Increasing the Cost of Informal Workers: Evidence from Mexico

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Disclaimer: This paper uses confidential data from the National Institute of Statistics and Geography (INEGI), the Ministry of Labor and Social Welfare (STPS), and the Mexican Social Security Institute (IMSS). IMSS data was accessed through the Econlab at Banco de México. The EconLab collected and processed the data as part of its effort to promote evidence-based research and foster ties between Banco de México's research staff and the academic community. Inquiries regarding the terms under which the data can be accessed should be directed to: econlab@banxico.org.mx.
The views and conclusions presented herein are exclusively the responsibility of the authors and do not necessarily reflect those of Banco de México, IMSS, INEGI or STPS.

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Motivation

- 61% of all employment around the world is informal, the vast majority concentrated in developing economies.
- In Mexico:
  - 23% of GDP is produced by the informal economy,
  - 6 out of every 10 workers participates in the informal economy,
  - 1 out of every 4 workers at a formal firm is informally employed.
- Despite its prevalence across the world:
  - the evidence on the impact of enforcement is mixed,
  - few studies analyze the "intensive-margin" of informality (i.e. informal employment within registered firms).

Research Question

- What are the effects of increasing the cost of informal employment?
  - Firm-level outcomes (survival, job creation and destruction, wages)
  - Worker-level outcomes (formalization, unemployment duration, wages)

- Contribution:
  - Address the two main challenges in estimating causal effects:
    1. Measuring Informal Employment: New data combining household surveys and administrative employer-employee matched records (allow us to observe transitions across formality status with the same employer)
    2. Causality: Exploit random variation in the cost of informal employment caused by over 400,000 random work-site inspections
  - New stylized facts on within-firm informality and its dynamics.

Previous Literature

- **Theoretical papers with informal sector** Cahuc et al. (2006), Albrecht et al. (2009), Bosch and Esteban-Pretel (2012, 2015), Meghir et al. (2015), Leyva and Urrutia (2017); Ulyssea (2018)
- **Effects of Lowering Costs**: Fajnzylber, Maloney and Montes-Rojas (2011); Kugler, Kugler and Herrera-Prada (2017); Pagés (2017); Samaniego de la Parra, Otero-Cortés, and Morales (2023);
- **Effects of regulatory enforcement/monitoring** Ronconi (2010), Levine et al. (2012), Henrique de Andrade et. al. (2013), Almeida and Carneiro (2005, 2009, 2012), Locke et. al (2007) and Lock and Romis (2010)

Outline

1. Motivation
   - Research Question
   - Contribution + Previous Literature
2. Data
3. New Facts on Informality and its Dynamics
4. Increasing the Cost of Informal Workers
   - Effects on Firms
   - Effects of Informal Workers
   - Effects on Formal Co-workers
5. Conclusions
6. How Much Is a Formal Job Worth?

Data

- STPS's Directory of Firms (DNE) and Inspection Logs (2005-2016)
  - 394,651 establishments
  - 620,816 inspections at 282,661 establishments

Inspection Process | Inspection Outcomes | Random Selection

- IMSS administrative data (2005-2016)
  - All formal employer-formal employee matches.
  - Tracks workers' complete formal labor market trajectory, and the evolution of firms' formal payroll.
  - We focus on 950,000 employers that we also find in STPS's DNE and the 2M formal employees they hired between 2005 and 2016.
- ENOE (2005-2016)
  - Quarterly household rotating panel (avg. 420,000 individuals)
  - Employed (for at least one wave) at firms in the DNE (35,000 p/qtr)
  - Self-reported individual and household characteristics, labor market status and employer characteristics.

LMS Transitions (Within & Across Employers)

Predicted Quarterly Transition Probabilities

		Initial Labor Market Status	
Labor Market Status		Formal Establishment	
Next Quarter		Informal	Formal
Same Formal Firm	Informal	38.5%	1.1%
	Formal	14.2%	81.8%
Separation	New Formal Firm	7.7%	7.5%
	Other	40.2%	9.1%
Conditional on Separating to a New Formal Firm			
New Formal Firm	Informal	64.5%	30.7%
	Formal	35.1%	69.3%

The sample consists of individuals employed at DNE firms for at least one of the quarters when they participate in ENOE's survey.
"Other" separations include separating to a job as an employee at an informal firm, becoming self-employed, transitioning to unemployment and movements out of the labor force.
Source: Own calculations using data from ENOE (2005-2016) and DNE.

