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Revisiting the Beveridge Curve: Evidence from the Malaysia Labour Market

Salwaty Jamaludin*, Chong Siew Huay, Sharulshahida Shakrein Safian, Muhammad Ridzuan Abd Aziz
**Corresponding Author*

Faculty of Business and Management, UiTM Cawangan Selangor, Kampus Puncak Alam, Selangor, Malaysia

salwatyjamaludin@uitm.edu.my, siewhuaychong@uitm.edu.my, sharulshahida@uitm.edu.my, ridzuandba@uitm.edu.my
Tel: +603 32585129

Abstract
Examining the Beveridge curve (BC), which depicts the nexus between unemployment and vacancy rates, has received more attention as a central organizing framework for economists to understand the labour markets. This study employs the Autoregressive Distributed Lag (ARDL) method to analyze the unemployment-vacancy rates in the Malaysia labour market from 1994 to 2023. Analysis reveals that vacancy rates and economics growth affect the unemployment rate. Furthermore, in the long-run, there is a negative correlation between the unemployment rate and the vacancy rate, confirming the Beveridge curve's pattern.

Keywords: Beveridge curve; unemployment; vacancy; labour market

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1.0 Introduction

Before the COVID-19 epidemic, Malaysia's unemployment rate was low, approximately 3.3% to 3.4%. This was seen as the natural unemployment rate, signifying a steady labour market consistent with Malaysia's moderate economic growth of roughly 4-5% annually throughout this period. By the end of 2019, the global spread of the COVID-19 pandemic, originating in Wuhan, China, had triggered substantial adjustments across all facets of human life, particularly in health, economics, and social interactions. Governments worldwide implemented a variety of regulations in efforts to contain the contagious virus. In Malaysia, the first case was identified in January 2020, marking the beginning of an upward trajectory in infection rates. The Malaysian government responded by using multiple phases of Movement Control Orders (MCO) to manage the situation.

The government's implementation of control orders undoubtedly led to widespread job losses and economic downturns across many nations, resulting in a historically significant impact on the global labour market. Malaysia, in particular, faced severe repercussions, witnessing substantial declines in employment rates and productivity growth. The workforce experienced significant reductions due to layoffs, contract non-renewals, and adverse effects on small businesses. Employment figures plummeted from 15.1 million in 2019 to 14.9 million by the second quarter of 2020, as reported by Bank Negara Malaysia in 2021.

The unemployment rate significantly rose due to layoffs and the inability of individuals to access the formal job market amid the pandemic. Starting from approximately 3.3% in January 2020, it surged to 5.3% in May 2020, coinciding with the government's imposition of restriction orders, and then plateaued at 4.6% in the subsequent months. By the conclusion of 2022, the unemployment rate remained relatively unchanged, hovering around 3.6%.

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1.1 Job retrenchment and job vacancy

Retrenchments in the workforce may result in a high unemployment rate. In 2020, there were a total of 107024 job retrenchments. As shown in Fig 1, the manufacturing and services industry (wholesale and retail, accommodation, and food and beverage industries) experienced the highest number of job retrenchments, with 23281 and 29450, respectively. In 2021 and 2022, the total number of job retrenchments was 61360 and 34388, respectively. The manufacturing and services industries continued to lead in job retrenchments. According to Rahman et al. (2020), key factors influencing job vulnerability during the pandemic include job type, industry attributes, worker demographics, and geographical location. Employees in the service sector, especially those in wholesale and retail, accommodation, food, and beverage industries, are highly susceptible to job losses. While workers in the manufacturing and construction sectors face risks, their vulnerability is comparatively lower. Among worker demographics, young workers and individuals with lower levels of education are particularly at risk of experiencing job losses.

