The Association Between the Kaitz Index and Employment in Puerto Rico

Alejandro M. Ouslan
University of Puerto Rico, Mayaguez
alejandro.ouslan@upr.edu

May 14, 2025

Abstract

This study examines the relationship between the Kaitz Index and employment levels in Puerto Rico using panel data at the postal code level. The data covers the period from Q1 2012 to Q4 2023. A Spatial Durbin Model with fixed effects is applied to investigate both the direct effect of the Kaitz Index on employment and potential spatial effects from adjacent regions. The findings largely support existing literature suggesting a negative relationship between the minimum wage and employment. Additionally, despite some convergence issues with the MCMC of the Kaitz variable, the confidence interval indicates a negative spillover effect on neighboring regions' employment levels.

1 Introduction

The minimum wage and its impact on employment are among the most debated topics in labor economics, especially in regions with unique economic structures like Puerto Rico. Numerous studies have attempted to analyze this relationship, yielding diverse results. For example, a meta-analysis by Stanley (2009) [6] and Card & Krueger (1994) [3] concluded that there is no significant effect on employment, while the Federal Reserve's 2012 *Competitiveness of the Puerto Rican Economy* (2012) [9] report emphasized the need for policies that focus on employment creation and suggested a submininum wage for young workers under 25. Locally, Hernández (2017) found a reduction in total employment following minimum wage increases, while Hernández & Wu (2025) identified differential responses by local versus foreign-owned businesses. However, the spatial dynamics of the minimum wage—how wage conditions in one region may affect neighboring areas—remain underexplored. This paper seeks to fill that gap by analyzing the relationship between the Kaitz Index [10] and employment using spatial econometrics.

2 Literature Review

Castillo (1983) [4] notes that Puerto Rican emigrants to the U.S. often migrate due to unemployment, a condition linked to minimum wage policies. Freeman (1992) [5] found that the imposition of the U.S. minimum wage in Puerto Rico led to an 8%–10% reduction in employment. Brown (1988) [1] noted that the U.S. minimum wage altered the earnings distribution in Puerto Rico, creating sharp peaks. Krueger (1994) [3] found a negative relationship between minimum wages and employment using aggregate time series data. In contrast, Caraballo-Cueto (2016) [2] observed a slight positive effect of minimum wages on employment in the short run. Finally, Neumark (2000) [8] found that higher minimum wages are associated with higher unemployment rates across U.S. regions. These studies highlight the complexity of the minimum wage-employment relationship, with results varying by geography, time, and methodology.

3 Methodology

The minimum wage data used in this study comes from the FRED database, while employment and average wage data are sourced from the Quarterly Census of Employment and Wages (QCEW) provided by the Department of Labor. The dataset consists of 6,240 observations spanning Q1 2012 to Q4 2023, organized by postal codes in Puerto Rico. Additional data on economic characteristics of the zip codes were obtained from the American Community Survey.

This study employs a Spatial Durbin Model (SDM) [7] with fixed effects to account for spatial dependence between regions. The model allows for the estimation of both direct and indirect effects. The Kaitz Index is defined as:

$$K_{it} = \frac{m_t}{\bar{w}_{it}}$$

where:

- K_{it} is the Kaitz Index in zip code i at time t,
- m_t is the minimum wage at time t,
- $\bar{w}_{it}$ is the average wage in zip code i during time t.

The full Spatial Durbin Model is:

$$Y_{it} = \alpha + \beta_1 X_{it} + \rho W Y_{it} + \gamma W X_{it} + \epsilon_{it}$$

where:

- Y_{it} is employment in zip code i at time t,
- X_{it} includes the Kaitz Index (K), the minimum wage (M), and the average wage (W),
- W is the spatial weights matrix reflecting adjacency between regions,

- ρ is the spatial autoregressive parameter capturing spatial dependence,
- ϵ_{it} is the error term.

4 Results

The results indicate a negative and statistically significant relationship between the Kaitz Index and employment in Puerto Rico. Additionally, the spillover effects of the Kaitz Index on neighboring regions' employment levels are negative. However, convergence issues with the MCMC method for the Kaitz variable make it difficult to quantify the precise magnitude of the spillover effects. A small but significant effect of households with children under 6 years old on employment was also observed.

5 Conclusion

This study found a negative and statistically significant relationship between the Kaitz Index and employment in Puerto Rico's ZIP codes, suggesting that higher minimum wages relative to the average wage may reduce employment levels. The spatial econometric approach used here also highlights spillover effects, indicating that wage policies in one area can influence neighboring regions. Future research should explore lagged spatial effects to evaluate whether the historical characteristics of neighboring regions significantly influence current employment trends.

References

[1] Charles Brown. "Minimum wage laws: Are they overrated?" In: *Journal of Economic Perspectives* 2.3 (1988), pp. 133–145.

[2] Jose Caraballo-Cueto. "Is there a minimum wage biting in Puerto Rico? Updating the debate". In: *Industrial Relations Journal* 47.5-6 (2016), pp. 513–529.

[3] David Card, Lawrence F Katz, and Alan B Krueger. "Comment on David Neumark and William Wascher,"Employment effects of minimum and subminimum wages: Panel data on state minimum wage laws"". In: *ILR Review* 47.3 (1994), pp. 487–497.

[4] Alida Josefina Castillo. "Jobless in the sun: a study of the impact of the Federal minimum wage on employment in Puerto Rico". PhD thesis. Harvard University, 1983.

