics, Unbalanced Panel, Multivariate Analysis, Asia.

Received: July 19, 2024. Revised: February 8, 2025. Accepted: March 7, 2025. Published: April 4, 2025.

1 Introduction

Unemployment and financial economic stability are closely linked, with unemployment rates often negatively impacting a country's economic situation and vice versa. However, unemployment tends to be a lagging indicator, meaning it may take time to reflect changes in the economic business landscape. Instead of economic factors, other determinants such as labor market policy and business regulations influence the sensitivity of unemployment rates to economic growth, [1], [2]. Fresh graduate students contribute to higher unemployment as reported by the labor force participation rate for each country during COVID-19. According to [3], youth unemployment presents significant challenges with high technology skills, equipping themselves with online jobs as well as ready to seek job opportunities abroad in Asia, especially in Malaysia and Indonesia. Therefore, issues of unemployment are widespread globally, impacting social living standards and economies. This is measured by the proportion of jobless individuals or labor that actively attempt to find a secure job but are frustrated. Thus, higher unemployment rates signal an economic downturn and affect both individuals and governments.

The COVID-19, impact on momentous job loss globally including Malaysia even endemic was announced. [4] addressing this issue is crucial to the pivotal emergence of jobless graduates and national impacts. Therefore, the WHO highlighted that directions for approaching the planning of unemployment rates are essential for effective financial economics policy [5] during the endemic.

In addition, unemployment issues extend beyond financial and economic implications, as they

also lead to psychological issues like stress, mental health problems, and financial crimes, affecting individuals and communities. This can be seen from the findings revealed by [6], that staying employed during economic turbulence is difficult and affects a significant life psychological feature requiring social pattern change. [7] stress process model explains how unemployment leads to tension and emotional instability due to a lack of money as a transaction medium, constricted opportunities, and no self-motivation, [7], [8]. Thus, unemployment results in limited actions in getting good food, lifestyles, and luxury things, contributing to poor mental health, [8]. Additionally, during the COVID-19 outbreak, fears of infection and financial strain have exacerbated the stress caused by unemployment, [5]. The connections between impact areas and other determinant factors can be seen in Figure 1 using bibliometric citation analysis based on VOS viewer software combined with content analysis. This approach provides significant value in examining the scope and coverage of unemployment studies worldwide by analyzing the influential aspects of relevant fields and networks.

Based on the issues discussed in the introduction, this study aims to investigate the relationship between the unemployment rate and its dynamic determinant factors during and after the COVID-19 pandemic in Asia regions. This study will also include a discussion of past research related to relevant theories. The study will then provide explanations of the data collection and research methodology applied. Followed by discussions on the statistical results in the next sections. Lastly, the paper will conclude with policy implications regarding unemployment issues.

2 Literature Reviews and Theoretical Discussions

Unemployment rates are closely linked to business and economic activities, with high rates indicating a slowdown in economic growth measured by GDP. This is consistent with an argument made by [9] whereby unemployment is considered a lagging indicator for economic growth with a delay. Government policies aimed at reducing the unemployment rate by boosting consumer demand may lead to temporary reductions, which can then result in higher inflation rates.

However, in this global network era, technological advancements and demographic shifts can also impact long-term unemployment trends, [2]. This literature review will focus on the discussion of unemployment issues with these two significant theories and their dynamic determinant associations.

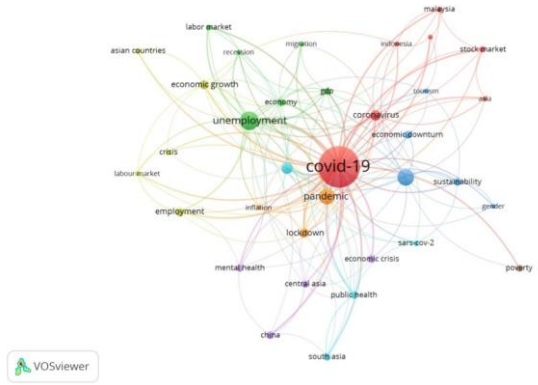

Fig. 1: Network visualization mapping the worldwide connection between unemployment issue areas
Source: Authors (2024)

Contemporary unemployment issues are complex and multifaceted, requiring a nuanced understanding of economic theories to inform policy responses that address dynamic macroeconomic and macro-financial situations as technological advancements are applied in the workplace. While several theories offer insights into unemployment dynamics, their relevance and applicability vary in today's context. For instance, classical economic theories, which emphasize market equilibrium and the self-correcting nature of economies, may be considered less relevant in explaining persistent unemployment amid structural shifts and technological disruptions, [10], [11]. Among others, the Phillips Curve Economic theory is one, if not the only, famous in explaining the relationship between the unemployment rate, GDP, and inflation. This theory found that the association between the inflation rate and unemployment rate indicates an inverse relationship. However, recent empirical studies have questioned the stability of this relationship, particularly in advanced economies. For instance, [12] observed a weakening of the Phillips Curve during the 1970s, indicating the emergence of stagflation, where high inflation coincided with high unemployment, a phenomenon not explained by traditional Phillips Curve theory.

Next, in modern economics with many technological innovations coming forward, skilled workers are more in demand to increase efficiency in the business economic landscape. Modern Economic Theory is a critique of how the monetary revolution across the globe is changing the course of world economies, financial systems, and markets. This economic cycle can be explained by

Structural Unemployment theory which arises from long-term mismatches between the worker skills and with expected talent required by employers creating an unemployment issue. Supported by [13], structural unemployment can be exacerbated by factors such as applied to industry-based technology and innovations, robotics, and shifts in business orientation. Thus, contemporary unemployment issues require a comprehensive understanding that integrates insights from various economic theories. While each theory offers valuable perspectives, addressing modern unemployment forms necessitates tailored policy responses that account for the complexities of today's labor markets and economic landscape.

Generally, economists measure unemployment rates by the percentage of workers actively seeking jobs. Whereas, underemployment includes involuntarily part-time workers and marginally attached workers, providing a more comprehensive measure of labor market slack. The labor force participation rate and the ratio of job seekers to job openings are additional indicators of labor market strength. In interpreting economic indicators, it's essential to consider historical trends and compare data over time to understand the broader economic landscape. While economic indicators offer valuable insights, they are subject to interpretation and may not always predict future outcomes accurately, [14].