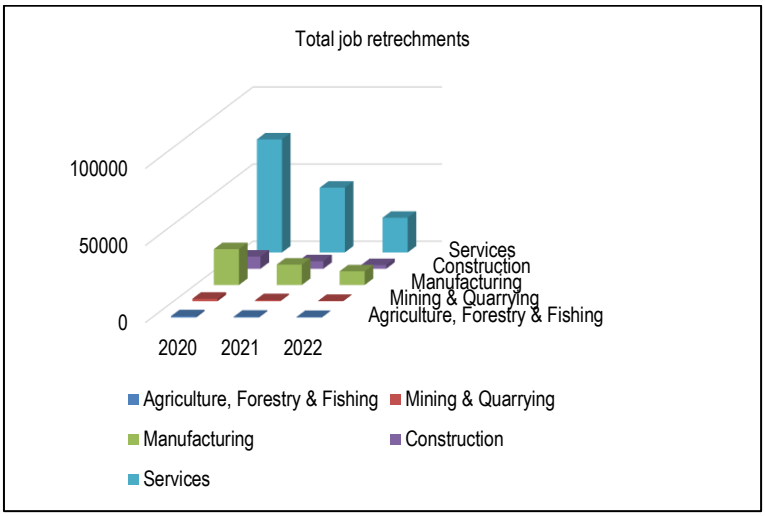

Fig 1: Job retrenchment by industry 2020, 2021 and 2022
(Source: Ministry of Human Resources Malaysia (MOHR))

Furthermore, from 2020 to 2022, high-skilled workers (managers, professionals, and technicians & associate professionals) experienced the highest impact, comprising 60%, 58%, and 70% of total job retrenchments, respectively (see Fig 2). Middle-skilled workers constituted the second most affected category, accounting for 34%, 34%, and 19% of total job layoffs, respectively. The rest of the percentage consists of low-skilled workers.

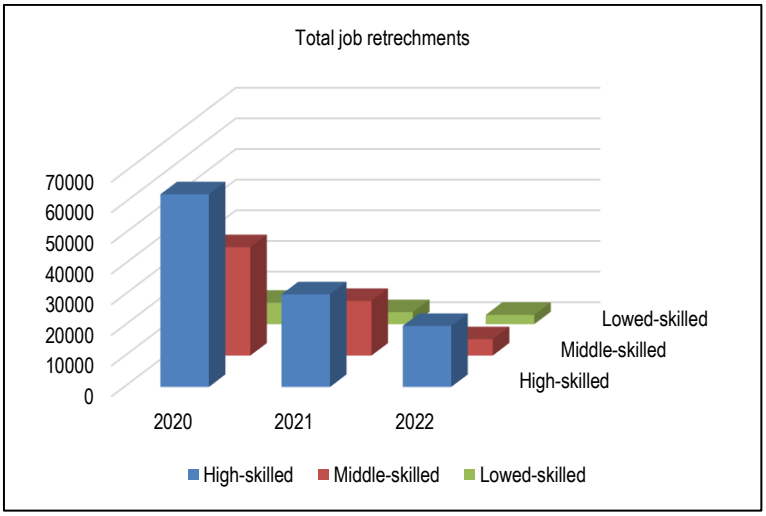

Fig 2: Job retrenchment by occupation 2020, 2021 and 2022
(Source: MOHR)

However, despite the challenges posed by the COVID-19 pandemic, numerous new job opportunities were available. According to Fig 3, from 2020 to 2022, there were 745304, 2480577, and 4753418 job vacancies, respectively. The industries with the highest number of job vacancies were manufacturing and service, specifically in the wholesale and retail, accommodation, and food and beverage industries.

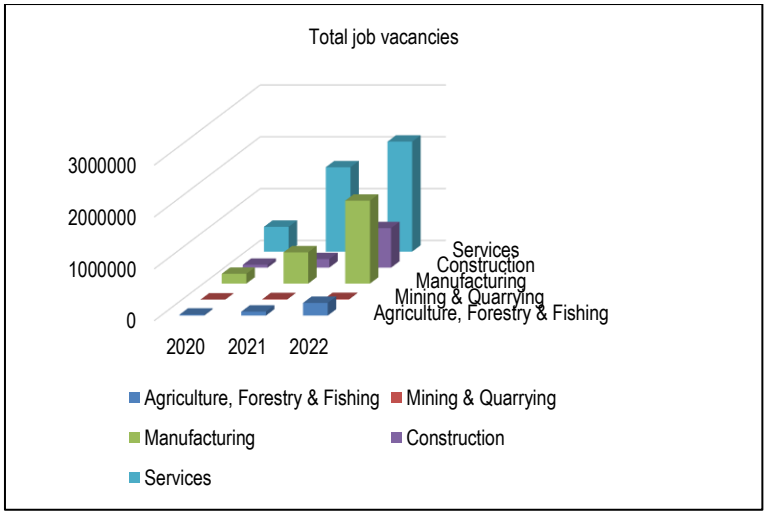

Fig 3: Job vacancies by industry 2020, 2021 and 2022
(Source: MOHR)

