

Determinants of Unemployment: Empirical Evidence from Indonesia

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Abstract - Indonesia faces the challenge of a rapidly increasing labor force that is not proportional to the number of jobs available, resulting in unemployment. This study examines the effect of economic growth, inflation, and minimum wage on unemployment in 34 provinces in Indonesia from 2018 to 2022. This research uses secondary data from the Central Bureau of Statistics and Bank Indonesia. The data processing method uses panel data regression with the Fixed Effect model. The results of the analysis show that economic growth and inflation have a negative and significant relationship with unemployment in Indonesia. In contrast, the provincial minimum wage has a positive and significant relationship with unemployment in Indonesia.

Keywords: Economic growth, Minimum wage, Unemployment

1. Introduction

Indonesia has the fourth-largest population in the world and is a developing nation. Problems commonly faced by both developed and developing countries, especially Indonesia, are macroeconomic issues such as unemployment and inflation (Prihadyatama & Kurniawan, 2022; Karimah et al., 2023).

Regarding employment, Indonesia faces a rapidly growing labor force that is not proportional to the number of jobs available. This results in unemployment. This has become a severe problem in almost all regions of Indonesia, where the reality is that economic development has not proportionally created more jobs as the population growth increases every year (Wahab, 2022). Efforts in economic development are to create prosperity and welfare for the community, expand the provision of employment, and equalize income distribution. If development can improve welfare more broadly, then development is considered successful, meaning that economic development's benefits must be felt equally and somewhat by all people (Purba et al., 2022).

Provinces on Java Island account for the majority of Indonesia's Open Unemployment Rate (OUR), which ranges from 3.7 percent to 8.5 percent, according to data released by the Central Statistics Agency (BPS) in 2022. In second place is Sumatera Island, which shows a reasonably high OUR, ranging from 3.4 percent to 8 percent. Meanwhile, Kalimantan Island ranked third with OUR values ranging from 4.2 percent to 6.7 percent. The average OUR in 2022 was around 5.83 percent at the national level. The data shows a considerable gap in the OUR between provinces.

As a macroeconomic indicator, unemployment is not a separate variable. It has a relationship with other macroeconomic variables, either directly or indirectly. According to Keynes theory, a less flexible pay rate in the labor market impacts unemployment (Kaufman & Hotchkiss.T, 1999).

Similar to supply, wage rate has an impact on demand. There is an inverse link between labor demand and pay rate; when wages rise in the market, fewer workers are required, which results in unemployment. When wages rise, employers frequently switch from using labor to using machinery or technology. Labor demand is the number of workers an employer can hire or require at a given wage level (Case, Fair, & M, 2007).

In an equilibrium, supply and demand are equal. There will be full employment when equilibrium is achieved. This equilibrium also referred to as competitive wages and competitive workers, strikes a balance between the number of workers and wages. In this equilibrium state, the wage rate is the market-clearing wage rate. There will be pressure to raise or decrease the pay rate if it deviates from the equilibrium wage rate. Labor-intensive job vacancies will result from this uneven wage rate, or too many workers may vying for the same number of positions. On the other hand, there will be less of a need for work during a recession (Soekapdjo & Oktavia, 2021).

Okun (1962) first proposed that unemployment and economic growth are correlated. Okun's Law states that the unemployment rate and GDP have a negative relationship, with a 2% decline in GDP will result in a 1% increase in unemployment. This suggests that as economic

growth picks up, the unemployment issue might get better, and that as growth picks down, the jobless rate usually does too. According to Okun, this relationship's theoretical foundation is the idea that rising labor force participation should lead to rising output of goods and services. If we examine the link between the production gap and unemployment, we may infer that the two variables are negatively correlated; that is, unemployment will be lower when actual production exceeds potential, or when the production gap is positive.

Similarly, Phillips (1958) was the first to describe the negative link between unemployment and inflation. Inflation is defined as a general and ongoing rise in the price of goods and services (Dornbusch & Fischer, 1992). Based on the premise that inflation is a measure of aggregate demand, the Phillips curve describes the relationship between inflation and the unemployment rate. Demand theory predicts that prices will increase due to increased demand overall. As a means of raising funds to expand production capacity, producers are incentivized by this price increase to augment their workforce. As a result, as inflation rises, the unemployment rate falls. How it is handled also demonstrates the inverse relationship between inflation and unemployment. Implementing a tight money policy is one of the tactical tools employed in nations facing high inflation. Interest rates are raised to accomplish this. Maintaining the current trend of rising interest rates will discourage investment, raising the unemployment rate.