Moreover, unemployment can affect a country's capital adequacy ratio, which measures the financial health and stability of its banking sector. High unemployment rates may increase loan defaults and reduce the quality of banks' assets, potentially lowering their capital adequacy ratios, [15]. This can undermine investor confidence in the banking system and contribute to financial instability. Conversely, improvements in employment levels can have positive effects on financial indicators. Lower unemployment rates typically coincide with higher consumer spending, increased business investment, and improved corporate profitability, which can bolster stock market performance and elevate market capitalization. Additionally, a growing labor force and higher levels of employment may enhance borrowers' creditworthiness, leading to higher performance of bank position and able to increase capital adequacy ratios, [16]. Another study by [17] investigates the relationship between unemployment and financial indicators using econometric models, time-series analysis, and empirical studies providing insights into the impact of labor market conditions on investor behavior and asset prices that lead to increased capital adequacy ratios as well.

Not only financial indicators, but but the issue of unemployment also poses a significant macroeconomic challenge, especially evident in many developing countries, with the implementation of nationwide measures like the Movement Control Order (MCO) during COVID-19 exacerbating this trend, [18]. Particularly in Malaysia, youth unemployment emerges as a pressing concern, as highlighted by [19], who underscore the struggles of young individuals in securing jobs that align with their qualifications, [20]. This disparity in job opportunities not only affects individual livelihoods but also has broader ramifications, including economic and social instability within society. The ripple effects of unemployment extend to reduced purchasing power and a deceleration in economic growth, further complicating the macroeconomic landscape. Moreover, unemployment directly impacts individuals' standard of living by impeding their ability to earn a consistent monthly income, as emphasized by [21]. Thus, addressing unemployment becomes paramount not only for individual welfare but also for fostering sustainable economic development and social cohesion.

According to [22], Okun’s law introduced the core empirical principle in macroeconomics was proposed as an inverse link between unemployment and GDP. He claimed that GDP is often considered a fundamental economic indicator, reflecting a country's overall business economic landscape through the production of import and export goods and services, [23]. There is also a similar pattern in China, where rapid GDP growth tends to lower unemployment rates, with a 1% decrease in unemployment typically corresponding to a 3% rise in potential GDP, [24]. However, some previous studies by [25], [26], [27], challenge Okun’s law, suggesting a positive relationship between the real growth of gross domestic product and the unemployment rate due to factors beyond labor productivity. Next, [28] found that Okun’s law does not apply in Jordan, indicating that unemployment in the country is not solely influenced by economic growth. Similarly, [29] discovered no significant impact of GDP on unemployment in Indonesia, underscoring the multifaceted nature of the relationship between GDP and unemployment across diverse contexts. Similar trends were observed in Egypt, Malaysia, and Tanzania. Another finding reported by [30], the Phillips Curve theory relevant in revealing differing relationships between inflation and unemployment in Bangladesh and Pakistan. Contradicted findings found by [31] reported a positive link between the inflation rate and the unemployment rate in Pakistan.

However, India, Sri Lanka, and China displayed insignificant relationships between these dependent and independent variables. According to [32], the unemployment benefit duration is the shortest one in the European Union (EU), thus leading to an increase in the poverty gap even if the present public work program is maintained by the state. It also determined how much the employment as public workers of those who lose their jobs because of automation costs for the central budget. [33] also postulated that EU countries have been experiencing a difficult time period in recent years. He claimed that new trends have been appearing due to the economic crisis and growing competitive environment. Therefore, these trends influence the labor market and human resource management in organizations.

Next, [34] reveals that GDP exerts a negative influence on unemployment in Malaysia which explains that decreased interest rates stimulate higher spending and investment by reducing borrowing costs, indirectly boosting aggregate demand and GDP, consequently alleviating demand-deficient unemployment. Also studied using Malaysia data, [35] discovered that GDP significantly influenced the employment rate, emphasizing the role of these macroeconomic factors in shaping labor market outcomes. Overall, the findings from various researchers underscore the multifaceted nature of unemployment, shaped by a combination of economic, social, and policy factors. Addressing unemployment effectively requires holistic approaches that consider the interplay of these various factors to foster sustainable economic growth and job creation.

3 Data Collections and Research Methodology

Limited data on a monthly basis, T are considered to capture the impact of COVID-19 on unemployment issues which cover from year 2020 until 2023 for 9 Asia countries obtained from the CEIC Global Data Hub. These 9 Asian countries are numbered as follows, 1:Malaysia, 2:Indonesia, 3:Brunei, 4:Singapore, 5:Japan, 6:China, 7:Thailand, 8:South Korea, & 9:Vietnam. This data is important in analyzing unemployment issues based on its dynamic or robust determinants with regards to real GDP growth, inflation rate as a proxy by a consumer price index, labour rate proxy by labour force participation rate, capital adequacy, market capitalization and price/earnings ratio for each country respectively. Some of the missing data was declared in Table 1 for descriptive statistics results with different numbers of observations for the variables. However, the total number of observations, N for the unemployment rate, is 408. Imbalances between N and T may hence be problematic. However, there are models developed using estimation methods for panel data to address these short (T), and wide (N) data sets focusing on cross-sectional variation or heterogeneity. The most important benefit of the use of panel data is the possibility to control for unobserved individual heterogeneity through fixed effect and random effect approaches. Besides, it has more variability [36], [37] and allows exploring more issues than cross-sectional and time-series data alone, [38]. Moreover, panel data provide demonstrative data, less linearity among variables, increased degrees of freedom, efficiency in organized data [39], [40] and robust estimation methods available for fixed effect [41], [42] and random-effect [43] panel data.

Next, the pairwise t-test is run to compare the unemployment rate between countries to all 9 Asian countries. In this statistical approach, if the comparative analysis results for the unemployment rate are shown different among countries, the regressions test should be run for each country since the determinant factors might show different relationships or impacts.

