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Wage Policy and Economic Disparities: Analyzing the Regional Impact of Minimum Wages on Income Inequality in the Philippines Using Panel Autoregressive Distributed Lag (Ardl) Model

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Abstract

Income inequality remains one of the most persistent socioeconomic challenges in the Philippines, despite the implementation of region-specific minimum wage policies designed to improve worker welfare and promote equitable economic development. This study examines the impact of regional minimum wage policies on income inequality across seventeen Philippine regions from 1995 to 2023. Specifically, the study investigates the short-run and long-run relationship between minimum wage adjustments and regional income inequality. Using a panel data approach, the study employs descriptive statistics, trend analysis, Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) panel unit root tests, Pesaran cross-sectional dependence test, Pedroni and Westerlund panel cointegration tests, Panel Dynamic Ordinary Least Squares (PDOLS), and dynamic panel estimators. The results reveal that both minimum wage and income inequality are integrated of order one and exhibit a stable long-run equilibrium relationship. The short-run estimation indicates that changes in minimum wage have a negative but statistically insignificant effect on regional income inequality, suggesting that wage adjustments do not immediately translate into measurable distributional improvements. In contrast, the long-run PDOLS estimates demonstrate a significant negative relationship between minimum wage and income inequality ($\beta = -0.2075$, $t = -11.16$), indicating that sustained increases in regional minimum wages contribute to reducing income disparities over time. The dynamic fixed-effects and random-effects models further confirm the robustness of the long-run findings. The study concludes that minimum wage policy functions primarily as a long-term redistributive mechanism rather than an immediate corrective instrument for inequality reduction. These findings provide important policy insights for labor regulators and wage-setting institutions by highlighting the role of sustained wage adjustments in promoting inclusive growth and reducing regional economic disparities in the Philippines.

Keywords: Minimum Wage Policy; Income Inequality; Regional Development; Panel Data Analysis; Cointegration; PDOLS; Philippines; Labor Economics.

1. Introduction

1.1. Background of the Study

The minimum wage rate regulation in the Philippines is an important tool for ensuring equitable labor remuneration and maintaining economic stability. This policy was passed under the Wage Rationalization Act (Republic Act No. 6727) and established the Regional Tripartite Wages and Productivity Boards (RTWPBs). These boards set minimum wages for each region based on economic factors like inflation, cost of living, labor productivity, and regional economic conditions. This decentralized strategy leads to major salary differences between locations. For example, in 2023, the daily minimum pay in the National Capital Region (NCR) is ₱610, whereas in less developed regions such as Region IX (Zamboanga Peninsula) and Region XII (SOCCSKSARGEN), the minimum earnings are significantly lower at ₱350-₱400 (Department of Labor and Employment [DOLE], 2023). Such differences raise questions regarding the extent to which minimum wage rules exacerbate or alleviate regional income disparity. Income inequality, or the uneven distribution of income among the population, remains a perennial economic problem in the Philippines. The Philippine Statistics Authority (PSA) said it recorded a Gini value of 0.42 in 2021, indicating a large gap in income distribution, as measured by measures like the Gini coefficient. High levels of income disparity constrain economic mobility, limit access to key services such as education and health care, and perpetuate poverty, especially in rural and underdeveloped areas. It also impacts regional and national economic growth by concentrating wealth in the hands of a few, reducing the purchasing power of consumers and general economic engagement. In these circumstances, a thorough knowledge of the impact of minimum wage policy on income distribution is vital for formulating policies for balanced economic development. It is important to study the relationship between minimum wage legislation and income disparity for the

economic growth of regions and the country. In theory, raising the minimum wage should enhance the incomes of low-income workers and thereby reduce inequality. But the real impact of pay hikes depends on a number of economic responses. Firms in response could trim their headcount, decrease hours or turn to the informal job market. This would aggravate inequality, not improve it. Understanding these dynamics is important to ensuring that pay regulations are balanced between fair remuneration and economic viability. At the regional level, the inequality in salary levels between different economic zones shows the differing effects of wage policies on the distribution of income. Take for instance the BARMM (Bangsamoro Autonomous Region in Muslim Mindanao) with a poverty incidence of 37.2% compared to much lower rates of 2.2% in affluent regions like NCR (PSA, 2023). Empirical research of these pay gaps can inform government initiatives and enhance regional economic outcomes. Without appropriate wage strategies, economic growth could be focused in industrialized regions, putting less developed areas behind in income growth and poverty reduction. Minimum wage policies are designed to help workers. However, there are various problems that prevent minimum wage regulations from lowering income disparity. A major problem is that wage rates are applied unevenly by region: metropolitan areas can afford higher wages because they have strong industries, whereas rural areas cannot afford higher wages, resulting to job losses and more informal work. The informal labor sector, which makes up roughly 38% of the overall labor force (PSA, 2022), is a result of the incapacity of firms to sustain increased pay. Wage gains also provide fuel to inflation, especially on basic goods, which witnessed an inflation rate of 6.1% in 2023 (Bangko Sentral ng Pilipinas [BSP], 2023). Another difficulty is the disconnect between earnings and the cost of living. A family of five in Metro Manila need ₱1,160 per day to cover basic needs, a far cry from the ₱610 minimum wage (National earnings and Productivity Commission [NWPC], 2023). In addition, higher wages may not always result in regional economic growth. Industrialized areas like Calabarzon and Central Luzon are benefiting from pay hikes because of their strong manufacturing and service sectors, whereas other less developed areas, particularly in Mindanao, find it difficult to attract investments because of increasing labor expenses. Such differences underline the need to adapt wage policies to the realities of the regional economies, including their impact on employment and income distribution. Finally, the analysis of minimum wage rules and their effects on income inequality are important for designing labor policies that foster equitable economic growth. This study intends to give empirical evidence to policy makers by examining pay differentials across areas and how they affect poverty and inequality. Balancing pay rises with sustainable economic growth is vital to avoid unforeseen outcomes like job losses and inflation, and to ensure that minimum wage rules achieve their intended objective of lowering income inequality while promoting regional and national development.

1.2. Objective of the Study

The primary purpose of this study is to examine the geographical influence of minimum wage legislation on income inequality in the Philippines using the Panel Autoregressive Distributed Lag (ARDL) model. This study intends specifically to;

1. Present the data trend of income inequality among regions;
2. Present the data trend of the minimum wages among regions;
3. To investigate the short-run and long-run effects of minimum wage policies on income inequality using the Panel ARDL model;

1.3. Significance of the Study

The results of the study is deem significant to the following;

Department of Labor and Employment (DOLE). This study is relevant to DOLE as it provides empirical information on the impact of regional minimum wage policy on income disparity. Understanding these consequences will help DOLE fine-tune its wage-setting systems to balance equitable recompense for labor with economic sustainability. The findings should inform revisions of wage policies to ensure they are conducive to reducing poverty and promoting economic growth while limiting unintended outcomes such as job loss and rising informal employment.