Diverse and conflicting research has been done on the factors influencing unemployment in Indonesia. For instance, according to Wahab (2022) research on the relationship between economic growth and unemployment, a 1% rise in economic growth will result in a 0.96% drop in South Sulawesi's unemployment rate. This is consistent with the study conducted in the Sumatra province by research of Putra et al., (2021), which discovered a significant negative effect between the two factors. On the other hand, studies conducted at the regional and national levels by Purba et al., (2022) and Suhendra & Wicaksono (2020) discovered a strong positive influence between the two factors. Nevertheless, a study conducted in West Kalimantan by Yacoub & Firdayanti (2019) revealed no significant correlation between the two factors.

Additionally, Tenzin's (2019) study demonstrates that Bhutan follows the Phillips Curve in the near run, with a 1% increase in inflation translating into a 0.29 percent decrease in unemployment. Put another way, as employment rises, so do product and service prices.

Soekapdjo & Oktavia (2021) conducted the same research and discovered that inflation significantly negatively affects unemployment in Indonesia. Using the same study setting, Astuti et al., (2019) found different results where inflation

significantly positively affects unemployment in Indonesia. However, investigation on Manado by Lutherani et al., (2023) revealed that neither of the variables had any discernible impact.

Similarly, study by Putra et al., (2021) discovered a negative correlation between the minimum wage and the unemployment rate. A company cannot recruit people if its minimum salary falls too far below the established regional minimum wage. This is consistent with research by Santoso & Kristiyanto (2021) that indicates salaries have a statistically significant negative impact on unemployment; however, it is at odds with research by Yacoub & Firdayanti (2019) that shows both variables have a positive influence.

Previous literature shows inconsistent findings on the variables studied. This is the urgency of this study, which is to respond to the conclusions of the previous literature that provide inconsistent empirical evidence and fill the gaps in the literature with new empirical evidence. The difference between this research and the research by Putra et al., (2021) lies in the object of research, where this research uses the research object of Indonesia, while the research by Putra et al., (2021) uses the research object of Sumatra, Indonesia.

2. Research Methods

This research utilizes a quantitative approach using panel data regression that integrates both cross-sectional and time series analysis techniques. Cross-sectional data from 34 Indonesian provinces was provided, while the time series data collected from 2018 to 2022. The secondary data for this study were processed from the Central Bureau of Statistics using Eviews 9. In this study, hypothesis testing aims to establish relationships among the variables under examination, constituting a correlational study. The dependent variable is the open unemployment rate, while economic growth, inflation, and provincial minimum wage serve as independent variables. Economic growth is represented by Gross Domestic Product in this analysis. The ensuing panel data regression model outlines the analytical framework utilized in this research:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + e_{it}$$

Description:

Y = Open Unemployment Rate

X1 = Economic Growth

X2 = Inflation

X3 = Provincial Minimum Wage

i = 1, 2, ..., 34 (cross-section data)

t = 1, 2, ..., 5 (time series data)

e = error term

β_0 = constant

$\beta_1, \beta_2, \beta_3$ = regression coefficient

The data analysis technique used is panel data regression. Panel data estimation in this study involves several stages of testing aimed at ensuring

that the estimation will provide the most effective results. The first stage is selecting the best model, which will be tested using the Chow Test, Hausman Test, and LM Test. The three models to be regressed are common effect model, fixed effect model or random effect model. Furthermore, it is necessary to test data consistency using the classical assumption test. The three tests need to be done to test the validity of the data used.

3. Results and Discussion

3.1. Panel Data Regression Analysis

Regression analysis on panel data begins with a test of the best model. To make model estimation easier, some of the variables in this analysis have been transformed into logarithms. The results of each model are shown in Table 1.

Table 1. Result of the Common Effect Model (CEM) Panel Data Estimation

Variable	Coefficient	Prob.
C	-35.25028	0.0000
LOG_X1	0.766119	0.0000
X2	-0.14856	0.0301
LOG_X3	2.152673	0.0001
R-squared		0.293203
Adjusted R-squared		0.28043
Durbin-Watson stat		0.343821

Due to the probability value of each variable being less than 0.05, Table 1 demonstrates that all variables have a significant effect.

