

Original Article

# The Impact of Government Expenditure on Education on the Unemployment Rates in the Philippines from 1991 to 2024

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**Abstract.** Government expenditure on education plays an important role in developing human capital by supporting the knowledge, skills, and competencies needed to participate in the labor market and support long-term economic development. This study examines the relationship between government expenditure on education and the unemployment rate in the Philippines. Using a correlational research design, the study analyzed secondary annual data obtained from the World Bank to examine the relationship between these economic variables over time. Ordinary Least Squares (OLS) regression was employed to determine whether a statistically significant relationship exists between government expenditure on education and the unemployment rate. The findings revealed a significant inverse association between government expenditure on education and the unemployment rate in the Philippines, indicating that higher levels of government expenditure on education were associated with lower unemployment rates during the period examined. However, this relationship should not be interpreted as evidence of a direct causal effect, as other economic and structural factors may also influence unemployment. The findings suggest that sustained investment in education may be associated with favorable labor market outcomes and can provide useful evidence for policymakers in considering education as part of broader strategies for human capital development and employment.

**Keywords:** *Human capital; Labor market; RStudio; Time series; Workforce.*

Unemployment is one of the most persistent economic challenges faced by countries worldwide. It affects not only individuals and households but also the broader economy, as unemployed individuals cannot fully participate in productive activities. Because employment opportunities are closely linked to the workforce's knowledge and skills, governments have increasingly recognized education as an important area of public investment. Government education spending supports human capital development by providing individuals with knowledge, competencies, and skills that may enhance their participation in the labor market. Similarly, higher education expenditure in ASEAN countries contributed to economic growth and labor market development, suggesting that investment in education may be associated with broader economic and employment

outcomes (Maneejuk & Yamaka, 2021).

In the Philippines, investment in education remains a key policy concern because of ongoing challenges related to unemployment, skills mismatch, and labor market development. The Philippines allocated about 3.4% of its gross domestic product (GDP) to education in 2018, below the reported average of several ASEAN countries (Uy, 2021). At the same time, unemployment continues to affect a significant portion of the Filipino workforce. The unemployment rate among Filipinos aged 15 years and above was 3.8%, or about 1.94 million individuals, compared with 4.4%, or 2.19 million individuals, in 2023 (Philippine Statistics Authority, 2025). Although this reflects improved labor market conditions, changes in unemployment cannot be attributed to government education spending alone. Examining the relationship between government education spending and unemployment is therefore important for understanding the possible role of educational investment within the broader Philippine economy.

Previous studies generally recognize education spending as an important investment in human capital and employability. Education can improve employability by developing the skills and competencies the labor market needs (Butiong et al., 2023). Similarly, higher government expenditure on education was associated with improved employment outcomes in the Philippines (Espinosa et al., 2024). Sustained investment in education can contribute to workforce development and labor market competitiveness over time (Singh & Shastri, 2020). These findings suggest that government education spending may be associated with employment outcomes by strengthening individual capabilities and improving workers' ability to meet labor market requirements.

However, the literature does not provide a consistent conclusion regarding the relationship between government education spending and unemployment. While some studies suggest that education expenditure is associated with improved employment outcomes or lower unemployment, other studies indicate that its relationship with unemployment is not statistically significant or may be limited. Government expenditure on education, for instance, was not found to be a significant predictor of unemployment in their analysis, while other macroeconomic factors, such as GDP growth, inflation, and foreign direct investment, showed significant relationships with unemployment (Caligagan et al., 2022). These findings suggest that government education spending may affect labor market outcomes. Still, its observed relationship with unemployment may be weak or inconsistent because several economic and structural factors also influence unemployment. Thus, existing evidence does not establish a uniform relationship between government education spending and unemployment.

The inconsistency in previous findings may partly stem from the fact that education expenditure alone does not automatically produce favorable labor market outcomes. Higher education budgets do not necessarily translate into improved outcomes because spending effectiveness depends on how resources are allocated and managed (Sabado et al., 2023). Similarly, the outcomes of government expenditure may vary depending on how public spending is structured and implemented (Rambeli et al., 2021). In the Philippines, limited educational resources, including overcrowded classrooms and inadequate learning facilities, may affect the effectiveness of educational investment (Albert et al., 2021). Skills mismatch also remains a continuing challenge (Butiong et al., 2023), while education quality and actual skills may matter more for economic outcomes than educational attainment alone (Hanushek et al., 2020). These findings indicate that education spending alone may not explain labor market outcomes without considering the quality, efficiency, and relevance of educational investment.