Elementary Occupations, categorized as low-skilled jobs, constitute 25-50% of all job openings, while middle-skilled jobs comprise 31-44% (Fig 4). This scenario highlights a significant imbalance between the available workforce and the demands of the Malaysian labour market. Consequently, accessing formal employment during the pandemic proves challenging, particularly for high-skilled individuals and recent graduates, given the prevalence of job vacancies predominantly focused on middle-skilled and low-skilled positions.

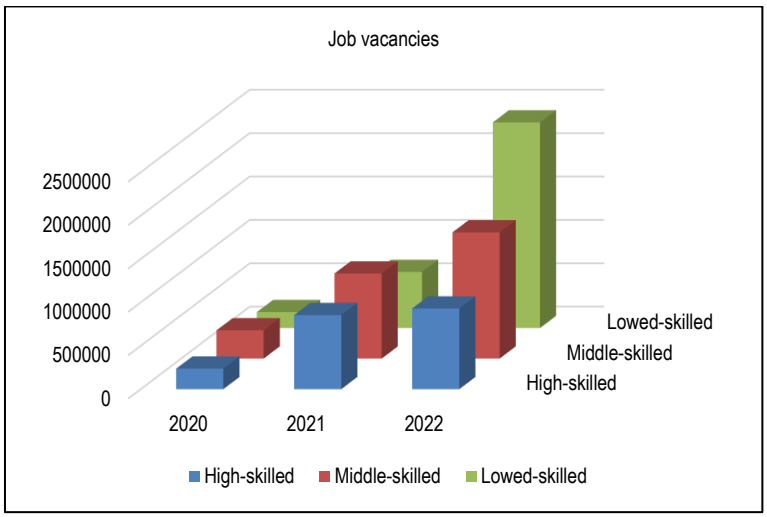

Fig 4: Job vacancies by occupation 2020, 2021 and 2022
(Source: MOHR)

Considering these circumstances, this study examines the relationship between unemployment and vacancy rates in Malaysia's formal labour market through the lens of the Beveridge Curve. Using the ARDL framework, it aims to (1) empirically assess the impact of unemployment-vacancy nexus addressing gaps in ASEAN labour market research, and (2) to inform policies addressing pandemic-driven labour market inefficiencies and restoring equilibrium in high-unemployment contexts. This aspect has received limited research attention thus far.

2.0 Literature Review

2.1 The Beveridge Curve

The Beveridge curve (Fig 5), proposed by British economist William Beveridge in 1944, illustrates how unemployment and job vacancies fluctuate along the curve. Typically, job vacancies are high, and unemployment is low during periods of substantial economic expansion. There may come a time when there are more open positions than unemployed people, and vice versa. The 45-degree line from the origin indicates all points where the unemployment rate matches the number of job vacancies.

Fig 5: The Beveridge Curve

The labour market has two possible outcomes if the Beveridge curve swings outward. First, jobless people are becoming ineffective. Second, if firms are posting more job vacancies but potential applicants need to gain the necessary skills, this could lead to a mismatch between unemployment and job vacancies across sectors. When a mismatch occurs, the hiring rate declines at a given level of labour market tightness, causing the curve to shift outward from its original position (Wall & Zoega, 2002; Albaek and Hansen, 2004; Shibata, 2013).

However, the shift in the curve's pattern does not always indicate an increase in mismatch or structural unemployment. First, unemployment insurance may cause workers' reluctance to hunt for work. Second, companies might be listing more positions but not ready to hire. Besides that, the movement along the curve is associated with the state of the business cycle (Arpaia et al., 2014). During a recession, businesses reduce expenses and hesitate to hire new employees. Because there are not any new vacancies available, the unemployment rate is higher. Thus, equilibrium unemployment decreases along the curve. Conversely, outward shifts in the Beveridge curve typically happen following recessions, when firms advertise job vacancies more rapidly than unemployed individuals are matched with jobs (Consolo & Da Silva, 2019).

