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EXAMINING THE IMPACT OF REGIONAL ECONOMIC GROWTH, EDUCATION, AND MINIMUM WAGES ON OPEN UNEMPLOYMENT IN CENTRAL JAVA PROVINCE

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ABSTRACT

This study aims to analyze the effect of Regional Gross Domestic Product (RGDP), Education, and the Regency/City Minimum Wage on the Open Unemployment Rate (OUR) in Central Java Province during 2020–2023. This study uses secondary data obtained from the Central Statistics Agency (BPS) with a panel data approach combining time series and cross-sectional data across regencies/cities in Central Java. The analytical method used is panel data regression to determine the effect of the independent variables on the Open Unemployment Rate. The results show that, partially, the RGDP variable has no significant effect on the Open Unemployment Rate, while the Mean Years of Schooling (MYS) and the Regency/City Minimum Wage (RMW) have a negative and significant effect on OUR. Simultaneously, RGDP, MYS, and RMW have a significant effect on OUR in Central Java Province during 2020–2023. The results of this study can serve as a consideration for the government in formulating economic and employment policies.

Keywords: Open Unemployment Rate, RGDP, Education, Minimum Wage

INTRODUCTION

Unemployment is one of the fundamental economic problems in Indonesia, with broad implications for public welfare. The Open Unemployment Rate (OUR) is used as a primary indicator to measure the proportion of the labor force that has not yet obtained employment but is actively seeking work. A high OUR reflects underlying pressures in the economy, which may lead to slower economic growth, increased poverty, and disruptions to social stability (Putri et al., 2025; Choiri et al., 2025). Fluctuations in the OUR indicate imbalances in the labor market, both cyclical and structural in nature. These imbalances are often driven by mismatches between labor supply and demand, particularly in terms of skill disparities, educational attainment, and sectoral labor requirements.

During the 2020–2023 period, the OUR in Central Java Province exhibited considerable fluctuations. This condition cannot be separated from the significant socioeconomic disruptions caused by the COVID-19 pandemic, which affected various economic sectors, particularly the labor market.

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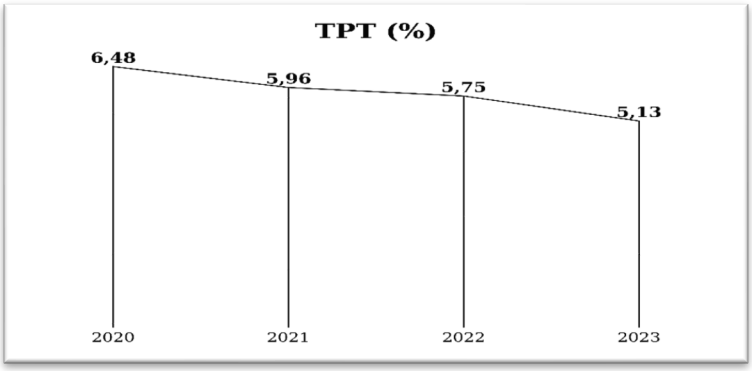

Figure 1. Open Unemployment Rate (%) in Central Java Province, 2020–2023
Source: Central Java Provincial Statistics Agency (BPS), 2026

Based on data from the Central Java Provincial Statistics Agency (BPS), the OUR in Central Java rose sharply to 6.48 percent in 2020 due to mass layoffs during the pandemic. It then decreased gradually to 5.96 percent (2021), 5.75 percent (2022), and 5.13 percent (2023) as economic activity recovered (BPS Jawa Tengah, 2020; BPS Jawa Tengah, 2024). However, disparities remain across the 35 regencies and cities, indicating that regional recovery has been uneven. This heterogeneity in unemployment dynamics motivates the need for a disaggregated, panel data analysis of the determinants of unemployment at the regency/city level.

Three factors are theoretically and empirically linked to OUR in this context. First, Regional Gross Domestic Product (RGDP) represents a region's productive capacity; an expansion of RGDP is expected to increase labor demand and reduce unemployment, as postulated by Okun's Law (Okun, 1962). Second, education measured by Mean Years of Schooling (MYS) is a key dimension of human capital. Human Capital Theory (Becker, 1962) asserts that higher educational attainment raises worker productivity and employability, thereby reducing unemployment. Third, the Regency/City Minimum Wage (RMW) policy influences both worker welfare and employer labor demand costs. Efficiency Wage Theory (Shapiro & Stiglitz, 1984) suggests that higher wages can incentivize worker productivity, while Classical Labor Market Theory warns that wages set above equilibrium may reduce labor demand.