Therefore, testing the relationship between the unemployment rate with its dynamic determinants was considered the estimation models for the multivariate panel regressions for fixed effect and random effect regressions model. These models, as shown in model eq. 1 and 2 are developed based on dependent and independent variables for 9 Asian countries that the study predicts have a different effect on unemployment due to imposing different government policies besides some of these countries belonging to developed countries, and most of them are under the developing category.

$$Unemploy_{it} = \beta_{fe} + \beta_{fe_1}(\mathrm{Re}alGDP_{it}) + \beta_{fe_2}(Inf_{it}) + \beta_{fe_3}(Labour_{it}) + \beta_{fe_4}(CapA_{it}) + \beta_{fe_5}(MktCap_{it}) + \beta_{fe_6}(PEratio_{it}) + \varepsilon$$

… eq.1 fixed effects model

where:

$Unemploy_{it}$ = the rate of unemployment for each countries (t = 1:Malaysia, 2:Indonesia, 3:Brunei, 4:Singapore, 5:Japan, 6:China, 7:Thailand, 8:South Korea, & 9:Vietnam) in monthly for the ith year,

β_{fe} = the coefficient estimates in ordinary least square of the independent variables,

$\mathrm{Re}alGDP_i$ = the real growth domestic product for each country in monthly for the year,

Inf_i = the consumer price index for each country in monthly for the year,
$Labour_i$ = the labor force participation rate for each country monthly for the year,
$CapA_i$ = the capital adequacy ratio for each country monthly for the year,
$MktCap_i$ = the market capitalization for each country in monthly for the year,
$PEratio_i$ = the price-earnings ratio for each country in monthly for the year,
ε = the standard error of estimation.

With regards to the robust regression test, it was regressed using a random effect approach which decomposes the error term into two composite error terms with robust. In this study, model eq.2 assumes that the independent variables have their intercepts while restricting the slope to be homogenous for the unemployment rate for each country. Their macro effect factors for economics and finance indicators are probably in robust effect as a dynamic movement which required technique of the regressions as applied by [41].

$$Unemploy_{it} = \beta_{re} + \beta_{re_1}(\mathrm{Re}alGDP_{it}) + \beta_{re_2}(Inf_{it}) + \beta_{re_3}(Labour_{it}) + \beta_{re_4}(CapA_{it}) + \beta_{re_5}(MktCap_{it}) + \beta_{re_6}(PEratio_{it}) + (\lambda_i + u_{it})$$

…eq.2 Random effects model

Where:
β_{re} = the coefficient estimates in the robust effect of the explanatory variables, and
$\lambda_i + u_{it}$ = the error term decomposed the ε into two composite error terms for unobserved heterogeneity and it is identically and independently distributed.

The validity of the multivariate panel regressions model represents the best fit for data in explaining the relationship between the dependent by unemployment rate and independent variables. A valid model produces an accurate result of proposed model regression estimations for findings. Thus, it is important to check the model regression validation using r-square and f-test for model eq.1. The significance of the Wald Chi-square test for random-effect models also needs to check the validity of the proposed model equation, eq. 2.

Here, the f-statistic also explains the overall goodness-of-fit for the model estimation regression and its effectiveness over the error term. It can also detect a possible false null hypothesis. The higher value of the f-statistic indicates that the model has best-fit estimations and valid model equations in explaining the regression results, [42]. The significant result of this f-statistic can be seen when its p-values are less than 0.01 (99% confidence level), 0.05 (95% confidence level), and 0.1 (90% confidence level). This statistically significant level is a good indicator to show that the model equation is valid in the prediction of the coefficient of estimations for dependent variables by independent variables. If the f-statistics are significant and the r-squared is at a low percentage, it denotes that the model is problem-free and best-fit for data justifying that f-statistics is more powerful than r-squared, [42]. With respect to the wald-chi-squared test for the random-effect model involves merely looking at the t-statistic in the model whereby more than a positive or negative value of 2.35 justifying that the model is accepted at 95% confidence level, [43].

4 Results and Discussion

Trends for unemployment are always dynamic based on the determinants factor for each country respectively. Since these countries consist of developed and developing countries, thus the trends postulate a different pattern implying that the unemployment rate indicates different rates and dynamic growth patterns, see Figure 2 are also varying might be imposed on government policies not only on the labor market but also on financial positions respectively. For instance, Japan and Singapore are developed countries that hire many foreign workers, especially from Malaysian labor works in Singapore as compared to others.

Besides, labor migration to developed countries like Japan and Singapore is a way to maximize income and reduce the risk of revenue through education, higher wages and to get better health and education services as well as access to developed infrastructure after being employed, [44]. In addition, it is necessary to encourage and attract local and international investment to establish businesses and support business growth and job creation in the country's business economics landscape. However, a policy of job nationalization in the private sector can be burdensome for business owners and might negatively affect their success in the market, thus influencing job creation negatively, [45].

With regards to the dynamic trends of this unemployment with its determinants as shown in Figure 3, the economic factors like GDP growth, inflation rate as well as labor force participation rate are shown below performance as compared to unemployment rates. These dynamic patterns were supported by descriptive statistical results reported in Table 1 for minimum value as a negative value

(for instance, GDP for -17.096% and inflation for -3.438%) as compared to the unemployment rate for 0.85%. Justifying that, current government policies under labor law have mitigated the issues of unemployment during economic turbulence such as the post-COVID pandemic era. However, all the selected macro-finance factors have shown that performance is above unemployment rates except for the capital adequacy ratios of countries.