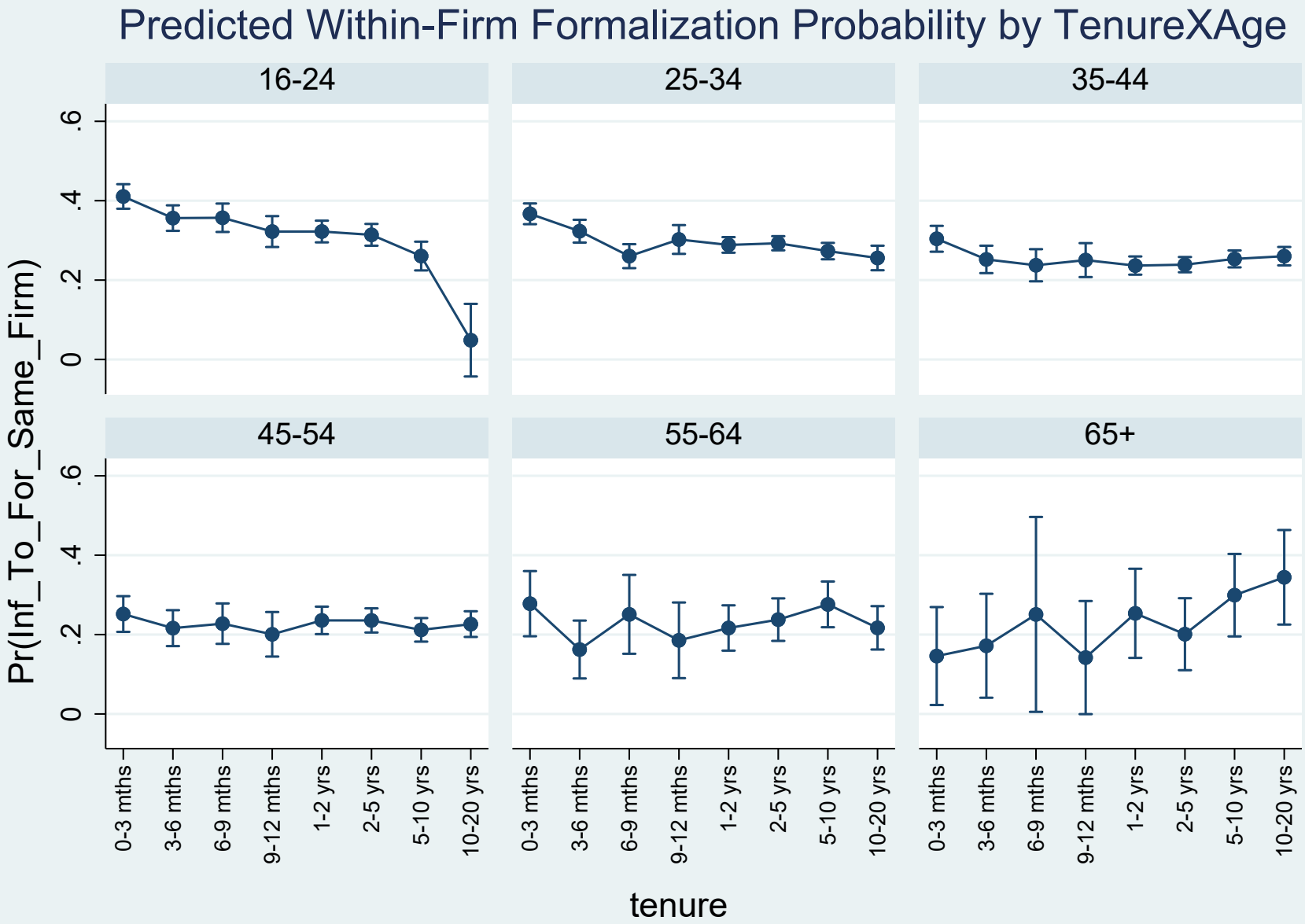
Share of Informal Employment within Formal Firms by Firm Size

(January 2005-June 2016 Average)

Industry	Establishment Size							
	2-5	6-10	11-15	16-20	21-30	...	501+	Total
Oil & Mining	40.5	56.5	24.6	35.6	16.5	...	1.3	7.7
Manufact.	79.7	61.3	53.0	37.8	30.2	...	2.4	20.6
Construction	61.1	44.7	34.0	35.1	31.4	...	5.1	27.6
Retail/Wholesale	72.5	34.5	25.5	16.8	13.5	...	9.2	32.4
Lodging & Food	83.1	65.5	41.2	34.6	16.4	...	4.0	45.3
Transport. & Comms.	79.4	46.5	34.4	33.4	19.9	...	11.3	27.5
Finance & Prof. Buss.	67.1	40.6	25.5	25.2	23.0	...	6.8	26.4
Government & NGOs	62.0	47.8	36.9	32.5	42.0	...	11.4	17.2
Total	73.1	45.0	29.8	24.9	20.6	...	7.3	26.0

We measure establishment size using the mode of the number of individuals (including the owner, formal and informal employees) working at the establishment as reported by all workers surveyed by ENOE during each calendar year.
Source: Own calculations using data from ENOE (2005-2016) and DNE.