2.2 Empirical review

A homogenous series of job openings in the Spanish economy between 1980 and 2016 allowed Boscá et al. (2017) to analyze how the economic cycle affects the link between unemployment and vacancy. According to the presented data, the Beveridge curve has been progressively returning to its pre-crisis level since 2014, which has resulted in a drop in the unemployment rate. This uniform set of job openings provides insightful data about how the economic cycle affects the labour market. The result showed that the Beveridge curve is reasonably stable, with a vacancy rate of 0.41% and an average unemployment rate of 14.25% throughout that time. Still, the Beveridge curve begins to revert to its pre-crisis level between 2014 and 2016, which leads to a decrease in unemployment.

Tagkalakis (2016) examined the dynamics of unemployment and the factors influencing Greece's Beveridge curve. In the early years of the crisis, the labour market changed, and the economic downturn increased the inflow rate and decreased the outflow rate from unemployment. The inflow rate decreased, and the outflow rate increased because of the gradual normalization of economic conditions and the implementation of additional structural reforms. His findings suggest an inverse relationship between unemployment and vacancies in Greece, fueled by post-crisis trends.

Babangida et al. (2024) examine the evolution of the unemployment-vacancy rate in the Turkish labour market during the COVID-19 pandemic and the global financial crisis. The study's conclusions show that the labour market is becoming less efficient, as seen by Beveridge Curve's migration away from its origin. Both the unemployment and vacancy rates rise over time, with Beveridge Curve's shifting left during the global financial crisis and right during COVID-19. The analysis also shows that the dynamics of the unemployment-vacancy rate were unaffected significantly by either crisis. There is a situation in the Turkish labour market where the unemployment rate in Turkiye is higher than the vacancy rate. This establishes a favourable correlation between these two variables. Turkiye's labour market is inefficient since not enough jobs are created to satisfy job searchers' demand.

In Malaysia, Subramaniam and Baharumshah (2011) claim that based on the Beveridge Curve, the labour market shows signs of potential mismatch since they find a positive association between total unemployment and total vacancies. The types of employment openings produced in the market are among the variables that have resulted in these conditions.

3.0 Methodology

3.1 Source of data

Secondary data was used to conduct this study. Data on unemployment rate, vacancy rate, growth domestic product (GDP), inflation rate, and share of employment in manufacturing and service industries have been collected from the Ministry of Human Resources Malaysia, the Department of Statistics Malaysia, and The World Bank Indicator. Time series data is used from 1994 to 2023, with observations of 30 years based on data availability. The unemployment rate is a proxy by unemployment, total (% of the total labour force), and the vacancy rate is a proxy by total vacancy (Employment Information and Analysis Services (EIAS) estimates based on vacancies dataset from MYFutureJobs) divided by total vacancies and total employed. GDP is a proxy of GDP growth (annual %). While the inflation rate is a proxy of inflation, consumer prices (annual %) and the share of employment in manufacturing and service industries are proxies of employed persons in the manufacturing and service industries. To represent the consequences of the COVID-19 crisis, the dummy variable has a value of 1 from 2020 until the end of the sample and 0 otherwise.

3.2 Model specification

The models and their determinants are below, following Babangida et al. (2024) and Bonthuis et al. (2013).

$$UR_t = \beta_0 + \beta_1 UR_{t-1} + \beta_2 VA_t + \beta_3 GDP_t + \beta_4 INFt_t + \beta_5 SE_t + \beta_5 CO_t + \varepsilon_t \quad (1)$$

where;
UR = unemployment rate, VA = vacancy rate, GDP = growth domestic product, INF = inflation rate, SE = share of employment in manufacturing and service industries, CO = covid-19, β = coefficient, ε = error term.

3.3 Unit root test

A unit root test has been conducted to determine whether the variables are stationary I (0) or non-stationary I (1) by applying both the Augmented Dickey-Fuller (ADF) and Philips and Perron (PP) tests.

3.4 Long-run cointegration relationship

Autoregressive Distributed Lag (ARDL) bound test approaches were used to regress the data since ARDL can handle both I(0) and I(1). Introduced by Pesaran et al. (2001), the ARDL bound test is used to determine the presence of long-run and short-run relationships between variables. The ARDL framework incorporates an error correction model (ECM), facilitating the direct calculation of the adjustment speed to long-run equilibrium after a disturbance. This is essential in labour market analysis, as it aids in comprehending the speed at which unemployment or other economic indicators revert to their long-term equilibrium after short-run disruption.