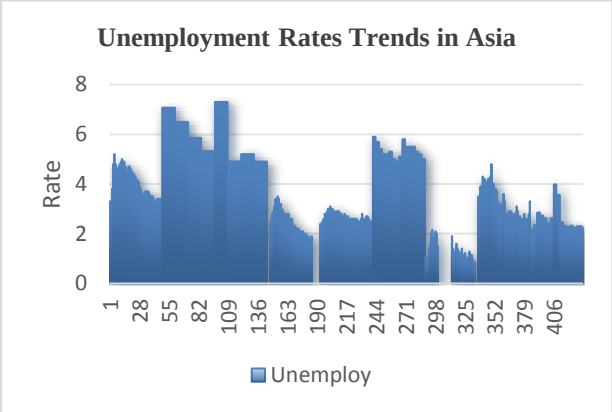

Fig. 2: Unemployment Rates Trends in Asia from 2020 to 2023

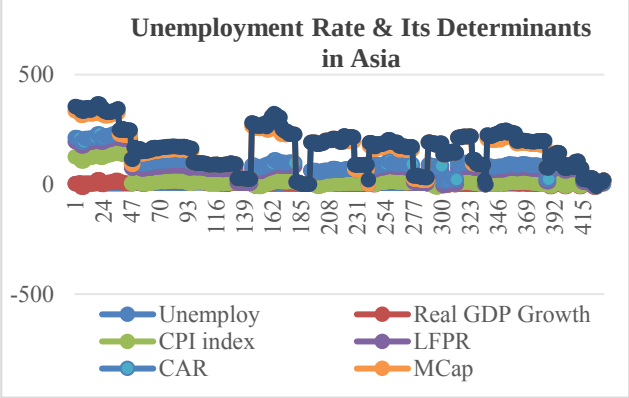

Fig. 3: The Dynamic Patterns of Unemployment Rate and its Determinants in Asia

4.1 Descriptive Statistics Analysis

Table 1 presents the results of the number of observations, mean, standard deviation, and minimum and maximum values for the variables. There is unbalanced data for the countries across the study period since some of the countries did not publish or still did not publish the required data at the time of data collection processes. For instance, Brunei and Vietnam do not publish their data on market capitalization and PE ratio, Japan does not publish data on capital adequacy and market capitalization, and Thailand for only the PE ratio. Some of the countries also still do not update the monthly reporting data on certain variables as reported by the total number of observations in Table 1.

Table 1. Descriptive Statistics Results

Variable	N	Mean	Std.Dev	Min	Max
Unemploy	408	3.849	1.632	0.850	7.300
Real.GDP	371	1.693	6.177	-17.096	19.996
Inf. (CPI)	404	16.268	39.074	-3.438	130.900
Labour	360	66.511	2.795	60.900	70.500
CapA	364	18.048	3.862	11.060	27.743
Mkt.Cap	288	101.350	36.322	45.126	179.347
PE ratio	246	17.929	8.082	9.370	54.494
Country	9	5	2.585	1	9
Year	4	2021	1.119	2020	2023
Month	432	6.5	3.456	1	12

The minimum value for unemployment is less than 1% and the maximum value is 7.3% with a mean value of 3.849% during this post-COVID-19 pandemic and poly-crises with economics unstable due to a series of wars (for instance, Russia & Ukraine, and Palestine & Israel) that lead to lack of job opportunities and increasing prices of certain imported product or output. Asia countries are also wedged from the issue whereby the minimum value for real GDP growth rate shows a negative value at -17.096%. Besides, the maximum value of the inflation rate reached 130.9% with an average value of 16.268%. This reaction of both macroeconomic variables is consistent with the theory discussed in Philip Curve.

Regards to the labor force participation rate was shown acceptable rate across countries with a maximum value of 70.5% and a mean value of 66.511%. The other macro-finance variables show quite dynamic patterns at positive values that reflect that the Asia business economics landscape is robust but it still has stable positions.

[46], [47] claimed that the issue of multicollinearity exists can be traced by testing the coefficients of correlation pairwise. The coefficient of correlation estimation result is considered high when the value (>0.80) among variables. From the analysis presented in Table 2, the highest correlated result is -0.644 between unemployment and market capitalization, therefore no multicollinearity exists in multiple regression analysis, including fixed effects and random effects equation models. Correlation on macroeconomics shows that GDP and inflation rate have a positive significant correlation with the unemployment rate whereas the labor force participation rate shows an inverse correlation. With regards to the correlation coefficient regression among variables in the country's financial indicators, capital adequacy shows a positive correlation towards unemployment

but both market capitalization and price-earnings ratio showed a negative correlation. This justifies that dynamic determinants in either macroeconomics or macro-finance, both have a relation to unemployment issues in Asia.

4.2 Pairwise Correlations among Variables Analysis

Table 2. Pairwise Correlations Results

Variables	Unemp.	GDP	Inf.	Labour	CapA	MCap	PE
Unemploy	1.000						
GDP	0.093	1.000					
Inf.	0.050	0.045	1.000				
Labor	-0.011	0.183	0.375	1.000			
CapA	0.438	0.003	0.055	0.160	1.000		
MCap	-0.644	-0.231	0.042	-0.240	-0.341	1.000	
PE	-0.349	0.189	0.116	0.096	-0.170	0.471	1.000

As reported in the pairwise correlation matrix, there are mixed positive and negative correlations at 99% and 90% confidence levels respectively. Not only reports on mixed findings but also mixed correlations as revealed by the coefficient of estimations among variables. Again, results confirmed that no serious multicollinearity exists between dependent and independent variables, therefore next findings on the multivariate panel regressions are tested and presented in Table 4 and Table 5.

4.3 Pairwise Test Comparisons of Unemployment Rate by Countries

Table 3 shows that the unemployment rate of 9 Asian countries overall revealed a significantly different mean in contrast value whereby none of these statistical results (contrast in range of 0.065 to -4.841) show a similar value.

Thus, the unemployment rate indicates a different impact imposed by a country's labor policy even though its determinant proxies are the same as a well wider range of spread by dynamic factors giving a huge chance for default risks to occur. This result also shows that there is a statistically significant mean difference between unemployment rates across countries in Asia (in contrast an unadjusted value less than 5 for each pair of country comparisons at a 95% confidence interval).

As regards to variation of risks represented by standard deviation (see column Std. Err. in Table 3) shows that all 9 Asia countries share a quite similar dynamic risk lowest at 0.119 to 0.131 level. The riskier can be seen for Thailand's unemployment risk (0.131) and little variation for Vietnam (0.119). However, this risk is quite consistent with small different values of standard deviation in all countries. Implying that an evaluation and analysis of microeconomics and micro-finance data involved an element of interest rate as a systematic risk factor that is uncontrollable even by mitigating the issues in employment.