Prior empirical studies have reported inconsistent findings regarding the determinants of unemployment, indicating that the relationship between Regional Gross Domestic Product (RGDP), education, and minimum wage is highly context-dependent. Regarding RGDP, Setyaputri et al. (2025) and Mifta et al. (2022) found that economic growth significantly reduces unemployment in Central Java, supporting Okun's Law. In contrast, Ghiswa and Hasmarini (2022) as well as Gina and Sabar (2025) reported that RGDP has no statistically significant effect after controlling for other regional characteristics. Likewise, the effect of education remains inconclusive. Wahyulianti et al. (2025) and Azizy (2026) concluded that higher educational attainment significantly lowers unemployment through improvements in human capital, whereas several studies have suggested that

educational expansion alone is insufficient to reduce unemployment because labor market demand does not always match the qualifications of graduates. Similarly, empirical evidence on minimum wages remains mixed. Silvie and Hasmarini (2023) found that the Regency/City Minimum Wage (RMW) reduces unemployment in Central Java, while Faizah and Woyanti (2023) observed an insignificant effect in Banten, suggesting that the effectiveness of wage policy differs across regional labor markets.

These inconsistent findings indicate that the determinants of unemployment are influenced by regional characteristics, economic structure, and the period of observation. Most previous studies have examined these variables separately or have focused on limited geographical areas and pre-pandemic conditions. Consequently, the existing evidence has not yet provided a comprehensive understanding of how economic growth, education, and minimum wage policies jointly affect unemployment during the post-pandemic recovery period.

This study differs from previous studies in several important aspects. First, unlike earlier studies that generally focused on either economic growth, education, or minimum wage individually, this research simultaneously examines the combined effects of RGDP, Mean Years of Schooling (MYS), and Regency/City Minimum Wage (RMW) within a single analytical framework. Second, this study specifically investigates the post-pandemic recovery period (2020–2023), during which labor market conditions experienced substantial structural changes due to COVID-19. Third, the analysis covers all 35 regencies/cities in Central Java using a Fixed Effect Model (FEM) panel data approach, allowing the model to control for unobserved regional heterogeneity that is often overlooked in previous studies. Finally, while previous research has frequently concentrated on other provinces or broader national data, this study provides region-specific empirical evidence for Central Java, thereby enriching the literature on regional labor market dynamics in Indonesia.

Therefore, this study aims to address these research gaps by providing more comprehensive and context-specific empirical evidence regarding the influence of RGDP, education, and minimum wage on the Open Unemployment Rate in Central Java during the post-pandemic recovery period.

The originality of this study lies not only in its focus on the post-pandemic period (2020–2023), but also in its integrated analysis of Regional Gross Domestic Product (RGDP), Mean Years of Schooling (MYS), and Regency/City Minimum Wage (RMW) across all 35 regencies/cities in Central Java using a Fixed Effect Model (FEM). By simultaneously examining these determinants while accounting for regional heterogeneity, this study extends previous empirical research and provides more comprehensive evidence on the factors influencing the Open Unemployment Rate in one of Indonesia's most economically diverse provinces.

MATERIAL AND METHOD

This study uses a quantitative technique with secondary data gathered from the Central Java Provincial Statistics Agency (BPS). The data used cover 35

regencies/cities in Central Java during the 2020–2023 period. The research variables consist of Regional Gross Domestic Product (RGDP), the level of education measured by Mean Years of Schooling, the Regency/City Minimum Wage (RMW), and the Open Unemployment Rate (OUR).

The analysis was conducted using panel data regression with the assistance of EViews 12 software. The RGDP variable is measured in millions of rupiah, the level of education in years, the RMW in rupiah, and OUR in percentage. These four variables are used to analyze the economic and employment conditions in Central Java. The Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) were used to choose the panel data regression model. The panel data regression equation used in this study is as follows:

$$OUR_{it} = \alpha + \beta 1\ RGDP_{it} + \beta 2\ MYS_{it} + \beta 3\ RMW_{it} + \varepsilon_{it} \quad (1)$$

Where: OUR is the Open Unemployment Rate (percent), α is the constant, β1, β2, and β3 are the regression coefficients of the respective independent variables, RGDP is Regional Gross Domestic Product, MYS is Mean Years of Schooling, RMW is the Regency/City Minimum Wage (Rupiah), i is the cross-section unit (regency/city), t is the time period (year), and ε is the error term.

The Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) were evaluated in order to determine the best panel data specification. The Hausman test was utilized to ascertain if the Fixed Effect Model or Random Effect Model was more suitable, and the Chow test was utilized to compare CEM with FEM. The F-test, t-test, and coefficient of determination (R2) were then used to assess the chosen model. The consistency of the estimated coefficients across alternative panel data specifications (CEM, FEM, and REM) was also examined as a robustness check before selecting the final model.

RESULT AND DISCUSSION

The test results are as follows:

Tabel 1. CEM, FEM, and REM regression results.

	Regression Coefficient		
Variables	**CEM**	**FEM**	**REM**
C	6.145828	31.44947	17.62096
RGDP	2.29E-07	-4.66E-08	2.95E-10
MYS	-0.239140	-2.553543	-0.497949
RMW	3.85E-07	-2.48E-06	-3.88E-06
R^2	0.033073	0.914008	0.280584
F-statistic prob	0.204345	0.000000	0.000000
Chow Test			
Cross-section F (34,102) = 30.732967; Prob. F = 0.0000			
Hausman test			
Random cross-section χ^2 (3) = 52.006664; Prob. χ^2 = 0.0000			

Source: Processed secondary data (2026)

After estimating the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM), the test results show that the most appropriate model to use in this study is the Fixed Effect Model (FEM). This model selection is based on the results of the Chow Test and Hausman Test, which are statistically significant and show that FEM is superior in capturing the effect of individual heterogeneity. In other words, FEM is able to accommodate the unique, time-invariant characteristics of each observation unit, thereby producing more consistent and unbiased coefficient estimates.

Based on the data presented in Table 1, the probability value of the Cross-section F reaches 0.000, which is lower than α (0.05). Consequently, H_0 is rejected and FEM is established as the most optimal model for this panel data estimation. Furthermore, the Hausman Test result also records a probability value of 0.000 (< 0.05), reinforcing the rejection of H_0 and confirming the use of FEM as the final model for analysis.

The overall model adequacy is assessed through the F-Test. The null hypothesis H_0 assumes that all independent variables namely Mean Years of Schooling (MYS), Real GDP (RGDP), and Regency/City Minimum Wage (RMW) collectively have no effect on the unemployment rate. H_0 is rejected when the probability value of the F-statistic is smaller than the significance level α. In addition, the t-Test is applied to detect the partial significance of each independent variable on the dependent variable. In this context, H_0 assumes that the i-th independent variable has no impact on the unemployment rate, while H_a states that a significant effect exists. H_0 is rejected if the probability value of the t-statistic falls below α (0.05).

Tabel 2. FEM regression results.

$OUR_{it} = 31.44947 - 0.4388RGDP_{it} - 0.0000MYS_{it}^{*} - 0.0013RMW_{it}^{*} + \varepsilon_{it}$
R^2 = 0,914; *F-stat* = 29,30135; Prob. *F-stat* = 0,000

Source: Processed secondary data (2026)
Note : *significant coefisient at α 0.01; **significant coefficient at α 0.05; ***significant coefficient at α 0.1

Based on the F-test results in Table 2, the F-statistic probability is 0.000, which is lower than the significance level of 0.05, and the F-statistic value (29.30135) is greater than the F-table value (2.671178). Therefore, H_0 is rejected and H_A is accepted, indicating that Gross Regional Domestic Product (GRDP), Mean Years of Schooling (MYS), and Regency/City Minimum Wage (RMW) simultaneously have a significant effect on the Open Unemployment Rate (OUR) in the 35 regencies/cities of Central Java Province during 2020–2023. In addition, the Adjusted R^2 value of 0.882814 shows that 88.28% of the variation in OUR can be explained by these three variables, while the remaining 11.72% is influenced by other factors not included in the model, such as investment, population, and labor force participation rates. However, the insignificant effect of GRDP when tested individually will be discussed further in the partial (t-test) results.

