Minimum Wage and Firm Outcomes[1]

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Motivation

- Despite a large body of literature on the topic, the economic effects of minimum wage policies remain contested, with studies showing wage gains for low-wage workers but ambiguous impact on employment.
- **Own-wage elasticity (OWE)** is usually used to compare results of different studies. In many studies, OWE is close to 0. Median/mean OWE of 72 published studies are $-0.13\%/-0.25\%$ (Dube and Lindner, 2024).
- Most studies are for the US (78%) and UK (11%).
- The distributional impact of minimum wage policies depend on who bears the cost: if firms absorb it, the policy may improve equity; if passed on to workers, especially low-wage ones, it could be regressive.

This Paper

- This paper studies the analyzes a significant minimum wage increase in Chile (24.5% nominal, 16.4% real over 21 months), evaluating its effects on firms and workers.
- We use a unique monthly employer-employee dataset that can be merged with data on other firm characteristics such as worker´s education, firm-to-firm transactions, sales, debt and expenditures.
- We run a diff-in-diff analysis for the formal firms in the economy, *a la* Harasztosi and Lindner 2019.

Preview of the Results

Main findings:

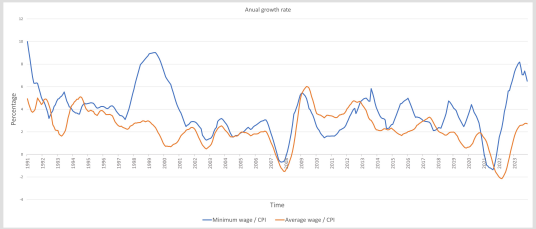
- The increase of the minimum wage raised salaries by 4.8% in firms with high proportion of workers under MW.
- It reduced employment by 5.6% in firms with high proportion of workers under MW.
- The ratio between high and low skilled workers increased by 6%.
- Prices increased by 0.5% (driven mainly by Manufacturing and Commerce sectors).
- In terms of heterogeneity:
  - Effects better identified in micro and small firms, less on medium and large firms.
  - Similar effects across large economic sectors intensive in labor (Construction, Services). Less well identified in Commerce. Too noisy in Agriculture. Absent in Mining.

Related Literature

- Positive or neutral effects of minimum wage on employment associated with monopsonistic power among firms (Manning, 2011; Azar et al., 2023), or with the presence of holdup problems that distort capital accumulation (Bauducco and Janiak, 2018).
- Negative effects reflect neoclassical labor demand curves with a downward slope in the relevant region.
- Heterogeneous sectoral effects: tradable sectors/manufacturing tend to show negative employment effects, while non-tradable sectors/services tend to show neutral effects (Cengiz et al., 2019; Gopalan et al., 2021).
- Nonlinear effects may be relevant (Clemens and Strain (2021)).
- **Interactions between large minimum wage increases in economies where the minimum wage is already high relative to the mean/median are intuitive but need to be empirically studied (Dube and Lindner, 2024)**.

Background

- In 2023, the Minimum Wage Law 21.578 increased the minimum wage in four phases, totaling a 24.5% nominal increase: (i) \$410,000 to \$440,000 in May 2023; (ii) \$460,000 in September 2023; (iii) \$500,000 in July 2024; (iv) \$510,636 in January 2025.
- This was a historically large increase, in an economy where the minimum wage is very binding.



Empirical Strategy

We closely follow Machin, Manning, and Rahman 2003 and Harasztosi and Lindner 2019 to estimate a Difference-in-Difference (DiD) model:

$$y_{it} = \alpha + \beta \times \text{Treat}_i \times \text{Post}_t + \delta_i + \theta_t + \textit{size}_{i23} \times \theta_t + \epsilon_{it} \tag{1}$$

where, $\textit{size}_{i23} = \textit{micro}, \textit{small}, \textit{medium}, \textit{large}$ for firm i in 2023 and,

$$\text{Treat}_i = \begin{cases} 1 & \text{if } \frac{\sum_{j=1}^{n} 1(w_j \leq 1.3 * w_{min})}{N_i} \geq \textit{median}(\textit{ratio workers under MW}) \\ 0 & \text{if not} \end{cases}$$

