

Employment as the Missing Link: Full Mediation of Minimum Wage Effect on Per Capita Income in Central Java

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JEL Classification:

E24
H52
J31
O15

Received: 04 July 2025

Revised: 18 August 2025

Accepted: 24 August 2025

Available online: October 2025

Published Regularly: October 2025

ABSTRACT

Research Originality: This paper is original by explicitly analyzing employment as a mediating variable in the relationship between minimum wage and per capita income, given the inconclusive findings of previous research on these variables.

Research Objectives: This study investigates the relationship between minimum wage and per capita income and examines the mediating role of employment with two control variables: government expenditure and education.

Research Methods: This study utilized secondary data from BPS covering 35 districts and municipalities in Central Java Province over the period 2018–2023. The study applies panel-data regression, complemented by mediation analysis using path analysis and the Sobel test.

Empirical Results: The minimum wage does not directly affect per capita income; instead, its impact is fully mediated by employment. The finding suggests that the minimum wage alone does not raise per capita income; rather, it exerts its influence indirectly by improving employment, which in turn drives income growth. As control variables, government expenditure and education exert positive and significant effects on per capita income.

Implications: A minimum wage policy must be accompanied by job-creation strategies. A minimum wage increase without policies that maintain or increase jobs will not effectively boost per capita income.

Keywords:

minimum wage; per capita income; employment; government expenditure; education

How to Cite:

Pratista, R., Istiqomah., & Pravitasari, C. F. (2025). Employment as the Missing Link: Full Mediation of Minimum Wage Effect on per Capita Income in Central Java. *Signifikan: Jurnal Ilmu Ekonomi*, 14(2), 437-448. <https://doi.org/10.15408/sjie.v14i2.46419>.

INTRODUCTION

The primary emphasis in Indonesia's economic development initiatives, particularly in Central Java Province, has consistently been on economic growth and improving community welfare. Per capita income is a metric that reflects a region's welfare. Per capita income is an economic metric used to determine the average income of individuals in a territory over a designated period. According to Statistics Indonesia (BPS, 2023), Central Java ranks 31st among Indonesian provinces in per capita income. In 2023, Central Java's per capita income was IDR 45.16 million, much below the national average of IDR 79.56 million. DKI Jakarta has the highest per capita income, while Papua Barat Daya has the lowest. Among the other provinces on the island of Java, Central Java ranks fifth out of six, above DI Yogyakarta, which historically had the lowest per capita income on the island.

During the period from 2018 to 2023, DKI Jakarta exhibited the greatest per capita GRDP among all provinces on the island of Java. This amount significantly exceeds that of other provinces, more than Rp300 million per capita in 2023. This data indicates that Jakarta, as the hub of governance and commerce, has a significantly more advanced economy than other provinces. Central Java and DI Yogyakarta exhibited the lowest per capita GRDP among the provinces on the island of Java, with both falling below Rp50 million per capita in 2023. Central Java is the province with the third-largest area in Java, characterized by enormous and diverse natural resources; nonetheless, it lags in per capita income due to the predominance of the agricultural sector and low-tech industries. This fact indicates a substantial economic disparity among provinces on the island of Java. Moreover, substantial variations in per capita GRDP exist among cities and regencies within Central Java Province, comprising 29 districts and six municipalities.

Semarang possesses the greatest per capita GRDP among other districts and municipalities in Central Java, as it serves as the provincial capital and the hub of government and administration. Districts such as Pemalang, Grobogan, and Kebumen have comparatively low per capita GRDP. A notable discrepancy exists between urban and rural regions. Urban areas such as Semarang, Surakarta, and Kudus exhibit significantly higher per capita GRDP than rural areas such as Rembang, Brebes, and Pemalang. This condition indicates that economic hubs are situated in major urban centers.