Local Government Units (LGUs). This study provides information for local government units on how wage policies affect regional economic development. The findings can be utilized by LGUs to advocate for region-specific labor policies to support sustainable employment and attract investments. In addition, the study emphasizes the economic discrepancies among areas, which could help LGUs in designing social programs for vulnerable workers affected by wage changes.

Policy Makers. The study's findings could help policymakers develop more focused labor and economic strategies. Policymakers can develop policies that promote inclusive growth by understanding how changes in wages impact income distribution in the long run and the short run. This study also contributes to the understanding of regional economic disparities and informs the national decision making on fair and regionally relevant wage policy.

Future Researcher. This research will be a useful reference for future researchers doing research in labor economics, wage policies, and income inequality. It provides a methodological framework, particularly in the use of Panel Autoregressive Distributed Lag (ARDL) model, for future scholars to build upon. It also points to crucial data sources and economic indicators for additional analysis in future research to improve understanding of Philippine labor market dynamics.

1.4. Theoretical Framework

This paper is based on the Efficiency Wage Theory of Shapiro and Stiglitz (1984). The idea is that greater salaries make workers more productive and efficient, so they're less likely to quit their jobs and the broader economy produces more. In this setting employers offer wages above the market clearing level to inspire employees, to increase loyalty, and to discourage shirking. But it also recognizes that greater wages could lead to higher unemployment, especially in places where companies can't afford to pay more for labor. The study, utilizing the theory, attempts to determine if an increase in minimum wages in the Philippines helps reduce income inequality or worsens regional disparities due to job losses and the rise of informal employment.

1.5. Conceptual Framework

The conceptual framework of this study presents the possible relationship of minimum wage rates to income inequality in the Philippines highlighting its geographical differences and economic repercussions. The diagram in figure 1 shows minimum wage rate on the left and income inequality measured by the Theil-T Index on the right and linked with a two-headed arrow to indicate their potential bidirectional influence. Minimum wage regulations are designed to increase the salaries of workers and eliminate poverty, although their impact is debatable. Wage rises can assist to reduce income inequalities, but at the same time they can lead to job losses, informality and inflation, which can worsen inequalities, especially in less developed regions. The effect is compounded by the Philippines' wage-setting mechanism through Regional Tripartite Wages and Productivity Boards (RTWPBs) which have different economic conditions across regions. "Income disparity is still a big problem, with wealth concentrated in urban centers like Metro Manila, while rural areas are plagued with lower wages and employment opportunities. Policymakers often boost minimum salaries to address these discrepancies. Yet, pay rises alone may not be enough to bring down inequality without accompanying policies such as social protection and labor market changes. This link is investigated using the Panel Autoregressive Distributed Lag (ARDL) model, which assesses the short-run and long-run effects of changes in wages on inequality. This approach is particularly suitable for measuring regional economic disparities across time. The findings will give an idea on whether minimum wage policy may successfully address income inequality or else other approaches are needed to attain a more inclusive and balanced economic growth in the Philippines.

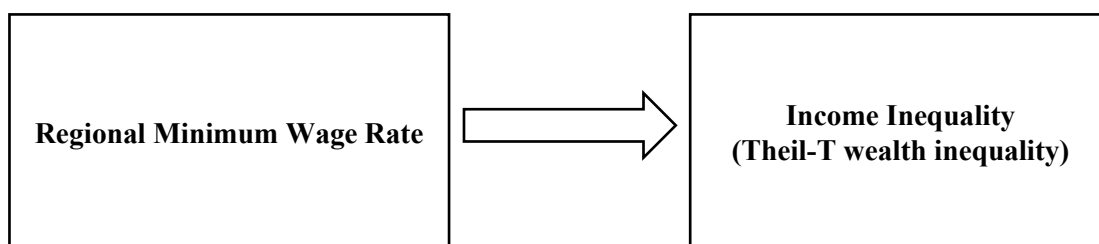


Figure 1. The Conceptual Framework of the Study

1.6. Review of Related Literature

Minimum Wage Rate Policy in the Philippines

The minimum wage policy in the Philippines is implemented through the Republic Act No. 6727, or the Wage Rationalization Act, which mandates the Regional Tripartite Wages and Productivity Boards (RTWPBs) to determine minimum wages based on regional socio-economic conditions (National Wages and Productivity Commission [NWPC], 2022). Inflation, cost of living, productivity, and the economic capacity of enterprises to absorb wage increases are among the considerations taken into account in determining wages. The minimum wage has generally changed by region over the years, reflecting the economic inequalities between the less developed regions and Metro Manila (Pernia & Intal, 2020). It has been found out by studies that, while the intention of raising minimum wages is to promote the welfare of the workers, it might result in unforeseen consequences like job losses and more informal employment (Orbeta & Lanzona, 2021). However, other scholars believe that higher earnings do not always mean better living standards, as higher costs and fewer working hours can counterbalance nominal salary increases

(Balisacan & Hill, 2021). Hence, the potential of wage regulation in reducing poverty and inequality remains a subject of controversy in Philippine economic study.

Income Inequality in the Philippines

The Philippines continues to face income inequality and regional differences. The Gini coefficient is a measure of income inequality. Over the years, the Gini coefficient has changed, according to the Philippine Statistics Authority (PSA, 2023), showing the expanding gap between high-income and low-income households. Economic growth has not been fairly spread, with urban hubs such as Metro Manila rapidly industrializing while rural provinces remain predominantly agrarian and low-income (Habito, 2021). According to research, income inequality is exacerbated by structural problems such as poor labour market laws, access to education, and the disparity in economic possibilities (Daway & Fabella, 2019). The minimum wage is designed to benefit low-paid workers, although its influence on the distribution of income is unclear. Other analysts claim that the increase in minimum wages benefits primarily those in formal employment, with workers in the informal sector, which constitutes a large share of the labor market, remaining under protected (Albert & Martinez, 2020). Income inequality, with all its intricacies, continues to be a major issue for policymakers in building a more inclusive economy.