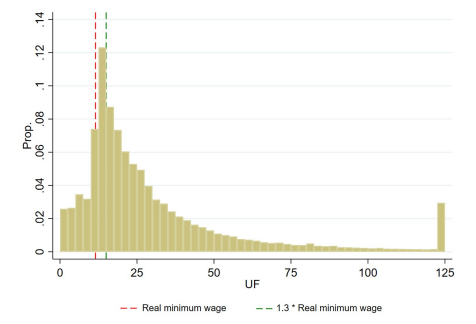
$$\text{Post}_t = \begin{cases} 1 & \text{month} \geq \text{April 2023} \\ 0 & \text{if not} \end{cases}$$

This ratio of workers under MW is calculated over the 12 months preceding the change in the MW law.

Empirical Strategy

- We select workers with less than $1.3W_{mw}$ as workers under the MW
  1. Chilean firms in the private sector usually pay a flat bonus of 25% of the salary instead of paying a proportion of the revenues.
  2. From an empirical perspective, we observe bunching around $1.3W_{mw}$.

Figure 1: Distribution of real wages in March 2023



Source: Central Bank of Chile based on Unemployment Insurance data.

Identification and Empirical Strategy

We estimate an event study based on the previous DiD specification.

$$y_{it} = \sum_{j=-4,\neq -2}^{16} \beta_j 1[D_i = 1]1[t - 2 = j] + \delta_i + \theta_t + size_{i23} \times \theta_t + \epsilon_{it} \quad (2)$$

- The key assumption for causal identification is parallel trends, i.e., that in absence of changes in minimum wage, variable y_{it} for both groups would have evolved in parallel.
- We set it in March 2023 to control for possible anticipation decisions by firms before law comes into force. In March 2023 Central Unitaria de Trabajadores y Trabajadoras (CUT) began discussing terms with the government.
- Finally, we only include observations from January 2023 since this month marks the last stage of previous minimum wage law (Law 21.456).

Data

- We use anonymized monthly employer-employee data from the Unemployment Insurance Administrator (AFC) from January 2022 to April 2025 to identify labor relationships and their characteristics.
- We also use educational data from the Ministry of Education and sales data from Electronic invoices from Chilean IRS (SII).
- We focus on firms with more than 5 employees in 2022 that appear in the National Account Business Directory from the Central Bank of Chile.
- We use firm-to-firm transactions data from the IRS to obtain prices at the firm level.

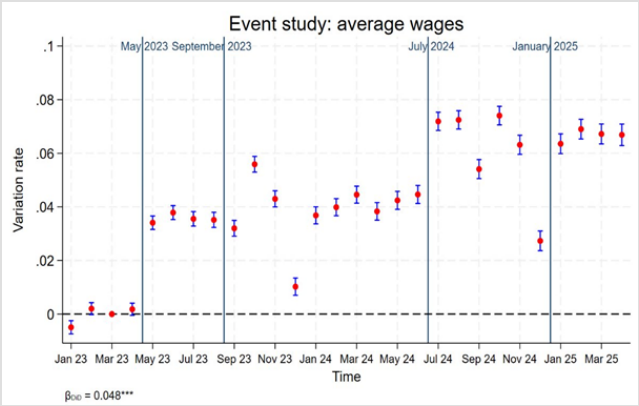
Summary Statistics

Table 1: Descriptive Statistics

	Control	Treated
Workers (% of total)	69.6	30.4
Average number of workers	54.84	23.01
Workers affected by minimum wage (% per firm)	10.93	71.03
Qualified / unqualified workers (% per firm)	17.04	7.22
Labor costs / total costs (% per group)	18.03	23.8
Sales (% of total)	91.4	8.6
Sales with receipts (% of total)	59.8	40.2
Not defined (% of group)	8.58	13.27
Micro (% of group)	3.24	10.66
Small (% of group)	42.4	61.13
Medium (% of group)	27.56	12.49
Large (% of group)	18.23	2.44
Number of firms	60,975	60,975

Source: Central Bank of Chile calculations based on Unemployment Insurance data, National Accounts Business Directory, and Internal Revenue Service.