The minimum wage is one of the factors that influence per capita income. Article 1, paragraph 1, of Law Number 78 of 2015 states that the minimum wage is a monetary right granted by the employer to the worker/laborer as compensation for services rendered, in accordance with the provisions of the legislation. By providing a decent wage standard, this policy aims to protect workers from labor exploitation. A higher minimum wage is expected to improve the income and welfare of the workforce. The increase in the minimum wage is expected to raise labor income, thereby increasing per capita income (Chen & Xu, 2024; Lv et al., 2023; Sabokkhiz et al., 2021).

The urgency of minimum wage in economic development is highlighted by its multifaceted impacts. On the one hand, it can reduce household economic vulnerability,

raise consumption, and support economic growth (Lv et al., 2023; Sabokkhiz et al., 2021). On the other hand, challenges remain in its enforcement, particularly in developing countries characterized by abundant informal sectors (Badaoui & Walsh, 2022). The academic debate has therefore centered on whether the minimum wage primarily serves as a tool for welfare improvement or as a labor-market distortion.

The impact of the minimum wage on employment remains a contentious issue in economics, as this controversy illustrates. While some studies find positive effects (e.g., Kar et al., 2019; Chen & Xu, 2024), others report negative impacts on vulnerable groups (Paun et al., 2021; Rybczynski & Sen, 2018; Broecke et al., 2017). These inconsistencies reflect differences in the structure of the labor market, enforcement capacity, and economic context. In developed countries, wage increases may improve household income without substantial job loss, while in developing countries, due to work informality and weak enforcement, the risk of unemployment is magnified. Thus, the existing literature has not reached a consensus on whether minimum wage increases or suppresses per capita income, directly or indirectly.

In this study, government expenditure and education are used as control variables to reduce bias and ensure the impact of the minimum wage on per capita income is correctly analyzed. These two variables were chosen because they play an important role in shaping a region's economic and social conditions. Government spending that supports economic development, particularly in sectors such as infrastructure, health, and education, can influence regional economic growth (Clements et al., 2024; Cooray & Nam, 2024; Haini, 2020; Anwar et al., 2020; Ojede et al., 2018). Effective government spending strategies can support economic and social development and improve community welfare by increasing per capita income.

Besides government spending, education is also an important factor that influences economic growth. Better education equips the workforce with higher skills and knowledge, leading to better jobs with higher wages. Long-term economic growth is predominantly driven by human capital (Hanushek & Woessmann, 2021). Higher income in society leads to a cumulative increase in per capita income (Kusuma & Wijaya, 2023).

Research on the effect of the minimum wage on per capita income yields inconclusive findings. Using survey data from 1984 to 2013, Dube (2019) found that minimum wages increase the incomes of the poor. Accordingly, Overstreet (2019) found a positive relationship between the minimum wage and per capita income in Arizona, indicating that a 1 percent increase in the minimum wage would increase per capita income by 1.13 percent. Thus, the benefits to low-income workers outweigh the costs borne by high-income residents and employers through minimum wage increases.

However, Overstreet cautioned that wage increases should not lead to unemployment. Research in Hungary indicates that firms respond to minimum wages by substituting labor for capital, and that the disemployment effect is higher in industries that have more difficulty passing wage increases on to consumers (Harasztosi & Lindner, 2019).

The impact of the minimum wage on poverty alleviation will be small if layoffs resulting from an increase in the minimum wage are large (Dube, 2019). Using data from Sumatra Island from 2008 to 2017, Pratama et al. (2020) found that provincial minimum wages had a significant positive impact on employment in the long term but a significant negative impact on employment opportunities in the short term.

Despite extensive studies, the existing literature has two significant limitations. First, most research focused on the direct relationship between the minimum wage and per capita income, yielding inconclusive results. Few studies have explored the indirect mechanism, particularly through the mediating role of employment. Second, the Indonesian context, characterized by a large informal sector, provincial disparities, and high variability in the enforcement of labor regulations, remains understudied.

