

Does an Increasing Minimum Wage Reduce Formal Sector Employment? Evidence from Brazil*

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Motivation

- ▶ Labor markets in Latin America are characterized by broad regulations (Heckman et al. 2000).
 - ▶ Minimum wages are a common feature in the region (Maloney et al., 2003).
 - ▶ Large informal sector may shape the employment effects of formal sector minimum wages.

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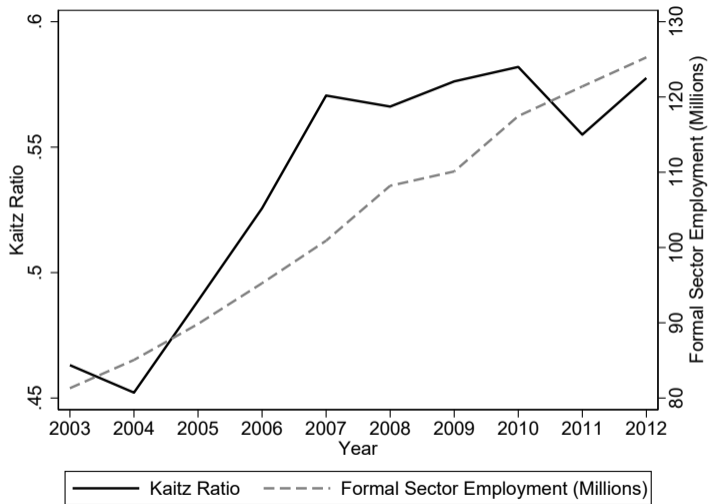
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 - ▶ Large informal sector may shape the employment effects of formal sector minimum wages.

This Paper

We examine the impacts of the minimum wage on formal sector employment in Brazil.

- ▶ Between 2003 and 2012, Brazil's real national minimum wage grew by 62 percent.
- ▶ The Kaitz index (MW/median wage ratio) grew from 45% in 2003 to 58% in 2012.

Kaitz Index and Formal Sector Employment: 2003-2012



Setting

- ▶ We leverage variation in the incidence of the minimum wage across states to study its impacts on formal sector employment.
 - ▶ Matched employee-employer data (RAIS) on formal sector workers and firms in Brazil.
 - ▶ We also exploit variation in the incidence of the minimum wage at the microregion level.

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- ▶ Across these two levels of variation, an increase in the MW is associated with employment elasticities that are not different from zero.
- ▶ We study how the minimum wage affects outcomes for high school dropouts.
 - ▶ We find negative employment elasticities that are not statistically significant.

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 - ▶ However, wage floors do not drive significant disemployment effects.
- ▶ Paper contributes to literature on impacts of minimum wages on employment.
 1. **In Brazil** (Fajnzylber, 2001; Camargo et al., 2001; Lemos, 2004; Neumark et al., 2006; Lemos, 2009a,b; Broecke and Vandeweyer, 2016; Jales, 2018).
 2. **In Latin America** (Arango and Pachón, 2004; Khamis, 2013; Maurizio and Vazquez, 2016).
 3. **Work exploiting within-country variation in minimum wage policies in developing countries** (Gindling and Terrell 2007, 2009, 2010; Alaniz et al. 2011; Ham 2018; Wong 2019).

Outline

1. Institutional Background
2. Data Sources and Empirical Strategy
3. Main Results: National Minimum Wage
4. Main Results: Regional Wage Floors
5. Conclusion

National Minimum Wage

- ▶ The national minimum wage covers all formal sector workers in Brazil.
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- ▶ In 2003-2012, the real minimum wage grew by 62%, reaching a value of 622 Reais.
- ▶ We assess the incidence of the minimum wage through the Kaitz ratio, defined as:
 1. The ratio of the minimum wage to the median wage.
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- ▶ We assess the incidence of the minimum wage through the Kaitz ratio, defined as:
 1. The ratio of the minimum wage to the median wage.
 2. The ratio of the minimum wage to the average wage.
- ▶ Only 4-6% of formal sector workers earned ~ the minimum wage (Engbom and Moser 2023).
 - ▶ Limited direct incidence of the minimum wage on formal sector workers.