Probability of Within-Firm Formalization by AgeXTenure



Enforcement & Firm's Employment Decisions

- Consider the problem of a profit maximizing formal firm choosing whether to post a formal or an informal vacancy:

$$V^F = \left(y - w^F\left(1+\tau_p\right)\right)\left(1-\tau_\pi\right)$$
$$V^{INF} = y\left(1-\tau_\pi\right) - w^{INF} - C^{INF}\left(y\right)$$
$$C^{INF}\left(y\right) = \lambda\left(y\right)c\left(y\right)$$

$$\max\left\{V^F, V^{INF}, 0\right\}$$

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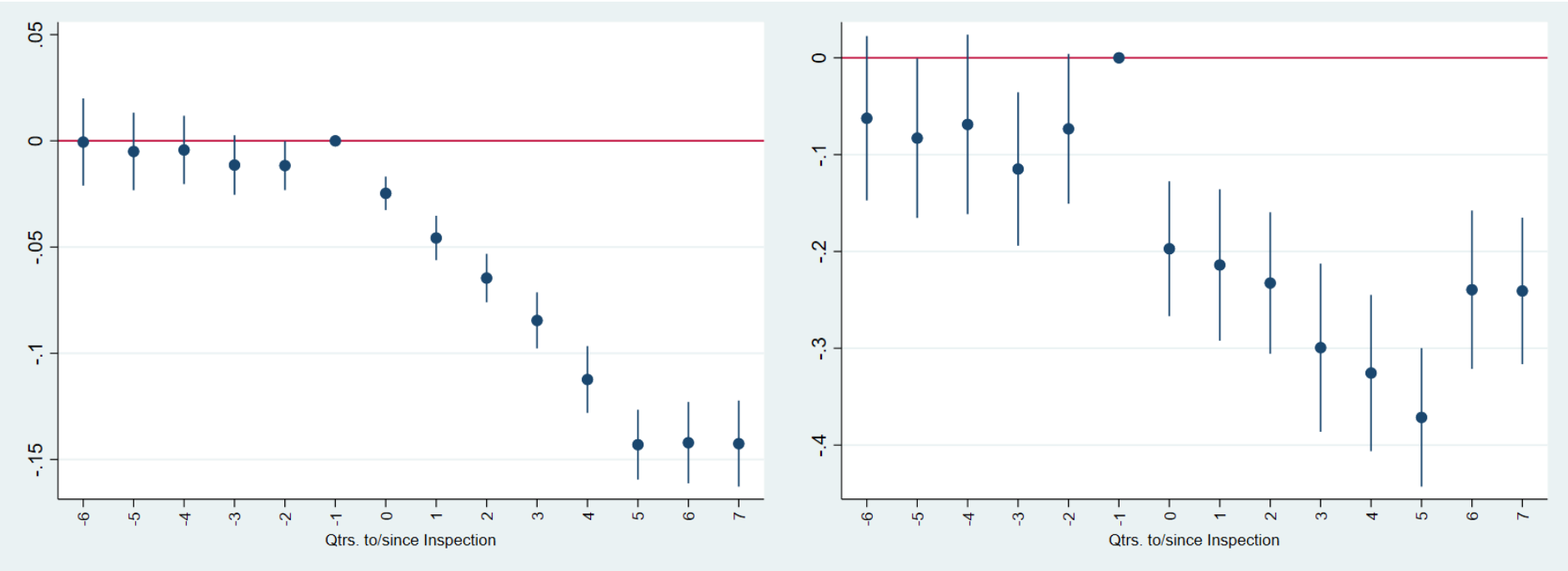
$$\max\left\{V^F, V^{INF}, 0\right\}$$

- The Social Security Institute (IMSS) and the Ministry of Labor (STPS) visit work-sites to verify compliance.
- STPS's **randomly** selects establishments from a list (DNE) for its ordinary inspections. Inspection Process

Firm Outcomes (I)

Firm-level dynamic diff-in-diff with placebo inspections for non-inspected firms

$$Y_{j,t} = \sum_{q=-6}^{6} \beta^q \, Treated_j \times I[q_{t(j)}] + \sum_{q=-6}^{6} \alpha^q I[q_{t(j)}] + \lambda_j + \theta_{t \times s(j) \times z(j)} + \epsilon_{j,t}$$