Panel ARDL in Wage and Inequality Studies

The Panel Autoregressive Distributed Lag (ARDL) model is a common econometric technique used for estimating the long- and short-term impacts of economic policies on variables such as wage levels and income distribution. Unlike classic time-series or cross-sectional models, the Panel ARDL approach takes into account diverse interactions across different areas and addresses stationarity issues in economic data (Pesaran et al., 2001). This approach is especially effective to study time dynamics of minimum wage changes on income inequality, considering short-term and long-term policy effects (Samreth, 2022). The Panel ARDL model has been successfully used in empirical studies to test the causal relationship between minimum wages and economic indicators, controlling for region-specific and time-related variables (Narayan, 2005). This approach ensures the robustness of the study in the analysis of the long-run and short-run equilibrium effects of the minimum wage policy on income inequality in the Philippines. The relationship of minimum wages and income inequality has been studied extensively both in the Philippines and in other countries. According to Medalla and Jandoc (2021), while rising minimum wages in the Philippines increased revenues for formal sector workers, they had little impact on poverty reduction due to the high level of informal employment. Similarly, Beltran and Gregorio (2020) study showed that the regional differences in pay adjustments generally cause more migration to urban centers, worsening congestion and inequality in metropolitan areas. More broadly, evidence from Rani et al. (2021) in developing countries suggests that well-targeted minimum wage laws can lower pay gaps but may not have a meaningful effect on total income inequality in the absence of complementary social security measures. Owino (2022) employed Panel ARDL analysis for sub-Saharan Africa and found that minimum wage legislation had beneficial effects on income distribution in the short run, but their long-term implications were contingent on labor market characteristics and enforcement methods. These results imply the significance of considering regional level policies in evaluating the effectiveness of wage restrictions in reducing income disparity.

2. Methodology

2.1. Research Design

A quantitative research methodology with panel econometric analysis was used in this study to explore the relationship between minimum wage rates and income inequality in the Philippines. The short-run and long-run effects of wage adjustment on income distribution are examined using the Panel Autoregressive Distributed Lag (ARDL) model of Pesaran et al. (2001) model. This approach is particularly useful for evaluating the time-dependent effects of minimum wage legislation in diverse areas, considering both immediate responses and delayed effects. For a given period, different Philippine areas are used under the panel data framework. This approach enables a more thorough analysis as it controls for the geographical differences and macroeconomic parameters such as inflation, level of employment, labor productivity and economic growth (Narayan, 2005). The Panel ARDL model is chosen because to its versatility in handling variables with varying orders of integration and capacity to predict heterogeneous associations across areas (Samreth, 2022). Unlike traditional regression approaches, this model recognizes that economic policies such as minimum wage hikes might have variable impacts in different locations, contingent on the economic structure and labor market conditions (Owino, 2022). Through this research approach, the study seeks to offer empirical data on whether minimum wage rises help in lowering income inequality or if they lead to unexpected economic disparities. The findings will contribute to policy discussions on the

effectiveness of minimum wage legislation in addressing regional economic imbalances in the Philippines and provide a platform for future labor market reforms.

2.2. Data used

Minimum Wage Rate Policy (Regional)

The minimum wage rate policy in the Philippines is under the Republic Act No. 6727 or the Wage Rationalization Act of 1989 which established the Regional Tripartite Wages and Productivity Boards (RTWPBs). These bodies are responsible for fixing the minimum wage rates in particular areas, taking into consideration a variety of economic and social issues. Instead of a single national minimum wage, the Philippines has a regional system that takes into account the varying economic circumstances in each province and city. The calculation of modifications to the minimum wage is done through a consultation process involving stakeholders such as labor groups, employer associations and government authorities. The formula for adjusting wages is not rigidly determined, but generally considers the evaluation of:

$$\Delta W = (CPI_t - CPI_{t-1}) \times \text{Base Wage}$$

where:

ΔW = Change in minimum wage

CPI_t = Current Consumer Price Index

CPI_{t-1} = Previous Consumer Price Index

Base Wage = The existing minimum wage prior to adjustment

The RTWPBs then recommend adjustments based on their analysis, which must be approved by the National Wages and Productivity Commission (NWPC) before implementation.

Income inequality

Wealth Theil-T inequality. The Theil Index is a metric to quantify income inequality and it reflects income distribution amongst a population. It is rooted in information theory and quantifies the magnitude of entropic divergence from equality. The index is particularly useful in that it can be broken into inequality within groups and across groups, and is therefore a good tool for examining regional or sectoral differences in the distribution of income.

The Theil Index ranges from 0 to ∞ .

a. A value of 0 indicates perfect equality, meaning income is evenly distributed across the population.

b. Higher values indicate greater income inequality. There is no upper bound, but in practical terms, values rarely exceed 2 or 3 in most economies.

The Theil Index is defined as:

$$T = \sum_{i=1}^n \frac{1}{n} \left(\frac{p_i}{q_i} \right) \ln \left(\frac{p_i}{q_i} \right)$$

where:

x_i = is the income of individual i

μ = is the mean income of the population

N = is the total number of individuals

The Theil Index can be broken into within-group and between-group components. This allows researchers to examine how much of overall inequality is due to differences within regions (intra-regional inequality) versus differences between regions (inter-regional inequality).

Thresholds for Interpretation

Theil Index Value	Interpretation
0.00	Perfect equality (all individuals have the same income)
0.1 - 0.3	Low income inequality
0.3 - 0.6	Moderate income inequality
Above 0.6	High income inequality

Theil Index Value	Interpretation
1.0 and above	Extreme inequality (major disparities in income distribution)

Conceição, P., & Ferreira, F. (2000). The Young Person's Guide to the Theil Index: Suggesting Intuitive Interpretations and Exploring Analytical Applications. UTIP Working Paper No. 14, University of Texas.

2.3. Data sources

Wealth Theil-T inequality. The Theil Index is a metric to quantify income inequality and it reflects income distribution amongst a population. It is rooted in information theory and quantifies the magnitude of entropic divergence from equality. The index is particularly useful in that it can be broken into inequality within groups and across groups, and is therefore a good tool for examining regional or sectoral differences in the distribution of income.

2.4. Statistical Analysis

This study uses Panel Autoregressive Distributed Lag (Panel ARDL) modeling to examine the nexus between minimum wage rates and income inequality across different areas of the Philippines. The Panel ARDL model established by Pesaran et al. (2001) is a rigorous econometric tool to investigate the economic links in the short-run and long-run, while accounting for regional variability. This model is particularly appropriate for this study since it can include stationary and non-stationary variables. Thus it is appropriate to analyze the effect of changes in minimum wage rates on income inequality over time.