The existence of cointegration will be tested by comparing the calculated value of F statistics with the critical value tabular by the same author. To estimate the long-run relationship, the hypothesis is written as;

$H_O = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6$ (no cointegration)

$H_1 \neq \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6$ (cointegration exists)

If the calculated F-statistics exceed the upper bound critical value I (1), it shows evidence of the existence of a long-run relationship, thus rejecting the null hypothesis. If the F-statistics is smaller than the lower bound I (0), it shows no existence of a long-run relationship, thus failing to reject the null hypothesis. However, if the F-statistics lie between the upper and lower bounds, it is inconclusive.

3.5 Long run and short run coefficient

If the result shows the presence of a long-run cointegration relationship between variables, then the long-run cointegration model can be estimated as follows:

$$UR_t = \beta_0 + \sum_{i=1}^{k} \alpha_1 UR_{t-i} + \sum_{j=0}^{l} \alpha_2 \Delta VA_{t-j} + \sum_{j=o}^{l} \alpha_3 \Delta GDP_{t-j} + \sum_{j=0}^{l} \alpha_4 \Delta INF_{t-j} + \sum_{j=0}^{l} \alpha_5 \Delta SE_{t-j} + \sum_{j=0}^{l} \alpha_6 \Delta CO_{t-j} + \varepsilon_t \quad (2)$$

Once the long-run coefficient was estimated to find the short-run coefficient and the speed of adjustment that drove the variables back to the long-run equilibrium, the Error Correction Model was regressed as below:

$$\Delta UR_t = \Upsilon_0 + \lambda\, ect_{t-1} + \beta_1 UR_{t-1} + \beta_2 VA_{t-1} + \beta_3 GDP_{t-1} + \beta_4 INF_{t-1} + \beta_5 SE_{t-1} + \beta_6 CO_{t-1} + \sum_{i=1}^{k} \alpha_1 UR_{t-i} + \sum_{j=0}^{l} \alpha_2 \Delta VA_{t-j} + \sum_{j=0}^{l} \alpha_3 \Delta GDP_{t-j} + \sum_{j=0}^{l} \alpha_4 \Delta INF_{t-j} + \sum_{j=0}^{l} \alpha_5 \Delta SE_{t-j} + \sum_{j=0}^{l} \alpha_6 \Delta CO_{t-j} + \varepsilon_t \quad (3)$$

Where I and j are the lags based on the selected lag length in the long-run equation, and ect_{t-1} is the error correction term. λ is the speed of adjustment that drives the variables back to the long-run equilibrium. λ also, should be negative and significant.

3.5 Diagnostic Test

For the Diagnostic Test, serial correlation heteroscedasticity and normality tests were performed. The CUSUM Square Test was also performed for the long-run stability test.

4.0 Findings and Discussion

Tables 1 and 2 show the descriptive statistics and correlation matrix for all the variables: unemployment rate, vacancy rate, GDP, inflation rate, the share of manufacturing and services industries in total employment, and dummy variable. The highest unemployment rate was 4.64 during the Covid-19 in 2021 and the lowest unemployment rate was 2.45 in 1997. The vacancy rate has lingered between 0.5 to 23.6%. All the variables are distributed normally.

Table1: Descriptive Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
(1) UR	30	3.389	.462	2.45	4.64
(2) VR	30	6.543	5.659	.5	23.6
(3) GDP	30	38.718	25.829	.27	100
(4) IR	30	4.392	1.38	.86	7.44
(5) SE	30	.767	.032	.71	.82
(6) CO	30	.133	.346	0	1

Table 2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) UR	1.000					
(2) VR	0.323	1.000				
(3) GDP	-0.357	-0.265	1.000			
(4) IR	-0.317	0.032	0.347	1.000		
(5) SE	0.539	0.706	-0.578	-0.393	1.000	
(6) CO	0.736	0.494	-0.100	-0.170	0.622	1.000

The unit root tests rely on the outcomes of the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The dependent variable exhibited stationarity after being differenced once (Table 3).

