

## DETERMINANTS OF REGENCY/CITY MINIMUM WAGES IN CENTRAL JAVA: A PANEL DATA APPROACH

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### Abstract

The regency/city minimum wage in Central Java Province is still relatively low and uneven, potentially impacting worker welfare. This study aims to analyze the factors influencing the minimum wage using panel data regression with the Fixed Effect Model (FEM) selected based on the Chow and Hausman tests. The independent variables include population, average years of schooling, Labor Force Participation Rate (LFPR), and Gross Regional Domestic Product (GRDP). The results show that average years of schooling, LFPR, and GRDP have a positive and significant effect on the minimum wage. The model is able to explain 92.42% of the variation in the minimum wage.

**Keywords:** Regency/city minimum wage, Panel Data Regression, Fixed Effect Model.

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### 1. INTRODUCTION

Wages are a crucial component of worker welfare and serve as an instrument of employment policy. Workers, as members of the working-age population, are entitled to receive income in the form of wages in accordance with statutory provisions (Yunita & Sentosa, 2019). The government sets a minimum wage to ensure a decent standard of living, but minimum wage levels across provinces remain uneven. Central Java is recorded as the province with the second-lowest minimum wage after Yogyakarta Special Region, IDR 1,742.015 (BPS, 2020). This situation indicates the need for a more in-depth analysis of the factors influencing minimum wage determination in Central Java.

Various economic and demographic factors are suspected to influence minimum wage determination. A large population can reflect an abundance of labor, thus affecting workers' bargaining power (Mcroberts et al., 1989). Moreover, average years of schooling contribute to improvements in labor quality and productivity, forming the basis for wage adjustments. The LFPR reflects the involvement of the working-age population in economic activities, GRDP reflects a region's economic capacity (BPS, 2023). The combination of these factors is thought to determine the regency/city minimum wage.

Previous studies on minimum wages in Central Java have been conducted by Charysa (2013), who found that economic growth had a positive and significant effect, whereas inflation showed a negative and significant relationship. Similar findings were reported by Damanik and Zalukhu (2021) as well as Utami (2019). In addition, GRDP, KHL, and LFPR were found to have positive and significant effects on minimum wages (BPS, 2020). Based on these findings, this study aims to examine the determinants of regency/city minimum wages in Central Java Province during the 2020–2024 period using panel data regression analysis.

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## 2. METHODOLOGY

This study utilizes secondary data sourced from Statistics Indonesia. The unit of analysis comprises 35 regencies and cities in Central Java Province observed during the period 2020–2024, forming a panel data set. The dependent variable is the regency/city minimum wage ( $Y$ ). The independent variables include total population ( $X_1$ ), average years of schooling ( $X_2$ ), LFPR ( $X_3$ ) and GRDP at constant prices ( $X_4$ ), which are considered key factors influencing minimum wage determination.

The research procedure is carried out through the following steps:

- a. Presenting descriptive statistics to examine the general characteristics of the data.
- b. Estimating panel data regression models, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).
- c. Selecting the most appropriate panel data model using formal model selection tests.
- d. Conducting classical assumption tests on the selected model.
- e. Conducting parameter significance tests using F-test and t-test.
- f. Re-estimating the model to obtain the best-fitting regression equation.
- g. Evaluating model goodness-of-fit using the coefficient of determination.
- h. Interpreting the estimation results and drawing conclusions based on the overall analysis.

## 3. FINDINGS AND DISCUSSION

### 3.1 Descriptive Statistics

Descriptive statistics were used to examine characteristics based on measures of central tendency and data dispersion. The results of descriptive statistics using EViews 12 are summarized in Table 1 as follows.

**Table 1. Descriptive Statistics**

Variable	Average	Maximum	Minimum	Std. Dev
$Y$	2,108,933	3,243,969	1,748,000	241,517.7
$X_1$	1,074,072	2,065,500	12,1530	446,411.6
$X_2$	8.1249	11.4800	6.2100	1.2788
$X_3$	71.2606	82.4500	58.7300	3.8863
$X_4$	30.0989	100.0400	12.3700	19.5481

Table 1 shows that the average regency/city minimum wage in Central Java Province is IDR 2,108,933, with values ranging from IDR 1,748,000 to IDR 3,243,969, indicating relatively moderate variation across regions. The average population is 1,074,072 people, with a wide range between districts/cities, reflecting substantial

differences in population size. The average years of schooling is 8.1249 years, with relatively small dispersion, suggesting homogeneous educational attainment. Similarly, the LFPR rate averages 71.26% and exhibits limited variation. In contrast, gross regional domestic product at constant prices shows considerable variability, indicating disparities in economic activity among regencies/cities in Central Java Province.