2.4.1 Descriptive Statistics

Descriptive statistics was used to summarize the feature of the variables under study. Specifically, the mean, standard deviation, minimum, maximum and observations were calculated to offer a summary of the distribution of regional income disparity and minimum wage rates over the study period.

2.4.2 Trend Analysis

The movement of minimum wages in the regions and the indices of income inequality were analyzed graphically. This approach enabled the study to visually analyze the temporal structures and regional changes of the two variables.

2.4.3 Short-Run Model (First-Difference Fixed Effects)

A first-difference panel regression model was applied to investigate the short-term impact of minimum wage policies on regional income disparity. The first difference captures the period-to-period changes in the variables and eliminates long-run trends. This approach allows the investigation to evaluate if the changes in the regional minimum wage rates immediately alter income inequality changes.

The short-run model is specified as follow:

$$\Delta \text{INEQ}_{it} = f(\Delta \text{LMW}_{it})$$

Where:

ΔINEQ_{it} = change in income inequality of region i at year t ,

ΔLMW_{it} = change in the natural logarithm of regional minimum wage

Finally the estimated short-run model is express as follow:

$$\Delta \text{Inequality}_{it} = \alpha_i + B_1 \Delta \ln(\text{MinimumWage}_{it}) + \varepsilon_{i,t}$$

2.4.4 Panel ARDL Model Specification

The general form of the Panel ARDL (p, q) model is specified as follows:

$$Y_{i,t} = \alpha_i + \sum_{j=1}^p B_j Y_{i,t-j} + \sum_{k=0}^q \gamma_k X_{i,t-k} + \lambda_i + \varepsilon_{i,t}$$

where:

$Y_{i,t}$ = Income inequality (Theil-T Index) for region i at time t

$X_{i,t}$ = Minimum Wage Rate for region i at time t

α_i = Region-specific fixed effects

B_j = Coefficients for lagged dependent variable

γ_k = Coefficient for lagged independent variables

λ_i = Unobserved regional effects

$\varepsilon_{i,t}$ = error terms

Estimation Techniques

To estimate the Panel ARDL model, the following econometric steps are undertaken:

a. Panel Unit Root Tests

The variables are subjected to Im-Pesaran Shin (IPS) and Levin, Lin and Chu (LLC) tests to test for stationarity or non-stationarity of the variables (Pesaran & Shin, 1999). This is a very important step since the existence of unit roots (non-stationarity) may lead to false regression findings (Gujarati & Porter, 2009). If variables are stationary at level then the usual regression approaches can be utilized.

The LLC test assumes that all panel members have a common unit root process, while the IPS test allows for heterogeneous unit root processes across regions. These tests were applied at levels and at initial differences to find out whether the variables were integrated of order zero, $I(0)$ or order one, $I(1)$. Prior to doing panel cointegration analysis, the order of integration has to be determined.

b. Cross-Sectional Dependence Test

Since Philippine regions are economically interconnected through labor mobility, migration, trade flows, and national economic policies, the study tested for cross-sectional dependence using the Pesaran Cross-Sectional Dependence (CD) test (Pesaran, 2004).

The test evaluates whether shocks occurring in one region are correlated with shocks in other regions. A significant result indicates that the panel units are not independent and that regional economies exhibit interdependence.

c. Panel Cointegration Test

After determining the stationarity properties of the variables, panel cointegration tests were conducted to investigate whether a long-run equilibrium relationship exists between minimum wage and income inequality.

The study utilized the Pedroni Panel Cointegration Test (Pedroni, 1999; 2001), which allows for heterogeneous intercepts and slope coefficients across regions. The Pedroni test examines whether non-stationary variables move together over time, indicating the existence of a stable long-run relationship.

To further validate the findings, the Westerlund Error Correction Model (ECM) Cointegration Test (Westerlund, 2007) was also employed. This test examines whether an error-correction mechanism exists among the variables and provides additional evidence regarding long-run equilibrium relationships.

d. Panel Dynamic Ordinary Least Squares (PDOLS)

Upon confirmation of cointegration, the long-run relationship between minimum wage and income inequality was estimated using Panel Dynamic Ordinary Least Squares (PDOLS). The PDOLS estimator developed by Pedroni (2001) corrects for potential endogeneity and serial correlation problems by incorporating leads and lags of the differenced explanatory variables.

The PDOLS model is expressed as:

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{i,t}$$

Where:

Y_{it} = Income inequality in region i at time t

X_{it} = Log of regional minimum wage

β = Long-run coefficient

$\varepsilon_{i,t}$ = Error term

The PDOLS estimator provides consistent and efficient estimates of the long-run effect of minimum wage policy on income inequality.

e. Hausman Test for Fixed vs. Random Effects

To ensure the robustness of the model, the Hausman test is conducted to determine whether a Fixed Effects (FE) or Random Effects (RE) model should be used (Hausman, 1978). The test evaluates whether individual-specific effects are correlated with the regressors. If the null hypothesis is rejected, the FE model is preferred; otherwise, the RE model is appropriate. This test is important because using an incorrect specification can lead to biased and inconsistent estimates (Wooldridge, 2010).

3. Results And Discussion

3.1 Descriptive Statistics

Table 1 presents the descriptive statistics of the key variables used in the study. The dependent variable is regional income inequality, while the independent variable is the natural logarithm of the regional minimum wage.

Table 1. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
Income Inequality	488	0.0845	0.0473	0.0100	0.2000
Log Minimum Wage	493	5.5029	0.3630	4.4886	6.4135