Table 2. Results of the Fixed Effect Model (FEM) Panel Data Estimation

Variable	Coefficient	Prob.
C	-22.31502	0.0619
LOG_X1	-6.804297	0.0000
X2	-0.065054	0.0409
LOG_X3	7.420753	0.0000
R-squared		0.908564
Adjusted R-squared		0.883814
Durbin-Watson stat		1.797435

Because the probability value of each independent variable in Table 2 is less than 0.05, it is evident that all factors have a substantial impact.

Table 3. Results of the Random Effect Model (REM)

Variable	Coefficient	Prob.
C	-54.64222	0.0000
LOG_X1	0.585468	0.0072
X2	-0.152951	0.0000
LOG_X3	3.616888	0.0000
R-squared		0.254689
Adjusted R-squared		0.24122
Durbin-Watson stat		1.670067

Because each variable's probability value is less than 0.05, Table 3 demonstrates that every variable has a significant impact.

3.2. Selecting the Best Model

The Chow and Hausman test tests which of the three models should be chosen after the three types of models have been analyzed. The outcomes of the Chow and Hausman tests to determine which model is optimal are listed below.

Table 4. Results of the Hausman and Chow Tests

Chow Test			
Effects Test	Statistic	d.f.	Prob.
Cross-section Chi-square	347.666853	33	0.0000
Hausman Test			
Test Summary	Chi-Sq. Stat	Chi-Sq.	Prob.
Cross-section random	40.640527	3	0.0000

The Fixed Effect model is better to the Common Effect model, as indicated by the Chow test probability value below the 0.05 significance level in Table 4's Hausman test findings. The Fixed Effect model is superior to the Random Effect model when the Hausman test is performed after the Chow test has determined which model was chosen. This is because the probability value is reached below the 0.05 significance level. Thus, it may be said that the Fixed Effect model (FEM) is the optimal mode for this investigation.

The regression equation is derived as follows using Table 2 as a basis:

$$Log_Y = -22.31502 - 6.804297 Log_X1 - 0.065054 X2 + 7.420753 Log_X3$$

The data in this study were transformed with logarithm linear regression with the aim of minimizing the conditions of violation of classical regression assumptions (Marwah, 2022). According to Lee, (2020), data transformation into logarithms is impossible when the values have negative, so inflation variable cannot be transformed because it contains negative values.

A classical assumption test is performed to ensure no correlation between variables and error variance in the model once the Fixed Effect Model is selected as the best model. Heteroscedasticity and multicollinearity tests are used in classical assumption testing.

The normality test determines whether the dependent and independent variables in the panel data linear regression model are normally distributed. This study uses the Central Limit Theorem assumption, which states that for large samples, especially more than 30 ($n \geq 30$), the sample distribution is considered normal, (Indriani

& Wahyono, 2022; Rahmadani et al., 2021; Tamarawati & Puspawati, 2022; Usriya & Usriya, 2021). The sample in the study was 170 ($n \geq 30$), by the Central Limit Theorem assumption, the normality test in long-term estimation was declared normally distributed.

Table 5. Multicollinearity Test Results

	LOG_X1	X2	LOG_X3
LOG_X1	1.000000	0.017173	-0.10222
X2	0.017173	1.000000	0.026967
LOG_X3	-0.10222	0.026967	1.000000

Table 5 indicates no multicollinearity in the data because the correlation coefficient between the independent variables is less than 0.80.

Table 6. Heteroscedasticity Test Results

Variable	Coefficient	Prob.
C	2.027814	0.7166
LOG_X1	0.829071	0.1487
X2	-0.00192	0.8971
LOG_X3	-0.784827	0.0531

The Glejser test results show that the independent variables do not occur heteroscedasticity because the prob value is greater than alpha 0.05.

The F and t-test are used to conduct simultaneous and partial significance testing after the classical assumption test.

Table 7. Partial Test Results

Variable	Coef.	$p > z $	α
LOG_X1	-6.8043	0.0000	0.05
X2	-0.06505	0.0409	0.05
LOG_X3	7.420753	0.0000	0.05

To ascertain the degree of significance between the independent and dependent variables, a partial statistical test, or t-test, is needed. The degree to which each independent variable partially explains the dependent variable is also ascertained using the t-test. Every independent variable has a considerable impact on OUR, as Table 7 demonstrates.

Table 8. Simultaneous Test Results

Prob>chi2	α	Desc
0.0000	0.05	Significant

The results of the F test, which is used to assess how simultaneously the independent factors affect the dependent variable, are displayed in Table 8. These findings demonstrate that Prob>chi2 0.0000 is less than 0.05, indicating that the independent variables collectively substantially impact the OUR variable.