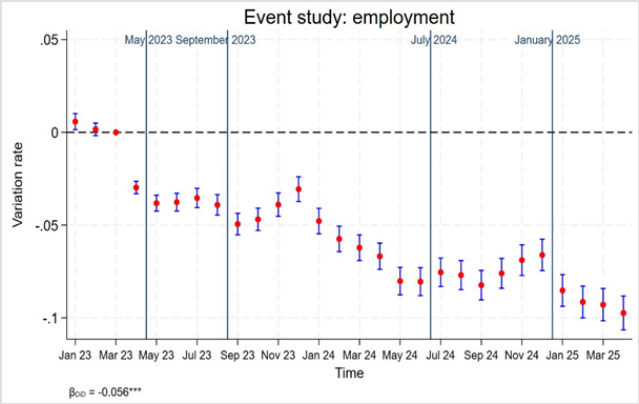
Minimum Wage Increase and Average Salaries



Note: The dependent variable is the logarithm of the firm's average salary. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

- We observe a positive effect on average salaries paid by firms starting in May 2023
- Following each increase, we see increases in average salaries

Minimum Wage Increase and Employment



Note: The dependent variable is the logarithm of the firm's average wage. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

- We observe a reduction on employment starting in April 2023.
- The effect becomes more negative over time.

Results

- We find an OWE of -1.2.
  - A 1% increase in average firm salaries induced by a change in minimum wage decreases employment for treated firms by -1.2%.
- This result lies at the upper end of the findings in the literature.
  - The median/mean employment drop per a one percent wage increase (as a consequence of the minimum wage increase) ranges -0.13%/-0.25% (Dube & Zipperer, 2024).

Identification challenges

- An anticipatory effect is observed in April 2023.
- Discussion of the bill began in late March 2023. On April 17, 2023, an agreement between the Government and CUT was announced, with deadlines and amounts already defined.
- News coverage in the media began to increase significantly in April 2023. go
- Sectors where anticipation is most evident are those with high labor turnover (construction, personal services) and, therefore, may delay hiring ("wait and see") in response to the usual departure of workers and expected higher labor costs. go
- The anticipation effect has empirical plausibility.

Heterogeneous Effects

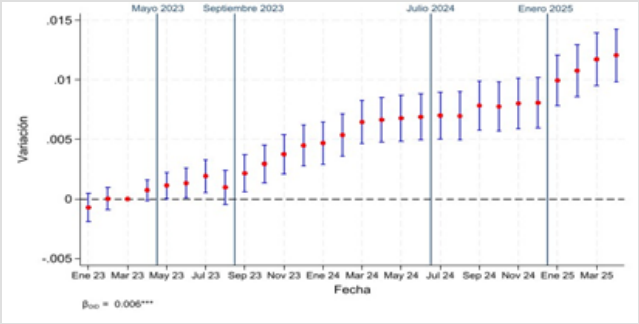
- Well-identified effects in small firms, less so in micro, medium and large firms. go
- Most important economic sectors intensive in labor have similar effects (Construction, Personal Services, Other Services). go
- Anticipation effects differ by sector: large in Construction, tiny in Manufacturing.