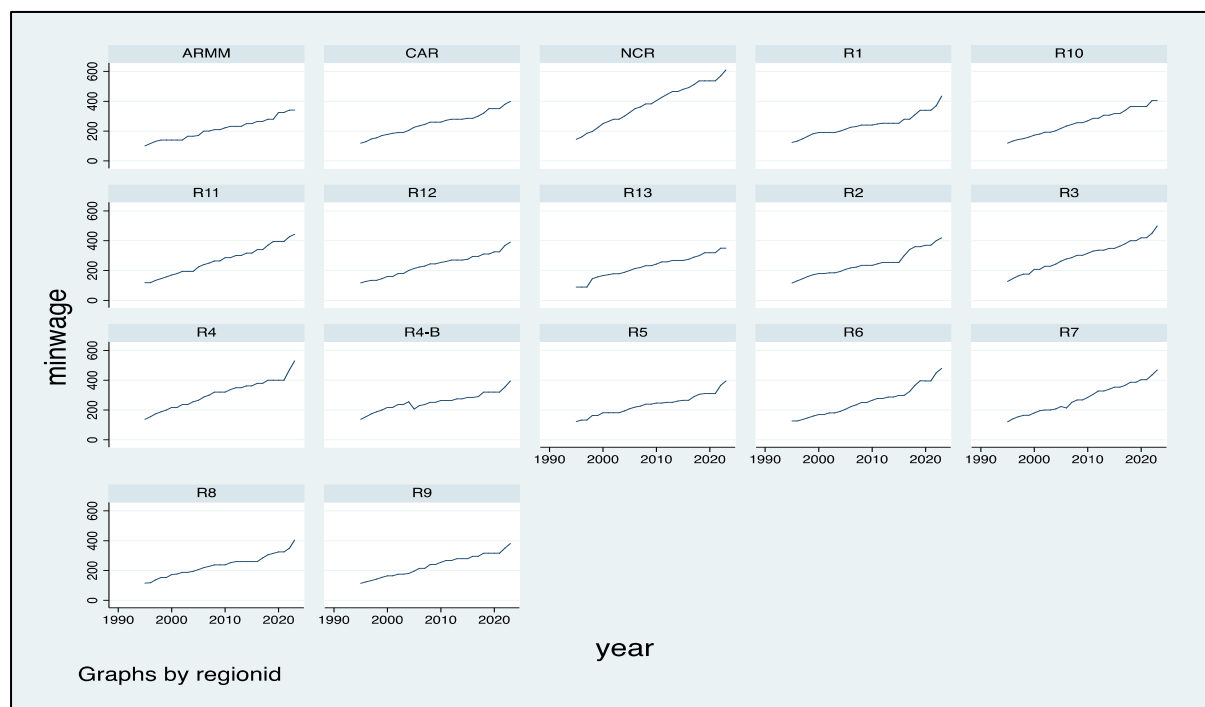
The results show that the average regional income inequality index is 0.0845, with a standard deviation of 0.0473. This suggests that regional inequality varies across the Philippines, although the observed values generally remain within the low to moderate range. The minimum value of 0.0100 indicates very low measured inequality in some regional-year observations, while the maximum value of 0.2000 indicates relatively higher inequality in some regions and periods.

The log of minimum wage has a mean value of 5.5029 and a standard deviation of 0.3630, indicating noticeable wage variation across regions and over time. This is consistent with the regional wage-setting system in the Philippines, where the Regional Tripartite Wages and Productivity Boards determine minimum wages based on region-specific economic conditions. The observed variation supports the relevance of examining whether minimum wage differences contribute to changes in regional income inequality.

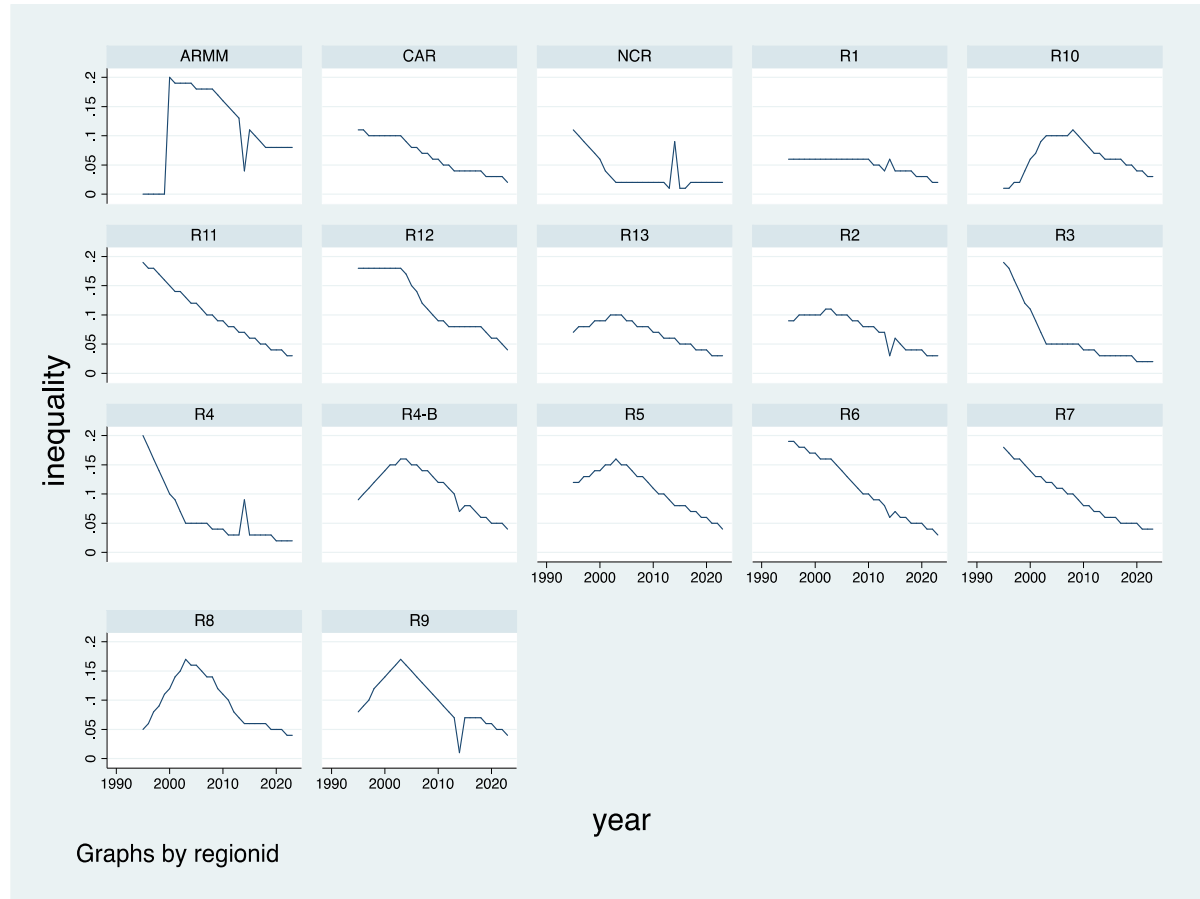
From a policy perspective, the descriptive results suggest that both wage levels and inequality differ across regions. This supports the central premise of the study that minimum wage policy should be analyzed not only at the national level but also from a regional development perspective. Since minimum wage rates are designed to protect low-income workers, their relationship with inequality is important in evaluating whether wage policies contribute to inclusive growth.