Table 3. The Results of Pairwise T-test Comparisons of Unemployment Rate by Countries

Jobless	Contrast	Std. Err.	Unadjusted [95% Conf.	Interval]
Country				
2 vs 1	2.108	.119	1.874	.342
3 vs 1	1.499	.119	1.266	1.733
4 vs 1	-1.549	.126	-1.796	-1.302
5 vs 1	-1.381	.120	-1.616	-1.146
6 vs 1	1.267	.119	1.033	1.500
7 vs 1	-2.733	.131	-2.991	-2.476
8 vs 1	-.781	.119	-1.015	-.548
9 vs 1	-1.484	.119	-1.717	-1.250
3 vs 2	-.609	.119	-.842	-.375
4 vs 2	-3.657	.126	-3.904	-3.410
5 vs 2	-3.489	.119	-3.724	-3.254
6 vs 2	-.841	.119	-1.075	-.607
7 vs 2	-4.841	.131	-5.097	-4.584
8 vs 2	-2.889	.119	-3.123	-2.656
9 vs 2	-3.591	.119	-3.825	-3.358
4 vs 3	-3.048	.126	-3.295	-2.801
5 vs 3	-2.881	.119	-3.116	-2.646
6 vs 3	-.233	.119	-.467	.001
7 vs 3	-4.232	.131	-4.489	-3.975
8 vs 3	-2.281	.119	-2.514	-2.047
9 vs 3	-2.983	.119	-3.217	-2.749
5 vs 4	.168	.126	-.081	.416
6 vs 4	2.816	.126	2.569	3.062
7 vs 4	-1.184	.137	-1.453	-.915
8 vs 4	.768	.126	.521	1.015
9 vs 4	.065	.126	-.182	.312
6 vs 5	2.648	.120	2.413	2.883
7 vs 5	-1.351	.131	-1.609	-1.093
8 vs 5	.600	.120	.365	.835
9 vs 5	-.102	.120	-.337	.133
7 vs 6	-3.999	.131	-4.256	-3.743
8 vs 6	-2.048	.119	-2.282	-1.814
9 vs 6	-2.750	.119	-2.984	-2.516
8 vs 7	1.951	.131	1.695	2.208
9 vs 7	1.249	.131	.992	1.506
9 vs 8	-.702	.119	-.936	-.468

Note: 1= Malaysia; 2= Indonesia; 3= Brunei; 4= Singapore; 5= Japan; 6= China; 7= Thailand; 8= South Korea, and 9= Vietnam

4.4 Multivariate Panel Regressions Test Analysis

In this results and discussion, there are two types of multivariate panel regressions presented in Table 4 and Table 5 for the fixed effects and random effects regression respectively. As mentioned in data methodology, the panel set of data represented by countries is unbalanced. The analysis also revealed the pooled results (see Pooled All) to represent the

overall relationship between unemployment issues with its dynamic determinants in Asia. Besides, the analysis also covered each of the countries in Asia since some of them are categorized as developed countries, for instance, Singapore and Japan while others are under developing countries. Thus, the results released by these findings will not only explain the relationship between the unemployment rate with its dynamic determinant factors but also indirectly explain the different government policies imposed on their labor market.

Validation for model regression equations has been tested using r-squared, F-statistics, and F-tests for the fixed effect model as reported in Table 3. Wald-chi-squared has been tested to validate the model equations for random effect and the results are presented in Table 4. Table 3 showed a value of r-square reported for model 1 estimation of regression for pooled data and each panel (countries) respectively, whether the relationship is strong or not in explaining unemployment rates with its determinants.

Table 4 Fixed Effect Regression Results

DV	R2	F-test	Independent Variables (IVs)					
N			GDP	Inf	Labour	CapA	MCap	PE
All	75.6	88.83	-6.77***	-0.82	1.23	0.48	-16.8***	3.18***
1	99.4	5900.39	-0.65	-3.74***	3.6***	0.88	-2.01**	3.13***
2	99.8	285.29	-2.15**	-5.19***	5.65***	-4.19***	0.15	0.11
3	98.6	288.87	5.51***	0.32	0.8	0.19	-	-
4	99.2	35.92	-1.5	-0.01	-1.25	1.68	0.85	-0.35
5	99.9	5916.09	-0.57	0.35	1.4	-	-1.09	1.09
6	99.9	173.73	1.22	2.54**	-0.77	2.54**	3.77***	-4.83***
7	97.8	6.849	-3.07***	-2.07*	0.91	1.16	2.04*	-
8	99.7	45.728	-4.03***	-1.8*	-0.95	1.34	2.02*	0.63
9	98.8	20.409	2.2**	-1.96*	-6.41***	-0.05	-	-

Notes:

(1) 1:Malaysia, 2:Indonesia, 3:Brunei, 4:Singapore, 5:Japan, 6:China, 7:Thailand, 8:South Korea, & 9:Vietnam

(2) The t-statistics of fixed effects estimators are reported and the asterisks indicate significance at 99% (***), 95% (**), and 90% (*) respectively.

(3) The results of the F-test indicate a significance at 99% (***) level to all the country panel data.

The results revealed that the R-squared is 76% for the pooled and almost 99% for all panels, except for Thailand which indicates 98%. It explains a strong relationship because around 98% to 99% of the unemployment rates' performance is explained by the determinant factors in the Asia economic landscape for the post-COVID-19 crisis.

With respect to the value of F-statistics and F-tests stated that the significant results as revealed by the fixed-effect model in Table 3 at a 99% confidence level to all panel regressions model confirming that there are significant associations between dependent and independent variables for the model estimation equation for each countries. The validation model for the random effects was presented in Table 4 indicating that the Wald-chi-squared value is valid at a 99% confidence level for all pooled and other countries panels except for Japan which was significant at a 95% confidence level. These results show the estimation model equation is valid to proceed with investigating the relationship between the unemployment rate with its dynamic determinants. Besides, the intercept value generated by the model is identically and independently distributed in both models, pooled observation as well as in panels.

Based on the findings reported in Table 3, the determinants factor for the unemployment rate postulates different findings across Asia countries whereby all the selected factors showed a significant mixed association except for both unemployment rates for countries, Singapore and Japan. These findings are consistent with the structural unemployment theory perspectives which arise from long-term mismatches between the skills demanded by employers in these both developed countries. Supported also by [18], where global changes in financial technology and research development reduced unemployment.

By looking at the overall results in Table 5, the pooled estimation model regression towards model eq. 1 provides empirical evidence that the impact of real growth in GDP can exacerbate the unemployment rate, whereas, in model eq. 2 as shown in Table 4 for the dynamic or random effect, not only lower GDP growth but increasing in the inflation rate will lead to a higher rate of the unemployment rate. Thus, the result revealed by model eq.2 is consistent with the Philip Curve theory on the dynamic impact of such a relationship. It implies that the economic downturn with bad performance of GDP growth and a higher inflation rate makes less job opportunities available in the country.