### 3.2 Panel Data Regression Estimation

In panel data regression, there are three model estimation approaches used, namely the Common Effect Model, Fixed Effect Model, and Random Effect Model (Blundell & Mátyás, 1992)

#### 3.2.1 Common Effect Model (CEM)

**Table 2. Estimation Results of CEM**

Variable	Coefficient	t-statistic	p-value
<i>C</i>	-228175.2	-0.7139	0.4763
<i>X</i> <sub>1</sub>	0.2435	6.7126***	0.0000
<i>X</i> <sub>2</sub>	64216.3	3.4732***	0.0007
<i>X</i> <sub>3</sub>	19856.1	5.4629***	0.0000
<i>X</i> <sub>4</sub>	4613.5	4.2136***	0.0000
$R^2 = 0.4495$			
$Adj. R^2 = 0.4365$			

Table 2 indicate that population size, average years of schooling, LFPR, and GRDP have a positive and statistically significant effect on the regency/city minimum wage at the 1% significance level. Indicating that demographic and economic factors play an important role in determining regency/city minimum wage in Central Java Province.

#### 3.2.2 Fixed Effect Model (FEM)

**Table 3. Estimation Results of FEM**

Variable	Coefficient	t-statistic	p-value
<i>C</i>	-535742.4	-2.6026	0.0103
<i>X</i> <sub>1</sub>	-0.0044	-0.0815	0.9355
<i>X</i> <sub>2</sub>	74483.9	2.7371***	0.0070
<i>X</i> <sub>3</sub>	13824.8	6.4743***	0.0000
<i>X</i> <sub>4</sub>	35186.7	10.6512***	0.0000
$R^2 = 0.9407$			
$Adj. R^2 = 0.9241$			

Table 3 show that population size does not have a statistically significant effect on the district/city minimum wage. In contrast, average years of schooling, LFPR, and GRDP have a positive and significant effect on UMK at the 1% significance level, indicating that improvements in education, labor market participation, and regional economic performance contribute to higher minimum wages.

### 3.2.3 Random Effect Model (REM)

**Table 4. Estimation Results of REM**

Variable	Coefficient	t-statistic	p-value
<i>C</i>	-525213.1	-2.7252	0.0071
<i>X</i> <sub>1</sub>	0.1549	3.6399***	0.0004
<i>X</i> <sub>2</sub>	90214.3	4.2012***	0.0000
<i>X</i> <sub>3</sub>	20235.1	10.2090***	0.0000
<i>X</i> <sub>4</sub>	9729.8	5.6333***	0.0000
$R^2 = 0.5300$			
$Adj. R^2 = 0.5189$			

Table 4 shows that population size, average years of schooling, LFPR, and GRPD have a positive and significant effect on regency/city minimum wages at the 1% level, highlighting the role of demographic and economic factors in Central Java Province.

### 3.3 Chow Test

**Table 5. Chow Test**

Effect test	$F_{statistic}$	p-value
Cross-section <i>F</i>	33.1497	0.0000

The value obtained is  $F_{statistic} = 33.15 > F_{table} = 1.52$  or  $p\text{-value} = 0.0000 < \alpha = 0.05$  indicating that the null hypothesis is rejected and the FEM is more appropriate than the CEM.

### 3.5 Hausman Test

**Table 6. Hausman Test**

Effect test	<i>W</i>	p-value
Cross-section <i>F</i>	133.1798	0.0000

The value obtained is  $W = 133.18 > \chi^2_{(0,05;4)} = 9.488$  or  $p\text{-value} = 0.0000 < \alpha = 0.05$  indicating that the null hypothesis is rejected, suggesting that the FEM is preferable to the REM.

### 3.6 Classical Assumption Test

#### 3.6.1 Normality Test

Based on the results of the test statistics, the Jarque-Bera value is obtained  $4.7602 < \chi^2_{(0,95;2)} = 5.991$  or  $p\text{-value} = 0.0925 > \alpha = 0.05$ ,  $H_0$  then is accepted, which means that the data is normally distributed.

#### 3.6.2 Multicollinearity Test

**Table 7. Multicollinearity Test**

Variable	VIF
$X_1$	1.0103
$X_2$	1.6778
$X_3$	1.1744
$X_4$	1.7133

Based on the results presented in Table 7, all independent variables have VIF values below 10, indicating that multicollinearity is not present in the regression model.