Table 3: Unit root test

	Unit root test			
Variables	ADF		PP	
	Level, I(0			
	Constant Without Trend	Constant With Trend	Constant Without Trend	Constant With Trend
UR	-2.40	-3.19	-2.57	-3.31*
VA	-1.91	-2.85	-1.80	-2.87
GDP	-5.31***	-5.29***	-6.28***	-9.92***
INF	-4.67***	-4.88***	-4.67***	-4.86***
SE	-0.52	-3.54**	-0.90	-3.54*
CO	-3.87	-3.28***	-0.33	-1.25
	First Difference, I(1)			
	Constant With Trend	Constant Without Trend	Constant Without Trend	Constant With Trend
UR	-6.51***	-6.32***	-9.69***	-9.60***
VA	-5.17***	-4.98***	-4.33***	-3.70**
GDP	-4.83***	-4.82***	-16.6***	-19.3***
INF	-8.31***	-8.20***	-12.3***	-12.4***
SE	-7.86***	-7.71***	-8.37***	-8.20***
CO	-3.80***	-6.50***	-5.29***	-6.15***
Note: ***, **, and * denotes significance at the 1%, 5%, and 10% significance levels respectively.				

4.1 Long-run cointegration relationship

Table 4 summarizes the cointegration test. A long-run cointegration relationship exists between the unemployment rate and its explanatory variables: unemployment rate, vacancy rate, GDP, inflation rate, the share of manufacturing and services industries in total employment, and dummy variable. The computed F statistics is 8.101, which is more than the upper bound value. The long-run cointegration emphasizes the necessity of accounting for asymmetry when investigating the relationship between these factors.

Table 4: Long-run cointegration relationship

critical value	lower bound value	upper bound value	Computed F-statistics
1%	3.41	4.68	8.101***
5%	2.62	3.79	
10%	2.26	3.35	

4.2 Long-run coefficient

Following the creation of the cointegration connection in Table 4, we investigated the long-run and short-run relationships between the variables. Table 5 displays the R-squared and estimation result for the long-run coefficient between the unemployment rate, vacancy rate, GDP, inflation rate, the share of manufacturing and services sector in total employment, and the dummy variable. The R-squared value of 0.944 means that the independent variables in the model can explain 94% of the variation in the unemployment rate. In addition, the results show that the vacancy rate is negatively and significantly related to the unemployment rate, which supports the Beveridge curve on the inverse relationship between unemployment and vacancy rate. An increase in the vacancy rate by 1% will decrease the unemployment rate by about 0.028%. This result is consistent with Raines and Baek (2016). As employers seeking new hires and unemployed individuals create matches, or "pairs," the concept of a matching function makes sense. The matching function describes the number of jobs created at any given time by the number of employers seeking to fill vacancies and the number of job seekers.

Next, regarding the relationship between GDP and unemployment, the growth rate is negatively and significantly related to unemployment, consistent with Okun's law, which claims a negative relationship between economic growth and unemployment. An increase in the GDP by 1% will decrease the unemployment rate by about 0.012%. This finding aligns with Kalinová and Kroutlová (2023) and Rhee (2018). Unemployment often decreases when it reaches or exceeds potential when the economy expands and employs more people. However, when the economy is in a recession or other downturn, the output gap widens, and the unemployment rate rises. Aside from that, the impact of the COVID-19 pandemic is captured by a dummy variable, which has a positive and substantial relationship with unemployment. This outcome results from the job losses during the COVID-19 pandemic and the rise in the unemployment rate.

Table 5: Long-run model

VARIABLES	LR
VA	-0.0282*
	(0.0134)
GDP	-0.0121**
	(0.00524)
IR	-0.0763
	(0.0510)
SE	-0.258
	(3.599)
CO	0.587*
	(0.301)
Constant	3.308
	(2.067)
Observations	30
R-squared	0.944

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The model was confirmed, and the cumulative sum control (CUSUM) square test was passed.