3.2 Trend Analysis of Minimum Wage and Income Inequality

The trend graphs show that minimum wages increased across all regions from 1995 to 2023. This upward pattern reflects repeated wage adjustments implemented through regional wage orders. The increase is particularly visible in highly urbanized and economically active regions such as the National Capital Region, while lower wage levels are observed in less developed regions.



Meanwhile, the regional trend of income inequality shows a generally declining pattern in several regions, although the pace and direction differ across areas. Some regions exhibit a steady decline in inequality, while others show fluctuations over time. This implies that changes in income inequality are not uniform across regions and may be influenced by differences in labor market structure, wage policy implementation, employment opportunities, and regional economic capacity.



The contrasting movement between increasing minimum wages and declining inequality in several regions provides preliminary evidence that wage increases may be associated with lower income inequality. However, trend analysis alone cannot establish a long-run relationship. Therefore, panel econometric tests were conducted to formally examine whether minimum wage policy has a statistically significant effect on regional income inequality.

3.3 Panel Unit Root Test Results

Before estimating the long-run relationship, the stationarity properties of the variables were examined using the Levin-Lin-Chu (LLC) and Im-Pesaran-Shin (IPS) panel unit root tests. These tests determine whether the variables are stationary at level or require first differencing.

Table 2. Levin-Lin-Chu Panel Unit Root Test

Variable	Adjusted t*	p-value	Decision
Income Inequality	-2.9433	0.0016	Stationary at level
Log Minimum Wage	-5.6206	0.0000	Stationary at level

Significant at 0.05 level

The LLC test results show that both variables are stationary at level. The p-values are below the 0.05 significance level, leading to the rejection of the null hypothesis that panels contain unit roots. This suggests that both income inequality and minimum wage are stationary under the LLC assumption of a common unit root process.

Table 3. Im-Pesaran-Shin Panel Unit Root Test at Level

Variable	Z-t-tilde-bar	p-value	Decision
Income Inequality	2.3031	0.9894	Non-stationary
Log Minimum Wage	-1.3001	0.0968	Non-stationary

Significant at 0.05 level

The IPS test produced mixed evidence. Income inequality was found to be non-stationary at level, while log minimum wage was only weakly stationary at the 10% level. Since IPS allows for heterogeneous unit root processes across regions, the mixed result is reasonable given the structural differences among Philippine regions.

To confirm the order of integration, the variables were tested at first difference.

Table 4. IPS Panel Unit Root Test at First Difference

Variable	Z-t-tilde-bar	p-value	Decision	Integration Order
Δ Income Inequality	-11.7254	0.0000	Stationary	I(1)
Δ Log Minimum Wage	-11.1252	0.0000	Stationary	I(1)

Significant at 0.05 level

The first-difference results show that both variables become stationary at the 1% significance level. Therefore, the variables are treated as integrated of order one, I(1). This supports the use of panel cointegration procedures and dynamic panel estimation. According to Pesaran, Shin, and Smith (2001), ARDL-type modeling is appropriate when variables are I(0), I(1), or a mixture of both, provided that none of the variables are I(2).

3.4 Cross-Sectional Dependence Test

Since Philippine regions are economically interconnected through labor mobility, trade, migration, and national wage policy coordination, it is important to test whether the panel units are cross-sectionally dependent.

Table 5. Pesaran Cross-Sectional Dependence Test

Test	Statistic	p-value	Decision
Pesaran CD Test	8.981	0.0000	Cross-sectional dependence exists

Significant at 0.05 level

The Pesaran CD test result is significant at the 1% level, indicating the presence of cross-sectional dependence among regions. This means that economic shocks or policy changes in one region may be related to changes in other regions. In the Philippine context, this is expected because wage policies, labor migration, inflationary pressures, and regional economic activities are not fully isolated from one another. The existence of cross-sectional dependence implies that regional wage and inequality dynamics should not be interpreted as purely independent regional outcomes. Instead, the effect of minimum wage policy may spill over across regions through employment movement, price adjustments, and migration patterns.

3.5 Panel Cointegration Test Results

After confirming that the variables are integrated of order one, panel cointegration tests were conducted to determine whether a stable long-run relationship exists between regional minimum wage and income inequality.

Table 6. Pedroni Panel Cointegration Test

Test Statistic	Panel	Group
v-statistic	-0.9369	—
rho-statistic	-1.5460	-0.1817
t-statistic	-3.4550	-3.8000
ADF-statistic	-1.5350	-1.5350

The Pedroni test provides evidence of cointegration, particularly through the panel t-statistic and group t-statistic, both of which are negative and relatively large in magnitude. Since the null hypothesis of Pedroni's test is no cointegration, the negative test statistics support the existence of a long-run relationship between minimum wage and regional income inequality.

To further validate the cointegration result, the Westerlund ECM panel cointegration test was also conducted.

Table 7. Westerlund ECM Panel Cointegration Test

Statistic	Value	Z-value	P-value	Decision
Gt	-2.015	-1.090	0.138	Not significant
Ga	-9.854	-2.054	0.020	Significant
Pt	-8.143	-2.187	0.014	Significant
Pa	-6.281	-1.904	0.028	Significant

Significant at 0.05 level

The Westerlund test results confirm the presence of cointegration. Three out of the four test statistics are statistically significant: Ga, Pt, and Pa. This indicates that there is a long-run equilibrium relationship between regional minimum wage and income inequality. In other words, minimum wage and inequality move together over time, suggesting that wage policy has a meaningful long-run association with regional income distribution.

This finding is consistent with labor market theory, which argues that minimum wage policy can influence income distribution by raising the earnings floor for low-wage workers. However, the direction of the effect depends on whether wage increases improve the welfare of low-income workers or whether they generate labor market adjustment costs such as reduced employment, reduced hours, or informalization.

3.6 Long-Run Relationship: Panel Dynamic OLS Result

After establishing cointegration, the long-run relationship was estimated using Panel Dynamic Ordinary Least Squares.

Table 8. Pedroni Panel DOLS Long-Run Estimate

Variables	Coefficient	T-statistic	Interpretation
Log Minimum Wage	-0.2075	-11.16	Negative and Significant long-run effect

Significant at 0.05 level

The long-run result shows that log minimum wage has a negative and statistically significant effect on income inequality. The coefficient of -0.2075 indicates that increases in minimum wage are associated with reductions in regional income inequality in the long run. Since the independent variable is in logarithmic form and the dependent variable is in level form, the coefficient may be interpreted as a semi-elasticity. Specifically, a 1% increase in regional minimum wage is associated with an estimated 0.002075 decrease in the income inequality index, holding the model structure constant.