Other Philippine studies further demonstrate that conditions beyond government education spending influence education and employment outcomes. Some Filipino workers are overeducated for the jobs they hold, suggesting a mismatch between educational qualifications and available labor market opportunities (Melchor, 2022). Similarly, tertiary education alone does not necessarily guarantee better wage outcomes (Tutor et al., 2021). Underemployment in Northern Mindanao also remained influenced by unfavorable business conditions (Araune & Sios-e, 2023), while vocational and skills-oriented training can provide stronger employment benefits than incomplete educational pathways (Vandenberg & Laranjo, 2020). These findings suggest that the relationship between education and labor market outcomes depends not only on government spending but also on whether the skills and qualifications developed through education match labor market needs and opportunities.

Moreover, broader macroeconomic and structural conditions shape unemployment. GDP growth, inflation, and foreign direct investment were significantly associated with unemployment in the Philippines (Caligagan et al., 2022), while the relationship between inflation and unemployment has also changed over time. Urbanization may

also influence unemployment, as evidence from selected Arab countries indicates that urban population growth can adversely affect unemployment (Hussien & Younus, 2021). Government expenditure alone does not guarantee particular economic outcomes because its effectiveness depends on how resources are allocated, managed, and aligned with broader development needs (Pelegrino, 2025; Almadin et al., 2022). Taken together, these studies show that multiple, interconnected factors influence unemployment. Consequently, any observed relationship between government education spending and unemployment should be interpreted cautiously and should not automatically be considered evidence of a direct causal relationship. Other macroeconomic and structural factors may also influence unemployment and may affect the observed relationship between education spending and labor market outcomes.

Despite the existing literature, a clear and consistent understanding of the relationship between government education spending and unemployment in the Philippines remains unresolved. Several Philippine studies have already examined education expenditure and labor market outcomes, but they differ in their periods of analysis, variables, outcome measures, and methodological approaches. Annual Philippine data from 1993 to 2018 were analyzed using Ordinary Least Squares (OLS) regression, with government expenditure on education found to be an insignificant predictor of unemployment (Caligagan et al., 2022). Espinas et al. (2024) analyzed employment and underemployment outcomes using Philippine data extending to 2020 with OLS regression and HAC standard errors, supported by diagnostic tests for heteroskedasticity, autocorrelation, multicollinearity, and cointegration. Time-series data from 2001 to 2022 were also analyzed using the Augmented Dickey-Fuller test, Johansen cointegration analysis, and Granger causality testing to examine the relationships among education expenditure, unemployment, business confidence, and poverty incidence (Nuñez et al., 2024). In addition, a systematic review of literature and secondary evidence from 1985 to 2022 identified major determinants of unemployment, including education, inflation, and economic growth (Butiong et al., 2023). Although these studies provide valuable evidence, their different methodologies and areas of focus make their findings difficult to compare directly and do not provide a single consistent conclusion regarding the relationship between government education spending and unemployment.

The existing Philippine evidence also leaves an important data-coverage gap. The identified studies use periods ending in 2018, 2020, or 2022, while none examine the relationship using annual Philippine data extending through 2024. This is particularly relevant because 2020 onward saw substantial disruptions to economic activity and employment due to the COVID-19 pandemic, followed by changes associated with economic and labor market recovery. Although more recent international studies have examined education expenditure and labor market outcomes, evidence based on updated annual Philippine data through 2024 remains limited. Furthermore, previous Philippine studies have used different dependent variables, including unemployment, employment, and underemployment, as well as different econometric techniques. Thus, it remains unclear whether the relationship between government education spending and unemployment observed in earlier Philippine studies persists when a longer, more recent annual time series is considered.