Robustness Checks

- Triple DiD go
- Balanced panel go
- Alternative data source go
- Continuous exposition go
- Definition of workers under W_{mw} go
- Sample without firm directory no ccnn
- Firms with more than 3 employees employees

Other Outcomes: Ratio of Skilled/Unskilled Workers

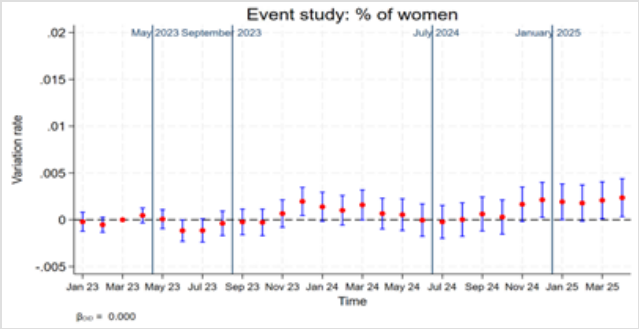
Figure 2: Effects on ratio of skilled over unskilled workers



Note: The dependent variable is the proportion of skilled/unskilled workers. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

- We observe an increase in the skilled/unskilled ratio.
- Suggestive evidence that treated firms are laying off unskilled workers.

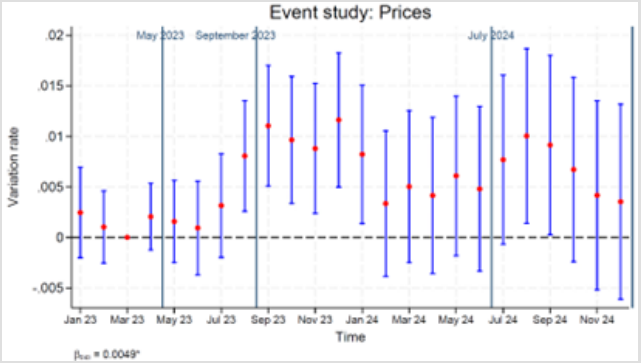
Other Outcomes: Ratio of Women/Men



Note: The dependent variable is the ratio of women/men workers. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

- We do not observe effects on the women/men ratio.

Other Outcomes: Prices



Note: The dependent variable is the accummulated change in average firm prices. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

- Prices increased 0.5% on average in response to the minimum wage increases. Pass-through not complete.

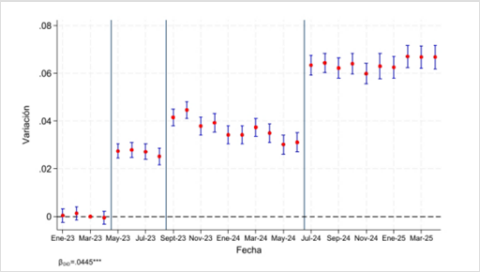
Conclusions

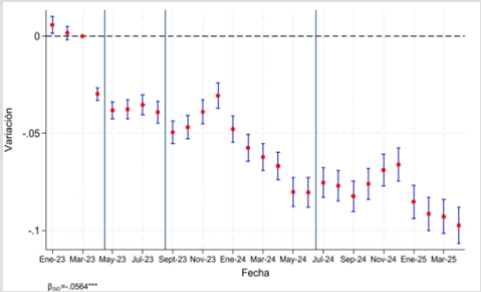
- We study the effects of a large increase of the minimum wage in Chile in 2023 on firm outcomes.
- **Good laboratory for a number of reasons: emerging economy, minimum wage was already quite binding, increase in 2023 was large**.
- We use unique monthly employer-employee data merged with other datasets with firm characteristics such as worker's education and firm-to-firm transactions.
- We find:
  - An increase in average salaries of 4.8%
  - A reduction in employment of 5.6%
  - An increase in the ratio of skilled to unskilled workers
  - An increase in prices of 0.5%.

