

IMPACT OF MINIMUM WAGE INCREASES ON EMPLOYMENT RATES USING SAS PANEL DATA REGRESSION

1. Overview

Client:

A U.S.-based economic research institute advising state governments on labor market policy

Objective:

To quantify how changes in minimum wage levels affect employment rates using fixed-effects panel data regression in SAS. The model aimed to isolate policy effects from state-level fixed characteristics and time trends.

2. Background

Minimum wage policy is a contentious topic. Policymakers need empirical evidence to balance worker welfare against potential job losses. The client required a rigorous econometric approach to assess employment responses to wage hikes, using longitudinal data from all 50 U.S. states.

3. Data Summary

Panel Data:

Balanced panel covering 50 states over 11 years (2010–2020)

Variables Used:

Variable	Type	Description
Employment_Rate (%)	Continuous	State-level employment rate (15–64 age group)
Min_Wage (USD/hour)	Continuous	State-mandated minimum wage
GDP_per_Capita (USD)	Continuous	Controls for economic output
Unionization_Rate (%)	Continuous	Share of workforce unionized
Education_Attainment (%)	Continuous	Adults with college degree
Year	Categorical	Time fixed effects

State	Categorical	State fixed effects
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4. Methodology

Software Used:

SAS 9.4 (with PROC PANEL for fixed-effects modeling)

SAS Workflow:

1. Data Preparation:

- Imported .csv into SAS using PROC IMPORT
- Used PROC SORT and BY State Year to structure panel
- Created dummy variables for year fixed effects

2. Descriptive Analysis:

- PROC MEANS, PROC CORR for trend review and correlation checks
- Graphed employment rate and minimum wage trends by region

3. Econometric Modeling:

- PROC PANEL with fixed-effects model:
- proc panel data=employment_data;
- id State Year;
- model Employment_Rate = Min_Wage GDP_per_Capita Unionization_Rate Education_Attainment / fixone;
- run;
- Checked model diagnostics (R^2 , Durbin–Watson, Hausman specification)

5. Key Results

Variable	Coefficient	p-value	Interpretation
Min_Wage	−0.28	0.017	\$1 increase in minimum wage → 0.28% decrease in employment
GDP_per_Capita	+0.015	0.004	Economic growth improves employment

Unionization_Rate	−0.09	0.083	Weak negative association (not statistically significant)
Education_Attainment	+0.21	<0.001	More educated states have higher employment levels

Model Fit:

- Within $R^2 = 0.62$
- Hausman test ($\chi^2 = 27.4$, $p < 0.01$) → fixed-effects model appropriate
- No significant serial correlation (Durbin–Watson ≈ 2.1)

6. Visual Outputs (from SAS):

- Line chart comparing employment rate trends before and after wage hikes
- Coefficient plot with 95% confidence intervals
- Heat map of marginal employment impact by state
- Residuals vs. fitted values plot to validate linearity assumption

7. Deliverables

- .sas program with macro-enabled panel modeling
- Technical report (20 pages), including:
 - Theoretical rationale for fixed-effects approach
 - Full regression output and coefficient interpretation
 - Sensitivity tests and robustness checks
 - Policy implications and state-by-state summaries
- Policy briefing (3 slides) for state labor departments:
 - Overview of model results
 - Predicted employment effects by wage policy scenario
 - Strategic guidance for wage setting and exception planning

8. Application & Outcome

- Adopted by three state governments for minimum wage impact review
- Used by the client to support testimony at state labor hearings
- Model framework replicated by client's internal research team for annual updates

9. Strategic Value Delivered

- Delivered a **rigorous, data-driven assessment of policy trade-offs**
- Enabled state policymakers to **simulate employment impacts under different wage scenarios**
- Created a **reusable panel model architecture** in SAS for ongoing analysis