The significant impact of these determinants on the unemployment rate can be seen in model eq. 2 as the result presented in Table 4, a random effect that tackles for dynamic or robust impact for all 9 Asia countries with a p-value of -6.84 and -1.83 at 99% and 90% confident level respectively. Followed by market capitalization and price-earnings ratios with significant levels 99% and 95% confidence level respectively. However, labor force and capital adequacy indicate insignificant results for both models eq. 1 and 2. based on pooled

observation results. Thus, the findings from this pooled estimation model regression towards models 1 and 2 could not provide empirical evidence of the dynamic factors of the labor force and capital adequacy toward unemployment rate in Asia.

Nevertheless, with regard to the panel data, these dynamic determinants are still significant at a confidence level of 90% to 99% in Malaysia, Indonesia, Japan, China, and Vietnam. Even so, the opposite direction for the labor force factor was shown by Japan with a positive association compared to others which indicates negative results. Again, these findings are consistent with the previous theory discussed under structural employment theory whereby Japan is a developed country with highly skilled workers and a technological-based industry that can be equipped by their labor force participation rate.

Table 5. Random Effect Regressions Results

DV	Wald-Chi2 Value	Intercept Value	Independent Variables (IVs)					
N			GDP	Inf	Labour	CapA	MCap	PE
All	93.97***	4.23***	-6.84***	-1.83*	0.58	0.29	-16.84***	2.05**
1	36.83***	3.16***	0.62	-0.38	-2.15**	0.81	0.98	-0.28
2	120.77***	11.0***	1.45	-4.67***	-7.27***	-7.3***	-5.69***	1.90*
3	110.95***	12.52***	2.42**	7.47***	-12.4***	1.99*	-	-
4	39.15***	-0.09	-0.26	-1.58	-0.22	1.07	1.71	-1.54
5	9.38**	-2.82**	-0.59	0.83	3.52**	-	-	2.46*
6	24.85***	3.51***	2.57**	2.9***	-2.41**	1.11	1.31	-5.88***
7	5.37***	-1.6	-2.71**	-1.73	0.93	1.16	1.73	-
8	36.61***	0.74	-3.47***	-1.77*	-0.58	1.07	1.76*	0.6
9	17.54***	3.50***	1.98**	-2.07**	-5.85***	0.04	-	-

Notes: The t-statistics of random effects estimators are reported and the asterisks indicate significance at 99% (***), 95% (**), and 90% (*) respectively

5 Conclusion and Policy Implications

Discussions on unemployment issues worldwide never end since their determinants are dynamic and very sensitive economic crises. Asia countries are also wedged from the issue whereby the minimum value for real GDP growth rate shows a negative value at -17.096%. Besides, the maximum value of the inflation rate reached 130.9% with an average value of 16.268%. This reaction of both macroeconomic variables is consistent with the theory discussed in Philip Curve. Regards to the labor force participation rate was shown acceptable rate across countries with a maximum value of 70.5% and a mean value of 66.511%. The other macro-finance variables show quite dynamic patterns at positive values that reflect that the Asia business economics landscape is robust but it still has stable positions. Besides, the results of the fixed effects model whereby at least 75.6% of the determinants cover real GDP growth, inflation rate, market capitalization, and price-earnings ratios impact the unemployment rate in 9 Asian countries. This percentage of association becomes higher up to a 99% confidence level when the study specifically runs for each of the country panel data. Thus, concluded that the dynamic determinants factor, especially GDP and inflation rate, deeply exacerbated the rate of unemployment which is consistent with the Philip Curve theory. According to this theory, lower unemployment can lead to higher inflation as increased demand for goods and services pushes prices up. However, the relationship can be complex and influenced by various factors including expectations and supply shocks. Eventually, the relationship may not hold, as seen in periods of stagflation where high inflation and high unemployment co-exist. However, Singapore and Japan postulated that their unemployment issues followed the Structural unemployment theory whereby those developed countries with highly skilled workers and applied advanced technological industries indicated no relationship towards these dynamics determinants factors in fixed effect but not in random effect model. Here, structural unemployment provides valuable frameworks for understanding labor market dynamics, including skill mismatches and geographical mobility constraints, [18]. Thus, this study would like to recommend that developing countries like Malaysia, Indonesia, Vietnam, and others need to review their labor market policy, especially during economic crises and post-COVID-19 since the dynamic determinants of the unemployment rate show a positive association. Justifying that, a higher rate of these determinant factors will lead to a higher rate of unemployment especially for real GDP growth as well as inflation rate. Thus, contemporary issues in unemployment require a comprehensive understanding that integrates insights from various economic theories, economic scenarios, and policies. While each theory offers valuable perspectives, addressing modern joblessness necessitates tailored policy responses that account for the complexities of today's labor markets and economic business landscape especially in Asia.

Acknowledgement:
We are thankful to Universiti Teknologi MARA (UiTM), Malaysia and Universitas Indonesia (UI), Indonesia for awarding this matching grant with the registration number of 100-RMC 5/3/SRP (061/2022) for the study.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

The authors wrote, reviewed and edited the content as needed and They have not utilised artificial intelligence (AI) tools. The authors take full responsibility for the content of the publication.

References:

[1] Hult, M., Lappalainen, K., Saaranen, T. K., Räsänen, K., Vanroelen, C., & Burdorf, A. (2020), Health-improving interventions for obtaining employment in unemployed job seekers, *Cochrane Database of Systematic Reviews,* 2020 Jan. 8;1(1):CD013152. https://doi.org/10.1002/14651858.cd013152.pub2.

[2] Oner, C. (2010), Unemployment: The curse of joblessness, Finance & Development, [Online]. https://www.imf.org/external/pubs/ft/fandd/basics/32-unemployment.htm (Accessed Date: December 2, 2023).

[3] Goldsmith, A. H., Veum, J. R., & Darity Jr, W. (1997), Unemployment, joblessness, psychological well-being and self-esteem: Theory and evidence, *The Journal of Socio-Economics,* 26(2), 133-158. https://doi.org/10.1016/S1053-5357(97)90030-5.

[4] Hossain, M. I., Yagamaran, K., Afrin, T., Limon, N., Nasiruzzaman, M., & Karim, A. M. (2018), Factors influencing unemployment among fresh graduates: A case study in Klang Valley, Malaysia, *International Journal of Academic Research in Business and Social Sciences*, 8(9), 1494-1507. http://dx.doi.org/10.6007/IJARBSS/v8-i9/4859.