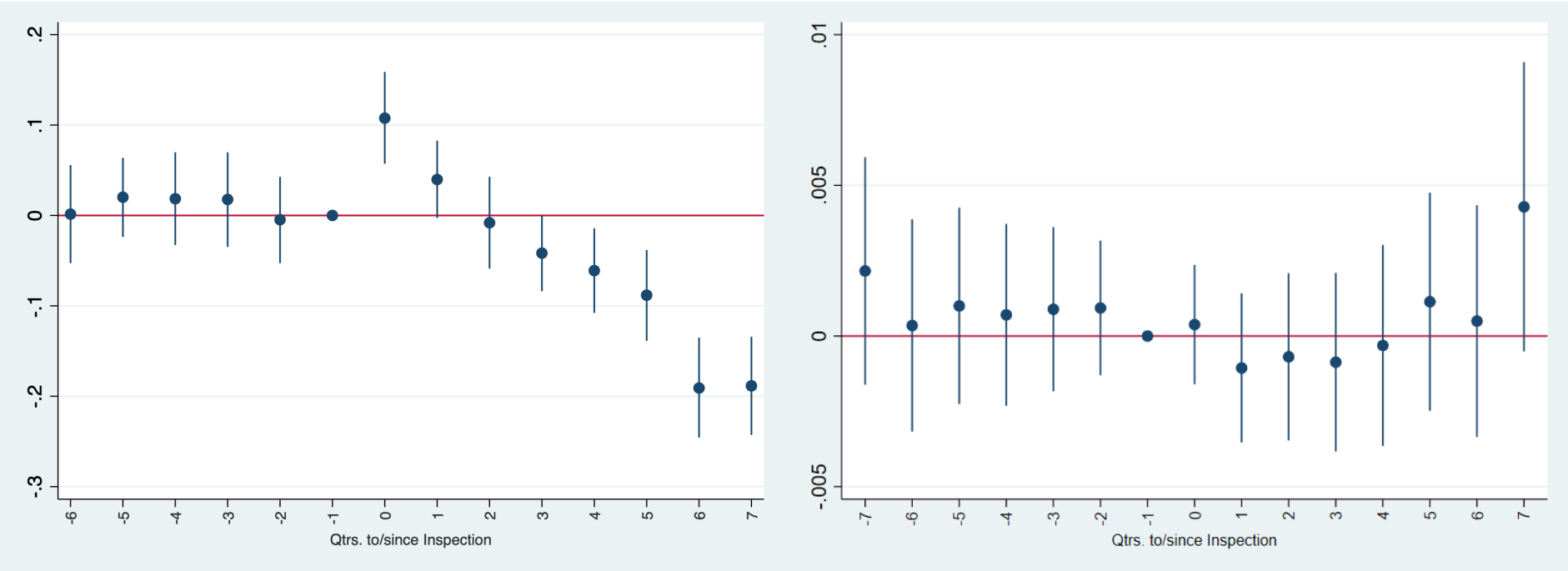
(a) No. of Formal Workers

(b) Formal Hires

Firm Outcomes (II)

Firm-level dynamic diff-in-diff with placebo inspections for non-inspected firms

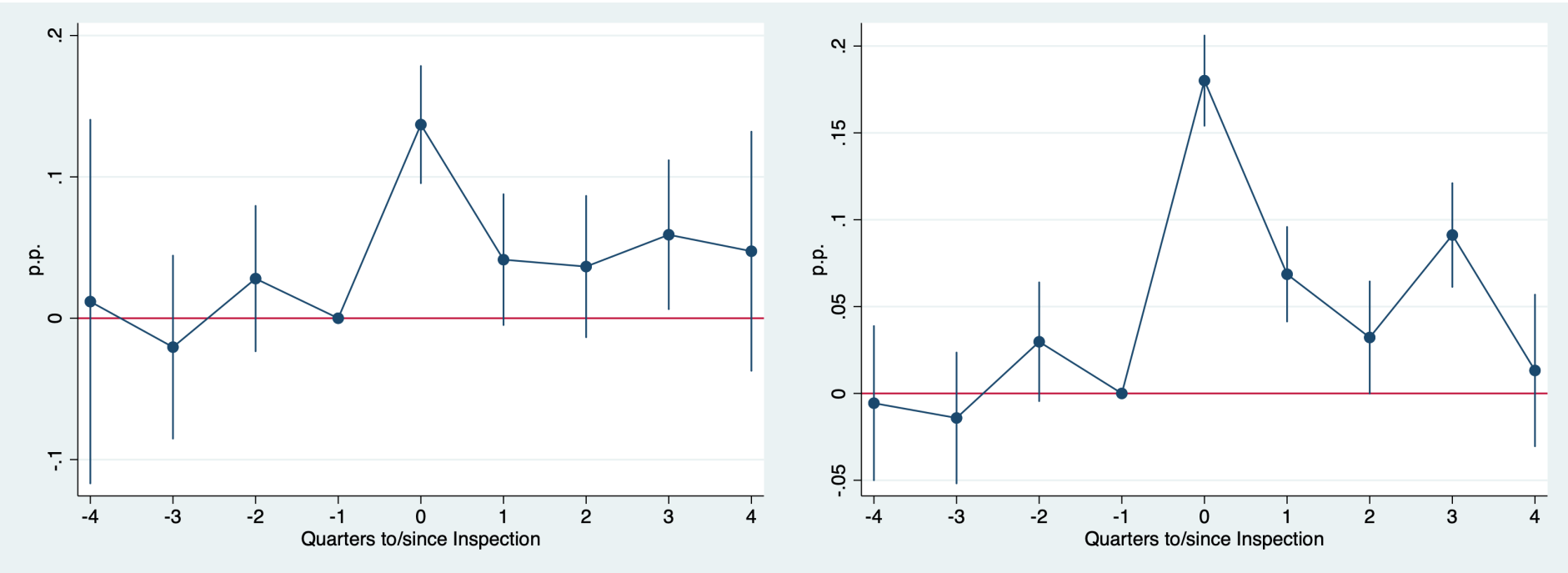
$$Y_{j,t} = \sum_{q=-6}^{6} \beta^q \, Treated_j \times I[q_{j,t}] + \sum_{q=-6}^{6} \alpha^q I[q_{j,t}] + \lambda_j + \theta_{t \times s(j) \times z(j)} + \epsilon_{j,t}$$