Regional Wage Floors

- ▶ In 2000, new law allowed states to introduce wage floors above the national MW.
 - ▶ Wage floors can apply selectively to certain occupations and industries.
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- ▶ The occupations and industries covered by wage floors vary significantly across states.
 - ▶ Rio de Janeiro defines the wage floor by occupational categories, yet the wage floor in Rio Grande do Sul is at the industry level.

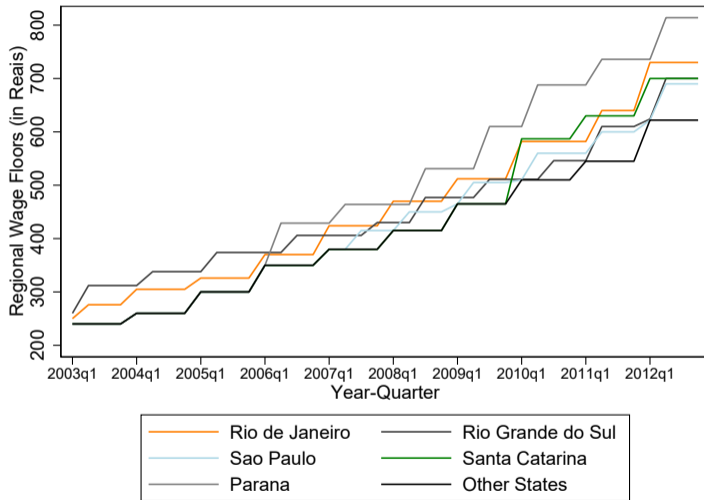
Regional Wage Floors

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- ▶ The occupations and industries covered by wage floors vary significantly across states.
 - ▶ Rio de Janeiro defines the wage floor by occupational categories, yet the wage floor in Rio Grande do Sul is at the industry level.
- ▶ *All* wage floors include explicit provisions for the restaurant-accommodation industry.
 - ▶ We create a state-level wage floor variable that tracks relevant floor for workers employed in this industry.

▶ Rio Grande do Sul

▶ Rio de Janeiro

Regional Wage Floors: 2003-2012



Data Sources

- ▶ We use matched employee-employer data from RAIS across 2003-2012, covering all formal sector employment in Brazil.
 - ▶ We observe employment outcomes across industries and various geographic levels in Brazil.
 - ▶ Using detailed geographic information, we construct employment measures at the microregion-level – 558 microregions comprise local labor markets in Brazil..

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- ▶ We observe the start/end month for each job and detailed earnings outcomes.
 - ▶ We observe workers' characteristics: age, gender, educational attainment and occupation.
- ▶ Use data on microregion-level population, population density and GDP per capita.
 - ▶ We also construct microregion-level exposure to the Brazil's commodity boom.

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Empirical Strategy

- ▶ The national MW does not vary within the country, yet there is variation in its binding nature across Brazil.

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- ▶ We leverage over-time changes in state-level Kaitz ratios to study the impacts of the MW on employment outcomes in:

$$y_{st} = \alpha + \sum_{k=1}^K \gamma_k [\ln(kaitz_{st})]^k + \alpha_1 X_{st} + \lambda_t + \sum_{s=0}^P \theta_s t + \varepsilon_{st}, \quad (1)$$

- ▶ y_{st} state-level annual employment outcomes.
- ▶ $kaitz_{st}$ is the Kaitz index. We include polynomials of order K .
- ▶ X_{st} : labor supply shifters and macroeconomic conditions (state-level real GDP).
- ▶ θ_s : state fixed effects ($s = 0$) and linear time trends ($s = 1$).

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- ▶ We also estimate equation (1) at the microregion-level, leveraging variation in the Kaitz ratio both within and across states.

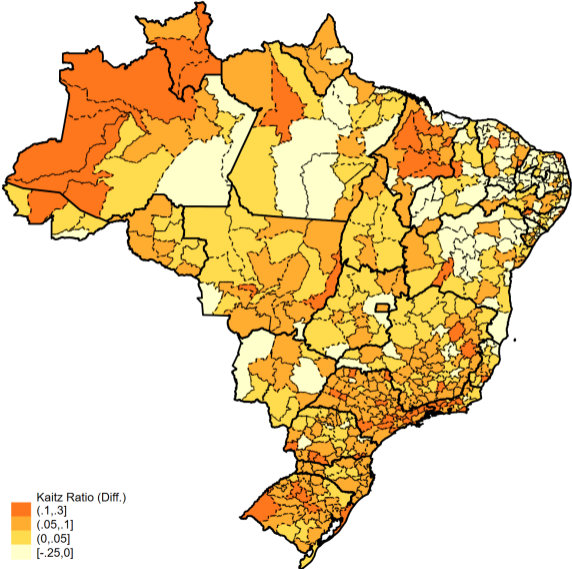
Employment Impact of State-Level Minimum Wage Incidence