This gap highlights the need for an updated examination using annual Philippine data from 1991 to 2024. The 1991–2024 period provides more than three decades of observations, allowing the relationship between government education spending and unemployment to be examined across different economic conditions, policy environments, and labor market developments. The longer observation period also provides a broader basis for assessing whether the relationship remains statistically evident across time rather than relying on a relatively short period of observations. Moreover, including data through 2024 incorporates the pandemic and post-pandemic period, which the earlier Philippine studies identified above did not cover. Therefore, annual data from 1991 to 2024 extend the existing Philippine evidence by combining a longer historical period with more recent labor market observations. Nevertheless, the analysis aims to identify statistical associations rather than establish that government education spending directly causes changes in unemployment, particularly because unemployment is also affected by other macroeconomic and structural conditions.

The research addresses four key objectives: (1) Analyze the relationship between government expenditure on education and unemployment rates in the Philippines; (2) Assess how government spending on education influences workforce skills and readiness for employment; (3) Examine trends in unemployment during the study period and identify potential links to education spending; and (4) Evaluate the effectiveness of education policies and programs in addressing unemployment and skills mismatch.

Anchored on Human Capital Theory, this study examines the relationship between government education spending and the unemployment rate in the Philippines from 1991 to 2024. Human Capital Theory provides a basis for understanding how investment in education may develop knowledge, skills, and competencies that influence individuals' participation in the labor market. By utilizing updated annual Philippine data over a longer time horizon, this study extends the existing Philippine evidence by incorporating observations through 2024 and examining the relationship across more than three decades of economic and labor market conditions. Rather than assuming that higher government education spending directly reduces unemployment, the study tests whether a statistically significant association exists between government education spending and the unemployment rate over the study period. The findings may provide additional evidence on the role and limitations of government education spending in relation to unemployment and contribute to discussions on education policy, human capital development, and sustainable employment in the Philippines.

## Methodology

### Research Design

The study employed a quantitative longitudinal time-series research design using secondary annual data from 1991 to 2024. This design provides a framework for statistically examining the relationship between government expenditure on education and the unemployment rate (Creswell, 2023). The analysis was framed to assess statistical associations rather than causal relationships, recognizing that multiple macroeconomic and labor-market factors influence unemployment outcomes. Thus, the study examines the statistical relationship between education expenditure and unemployment without attributing direct causal effects to education expenditure.

To operationalize this design, the study adopted a correlational approach to determine whether a statistically significant association exists between government expenditure on education and the unemployment rate in the Philippines. The relationship was estimated using the Ordinary Least Squares (OLS) regression model, an established econometric method for estimating linear relationships between variables. OLS was selected as an appropriate estimation method for examining the association between government education expenditure and unemployment, consistent with previous studies examining education expenditure and employment-related outcomes (Nuñez et al., 2024; Wang & Zhang, 2024).

### Research Instrument

The study used secondary data from the World Bank, covering 1991 to 2024. Data on government expenditure on education were obtained using the indicator "Government expenditure on education, total (% of GDP)" (SE.XPD.TOTL.GD.ZS), which measures general government expenditure on education including current expenditure, capital expenditure, and transfers as a percentage of GDP. Since the indicator is already expressed as a ratio to GDP, the nominal/real distinction is not applicable. Data on unemployment were obtained using the indicator "Unemployment, total (% of total labor force) (national estimate)" (SL.UEM.TOTL.NE.ZS), measured as the percentage of the total labor force. All annual observations from 1991 to 2024 were encoded and organized in Microsoft Excel to ensure consistency and accuracy before analysis.

### Data Gathering Procedure

The study used secondary annual data from 1991 to 2024. The study obtained data on government expenditure on education and the unemployment rate from the World Bank's World Development Indicators. During the initial data screening, we found four missing values in the government expenditure on education variable, specifically for the years 2010 to 2013. The World Bank database did not explain these gaps. We used the official observations for 2009 and 2014 as the basis for linear interpolation. This method was appropriate because the missing observations fell between two verified official data points, allowing intermediate annual values to be estimated without extrapolating beyond the observed data. I estimated the missing values for 2010 to 2013 in RStudio by proportionally distributing the difference between the 2009 and 2014 values across the missing years. The original government expenditure on education variable was retained, while the interpolated values were stored separately to distinguish estimated data from official observations. We conducted a sensitivity analysis by re-estimating the regression model without the four interpolated observations. The results remained consistent, indicating that the interpolation procedure did not affect the overall findings.