To address these gaps, this study explicitly investigates the mediating role of employment in the relationship between minimum wage and per capita income while controlling for government expenditure and education. This approach allows us to determine if the minimum wage can enhance welfare solely through job creation, rather than through the direct income effect. Therefore, the study contributes to the ongoing debate by reconciling the income and substitution effects and by providing evidence from Central Java Province.

METHODS

This study employs a quantitative associative approach. This study was conducted across 29 districts and 6 municipalities in Central Java Province, using panel data from 2018 to 2023. The research objects include the minimum wage, government expenditure, education, employment, and per capita income of regencies and cities in Central Java Province. This research utilizes data from Statistics Indonesia (BPS). In this study, there are four variables: the dependent variable (per capita income), the independent variable (minimum wage), the mediating variable (employment), and the control variables (government expenditure and education).

Panel data regression analyzes models using three approaches: the common effects model, the fixed effects model, and the random effects model. To determine the regression model, there are three types of tests: the Chow test, the Hausman test, and the Lagrange multiplier test. This study uses path analysis to evaluate the causal relationships among variables, thereby enabling an understanding of the direct and indirect effects of independent variables on the dependent variable. The following are the steps in using path analysis assisted by Eviews 12 software, as follow:

- a. Regressing the independent variable (W) and control variables, namely government spending (G) and education (E) on the dependent variable (Y).
- b. Regressing the independent variable (W) on the mediating variable (Z).
- c. Regressing the independent variable (W) on the dependent variable (Y) by adding a mediating variable (Z).

Based on the path analysis steps, the regression model in this study is formulated as follows:

$$Y_{it} = \alpha + \beta_1 W_{it} + \beta_2 G_{it} + \beta_3 E_{it} + e_{it} \quad 1)$$

$$Z_{it} = \alpha + \beta_1 W_{it} + e_{it} \quad 2)$$

$$Y_{it} = \alpha + \beta_1 W_{it} + \beta_2 G_{it} + \beta_3 E_{it} + \beta_4 Z_{it} + e_{it} \quad 3)$$

However, since each variable has different units, the regression model is transformed into natural logarithm form.

Y : Percapita Income

α : Constant

β : Regression Coefficients

W : Minimum Wage

G : Government Expenditure

E : Education

Z : Employment

i : 35 regencies/cities in Central Java Province

t : 2018-2023

The Sobel test can be used to test hypotheses in regression models with mediating variables. The indirect effect of the independent variables on the dependent variable is investigated through the mediating variable in the Sobel test. The objective of this test is to determine whether the mediating variable can substantially influence the relationship between other variables. The Sobel test formula is as follows:

$$Sab = \sqrt{b^2 Sa^2 + a^2 Sb^2 + Sa^2 Sb^2}$$

where:

Sab : Standard error of indirect effect

a : Path of variable W with variable Z

b : Path of variable Z with variable Y

Sa : Standard error of coefficient a

Sb : Standard error of coefficient b

To determine the significance of the indirect effect, it is necessary to calculate the t-value using the formula:

$$t = \frac{ab}{Sab}$$

It is possible to determine the presence of a mediating influence by comparing the statistical value to the table value. If the statistic value is larger than the table value, it is assumed that there is a mediating effect; otherwise, there is no mediating effect.

RESULTS AND DISCUSSION

Based on Chow and Hausman tests, the best model for equations (1) and (3) is the Fixed Effect Model, while for equation (2) it is the Random Effect Model. In panel data analysis, classical assumption tests typically only include tests for multicollinearity and heteroscedasticity. This is because panel data is a combination of cross-sectional and time-series data and has characteristics similar to those of cross-sectional data. Furthermore, the normality assumption is not required for a Best Linear Unbiased Estimator (BLUE). The results of the tests indicate that the regression models for equations (1), (2), and (3) are free of multicollinearity and heteroscedasticity. Table 1 presents the summary of the path coefficients.