[5] World Health Organization. (2020), Coronavirus disease (COVID-19), [Online]. https://www.who.int/health-topics/coronavirus (Accessed Date: January 12, 2024).

[6] Wheaton, B., & Montazer, S. (2010), Stressors, stress, and distress, A handbook for the study of mental health: *Social contexts, theories, and systems,* 2, 171-199. https://doi.org/https://doi.org/10.1017/9781316471289.013.

[7] Pearlin, L. I. (1989), The sociological study of stress, *Journal of Health and Social Behavior,* 30(3), 241-256. https://doi.org/https://doi.org/10.2307/2136956.

[8] Pearlin, L. I., Menaghan, E. G., Lieberman, M. A., & Mullan, J. T. (1981), The stress process, *Journal of Health and Social Behavior,* 22(4), 337-356. https://doi.org/https://doi.org/10.2307/2136676.

[9] Khalid, W., Akalpler, E., Khan, S., & Shah, N. H. (2021), The Relationship Between Unemployment and Economic Growth in South Africa: VAR Analysis, *Forman Journal of Economic Studies,* 17(1), 1-32. https://doi.org/http://dx.doi.org/10.32368/FJES.20211701.

[10] Inoua, S. M., & Smith, V. L. (2020). Classical Economics: Lost and Found. The Independent Review, 25(1), 79-90, [Online]. https://www.independent.org/publications/tir/article.asp?id=1493 (Accessed Date: March 2, 2023).

[11] Lucas Jr, R. E. (1978), On the size distribution of business firms, *The Bell Journal of Economics,* 9(2) (Autumn, 1978), 508-523. https://doi.org/https://doi.org/10.2307/3003596.

[12] Blanchard, O. J., & Summers, L. H. (1986), Hysteresis and the European unemployment problem, *NBER macroeconomics annual,* 1, 15-78. https://doi.org/https://doi.org/10.2307/3585159.

[13] Cahuc, P., Carcillo, S., & Zylberberg, A. (2014), Labor economics, MIT press, [Online]. https://books.google.com/books?hl=en&lr=&id=yf46BAAAQBAJ&oi=fnd&pg=PR5&dq=Cahuc,+P.,+%26+Zylberberg,+A.+(2014).+Labor+Economics.+MIT+Press.&ots=AURbRQHYcI&sig=E_vt2PJw4yD0Qc66LoacTyyoSBo (Accessed Date: March 2, 2024).

[14] Aoki, G., Ataka, K., Doi, T., & Tsubouchi, K. (2023), Data-driven estimation of economic indicators with search big data in discontinuous situation, *The Journal of Finance and Data Science,* 9, 100106. https://doi.org/https://doi.org/10.1016/j.jfds.2023.100106.

[15] Laeven, M. L., & Valencia, M. F. (2012), Systemic banking crises database: An update,

International Monetary Fund, [Online]. http://tvernedra.ru/GlobaliRegionRiski.pdf (Accessed Date: January 12, 2024).

[16] Ferreira, M. A., & Matos, P. (2008), The colors of investors' money: The role of institutional investors around the world, Journal of financial economics, 88(3), 499-533, [Online]. https://EconPapers.repec.org/RePEc:eee:jfinec:v:88:y:2008:i:3:p:499-533 (Accessed Date: March 21, 2023).

[17] Abreu, M., & Mendes, V. (2020), Do individual investors trade differently in different financial markets? *The European Journal of Finance*, 26(13), 1253-1270. https://doi.org/https://doi.org/10.1080/1351847X.2019.1709524.

[18] Borhan, H., Ridzuan, A. R., Razak, M. I. M., & Mohamed, R. N. (2023), The dynamic relationship between energy consumption and level of unemployment rates in Malaysia: a time series analysis based on ARDL estimation. *International Journal of Energy Economics and Policy*, 13(2), 207-214. https://doi.org/http://dx.doi.org/10.32479/ijeep.13893.

[19] Abd Rahman, N. H., Ismail, S., Ridzuan, A. R., & Abd Samad, K. (2020a), Graduates' mindset in designing their initial career, *International Journal of Academic Research in Business and Social Sciences*, 10(10), 917-924. https://doi.org/http://dx.doi.org/10.6007/IJARBSS/v10-i10/7798.

[20] Abd Rahman, N. H., Ismail, S., Ridzuan, A. R., & Abd Samad, K. (2020b), The issue of graduate unemployment in Malaysia: Post Covid-19, *International Journal of Academic Research in Business and Social Sciences*, 10(10), 834-841. https://doi.org/http://dx.doi.org/10.6007/IJARBSS/v10-i10/7843.

[21] Michael, E., & Geetha, C. (2020), Macroeconomic factors that affecting youth unemployment in Malaysia, Malaysian Journal of Business and Economics (MJBE), 7(2), 181-181. https://doi.org/http://dx.doi.org/10.51200/mjbe.vi.2890.

[22] Okun, A. M. (1963), Potential GNP: its measurement and significance, Cowles Foundation for Research in Economics at Yale University, [Online]. https://www.scribd.com/document/347717593/Potential-GNP-Its-Measurement-and-Significance (Accessed Date: January 12, 2024).

[23] Sahin, D. (2016), Determinants of unemployment: empirical analysis for China, Akademik Sosyal Araştırmalar Dergisi, 4(22), 50-58, [Online]. https://api.semanticscholar.org/CorpusID:54917097 (Accessed Date: March 24, 2023).

[24] Prachowny, M. F. (1993), Okun's law: theoretical foundations and revised estimates, *The review of Economics and Statistics*, 75(2), 331-336. https://doi.org/https://doi.org/10.2307/2109440.

[25] Blinder, A. S. (1997), A core of macroeconomic beliefs? *Challenge*, 40(4), 36-44. https://doi.org/https://doi.org/10.1080/05775132.1997.11471984.

[26] Altig, D., Fitzgerald, T. J., & Rupert, P. (1997, May 5, 1997), Okun's law revisited: should we worry about low unemployment?, Economic Commentary, 1-4, [Online]. https://www.clevelandfed.org/-/media/project/clevelandfedtenant/clevelandfedsite/publications/economic-commentary/1997/ec-19970515-okuns-law-revisited-should-we-worry-about-low-unemployment-pdf.pdf (Accessed Date: January 12, 2024).