(c) Formal Separation

(d) Mean Formal Wages

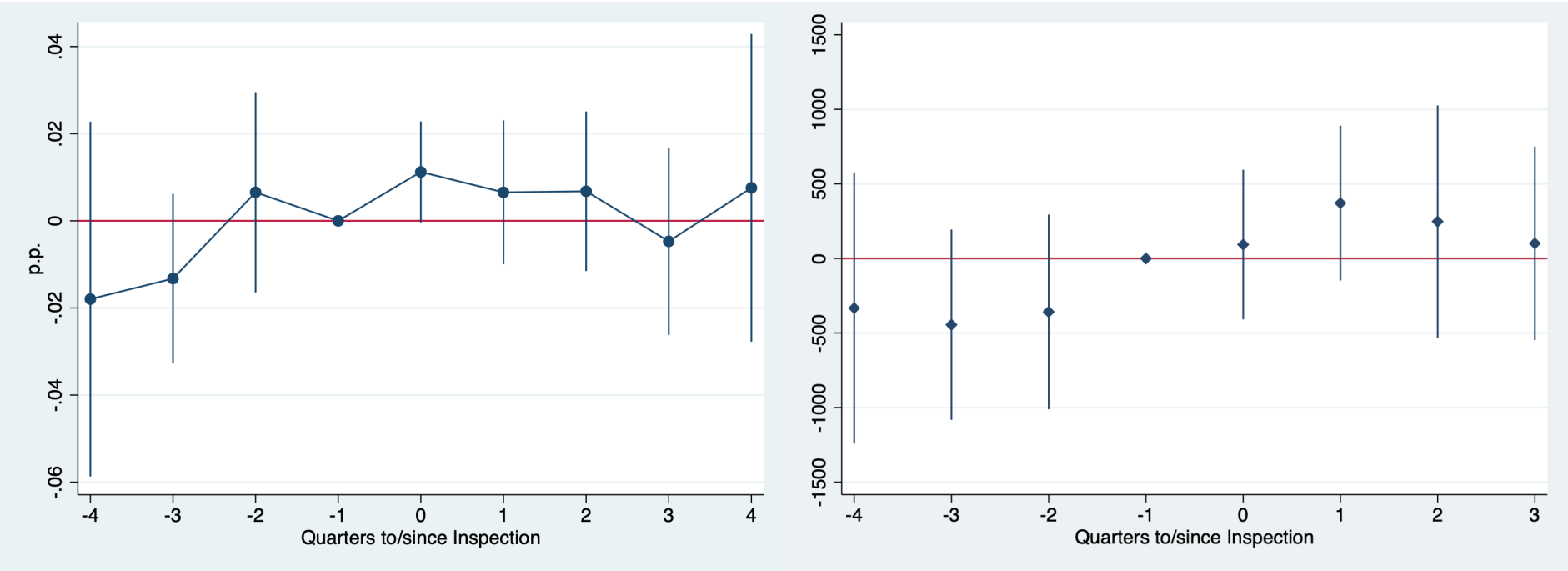
Worker Outcomes (I)



(a) Formal Employment

(b) Formal at Inspected Employer

Worker Outcomes (II)



(c) Unemployed

(d) Informal Workers: Monthly Wage ($MXN)

Formal Coworkers

Conclusions (I)

- New Facts:
  - 1 in 4 workers at a formal-sector firm is informally employed.
  - The intensive margin of informality is decreasing in the total number of workers.
  - Informal-to-formal job transitions are not rare, (13.5% mean qtr. transition rate). Most occur within the same firm and their rate declines with tenure (and age).
- For firms:
  - Inspections do not affect firms' probability of survival,
  - but the number of formal workers is 15% lower 1.5 years after the inspection, due to a decline in formal job creation (fewer informal workers to "promote" to formality) and a temporary increase in separations (more "forced" formalizations).