Table 1 shows that, based on the estimates from structural models I and III, the minimum wage yields a p-value > 0.05 and a t-statistic < the t-table value. This result indicates that the minimum wage does not have a significant effect on per capita income. Both government expenditure and education yield probability values < 0.05 and t-statistics > the t-table value. This result means that government expenditure and education have a positive and significant effect on per capita income. Based on the structural model II estimate, the minimum wage yields a p-value of < 0.05 and a t-statistic > the t-table value, indicating that the minimum wage has a positive and significant effect on employment. The estimation of structural model III shows that employment yields a p-value of < 0.05 and a t-statistic > the t-table value, indicating that employment has a positive and significant effect on per capita income. Based on Table 1, the following path diagrams in Figures 1, 2, and 3 can be formed.

Table 1. Summary of Path Coefficients

Variable	Coefficient	Std error	t-value	Prob
Structural equation I (W + G + E with regard to Y)				
Ln_W - Y	-0.040206	0.073171	-0.549478	0.5834
Ln_G - Y	0.164522	0.050392	3.264877	0.0013***
Ln_E - Y	0.781229	0.217635	3.589622	0.0004***
Structural equation II (W with regard to Z)				
Ln_W - Z	0.409240	0.042574	9.612487	0.0000***
Structural equation III (W + G + E + Z with regard to Y)				
Ln_W - Y	-0.097152	0.071109	-1.366251	0.1737
Ln_G - Y	0.182111	0.048265	3.773158	0.0002***
Ln_E - Y	0.594175	0.212332	2.798334	0.0057***
Ln_Z - Y	0.263396	0.062269	4.229984	0.0000***

Source: Data processed (2024)

Figure 1. Structural Equation Model Path Diagram (1)

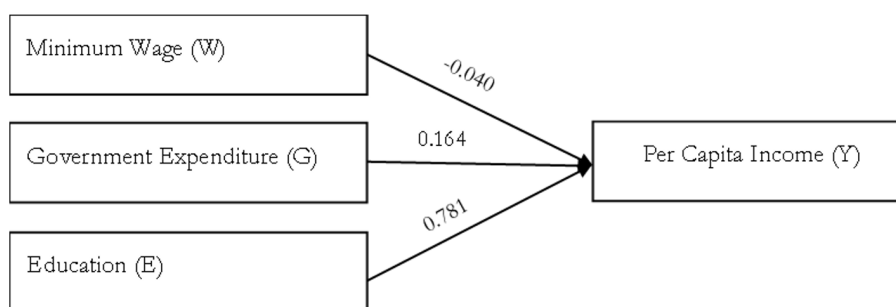


Figure 2. Structural Equation Model Path Diagram (2)

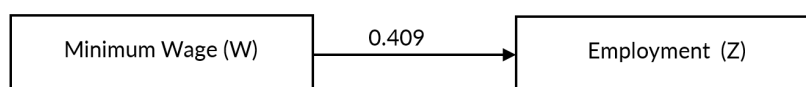
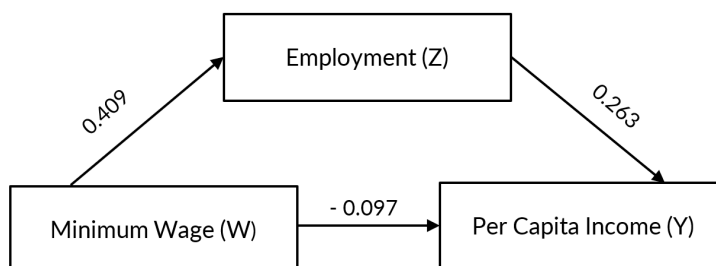


Figure 3. Structural Equation Model Path Diagram (3)



Based on the summary table of path coefficients and the structural equation path diagram, the minimum wage variable does not have a significant direct effect on per capita income, with a coefficient of -0.040. The indirect effect of the minimum wage on per capita income through employment (Z) can be calculated by multiplying the coefficient of X on Z with the coefficient of Z on Y, resulting in $(0.409) \times (0.263) = 0.107$. Then, the total effect of the minimum wage variable on per capita income is $(-0.040) + (0.107) = 0.067$.