Next Steps

- Extend pre-treatment period.
- Analyze the effects of the minimum wage **at the employee level.** Preliminary descriptive exercises have shown expected results on employment and wages.
- Use administrative forms (DJs) to disentangle **full vs. part-time workers** and **fixed-term vs. open-ended contracts** and investigate margins of adjustment.
- Deepen analysis on **other outcomes at the firm level** (mark-ups, import, exports, TFP, investment). In general, preliminary event studies for these outcomes do not look significative. go

Data from *Dirección del Trabajo*





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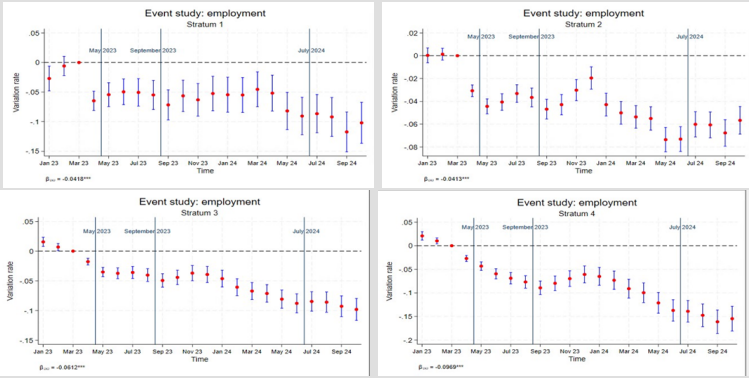
Heterogeneity Analysis: Firm Size by Annual Sales

Figure 3: Effects of Minimum Wage Increase Law on Employment by firm size



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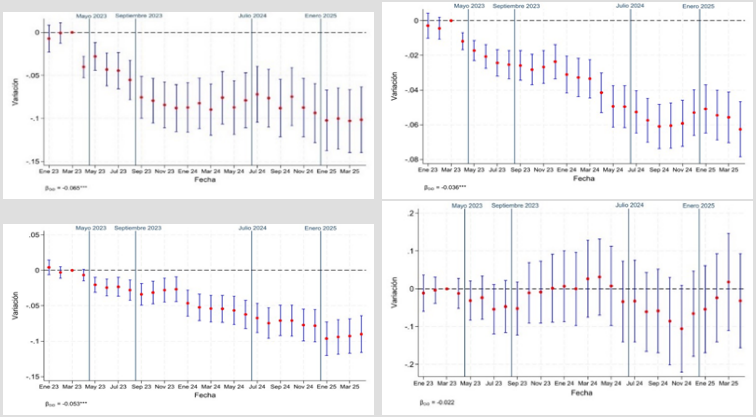
Heterogeneity Analysis: by economic sector

Figure 4: Effects of Minimum Wage Increase Law by Sector



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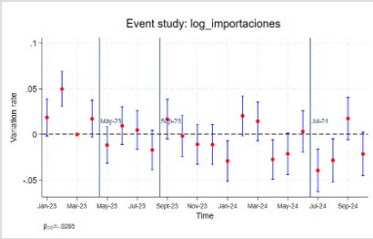
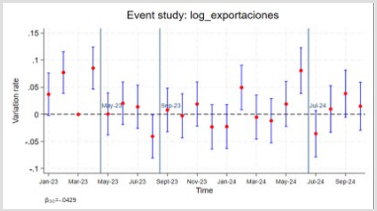
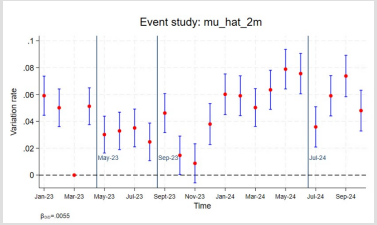
Other Firm Outcomes

Figure 5: Effects of Minimum Wage Increase Law on other firm outcomes







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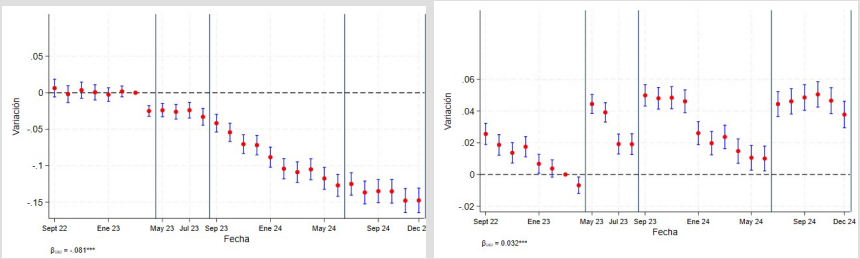
Triple DiD:2023-2016