### Data Analysis Procedure

The study used simple linear regression, estimated using the Ordinary Least Squares (OLS) method, to examine

the effect of government expenditure on education (GEEM) on the unemployment rate in the Philippines. Data preparation began in Microsoft Excel, after which the dataset was imported into RStudio to handle missing values and maintain continuity in the time-series data. The compiled dataset of (34) observations, covering the years 1991 to 2024, was then imported into RStudio for statistical analysis. To assess whether interpolating the four missing GEEM observations materially affected the regression results, we conducted a sensitivity analysis. We compared the regression model using the interpolated observations with a model that excluded the 2010–2013 observations entirely. We compared the two models based on the direction and statistical significance of the GEEM coefficient, as well as the R-squared and adjusted R-squared values.

Before regression analysis, we estimated a basic OLS model using the raw data to check whether it met the key assumptions of the classical linear regression framework. To test the assumption of independent errors, we applied the Durbin-Watson and Breusch-Godfrey tests. The results showed a Durbin-Watson statistic of 0.38 ( $p < .001$ ) and a Breusch-Godfrey LM statistic of 21.25 ( $p < .001$ ), indicating positive autocorrelation in the residuals. Next, we tested for homoscedasticity. The Breusch-Pagan test (Table 1) shows a statistic of 11.36 ( $p = .001$ ), rejecting the assumption of constant variance, while the Goldfeld-Quandt test shows a statistic of 0.02 ( $p = 1.000$ ). The model also yielded a significant  $F$ -statistic of 100.60 ( $p < .001$ ).

**Table 1.** Initial Diagnostic Test Results

| Test                                    | $p$   | Interpretation |
|-----------------------------------------|-------|----------------|
| Durbin-Watson Test (Autocorrelation)    | <.001 | Fail           |
| Breusch-Godfrey Test (Autocorrelation)  | <.001 | Fail           |
| Breusch-Pagan Test (Homoscedasticity)   | .001  | Fail           |
| Goldfeld-Quandt Test (Homoscedasticity) | 1.000 | Pass           |

Despite these initial violations, we attempted to fix the model using data transformations. We first tried a logarithmic transformation, but the resulting log-linear model still failed the Durbin-Watson and Breusch-Pagan diagnostic tests. Consequently, I applied a Box-Cox transformation to stabilize residual variance and improve linearity. The Box-Cox model showed a strong overall fit, yielding a multiple  $R$ -squared of 0.76, an adjusted  $R$ -squared of .75, and a highly significant  $F$ -statistic of 100.6 ( $p < .001$ ).

**Table 2.** Sensitivity Analysis of Regression Results

| Statistic           | Observations | GEEM coefficient        | SE                     | t     | p      | R <sup>2</sup> | Adj R <sup>2</sup> | Residual Std. Error | F     |
|---------------------|--------------|-------------------------|------------------------|-------|--------|----------------|--------------------|---------------------|-------|
| Interpolated model  | 34           | $-7.08 \times 10^{-12}$ | $1.45 \times 10^{-12}$ | -4.88 | < .001 | .43            | .41                | 2.37                | 23.82 |
| Excluding 2010-2013 | 30           | $-7.19 \times 10^{-12}$ | $1.49 \times 10^{-12}$ | -4.84 | < .001 | .46            | .44                | 2.42                | 23.43 |

To determine whether interpolating the missing GEEM observations for 2010–2013 materially affected the regression results, we compared the model using the interpolated observations with a model that excluded these four years. As shown in Table 2, both models produced a negative and statistically significant GEEM coefficient. The interpolated model yielded a coefficient of  $-7.08 \times 10^{-12}$  ( $p < .001$ ), while the model excluding 2010–2013 yielded  $-7.19 \times 10^{-12}$  ( $p < .001$ ). Although the  $R$ -squared increased slightly from .427 to .456 when the interpolated observations were excluded, the direction and statistical significance of the GEEM coefficient remained unchanged. These results indicate that handling the four missing observations did not materially alter the study's results.