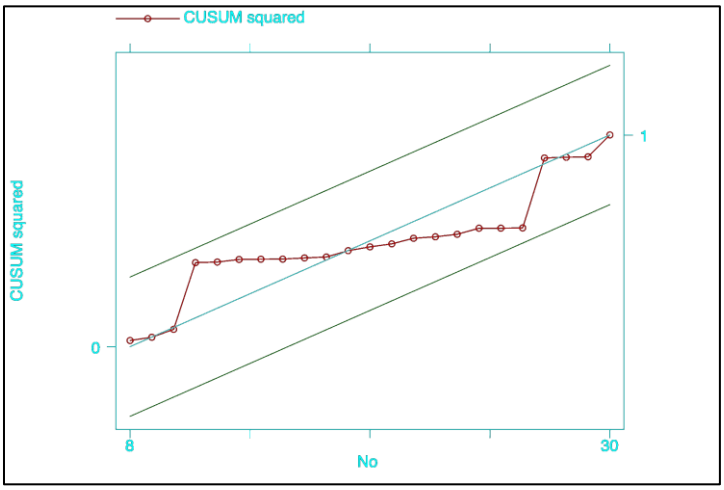

Fig 6: CUSUM squared Test

The CUSUM statistics stability test determines the significance at 95% confidence intervals. The figure's rejection of the null hypothesis suggests that all regression parameters are stable.

4.3 Short-run coefficient

Table 6 below shows the short-run error correction model.

Table 6: Short-run model

VARIABLES	SR
ADJ	-0.744***
	(0.143)
VR	0.0227**
	(0.0106)
GDP	-0.000761
	(0.00264)
IR	0.0230
	(0.0272)
SE	-15.71**
	(5.853)
CO	0.659**
	(0.273)

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The vacancy rate is positive and significant on the unemployment rate. The short-run result is likely due to the mismatch in the labour market (Said et al.,2021). Jobseekers opt to work in the gig economy. The share of manufacturing and service sectors in total employment is a negative and significant determinant of changes in the unemployment rate, where the higher the share of manufacturing and services, the lower the unemployment rate. The error-correction term (ECT) is negatively signed, has a coefficient that is less than one, and statistically significant. This indicates that any short-term deviation will correct itself and align with the long-term equilibrium trend. The whole adjustment will take place when the value reaches 100%. Hence, a conversion rate of 74.4% to 100% equates to 1.34 (i.e., 1/0.744=1.34). This implies that it would take around 1.34 years to return to the long-run equilibrium in the event of any short-run divergence. A lower adjustment interval corresponds to a greater ECT value and vice versa.

4.4 Diagnostic test

The LM test result for serial correlation indicates that the residuals do not exhibit serial correlation, as the p-value is 0.2907 above the significance level of 0.05. Furthermore, the result of the Breusch–Pagan–Godfrey test indicates that the residuals are Homoscedastic, as evidenced by the p-value of 0.7825. The residuals also exhibit a normal distribution, as indicated by the p-value 0.1255, which has a significance level of 0.05. based on the diagnostics test, we can conclude that the model is well-specified.

Table 7: Diagnostic test

Diagnostic tests	(Prob)
Serial Correlation	0.2907
Heteroscedasticity	0.7825
Normality	0.1255

5.0 Conclusion and Recommendations

This study revisits the relationship between unemployment and vacancy rates in Malaysia. It employs the ARDL method and analyzes time series data from 1994 to 2023. The empirical findings from the ARDL analysis indicate that there is a statistically significant and negative impact between unemployment and vacancy rate in the long term. Therefore, more middle- and high-skilled job openings are required in the market to lower unemployment and encourage jobseekers to enter the formal labour market. High-skilled industries like advanced manufacturing, renewable energy, and digital technology should see industrial expansion supported by the government. This can be achieved by providing specific tax breaks, grants, and subsidies to businesses that are automating or digitizing, especially by the 12th Malaysia Plan (12MP), which strongly emphasizes on high-tech and sustainable industries as a means of transforming the economy. Additionally, it might be necessary to improve the effectiveness of job search platforms to boost the effectiveness of job seekers' and employers' matching.

This study's exclusive focus on Malaysia limits its generalizability to ASEAN or other developing economies, which may exhibit distinct labor market structures, policy environments, or socio-economic challenges. Future research could adopt cross-country comparative frameworks with similar labor market challenges (e.g., Indonesia, Thailand) to explore transferable policy insights and identify scalable solutions for unemployment-vacancy imbalances in diverse developing contexts.

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Paper Contribution to Related Field of Study

This paper contributes to the field of labour economics.

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