Figure 6: Effects of Minimum Wage Increase Law on Employment: Triple DiD return

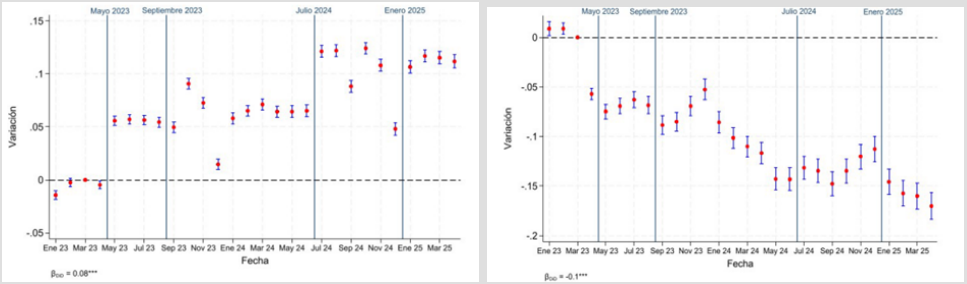


Note: The dependent variable is the logarithm of the firm's average wage and employment. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

return

Continuous Exposition

Figure 7: Effects of Minimum Wage Increase Law on Employment: Continuous Exposition



Note: The dependent variable is the logarithm of the firm's average wage and employment. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

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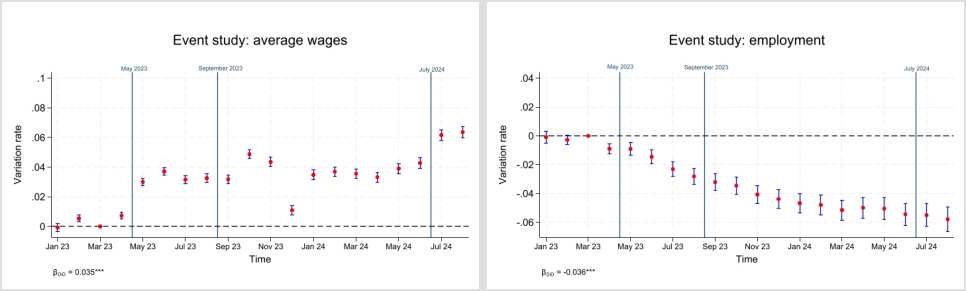
Figure 8: Effects of Minimum Wage Increase Law on Employment



Note: The dependent variable is the logarithm of the firm's average wage and employment. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

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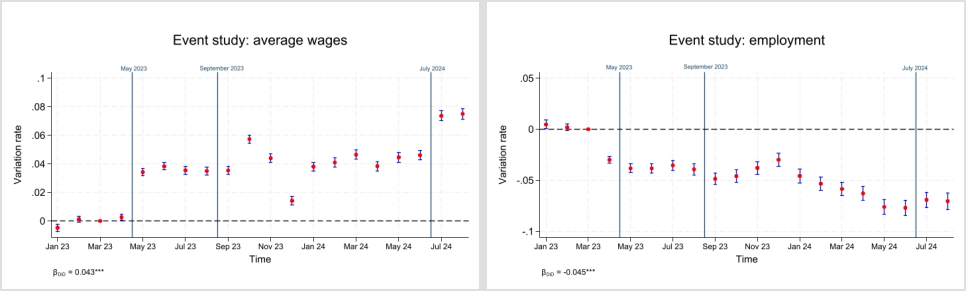
No Firm Directory

Figure 9: Effects of Minimum Wage Increase Law on Employment



Note: The dependent variable is the logarithm of the firm's average wage and employment. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