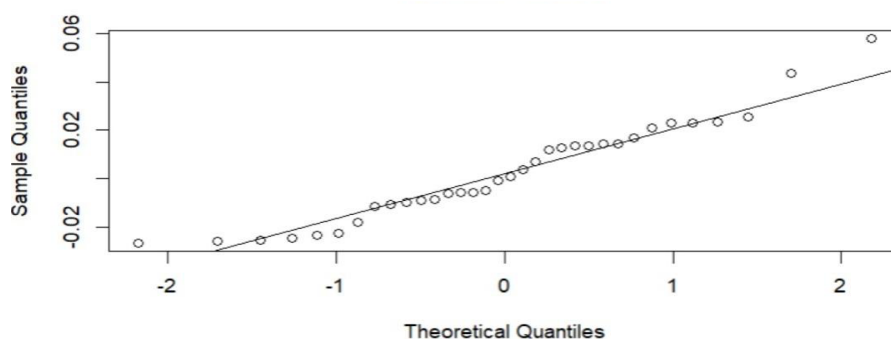
Table 3 presents the results of the final diagnostic tests conducted to validate the model assumptions after applying all corrective transformations.

**Table 3.** Final Diagnostic Test Results

| Test                                    | $p$  | Interpretation |
|-----------------------------------------|------|----------------|
| Durbin-Watson Test (Autocorrelation)    | .291 | Pass           |
| Breusch-Godfrey Test (Autocorrelation)  | .335 | Pass           |
| Breusch-Pagan Test (Homoscedasticity)   | .235 | Pass           |
| Goldfeld-Quandt Test (Homoscedasticity) | .368 | Pass           |
| Jarque-Bera Test (Unemployment Rate)    | .054 | Pass           |
| Jarque-Bera Test (GEEM)                 | .048 | Pass           |
| Jarque-Bera Test (Model Residuals)      | .229 | Pass           |

All final diagnostic tests indicate that the transformed model successfully meets the classical linear regression assumptions. As shown in Table 3, the final diagnostic tests indicate that the corrective procedures improved the model's compliance with the assumptions of homoscedasticity and independent errors. The Breusch-Pagan test ( $p = .235$ ) and Goldfeld-Quandt test ( $p = .368$ ) both failed to reject the null hypothesis of homoscedasticity. Because serial correlation persisted after the Box-Cox transformation, the Cochrane-Orcutt estimation method was used to correct the first-order autoregressive AR (1) error structure (Subhi & Al Azkiya, 2022). Post-transformation diagnostics in Table 1 confirm that this procedure successfully eliminated the serial correlation. The corrected model shows that the Durbin-Watson statistic rose to an optimal 1.87 ( $p = .291$ ) and the Breusch-Godfrey test dropped to 2.19 ( $p = .335$ ), confirming that the final error terms are independent.

Furthermore, the model's normality was verified. The Jarque-Bera test on the final residuals yielded a statistic of 2.95 and a non-significant  $p$ -value of .229, indicating that the error terms do not significantly deviate from normality. A Quantile-Quantile (Q-Q) plot visually supported this. Figure 1 compares the empirical distribution of the model's residuals against a theoretical normal distribution line. The close alignment of the data points along the diagonal reference line indicates that the error terms are normally distributed, satisfying the OLS normality assumption necessary for valid hypothesis testing. Minor deviations at the tails represent isolated outliers from the year 2000.