Conclusions (II)

- For informal workers:
  - the probability of transitioning to a formal job **doubles** in the quarter of inspection,
  - separations to unemployment or to the informal sector also increase, respectively, by 0.8 and 1.8 percentage points,
- For formal workers:
  - Six months after the inspection, the probability of remaining employed at the same firm is 4.7 percentage points lower
  - wages are, on average, MXN$500 higher than the control group's.

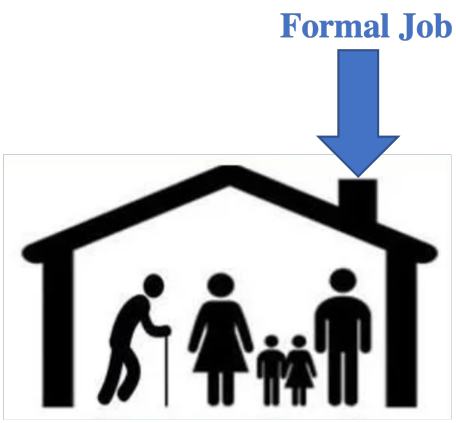
Making Sense of Worker- and Firm-Level Outcomes

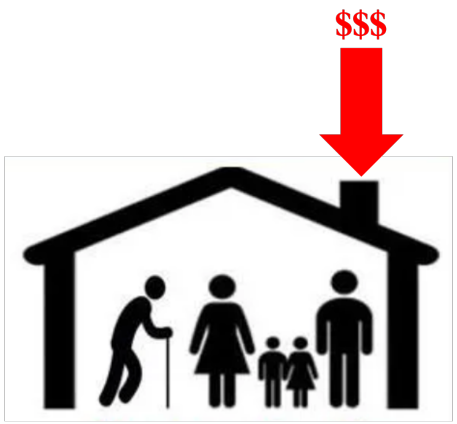
If the goal of enforcement is to increase the formalization rate for the average current informal worker, then inspections are arguably successful.

However, if the intent is to increase the number of workers with access to social benefits at formal-sector firms, then our evidence indicates that inspections have the opposite effect.

New Project: What is the value of a formal job?

- For each household, calculate the change in income required to elicit the same response as receiving a formal job offer.