The partial test (t-test) results indicate that the Gross Regional Domestic Product (GRDP) variable has no significant effect on the Open Unemployment Rate (OUR) in Central Java Province during 2020–2023. This is evidenced by a t-statistic of −0.777187, which is smaller than the t-table value of 1.977304, and a probability value of 0.4388 > 0.05. Although the coefficient is negative, implying that an increase of 1 million rupiah in GRDP is associated with a decrease of 0.0000000466 percentage points in OUR, the effect is not statistically significant.

In contrast, Mean Years of Schooling (MYS) has a negative and statistically significant effect on OUR, as indicated by a t-statistic of −5.841864 and a probability value of 0.0000 < 0.05. This finding suggests that an additional year of schooling is associated with a decrease of approximately 2.553543 percentage points in the Open Unemployment Rate, ceteris paribus.

Similarly, the Regency/City Minimum Wage (RMW) variable has a negative and significant effect on OUR. The t-statistic of −3.301680 exceeds the t-table value of 1.977304 in absolute terms, while the probability value of 0.0013 is below the 5 percent significance level. This result indicates that an increase of Rp1,000,000 in the minimum wage is associated with a decrease of approximately 2.48 percentage points in the Open Unemployment Rate, ceteris paribus

The Effect of RGDP on Open Unemployment Rate

The finding that RGDP does not exert a statistically significant effect on the open unemployment rate (OUR) in Central Java over the period 2020–2023 is consistent with a growing body of empirical literature. Ghiswa and Hasmarini (2022) similarly document the absence of a significant relationship between RGDP and unemployment in Central Java during 2018–2021, indicating that regional economic growth has not been sufficiently employment-intensive to generate meaningful labor absorption. Likewise, Gina and Sabar (2025) report insignificant effects of RGDP on unemployment across regencies and municipalities, attributing this pattern to the prevalence of jobless growth, whereby output expansion is predominantly driven by capital-intensive sectors rather than labor-intensive activities.

Further supporting this argument, Mifta et al. (2022) find that although RGDP exhibits a negative association with unemployment, the relationship loses statistical significance once human development indicators are incorporated into the model. This suggests that the transmission mechanism from economic growth to employment outcomes is mediated by structural and institutional factors, including human capital quality and labor market conditions.

Taken together, these findings imply that the empirical validity of Okun's Law is not uniform at the subnational (regency/city) level in Central Java. One plausible explanation lies in the structural composition of regional output, which is increasingly dominated by industrial and service sectors characterized by higher capital intensity and lower labor absorption capacity. Consequently, reliance on aggregate output growth alone is unlikely to serve as an effective policy instrument for reducing unemployment. Instead, a more comprehensive policy framework is

required, incorporating labor market reforms, human capital development, and sectoral strategies that promote employment-intensive growth.

The Effect of Mean Years of Schooling on Open Unemployment Rate

The negative and statistically significant effect of mean years of schooling (MYS) on the open unemployment rate (OUR) provides robust empirical validation of Human Capital Theory (Becker, 1962), which posits that education enhances workers' productivity, skill endowment, and employability, thereby reducing the probability of unemployment. This finding underscores the role of education not only as a social good but also as a key determinant of labor market efficiency and economic performance.

The result is consistent with a growing body of empirical literature. Wahyulianti et al. (2025) document a significant inverse relationship between educational attainment and unemployment in Central Java, suggesting that improvements in schooling levels contribute directly to labor absorption. Similarly, Azizy (2026), employing a Fixed Effects Model (FEM) across 27 regencies/cities in West Java, finds that education is a statistically significant negative determinant of unemployment, highlighting the robustness of this relationship across subnational contexts. Comparable evidence is reported by Faizah and Woyanti (2023), who demonstrate that higher levels of education are associated with lower unemployment in Banten Province. In addition, Radila et al. (2021) identify education as the most consistent and statistically significant factor in reducing unemployment in Bali Province, reinforcing the generalizability of this finding across different regional settings in Indonesia.

Beyond its direct effect on employability, education also operates through broader structural channels. As emphasized by Leoni (2023), education enhances individuals' adaptive capacity, enabling workers to respond more effectively to technological change, sectoral shifts, and economic disruptions. This dimension is particularly salient in the post-pandemic labor market, where flexibility, reskilling, and resilience have become critical determinants of employment outcomes. Consequently, the impact of education extends beyond static productivity gains to include dynamic adjustments within evolving labor market conditions.