| | State-Level Formal Employment | | | |
|-------------------------|-------------------------------|-------------------|-------------------|-------------------|
| | (1) | (2) | (3) | (4) |
| Kaitz Ratio | -0.257 (0.232) | -0.293 (0.272) | -0.015 (0.165) | -0.016 (0.192) |
| Real GDP | -0.006 (0.010) | -0.008 (0.009) | -0.008 (0.010) | -0.008 (0.010) |
| Population (15-59) | -0.162 (1.443) | 0.027 (1.400) | -0.006 (1.443) | -0.000 (1.450) |
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Change in Kaitz Index by Microregion: 2003-2012



Employment Impact of Microregion-Level Minimum Wage Incidence

| | Microregion-Level Formal Employment | | | |
|-------------------------|-------------------------------------|---------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| Kaitz Ratio | -0.044 (0.267) | -0.005 (0.270) | 0.021 (0.096) | 0.058 (0.121) |
| Real GDP | -0.036** (0.016) | -0.048** (0.019) | -0.037** (0.016) | -0.037** (0.018) |
| Population (15-59) | 3.994 (3.780) | 3.200 (4.113) | 3.480 (2.654) | 2.773 (3.003) |
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Employment Impact for Affected Groups

| | Less than HS Graduate | | | |
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| | (1) | (2) | (3) | (4) |
| Kaitz Ratio | -0.153 (0.257) | -0.117 (0.257) | 0.005 (0.092) | -0.010 (0.114) |
| Real GDP | -0.024 (0.018) | -0.034* (0.020) | -0.024 (0.019) | -0.024 (0.020) |
| Population (15-59) | 1.575 (4.184) | 0.850 (4.522) | 0.286 (3.208) | 0.566 (3.556) |
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- ▶ We first leverage variation in the wage floors across microregions over time:

$$y_{mt} = \beta_0 + \beta_1 \ln(\text{floor}_{st}) + \beta_2 X_{mt} + \lambda_t + \sum_{=0}^P \gamma_m t + \varepsilon_{mt} \quad (2)$$

- ▶ y_{mt} microregion-level employment outcomes.
- ▶ floor_{st} captures the binding floor for employment in this sector in year-quarter t .
- ▶ X_{mt} : labor supply shifters and macroeconomic conditions (state-level real GDP).
- ▶ ${}_m t^P$: microregion fixed effects and microregion-level time trends.

Estimated Impacts of Regional Wage Floors

| | W_{p10} (1) | W_{p25} (2) | W_{p50} (3) | Employment (4) |
|--------------------|---------------------|--------------------|-------------------|--------------------|
| MW | 0.176*** (0.030) | 0.135** (0.058) | 0.088 (0.062) | -0.073 (0.116) |
| Real GDP | -0.024* (0.014) | 0.003 (0.011) | 0.025 (0.019) | 0.094** (0.045) |
| Population (15-59) | -0.283 (0.231) | -0.209 (0.161) | -0.057 (0.188) | 0.931** (0.396) |
| Observations | 21120 | 21120 | 21120 | 21120 |

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 - ▶ 89 microregions in our sample belong to 138 unique cross-state border pairs.

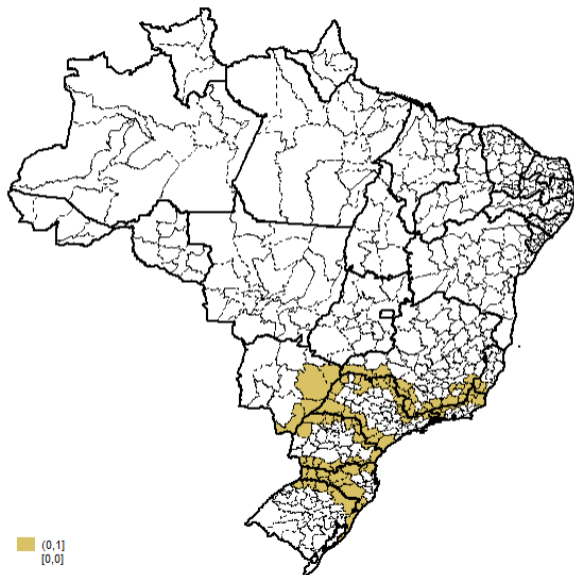
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- ▶ Cross-state sample includes 89 regions in the Southeastern part of Brazil.
 - ▶ 89 microregions in our sample belong to 138 unique cross-state border pairs.
- ▶ Estimating equation:

$$y_{mpt} = \alpha_0 + \alpha_1 \ln(\text{floor}_{st}) + \alpha_2 X_{mt} + \gamma_m + \tau_{pt} + \varepsilon_{mpt} \quad (3)$$

- ▶ y_{mpt} : outcome in microregion m in to border-pair p in year-quarter t .
- ▶ γ_m : microregion fixed effect.
- ▶ τ_{pt} : pair-year-quarter fixed effects, absorb regional economic shocks in each pair.

Microregions in Cross-Border Pair Sample



Mean Absolute Differences in Covariates between Microregions

| | Non-Contiguous Pair (1) | Contiguous Pair (2) | Gap (3) | Percentage Gap (4) |
|-------------------------------------|----------------------------|------------------------|------------------------|-----------------------|
| Formal Sector Employment | 69,520 (2,936.8)*** | 41,160 (4,296)*** | 28,360 (3,514.6)*** | 40.8 |
| Median Monthly Salary (Reais), 2003 | 117.5 (3.82)*** | 83.7 (7.02)*** | 33.9 (6.30)*** | 28.8 |
| Average Monthly Salary (Reais) | 227 (7.26)*** | 156 (13.10)*** | 71 (10.54)*** | 31.3 |
| GDP per Capita, 2003 | 6.51 (0.65)*** | 4.92 (0.86)*** | 1.59 (0.51)*** | 24.5 |
| Population, 2003 | 285,066 (11,197)*** | 185,546 (19,277)*** | 99,520 (15,262)*** | 34.9 |
| Population (15-59), 2003 | 186,915 (7,693)*** | 121,889 (12,771)*** | 65,026 (10,134)*** | 34.8 |
| Population Density, 2003 | 96.97 (3.171)*** | 30.35 (4.78)*** | 66.6 (3.74)*** | 68.7 |

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Estimated Impacts of Regional Wage Floors: CBCP Design

| | W_{p10} (1) | W_{p25} (2) | W_{p50} (3) | Employment (4) |
|--------------------|-------------------|------------------|-------------------|---------------------|
| MW | 0.187* (0.088) | 0.134 (0.103) | 0.133 (0.088) | 0.029 (0.087) |
| Real GDP | -0.007 (0.017) | 0.000 (0.025) | -0.022 (0.024) | -0.043 (0.028) |
| Population (15-59) | 0.501 (0.272) | 0.495 (0.313) | 0.757* (0.322) | 1.381*** (0.363) |
| Observations | 5,520 | 5,520 | 5,520 | 5,520 |

► Matching Design

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Spillover Effects

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 - ▶ Implementation of high floors in one state may lead workers in contiguous state to migrate
→ mute potential disemployment impacts.
- ▶ We compare the effects on border regions to those in the interior of each state in:

$$(y_{mpt} - \overline{y_{st}}) = \alpha_0 + \alpha_1 \ln(\text{floor}_{st}) + \alpha_2 (X_{mt} - \overline{X_{st}}) + \gamma_m + \tau_{pt} + \varepsilon_{mpt} \quad (4)$$

- ▶ $\overline{y_{st}}$: average outcome of restaurant workers in the interior microregions of state s.