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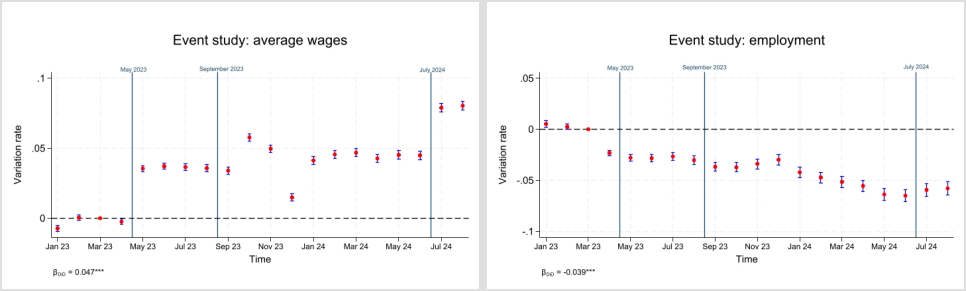
Three Employees

Figure 10: Effects of Minimum Wage Increase Law on Employment



Note: The dependent variable is the logarithm of the firm's average wage and employment. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

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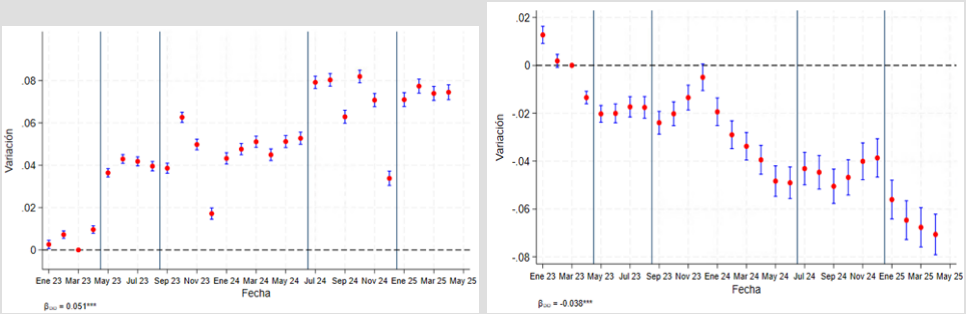
Balanced panel

Figure 11: Effects of Minimum Wage Increase Law on Employment



Note: The dependent variable is the logarithm of the firm's average wage and employment. Observations are at firm/month level. Includes fixed effects for firm and month/year. Standard errors are calculated at the firm level. Confidence intervals are calculated at 95%.

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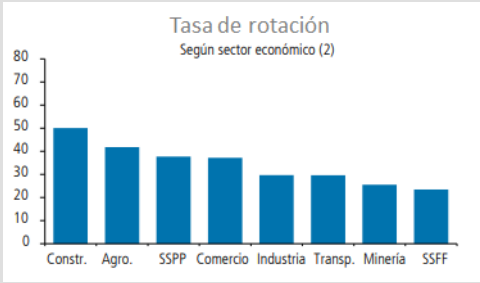
Labor turnover

Figure 12: Labor Turnover



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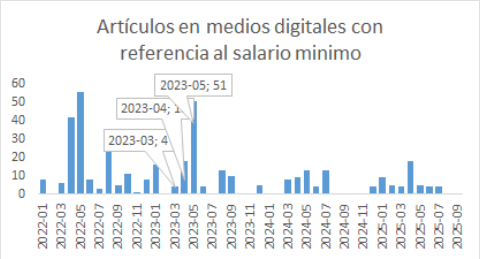
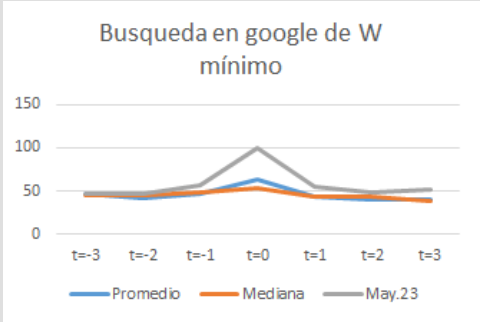
News coverage and google searches





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