The next test is the Sobel test, which is used to analyze the mediation hypothesis. In this context, the Sobel test can measure the magnitude of the indirect effect of the minimum wage (W) on per capita income (Y) through employment (Z). The mediation effect test is carried out using the following formula:

$$Sab = \sqrt{b^2 Sa^2 + a^2 Sb^2 + Sa^2 Sb^2}$$

$$t = \frac{ab}{Sab}$$

$$t = \frac{ab}{\sqrt{b^2 Sa^2 + a^2 Sb^2 + Sa^2 Sb^2}}$$

$$t = \frac{0.409 \times 0.263}{\sqrt{0.263^2 0.042^2 + 0.409^2 0.062^2 + 0.042^2 0.062^2}}$$

$$t = 3.871$$

The Sobel test indicates that employment mediates the relationship between the minimum wage and per capita income, as evidenced by the t-statistic exceeding the t-table value ($3.871 > 1.971$). The regression results show that the direct effect of the minimum wage on per capita income is not significant, whether employment is included or excluded from the model. Therefore, employment is a full mediator in the relationship between minimum wage and per capita income.

The results indicate that the minimum wage does not have a significant direct effect on per capita income. This condition may be because the minimum wage policy applies to only a small proportion of formal workers. At the same time, per capita income is calculated as total income divided by the total population, including entrepreneurs, informal workers, and the unemployed. In developing nations like Indonesia, the prominent role of the informal sector and SMEs (Charina et al., 2024; Surtiari et al., 2024), which are exempt from minimum wage regulations, means that many workers do not benefit from the policy. Paradoxically, an increase in the minimum wage may result in unexpected consequences, such as layoffs or reduced new hiring, which could lead to lower total income. This argument aligns with Bhorat et al. (2017), who found that the minimum wage has a significant negative impact on per capita income. Research in Hungary shows that firms respond to minimum wages by substituting labor for capital, and that the disemployment effect is higher in industries that have more difficulty passing wage increases on to consumers (Harasztosi & Lindner, 2019). Dube (2019) argued that the impact of the minimum wage on poverty alleviation will be small if layoffs resulting from an increase in the minimum wage are large.

In Central Java, this result is particularly understandable given the province's economic structure. Central Java has a large share of employment in agriculture and low-tech manufacturing, sectors with limited compliance with minimum wage regulations. Moreover, disparities between urban centers such as Semarang and rural districts such as Grobogan or Pemalang imply that the aggregate effect of minimum wage on per capita income is diluted when calculated at the provincial level. This structural heterogeneity helps explain why the direct effect disappears in the statistical model.

Government spending has a positive and significant effect on per capita income, as expenditures on education, infrastructure development, and health can improve the quality of life. Government investment in infrastructure projects such as roads, bridges, and public facilities not only creates employment but also improves public access to basic services by enabling better infrastructure and increased labor productivity, which in turn will positively impact per capita income. This result is in line with Dudzevičiūtė et al. (2018), who found that in eight EU countries there was a significant relationship between government spending and economic growth. The finding also supports Ahuja and Pandit (2020), who analyzed panel data from 59 developing countries during 1990-2019 and found unidirectional causality — i.e., government spending promotes economic growth — consistent with the Keynesian framework. Chandana et al. (2020) found that government spending, particularly capital expenditure, has a significant positive effect on economic growth in both the short and long term, while recurrent expenditure has no significant effect.

Education has a positive and significant effect on per capita income. This is because, as education levels increase, individuals' skills and knowledge also increase. This allows for

obtaining better and more productive jobs, which will then increase per capita income. This result is consistent with the previous research (Hanushek & Woessmann, 2021; Jamel et al., 2020; Ogundari & Awokuse, 2018; Erić, 2018) that education has a positive and significant impact on per capita income/economic growth.