Based on the regression analysis results, the economic growth variable reflected in the GRDP value has a coefficient of -6.804297 with a probability value of $0.0000 < 0.05$, which means that economic growth has a negative and significant effect on unemployment in Indonesia. So, if there is an increase in economic growth by 1 percent, it will reduce the open unemployment rate by 6.8 percent. This condition is in line with Okun's Law (1962) which states that economic growth and unemployment have a negative relationship. Increasing economic growth will lead to increased production of goods and services, thus requiring additional labor in the production process.

These findings are supported by research by Putra et al., (2021) and Chand et al., (2018), which also show that low economic growth contributes to higher unemployment, indicating that economic growth has a significant negative impact on unemployment. Reduced aggregate demand causes a reduction in aggregate supply, which in turn causes a decrease in production, which lowers the pace of economic growth. Therefore, firms reduce workers, which ultimately increases unemployment (Amor & Hassine, 2017). The study conducted by Soylu et al., (2018) also confirmed this research. There is a relationship between unemployment and work chances; employment opportunities are tied to investments made possible by savings, which are the remaining earnings that are not spent. When economic growth picks up, investors will swarm to the nation to place their capital. Investments from investors will create jobs that can be filled and effectively reduce unemployment (Mahrus Lutfi Adi Kurniawan, 2014). The expectation of creating additional production capacity, which will absorb new labor, increases with national wealth (Suhendra & Wicaksono, 2020).

The inflation variable has a coefficient of -0.065054 with a probability value of $0.0409 < 0.05$, which means that inflation has a negative and significant effect on unemployment in Indonesia, if there is an increase in inflation by 1 percent it will reduce the open unemployment rate by 0.06 percent, by a study conducted by Prakoso (2020) where inflation has a negative and significant effect on unemployment in Indonesia. If inflation increases sharply, companies will tend to reduce their production level due to the increase in raw material prices, so they do not need many employees. As a result, companies tend to reduce the number of their employees, which impacts increasing unemployment (Al-faridzi, 2023; Karimah et al., 2023). This condition is in line with the Phillips Curve, which illustrates the relationship between inflation and the unemployment rate. Demand theory states that prices will rise in response to an increase in aggregate demand. This price increase encourages producers to increase their labor force as one of the capital to increase production capacity. Therefore,

the unemployment rate decreases as the inflation rate increases.

The provincial minimum wage variable has a coefficient of 7.420753 with a probability value of $0.0000 < 0.05$, which means that the provincial minimum wage has a positive and significant effect on unemployment in Indonesia if there is an increase in the provincial minimum wage by 1 percent, it will increase the open unemployment rate by 7.4 percent, in line with the study conducted by Neumark & Wascher (2004) where an increase in the minimum wage causes more unemployment. The minimum wage have an impact on how eagerly businesses are to hire new workers (Atikasari, Khoirudin, & Saleh, 2023). In general, inflation drives wages; this will impede the absorption of labor, resulting in an increase in the unemployment rate (Lutherani et al., 2023). Theoretically, the minimum wage should reduce labor demand because the substitution and output effects work in the same direction (Herrera & Carmen, 2023). In "The General Theory," Keynes explains that an increase in employment can only occur if the wage rate falls (Mankiw, 2000). Traditional economists and employer representatives think that an increase in the minimum wage will increase costs, so employers are expected to reduce hiring (Fang & Lin, 2015; Wang et al., 2019). With an increase in wages, employers are likely to shift from labor to machinery or technology. On the other hand, setting a lower minimum wage encourages companies to use more labor to reduce unemployment (Prawira, 2018).

4. Conclusion

The impact of inflation, minimum wage, and economic growth on Indonesia's unemployment are all examined in this study covering 2018–2022. The data processing technique uses panel data regression with the Fixed Effect model. The analysis's findings demonstrate that Indonesian unemployment and economic growth are significantly and negatively correlated. It is therefore expected that the government will give it careful thought. This attention is intended to overcome the unemployment problem and seek to increase economic growth in Indonesia. In addition, inflation also shows a negative and significant relationship with unemployment. As a result, to minimize unemployment as much as possible, the government and the monetary authority must cooperate to manage inflation and direct it toward the desired inflation rate. In the meantime, the analysis's findings indicate that the province minimum wage and the unemployment get along well. The government should implement the province minimum wage as a preventative against employer labor exploitation. However, wage disputes between employers, workers, and the government will result if different factors aren't considered. As a result, the government must determine the appropriate

minimum wage for a particular region while considering several social and economic factors.

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