Taken together, these findings provide strong and consistent evidence that investment in education constitutes a fundamental pillar of unemployment reduction strategies. In the context of Central Java, this implies that policies should prioritize not only increasing years of schooling but also improving the quality and relevance of education to labor market needs. Strengthening human capital through targeted educational interventions is therefore essential for fostering inclusive and employment-intensive economic development.

The Effect of Regency/City Minimum Wage on Open Unemployment Rate

The negative and statistically significant effect of the regency/city minimum wage (RMW) on the open unemployment rate (OUR) provides empirical support for the Efficiency Wage Theory (Shapiro & Stiglitz, 1984), which posits that higher

wages can enhance worker motivation, productivity, and job attachment, thereby reducing turnover and improving employment stability. Within this framework, wages are not merely a cost component but also function as an efficiency-enhancing mechanism that can positively influence labor market outcomes.

This finding is consistent with a number of empirical studies in the Indonesian context. Silvie and Hasmarini (2023) report a significant negative relationship between minimum wages and unemployment in Central Java, suggesting that higher wage levels may increase workers' purchasing power and stimulate local aggregate demand, which in turn supports job creation and labor absorption. Similarly, Setyaputri et al. (2025) find that wage policy is inversely associated with unemployment across regencies and municipalities in Central Java during the 2019–2023 period, reinforcing the robustness of this relationship at the subnational level. In a broader regional context, Pratama et al. (2021) identify minimum wages as one of the most influential determinants of employment outcomes across provinces in Java.

However, this empirical evidence stands in contrast to the predictions of Classical Labor Market Theory, which argues that wages set above the market-clearing level will lead to excess labor supply and reduced labor demand, thereby increasing unemployment. The divergence between theory and empirical findings can be explained by contextual and structural factors. In Central Java, where employment is largely concentrated in manufacturing and trade sectors, moderate increases in minimum wages may still fall within a range that does not induce firms to substitute labor with capital. Instead, such wage adjustments may enhance productivity and demand-side dynamics without generating significant employment contraction.

Nevertheless, the sustainability of this relationship warrants careful consideration. As highlighted by Pasuria and Triwahyuningtyas (2022), excessively large increases in minimum wages may eventually exceed firms' capacity to absorb higher labor costs, potentially triggering adverse employment effects. This suggests the existence of a non-linear relationship between minimum wages and unemployment, where the direction and magnitude of the effect depend on the scale of wage adjustments and prevailing economic conditions.

Overall, these findings imply that minimum wage policy, when calibrated appropriately, can serve as an effective instrument for reducing unemployment while simultaneously enhancing worker welfare. For policymakers in Central Java, this underscores the importance of adopting a balanced and evidence-based approach to wage setting, taking into account productivity growth, sectoral characteristics, and labor market flexibility to ensure that wage increases remain supportive of both employment and economic stability.

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CONCLUSIONS

This study employs a Fixed Effects Model (FEM) to analyze the impact of Regional Gross Domestic Product (RGDP), Mean Years of Schooling (MYS), and Regency/City Minimum Wage (RMW) on the Open Unemployment Rate (OUR) across 35 regencies/cities in Central Java over the 2020–2023 period. The results reveal that MYS and RMW exert a significant negative effect on unemployment, while RGDP shows no significant influence, indicating that economic growth has not been sufficiently employment-intensive. The model demonstrates strong explanatory power, accounting for approximately 88.28% of the variation in unemployment. These findings highlight the importance of prioritizing human capital development and well-calibrated wage policies. Enhancing access to quality education, strengthening skills-based training, and aligning education with labor market demands are essential for reducing unemployment. In addition, minimum wage policies should balance worker welfare with productivity and business sustainability. Given the limited role of RGDP in reducing unemployment, regional development strategies should emphasize labor-intensive sectors and support small and medium-sized enterprises (SMEs) to foster more inclusive job creation.

This study is subject to several limitations. The relatively short observation period, coinciding with the COVID-19 pandemic and recovery phase, may not fully capture long-term dynamics. Moreover, the use of MYS as a proxy for education does not account for quality or skill relevance, and the exclusion of other relevant variables such as foreign direct investment, labor force participation, industrial structure, and technological change may constrain the analysis. Future research should extend the time horizon, incorporate additional determinants, and explore alternative panel estimation approaches to provide more comprehensive insights into unemployment dynamics in Indonesia.

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