This finding suggests that regional minimum wage adjustments contribute to reducing income inequality across Philippine regions. The result supports the redistributive role of minimum wage policy, especially when wage increases raise the earnings of workers at the lower end of the income distribution.

The result is consistent with the argument that minimum wage policy can compress wage dispersion by increasing the earnings of low-wage workers (Rani et al., 2013; International Labour Organization, 2020). It also supports the view that minimum wage laws can reduce inequality when they are effectively implemented and when workers are covered by formal labor standards. In the Philippine context, where minimum wages are regionally determined, this finding suggests that wage boards may play a role in narrowing income gaps across regions.

However, the result should be interpreted with caution. Since the study focuses only on minimum wage and income inequality, the estimated relationship reflects the direct bivariate association between the two variables. Other regional economic factors such as employment structure, poverty incidence, productivity, inflation, and regional output may also influence inequality. Nevertheless, the finding provides important empirical evidence that minimum wage policy is significantly linked to regional inequality outcomes.

3.7 Short-run Relationship

Table 9. Short-Run Effect of Minimum Wage on Income Inequality

Variables	Coefficient	Std. Error	T-value	P-value
$\Delta \ln mw$	-0.0076335	0.0144953	-0.53	0.599
Constant	-0.0024898	0.0009628	-2.59	0.010
Model Statistics:				
Statistics			Value	
Number of Observation			476	
Number of Regions			17	
F-statistics			0.28	
Prob > F			0.5987	
Within R ²			0.0006	

The short-run fixed-effects estimation examined whether changes in regional minimum wages immediately affect changes in regional income inequality. The coefficient of the change in log minimum wage ($\Delta \ln mw$) is negative (-0.0076), suggesting that increases in minimum wage are associated with reductions in income inequality in the short run. However, the relationship is statistically insignificant ($p = 0.599$), indicating that short-run wage adjustments do not produce an immediate measurable impact on regional income inequality.

The absence of a significant short-run effect suggests that income inequality responds gradually rather than instantaneously to wage policy changes. Although minimum wage increases directly affect the earnings of covered workers, broader changes in income distribution typically require time to materialize as firms adjust employment practices, workers respond to labor market incentives, and wage gains diffuse through the regional economy.

This finding is consistent with labor market adjustment theories, which argue that wage policies often exert delayed effects on income distribution because the transmission mechanism operates through employment, productivity, labor mobility, and household income accumulation. Similarly, Rani et al. (2013) noted that minimum wage policies are more likely to influence long-run wage dispersion than immediate income distribution outcomes. In developing economies, the short-run impact of wage increases may be weakened by the presence of informal employment, incomplete compliance with labor regulations, and regional differences in labor market structures.

The result also complements the cointegration and long-run findings of the study. While the short-run coefficient is statistically insignificant, the Pedroni cointegration test, Westerlund ECM test, and PDOLS estimates confirmed the existence of a significant long-run relationship between minimum wage and income inequality. This suggests that minimum wage policy contributes to reducing inequality over time, even if the immediate effect is not statistically observable.

Therefore, the evidence indicates that regional minimum wage adjustments are not an effective instrument for generating immediate reductions in inequality, but they may play a meaningful role in improving income distribution when sustained over a longer period.

3.8 Dynamic Fixed Effects Regression

To further examine the dynamic effect of minimum wage on inequality, a fixed-effects dynamic panel regression was estimated using the lagged dependent variable.

Table 10. Dynamic Fixed Effects Regression

Variable	Coefficient	Standard Error	t-statistic	p-value	95% Confidence Interval
L1. Income Inequality	0.8166	0.0200	40.75	0.000	0.7772 to 0.8560
Log Minimum Wage	-0.0192	0.0025	-7.71	0.000	-0.0241 to -0.0143
Constant	0.1187	0.0151	7.85	0.000	0.0890 to 0.1484

Model statistics:

Statistic	Value
Observations	471
Number of regions	17
Within R-squared	0.9170

Statistic	Value
Between R-squared	0.9950
Overall R-squared	0.9380
F-statistic	2497.33
Prob > F	0.0000

The dynamic fixed-effects result shows that the lagged value of income inequality is positive and statistically significant. This means that income inequality is persistent over time. Regions with higher inequality in the previous period tend to continue having higher inequality in the current period. This persistence is common in inequality studies because income distribution is shaped by structural factors such as access to education, labor market opportunities, regional productivity, and economic concentration.

The coefficient of log minimum wage is negative and significant at the 1% level. This confirms that higher regional minimum wages are associated with lower income inequality. Specifically, the coefficient of -0.0192 implies that a 1% increase in minimum wage is associated with an estimated 0.000192 reduction in the inequality index in the short-run dynamic specification.

The high within R-squared value of 0.9170 indicates that the model explains a large proportion of within-region variation in income inequality over time. The significant F-statistic also confirms that the explanatory variables jointly explain changes in inequality.

This result reinforces the long-run finding that minimum wage policy has an inequality-reducing effect. The evidence suggests that regional minimum wage increases may help improve the income position of lower-wage workers, thereby narrowing income disparities within regions.

3.9 Random Effects Regression

For comparison, a random-effects dynamic panel model was also estimated.

Table 11. Dynamic Random Effects Regression

Variable	Coefficient	Standard Error	z-statistic	p-value	95% Confidence Interval
L1. Income Inequality	0.8727	0.0155	56.39	0.000	0.8424 to 0.9030
Log Minimum Wage	-0.0150	0.0022	-6.94	0.000	-0.0192 to -0.0107
Constant	0.0905	0.0129	7.01	0.000	0.0652 to 0.1158

Model statistics:

Statistic	Value
Observations	471
Number of regions	17
Within R-squared	0.9164
Between R-squared	0.9960
Overall R-squared	0.9394
Wald chi-square	7258.66
Prob > chi-square	0.0000

The random-effects result is consistent with the fixed-effects model. The lagged dependent variable remains positive and significant, confirming the persistence of inequality. The minimum wage coefficient remains negative and statistically significant, indicating that higher minimum wages are associated with lower income inequality.

The consistency of the negative minimum wage coefficient across the Pedroni DOLS, fixed-effects, and random-effects results strengthens the empirical conclusion that regional minimum wage increases are linked with reductions in income inequality.