The minimum wage has a positive and significant effect on employment. From a labor supply perspective, higher wages will encourage higher labor force participation. Minimum wage increases encourage higher labor force participation among parents of dependent children (Godøy et al., 2019). In the US, Otterby et al. (2024) found a positive relationship between labor force participation and minimum wage. In OECD countries, a 1% increase in minimum wage was associated with a 0.17% rise in employment (Kar et al., 2019).

However, the employment data in this study do not distinguish between the formal and informal sectors. Formal employment may decrease while informal employment increases, potentially obscuring sectoral differences at the provincial level. This aligns with Broecke et al. (2017), who suggested that minimum wage effects in emerging economies often manifest in rising informality rather than net job losses. Compared with Pratama et al. (2020), who found long-term employment gains but short-term employment losses in Sumatra, our results suggest that Central Java may be experiencing stronger labor-market absorption into informal and semi-formal jobs, cushioning the short-run disemployment effect.

This study finds that employment has a positive and significant effect on per capita income. An increase in employment enables more individuals to participate in the labor market. As labor force participation rises, aggregate income in an economy also increases, thereby boosting per capita income. Based on the Sobel test, employment fully mediates the effect of the minimum wage on per capita income across 35 districts/municipalities in Central Java Province from 2018 to 2023. Complete mediation means that the minimum wage → employment → per capita income channel is the only significant pathway. This result means that a minimum wage increase does not automatically increase the average income of the population. Its effect operates through employment. The minimum wage only affects per capita income if it first affects employment. If raising the minimum wage does not raise the employment rate (or even lowers it), per capita income will not go up.

Theoretically, this finding advances the debate on the dual effects of minimum wage policy. It suggests that in Central Java, the income effect (higher wages) is not sufficient to raise per capita income unless it translates into higher employment. In contrast, the substitution effect (job loss) remains a risk in the formal sector. This reinforces the argument that minimum wage policies should be evaluated not merely as redistributive tools but also as labor-market activation mechanisms, in which employment growth is the key transmission channel to welfare gains.

These findings have important implications for the formulation of minimum wage policy. Job-creation strategies must accompany the minimum wage. A minimum wage increase without policies that maintain or increase employment will not be effective in boosting per capita income, for example, by providing incentives for MSMEs and labor-intensive industries to continue recruiting workers even as the minimum wage rises. Furthermore, policymakers need to consider labor elasticity. If the minimum wage increase is too high and leads to workforce reductions, the impact on per capita income could

actually be negative. Therefore, minimum wage adjustments should take into account the labor market's absorption capacity.

Beyond wage setting, complementary policies such as vocational training, technological upgrading for SMEs, and rural industrialization programs are essential. These interventions would not only preserve employment but also enhance productivity, ensuring that wage increases are matched with efficiency gains. By targeting labor-intensive sectors and fostering the formalization of informal enterprises, policymakers can strengthen the positive mediation channel identified in this study.

CONCLUSION

This study finds that employment fully mediates the relationship between minimum wage and per capita income in Central Java Province. The control variables—government expenditure and education—also have a significantly positive effect on per capita income. Therefore, the management of minimum wage policy, government spending, and practical education is crucial to improving societal welfare. Concerning the finding of a full mediation effect of employment, the government needs to develop policies that encourage job creation, such as incentives for labor-intensive industries, workforce training, and investment facilitation. To ensure that minimum wage policies do not negatively impact employment, wage increases must be in line with productivity improvements. This can be achieved by enhancing workforce skills and adopting technologies that support efficiency and competitiveness.

Furthermore, provincial governments can design complementary programs to support small and medium-sized enterprises (SMEs), given their significant role in labor absorption in Central Java. While this study provides clear policy insights, it is limited in scope to Central Java Province and a specific time frame (2018–2023). Future research is encouraged to extend the regional and temporal coverage and to differentiate between formal and informal labor markets to capture more nuanced effects.

ACKNOWLEDGEMENT

The authors would like to thank the anonymous reviewers for their valuable comments and suggestions, which have helped improve the quality of this paper.

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