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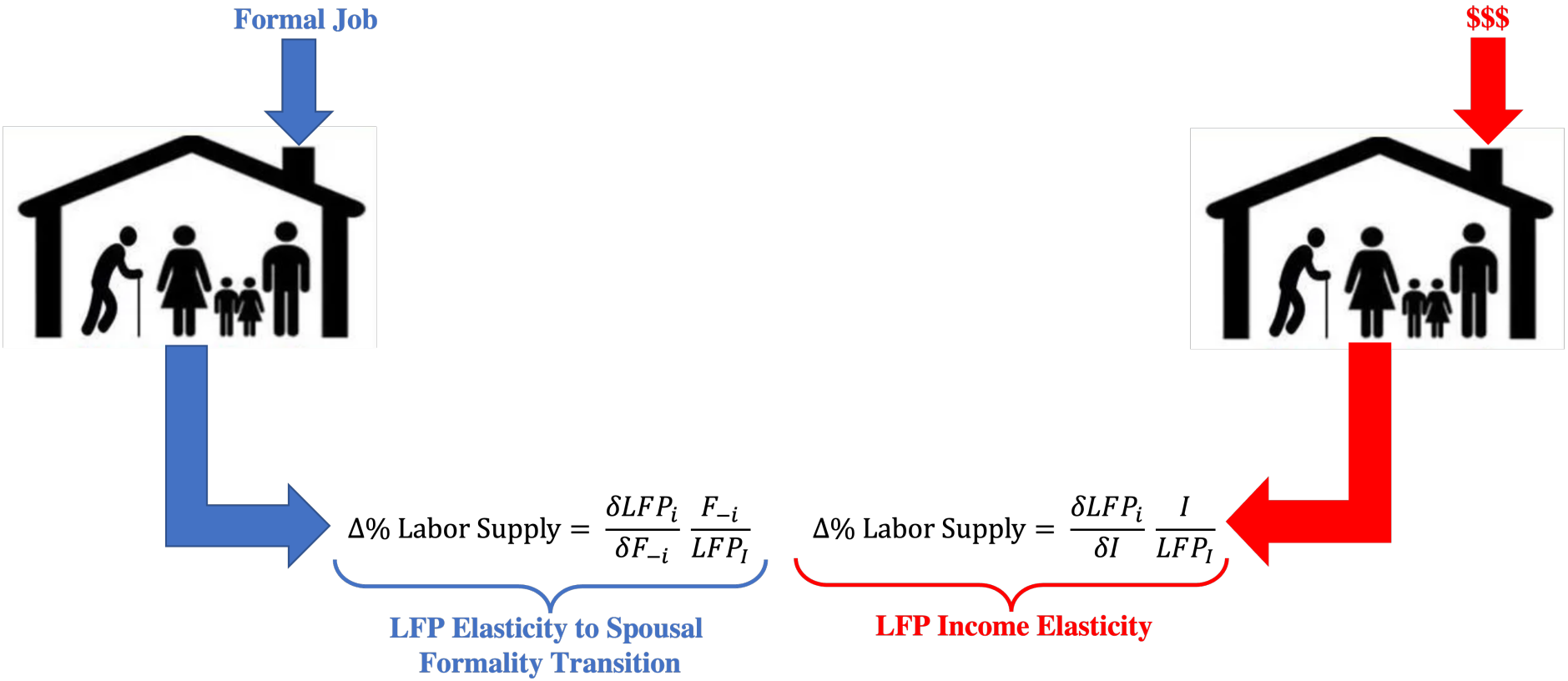
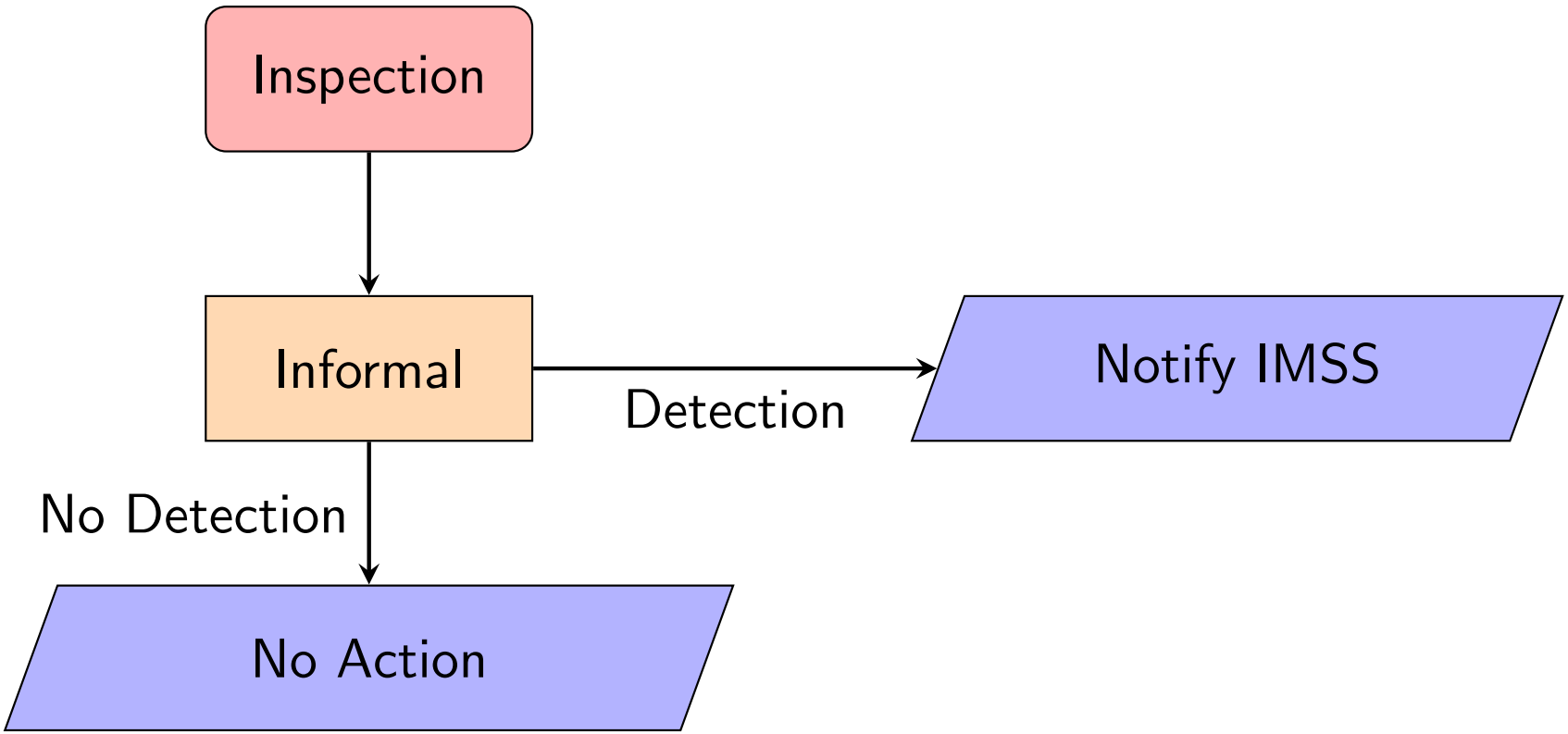