3.9 Overall Discussion of Findings

The research results give empirical evidence that the regional minimum wage legislation has a substantial association with income inequality in the Philippines. The trend analysis suggests that minimum salaries have climbed across regions between 1995 and 2023 and income inequality has typically fallen or

fluctuated depending on regional economic conditions. The panel unit root tests proved the variables are $I(1)$, and the Pedroni and Westerlund cointegration tests confirmed the presence of a long-run equilibrium link between minimum wage and income inequality. In the short run, the first-difference fixed effects model shows that increases in minimum wage have a negative but statistically negligible influence on changes in regional income inequality ($\beta = -0.0076$, $p = 0.599$). This implies that minimum wage changes do not result in measurable declines in income inequality in the short term. pay increases directly affect the earnings of covered workers, but changes in the distribution of income more generally often take longer to occur as labor markets, company establishments, and household income structures slowly respond to changes in pay policy. In the short run, the lack of importance may also be due to the existence of informal work, wage non-compliance and regional labor market rigidities which reduce the immediate transmission of pay increases to the income distribution as a whole. Similar findings have been found in underdeveloped economies where minimum wage rules tend to show delayed distributional impacts due to labor market adaptations and institutional constraints (Rani et al., 2013). The long-run findings, in contrast, provide a more convincing evidence on the redistributive effect of minimum wage policies. The results of the Pedroni and Westerlund cointegration tests indicated that minimum wage and income disparity are moving together over time, suggesting that there is a stable long run link. More crucially, the Panel Dynamic Ordinary Least Squares (PDOLS) estimation indicated a negative and statistically significant long-run coefficient ($\beta = -0.2075$, $t = -11.16$), implying that increases in regional minimum salaries contribute to reductions in income disparity over time. The evidence in the long-run is that consistent rises in minimum wages enhance the earnings situation of low-wage workers and gradually reduce regional income disparities. Minimum wage regulations set a floor on wages for vulnerable workers. Their cumulative influence is more visible in longer periods of time. Wage gains are absorbed by households and show up in aggregate patterns of income distribution. The results confirm the redistributive nature of wage policy and support the premise that increasing minimum wages can be an effective weapon for promoting inclusive growth and eliminating economic inequality. The findings are consistent with the worldwide literature emphasizing the importance of minimum wage policies to reduce pay dispersion and enhance income distribution. According to the International Labor Organization (2020) properly planned and enforced minimum wage policies help in reducing wage inequalities, particularly for low-income workers. Likewise, Rani et al. (2013) showed that minimum wage legislation in developing economies can reduce income inequality by raising the earnings floor and compressing salary differentials. The results are also consistent with the efficiency wage view of Shapiro and Stiglitz (1984) that higher pay may boost worker welfare and productivity as well as labor market outcomes. The dynamic panel estimations add further help. The negative and statistically significant coefficients for minimum wage in both the fixed-effects and random-effects models supported the stability of the long-run connection. Furthermore, the large lagged coefficient on inequality suggests that income inequality is persistent across time, meaning that current levels of income inequality are substantially dependent on the pattern of income distribution in the past. Such durability signals the need for continuing policy actions, not simply short-term one-off pay adjustments. The empirical evidence reveals that, in general, regional minimum wage regulation works more as a long-run redistributive mechanism than as an urgent corrective tool. Increasing wages has a little impact on reducing income inequality in the near term, but a big impact on reducing income inequality in the long term. Thus, regional minimum wage modifications should be seen as part of a broader long-term plan to pursue equitable economic development and inclusive growth throughout Philippine regions.

4. Conclusion And Recommendation

4.1. Conclusion

The study analyzed the effect of regional minimum wage legislation on income inequality in the Philippines using the panel data of seventeen regions from 1995-2023. The study employed panel unit root tests, cross-sectional dependence analysis, panel cointegration tests, Panel Dynamic Ordinary Least Squares (PDOLS), and dynamic panel estimations to examine the short-run and long-run relationship between minimum wage and income inequality. The results showed that minimum wage and income disparity have stable long run equilibrium relationship. The Pedroni and Westerlund cointegration tests demonstrated that changes in regional minimum wage legislation and income inequality move together over time, suggesting a long-term economic relationship between the two variables. In the near run, the data suggest that minimum wage hikes do not statistically affect regional income disparity. The coefficient estimate points to a negative association, but the effect is not statistically significant. In other words, changes in wages do not instantly translate into measurable improvements in the distribution of income. This conclusion suggests that the effect of wage policy takes time to be transferred through labor markets and household income structures, before affecting overall inequality outcomes. By contrast, the long-run data offer significant evidence that regional minimum wage hikes help to reduce income disparity. The estimates of PDOLS show a statistically significant negative link between minimum wage and income inequality. This means that the persistent

increase in wages improves the income situation of workers with lower wages and eventually reduces income differences between areas. This result is stable across the dynamic fixed-effects and random-effects models further strengthening the robustness of the results. The analysis concludes that regional minimum wage legislation is an essential long-term redistributive instrument in the Philippines. Increasing wages may not reduce inequality right once, but gradually raising the minimum wage does a lot to improve income distribution over time. Minimum wage regulations should therefore be considered as part of a more comprehensive long-term strategy to promote inclusive growth, reduce regional disparities of economic performance and improve the welfare of low income workers. The findings add to a growing corpus of labor economics literature by giving empirical evidence that minimum wage rules can play a significant role in reducing income inequality if consistently implemented and sustained over time. Moreover, the study stresses the need to take into account the time dimension of wage regulations, since their impact seems to be stronger in the long run than in the short term.

4.2. Recommendation

First, the Department of Labor and Employment and the National Wages and Productivity Commission should continue to enhance the regional wage-setting mechanism. Minimum wage hikes are proven to be connected with decreasing inequality. Wage modifications should stay responsive to regional living costs, inflation and worker welfare. Second, the Regional Tripartite Wages and Productivity Boards should incorporate empirical evidence in considering wage petitions. The wage strategy has to examine not only the business capacity but also the function it plays in lowering the regional income disparities. Third, authorities need to improve the enforcement mechanisms that accompany minimum wage hikes. The extent to which minimum wages reduce inequality relies on whether workers are covered by and can benefit from wage legislation. Fourth, local government units should back wage policies with complementary programs such as livelihood aid, employment facilitation and skills training. Such programs can assist prevent wage increases from squeezing vulnerable workers out of formal jobs. Lastly, future researchers may enhance this analysis by integrating other regional economic variables such as employment, poverty incidence, regional output, productivity and inflation. This would provide a wider explanation of the determinants of regional income inequality in the Philippines.

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