[27] Kreishan, F. M. (2011), Economic growth and unemployment: An empirical analysis, *Journal of social sciences*, 7(2), 228-231. https://doi.org/http://dx.doi.org/10.3844/jssp.2011.228.231.

[28] Trimurti, C. P., & Komalasari, Y. (2014), Determinants of unemployment: Empirical evidences from 7 Province in Indonesia, *Scientific Research Journal (SCIRJ)*, 2(8), 5-9, [Online]. https://www.scirj.org/papers-0814/scirj-P0814170.pdf (Accessed Date: March 24, 2023).

[29] Subhani, M. I., & Osman, A. (2011), The south Asian phillips curve: Assessing the gordon triangle, *European Journal of Economics, Finance and Administrative Sciences*, 36, 110-114, [Online]. https://ideas.repec.org/p/pra/mprapa/34734.html (Accessed Date: January 12, 2024).

[30] Umair, M., & Ullah, R. (2013), Impact of GDP and inflation on unemployment rate: A study of Pakistan economy in 2000-2010, *International Review of Management and Business Research*, 2(2), 388, [Online].

https://irmbrjournal.com/papers/1371452025.pdf (Accessed Date: January 12, 2024).

[31] Cserháti, I. & Takács, T. (2019), Potential Job Losses due to Automation and its Impact on Poverty Gap in Hungary, *WSEAS Transactions on Business and Economics*, vol. 16, pp.47-53, [Online]. https://www.wseas.org/multimedia/journals/economics/2019/a085107-097.pdf (Accessed Date: September 2, 2023).

[32] Stavjaníčková, I. (2015), How to be a Successful Graduate? Results of a Comparative Analysis of the Demand and Supply on the Labour Market, *WSEAS Transactions on Business and Economics*, vol.13, pp.1-9, [Online]. http://www.wseas.us/journal/pdf/economics/2015/a025707-284.pdf (Accessed Date: September 2, 2023).

[33] Baba, J. F., & Ali, D. (2021), Economic Determinants of Unemployment in Malaysia: Short–and Long–Run Causality, *Journal of Public Administration and Governance,* 11(1), 251-272. https://doi.org/http://dx.doi.org/10.5296/jpag.v11i1.17794.

[34] Irpan, H. M., Saad, R. M., Nor, A. H. S. M., & Ibrahim, N. (2016), Impact of foreign direct investment on the unemployment rate in Malaysia, *Journal of Physics: Conference Series,* https://doi.org/http://dx.doi.org/10.1088/1742-6596/710/1/012028.

[35] Baltagi, B.H. (1985), Pooling Cross-sections with Unequal Time-series Lengths, Economics Letters, 18, 133-136, [Online]. http://www.sciencedirect.com/science/article/pii/0165-1765(85)90167-3(Accessed Date: January 12, 2024).

[36] Kennedy, P. (2008), A *Guide to Econometrics,* 1st Edition. MIT Press. p.25.

[37] Bokpin, G.A. (2010), Financial Market Development and Corporate Financing: Evidence from Emerging Market Economies, *Journal of Economics Studies*, 37(1), 96-116. https://doi.org/10.1108/01443581011012270.

[38] Aquaro, M. & Cizek, P. (2013), One-step robust estimation of fixed-effects panel data models, *Computational Statistics & Data Analysis,* 57(1), 536-548. https://doi.org/10.1016/j.csda.2012.07.003.

[39] Stromberg A. (2004), Why write statistical software? The case of robust statistical methods, *Journal of Statistics Software,* 10(5), 1–8. https://doi.org/10.18637/jss.v010.i05.

[40] Mohd Saad, N. (2021), Relationship between Covid-19 pandemic and firm's performance towards unemployment across countries, *Turkish Journal of Computer and Mathematics Education (TURCOMAT),* 12(3), 5072-5081, [Online]. https://turcomat.org/index.php/turkbilmat/article/view/2038 (Accessed Date: March 24, 2023).

[41] Carrizosa, A., Estepa-Zabala, B. Fernandez-Abascal, B., Garcia-Hernandez, M.J. & Ruiz-Doblado, S. (2005), Alopecia Areata: A Specific Personality?, *International Journal of Dermatology,* 44(5), 437-438. https://doi.org/10.1111/j.1365-4632.2005.02277.x.

[42] Dougherty, C. (2002), Introduction to Econometrics (2nd Edition), Oxford University Press, Oxford), [Online]. https://home.ubalt.edu/ntsbarsh/Business-stat/StatistialTables.pdf (Accessed Date: January 12, 2024).

[43] Engle, R. F. (1980), Chapter Title: Hypothesis Testing in Spectral Regression: the Lagrange Multiplier Test as a Regression Diagnostic (p.309-321), National Bureau of Economic Research, [Online]. http://www.nber.org/chapters/c11707 (Accessed Date: January 12, 2024).

[44] Tkachova, N., Krushelnytska, T., Marchenko, O. & Kuznetsova, N. (2021), Migration Policy in the Context of Sustainable Development, *WSEAS Transactions on Business and Economics*, vol.13, 619-627. https://doi.org/10.37394/23207.2021.18.61.

[45] Almawishir, N., Alogali, A., & Fakieh, R. (2023). Job Nationalisation in the Private Sector: Obstacles and Solutions in the Jouf Region, *WSEAS Transactions on Business and Economics*, vol. 20, 1725-1744. https://doi.org/10.37394/23207.2023.20.153.

[46] Nguyen, T., Locke, S., & Reddy, K. (2015), Ownership concentration and corporate performance from a dynamic perspective: Does national governance quality matter?, *International Review of Financial Analysis,* 41, 148-161. https://doi.org/10.1016/j.irfa.2015.06.005.

[47] Gujarati, D.N. (2004), Basic Econometrics, 4th Edition. New York: McGraw-Hill, [Online]. https://zalamsyah.staff.unja.ac.id/wp-content/uploads/sites/286/2019/11/7-Basic-Econometrics-4th-Ed.-Gujarati.pdf (Accessed Date: January 12, 2024).

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

This study was received an International matching grant number, 100-RMC 5/3/SRP (061/2022).

Conflict of Interest

The authors have no conflicts of interest to declare.