[5] Alida Castillo-Freeman and Richard B Freeman. "When the minimum wage really bites: the effect of the US-level minimum on Puerto Rico". In: *Immigration and the work force: Economic consequences for the United States and source areas*. University of Chicago Press, 1992, pp. 177–212.

[6] Hristos Doucouliagos and Tom D Stanley. "Publication selection bias in minimum-wage research? A meta-regression analysis". In: *British Journal of Industrial Relations* 47.2 (2009), pp. 406–428.

[7] Lung-fei Lee and Jihai Yu. "Identification of spatial Durbin panel models". In: *Journal of Applied Econometrics* 31.1 (2016), pp. 133–162.

[8] David Neumark and William Wascher. "Minimum wages and employment: A case study of the fast-food industry in New Jersey and Pennsylvania: Comment". In: *American Economic Review* 90.5 (2000), pp. 1362–1396.

[9] Yvette Torres. "La Competitividad de la Economía Puertorriqueña: Cómo Reducir el Costo de la Actividad Comercial y Aumentar las Oportunidades en el Mercado Laboral". In: (2012).

[10] Nicolas Williams and Jeffrey A Mills. "Minimum wage effects by gender". In: *Journal of Labor Research* 19.2 (1998), pp. 397–414.

Appendix A: Supplementary Tables

Variables	**Mean**	**Standard Deviation**
Kaitz Index	0.72	0.21
Total Employment	1520.36	26.44
Own Car	3800.25	5377.21
Has children under 6	1520.36	1178.04
Has children between 6-17	3800.25	2879.77
Households under the SNAP	3741.17	2515.99
People with Social Security Disability	41.36	42.86

Table A1: Descriptive Statistics for Main Variables

Variable	**Mean**	**3% CI (Lower)**	**3% CI (Upper)**
Kaitz Index	-10.063	-13.387	-6.745
Spatial Kaitz Index	-1.122	-1.406	-0.844
Own Car	0.000	-0.001	0.000
Has children under 6	0.006	0.004	0.007
Has children between 6-17	0.000	-0.001	0.001
Households under SNAP	0.000	-0.001	0.000
Social Security Disability	0.002	-0.012	0.008
Spatial Employment	-0.001	0.000	0.001

Table A2: Regression Results: Parameter Estimates and Confidence Intervals

Variable	R-Squared
Kaitz Index	1.04
Spatial Kaitz Index	1.23
Own Car	1.03
Has children under 6	1.01
Has children between 6-17	1.01
Households under SNAP	1.04
Social Security Disability	1.00
Spatial Employment	1.22

Table A3: R-Squared for Individual Variables

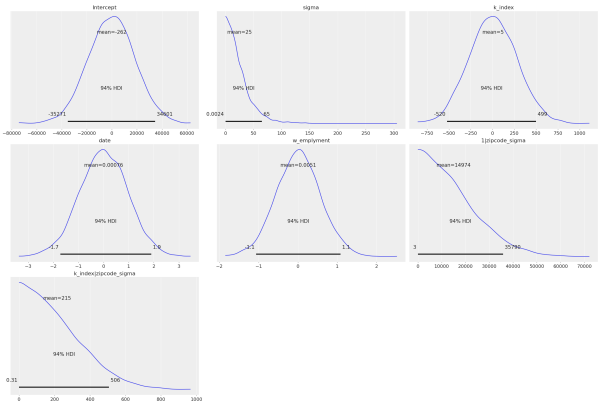

Figure 1: Non-informative Priori used

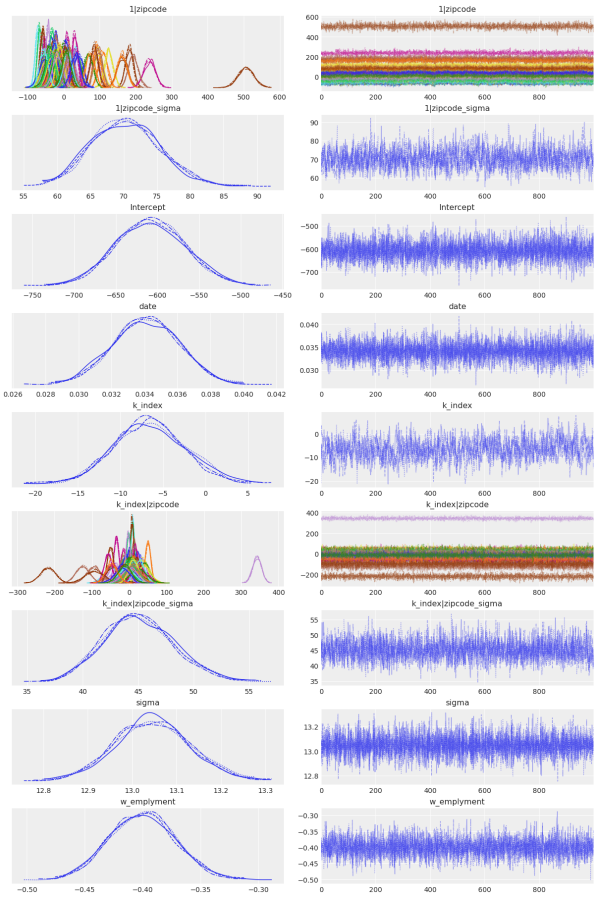

Figure 2: Summary of Regression Results