**Figure 1.** Normal Q-Q Plot of Final Regression Residuals

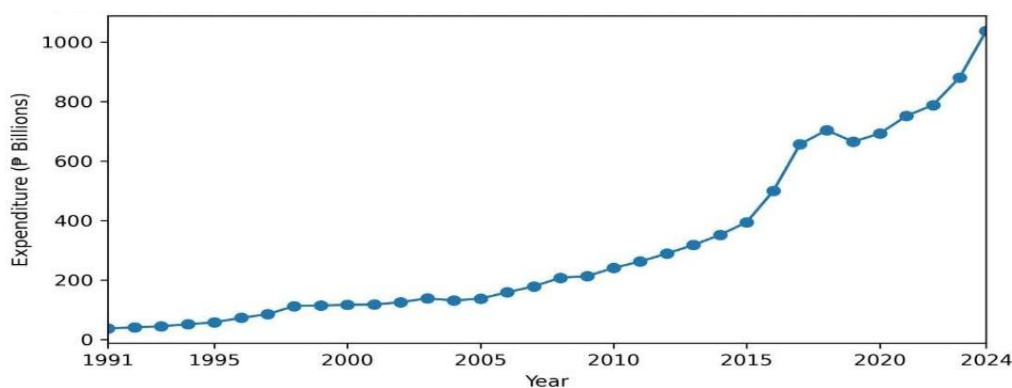
All statistical analyses were conducted at a 5 percent level of significance. The final regression model successfully satisfies all necessary OLS assumptions, ensuring that the estimated coefficients,  $t$ -statistics, and  $p$ -values are valid, efficient, and reliable for interpreting the relationship between government education spending and unemployment in the Philippines.

## Results and Discussion

### Trends in Government Expenditure on Education in the Philippines

Figure 2 presents the trend in Government Expenditure on Education (GEE) in the Philippines from 1991 to 2024. The results show a substantial increase in education spending over the study period, rising from approximately ₱37.9 billion in 1991 to more than ₱1 trillion in 2024. Growth was relatively gradual during the 1990s and early 2000s but accelerated after 2010, coinciding with educational reforms and increased government prioritization of the sector. Although expenditure declined slightly in 2019 and 2020 due to budgetary adjustments and the effects of the COVID-19 pandemic, it rebounded in subsequent years and reached record-high levels in 2023 and 2024.

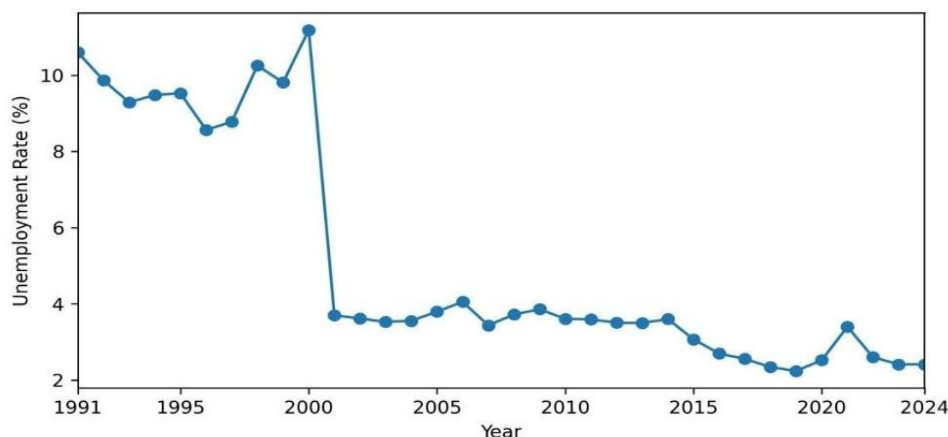
The upward trend suggests the Philippine government's sustained commitment to investing in education. The acceleration in spending after 2010 reflects growing recognition of education as a key component of national development and human capital formation. While temporary declines occurred during periods of economic and fiscal disruption, the subsequent recovery indicates continued policy support for the education sector despite external challenges. These findings are consistent with the view that educational investment remains a key policy priority for long-term socioeconomic development.



**Figure 2.** Trends in Government Expenditure on Education in the Philippines from 1991 to 2024

### Trends in the Unemployment Rate in the Philippines

Figure 3 illustrates the trend in the Unemployment Rate (UR) in the Philippines from 1991 to 2024.



**Figure 3.** Trends in Government Expenditure on Education in the Philippines from 1991 to 2024

The results indicate that unemployment remained relatively high during the 1990s and peaked at 11.19% in 2000, a period associated with the lingering effects of the Asian Financial Crisis. Thereafter, unemployment generally declined throughout the 2000s and 2010s, reaching a record low of 2.24% in 2019. However, the COVID-19 pandemic temporarily disrupted this trend, pushing the unemployment rate up to 3.40% in 2021. Following the pandemic, unemployment stabilized at approximately 2.41% in both 2023 and 2024. These fluctuations show unemployment's sensitivity to major economic events and external shocks. Despite temporary increases during crises, the overall downward trend suggests improving labor market conditions over time. The post-pandemic stabilization further indicates the gradual recovery of employment opportunities and economic activity in the country. The findings highlight the importance of considering broader economic conditions when examining labor market outcomes.