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Table: Cross-Border Microregion Pair Design: Spillover Test

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|--------------------|-------------------|-------------------|-------------------|-------------------|
| MW | 0.084 (0.058) | 0.040 (0.038) | 0.051 (0.085) | -0.010 (0.099) |
| Real GDP | 0.010 (0.018) | 0.019 (0.022) | -0.026 (0.018) | -0.036 (0.054) |
| Population (15-59) | -0.185 (0.273) | -0.271 (0.297) | 0.728 (0.387) | 0.823* (0.411) |
| Observations | 5520 | 5520 | 5520 | 5520 |

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Conclusion

- ▶ Minimum wage increased significantly in most Latin American countries during the economic expansion of the early 2000s.
 - ▶ Brazil's minimum wage almost doubled in this time period.
- ▶ This paper has studied whether the minimum wage or regional wage floors resulted in negative formal sector employment outcomes.
 - ▶ We have failed to find significant disemployment effects for either minimum wage.
- ▶ Evidence may suggest existence of non-competitive labor markets in Brazil's formal sector (Manning, 2003; Giuliano, 2013; Azar et al., 2019)..
- ▶ Further evidence is needed on the impacts of the minimum wage during periods of lower economic growth.

Wage Floors: Rio Grande do Sul

Rio Grande do Sul (2003-2012)

| | |
|-----------|---|
| Floor I | Workers employed in agriculture, extractive industries, fishing, domestic services, accommodation, construction, music, equestrian establishments and messengers. |
| Floor II | Workers employed in the following industries: clothing and footwear, spinning and weaving, leather goods, cardboard, newspaper, health services. |
| Floor III | Workers employed in the following industries: furniture, chemical and pharmaceutical, film, food, commerce. |
| Floor IV | Workers employed in the following industries: mechanical, metallurgical, glass, porcelain, residential buildings, jewelry and gemstone cutting and school administrators. |

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Wage Floors: Rio de Janeiro

Rio de Janeiro (2003-2007)

| | |
|-----------|--|
| Floor I | Agricultural and forestry workers |
| Floor II | Domestic employees, maintenance service workers, commercial companies, messengers, general assistants, unskilled commerce workers and barboys. |
| Floor III | Mail service workers, cooks, busboys, servers, cashiers, dishwashers, barbers, hairdressers, machine operators, agricultural and forest workers, woodworkers, food and beverage workers, footwear manufacturers, salespeople, health workers, security service workers along with tourism and accommodation workers. |
| Floor IV | Construction workers, public transportation, miners, painters, bricklayers, rubber and plastic industry workers and waiters. |
| Floor V | Administrators, metalworkers, plumbers, welders, drivers, musical instrument manufacturers, operators of construction and mining machinery and bartenders. |
| Floor VI | Accountants, secretaries, typists, communication services, telephone operators, network workers, sales supervisors, housekeepers, foremen, steel workers, tobacco workers, radio/TV/sound/cinema workers, machine assemblers, electricians and industrial production supervisors. |

Heterogeneous Employment Effects by Commodity Exposure

| | Full (1) | Industry (2) | Low-Skilled (3) | Full (4) | Industry (5) | Low-Skilled (6) |
|------------------------|----------------------|---------------------|----------------------|----------------------|--------------------|----------------------|
| Kaitz × Low Commodity | -0.312*** (0.091) | -0.210 (0.163) | -0.438*** (0.150) | -0.317*** (0.060) | -0.289* (0.146) | -0.321*** (0.111) |
| Kaitz × High Commodity | 0.273 (0.390) | -0.043 (0.253) | 0.184 (0.340) | -0.052 (0.252) | -0.074 (0.312) | 0.004 (0.192) |
| Real GDP | 0.198*** (0.040) | 0.133*** (0.046) | 0.187*** (0.042) | 0.184*** (0.039) | 0.123** (0.048) | 0.181*** (0.041) |
| Population (15-59) | 0.313 (0.449) | 0.805 (0.589) | -0.059 (0.555) | 0.310 (0.466) | 0.858 (0.577) | -0.091 (0.570) |
| Kaitz Definition | | MW/Median | | | MW/Mean | |
| Observations | 5580 | 5580 | 5580 | 5580 | 5580 | 5580 |

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Regional Wage Floors: Matching Design

| | W_{p10} (1) | W_{p25} (2) | W_{p50} (3) | Employment (4) |
|--------------------|---------------------|--------------------|-------------------|-------------------|
| MW | 0.167*** (0.014) | 0.100** (0.039) | 0.067* (0.032) | 0.038 (0.109) |
| Real GDP | 0.010 (0.013) | 0.023 (0.016) | 0.021 (0.015) | 0.043 (0.068) |
| Population (15-59) | -0.559 (0.683) | -0.075 (0.456) | 0.356 (0.359) | -0.234 (0.288) |
| Observations | 6560 | 6560 | 6560 | 6560 |

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