#### 3.6.3 Heteroscedasticity Test

**Table 8. Heteroscedasticity Test**

Variable	t-statistic	p-value
$X_1$	0.3454	0.7304
$X_2$	-0.6423	0.5218
$X_3$	0.3700	0.7120
$X_4$	0.1365	0.8916

Based on the Glejser test results reported in Table 8, all independent variables exhibit p-values greater than 0.05. This indicates that the variance of the residuals is constant, suggesting the absence of heteroscedasticity in the regression model.

#### 3.6.4 Autocorrelation Test

Referring to the Durbin–Watson (DW) statistic, the obtained value of 1.8379 lies within the acceptable range, indicating that the null hypothesis cannot be rejected. Therefore, no autocorrelation problem is detected in the regression model.

### 3.7 Parameter Significance Test

Following the results of the Chow and Hausman tests, the FEM is selected, followed by F-test and t-test to assess the joint and individual effects of the independent variables.

#### 3.7.1 F-test

The F-test results indicate an F-statistic value of 56.8013 with a p-value of 0.0000. Since the p-value is smaller than the 5% significance level, the null hypothesis is rejected, implying that all independent variables jointly have a statistically significant effect on the dependent variable.

### 3.7.2 t-test

The FEM estimation results in Table 3 indicate that average years of schooling, LFPR, and GRDP positively and significantly affect regency/city minimum wages at the 5% level, whereas total population is not statistically significant.

### 3.8 Best Model

Based on the model selection, the FEM was chosen. Initial estimation showed that population size ( $X_1$ ) was not significant, so subsequent estimation focused on significant independent variables.

**Table 9. Best Estimation Results**

Variable	Coefficient	p-value
$C$	-539,313.8	0.0080
$X_2$	74,434.03	0.0068
$X_3$	13,819.26	0.0000
$X_4$	35,174.15	0.0000
$R^2 = 0.9407$		
$Adj. R^2 = 0.9241$		

$$\hat{Y}_{it} = -539,313.8 + 74,434.03X_{2it} + 13,819.26X_{3it} + 35,174.15X_{4it} \quad (3.1)$$

Table 10 presents the intercept values for each regency/city estimated in EViews 12

**Table 10. Intercept Estimate**

$i$	Regency/City	$\alpha_i$	$i$	Regency/City	$\alpha_i$
1	Cilacap	-332,716.5	19	Kudus	-184,403.1
2	Banyumas	247,594	20	Jepara	488,292.2
3	Purbalingga	402,030.4	21	Demak	991,886.6
4	Banjarnegara	363,001.4	22	Semarang	25,079.86
5	Purworejo	338,575.7	23	Temanggung	220,921.9
6	Kebumen	284,891	24	Kendal	233,225.4
7	Wonosobo	416,529.5	25	Batang	475,387.1
8	Magelang	358,488.5	26	Pekalongan	536,667.8
9	Boyolali	154,274.5	27	Pemalang	636,450.1
10	Klaten	153,641	28	Tegal	513,922.7
11	Sukoharjo	-177,538.2	29	Brebes	464,897.9
12	Wonogiri	64,138.87	30	Kota Magelang	-122,8605
13	Karanganyar	-68,127.48	31	Kota Surakarta	-171,0953
14	Sragen	-144,316.9	32	Kota Salatiga	-933,169.2

$i$	Regency/City	$\alpha_i$	$i$	Regency/City	$\alpha_i$
15	Grobogan	435,555.1	33	Kota Semarang	151,054.5
16	Blora	218,659.4	34	Kota Pekalongan	161,240.7
17	Rembang	128,632.2	35	Kota Tegal	-503,317.6
18	Pati	139,336.5			

Based on the previous best regression model, it can be interpreted for each cross-section unit. An example of a regression model for Karanganyar Regency is as follows.

$$\hat{Y}_{it} = -607,441.28 + 74,434.03X_{2it} + 13,819.26X_{3it} + 35,174.15X_{4it} \quad (3.2)$$

Based on the regression model for Karanganyar Regency, the results indicate that higher average years of schooling, higher labor force participation, and increased GRDP significantly raise the regency/city minimum wage. Specifically, each additional year of schooling increases minimum wage by IDR 74,434.03, a one percent rise in labor force participation raises minimum wage by IDR 13,819.26, and an IDR 1 million increase in GRDP raises minimum wage by IDR 35,174.15, while the intercept represents the baseline regency/city minimum wage specific to the regency, independent of the included variables.

#### 4. CONCLUSION

The analysis indicates that the FEM is the most suitable for modeling regency/city minimum wage in Central Java Province during 2020–2024, based on Chow and Hausman tests. Average years of schooling, LFPR, and GRDP positively and significantly affect minimum wage, while population size has no significant effect. The adjusted R-squared value of 0.9242 reflects the strong performance of the estimated model in capturing variations in regency/city minimum wages.

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