### Impact of GEE on Unemployment Rate in the Philippines

Table 4 shows the effect of GEE on the unemployment rate in the Philippines.

**Table 4.** Impact of GEE on Unemployment Rate in the Philippines

| Variable                            | Coefficient | Standard Error | t      | p     | CI  | R <sup>2</sup> | Adjusted R <sup>2</sup> | F     | df | n  |
|-------------------------------------|-------------|----------------|--------|-------|-----|----------------|-------------------------|-------|----|----|
| Government Expenditure on Education | -1.22e-15   | 1.22e-16       | -10.30 | <.001 | 95% | 0.76           | 0.75                    | 100.6 | 32 | 34 |

The negative coefficient suggests that higher government expenditure on education was associated with lower unemployment rates. The model yielded an R-squared value of 0.76, indicating that approximately 76% of the variation in the unemployment rate was statistically associated with variation in government expenditure on

education within the sample period. However, interpret this value cautiously because the model includes only one explanatory variable and is based on time-series observations. Other economic, demographic, institutional, and labor market factors not included in the model may also contribute to variations in unemployment.

Therefore, the findings indicate a statistically significant association between government expenditure on education and the unemployment rate rather than establishing a direct causal relationship. While the results are broadly consistent with Human Capital Theory, which suggests that investments in education improve skills, productivity, and employability, the present analysis does not show that changes in education expenditure directly cause changes in unemployment. The diagnostic tests, including the Durbin–Watson, Breusch–Godfrey, and Jarque–Bera tests, supported the regression model's adequacy and indicated no major violations of the underlying assumptions. The results suggest that government expenditure on education is an important factor associated with unemployment trends in the Philippines. Nevertheless, future research should incorporate additional explanatory variables and more advanced econometric approaches to provide a more comprehensive assessment of the determinants of unemployment.

## Conclusion

Government expenditure on education shows a significant inverse association with unemployment in the Philippines during the 1991–2024 study period. Specifically, higher government education expenditure is statistically associated with lower unemployment rates. This finding is consistent with Human Capital Theory, which views education as an investment that can improve individuals' skills, productivity, and employability. The results therefore suggest that education expenditure may be relevant to labor-market outcomes and human capital development. However, the observed relationship should be interpreted as a statistical association rather than evidence that higher government education expenditure directly reduces unemployment.

The findings should also be interpreted in light of the study's limitations. The analysis uses a single-predictor model, which does not account for other factors that may influence unemployment, such as economic growth, inflation, job demand, and other labor-market conditions. The time-series data also cover a long period during which economic conditions, policies, and labor-market conditions may have changed. In addition, education expenditure data for 2010–2013 were unavailable and were estimated through linear interpolation using adjacent official observations. To assess whether these interpolated observations materially affected the results, we re-estimated the regression after excluding the 2010–2013 observations. The results remained consistent in direction and statistical significance, with the education expenditure coefficient remaining negative and statistically significant, suggesting that including the interpolated observations did not substantially alter the main inverse association.

Overall, the study finds a significant inverse association between government education expenditure and unemployment in the Philippines over the period examined. While the results provide empirical evidence consistent with the potential relevance of education spending to human capital and labor-market outcomes, the single-predictor specification, possible omitted variables, time-series limitations, and interpolated observations prevent the study from establishing causality. Future research may incorporate additional economic and labor-market variables and apply alternative time-series or econometric methods to provide a more comprehensive assessment of the factors associated with unemployment in the Philippines.

## Contributions of Authors

**Author 1:** conceptualization, project leadership, data analysis, statistical treatment, manuscript review

**Author 2:** results and discussion, manuscript review

**Author 3:** conclusion and recommendations, data analysis

**Author 4:** data gathering, data analysis, research instrument development

**Author 5:** data gathering, data analysis

**Author 6:** conceptualization, data gathering

**Author 7:** research supervision, research guidance, manuscript review

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## Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this research.

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