Structural Estimate: MWP for a Formal Job

Table: MWP for households with median formal income

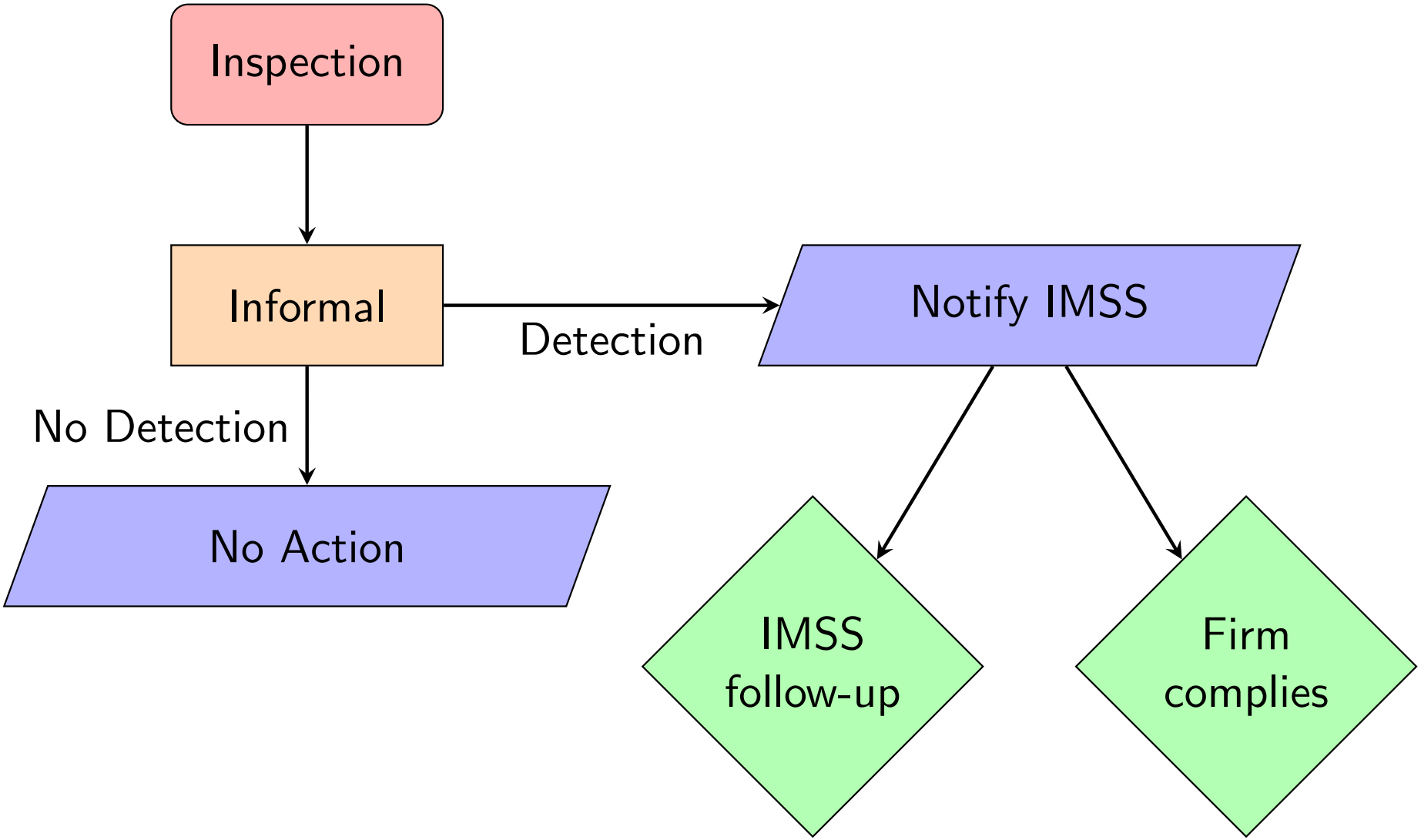
MWP for formal job (MXN$)	1,013
% of mean formal wage	19.4%
Avg. Payroll Tax Rate	20%
Value-Cost Ratio	0.97

Inspection Process



Back Back2

Inspection Process



Back Back2

Inspection Outcomes

Table: Distribution of STPS's Inspections by Result (2005-2016)

	Result		Inspection Count	%
Violation Detected	Closed without report of violations		266,517	43%
	Provided proof of compliance		296,367	48%
	Request for time extension granted		184	0%
	Sanction process started	Sanction imposed	23,154	4%
		Sanction no yet imposed	34,620	6%

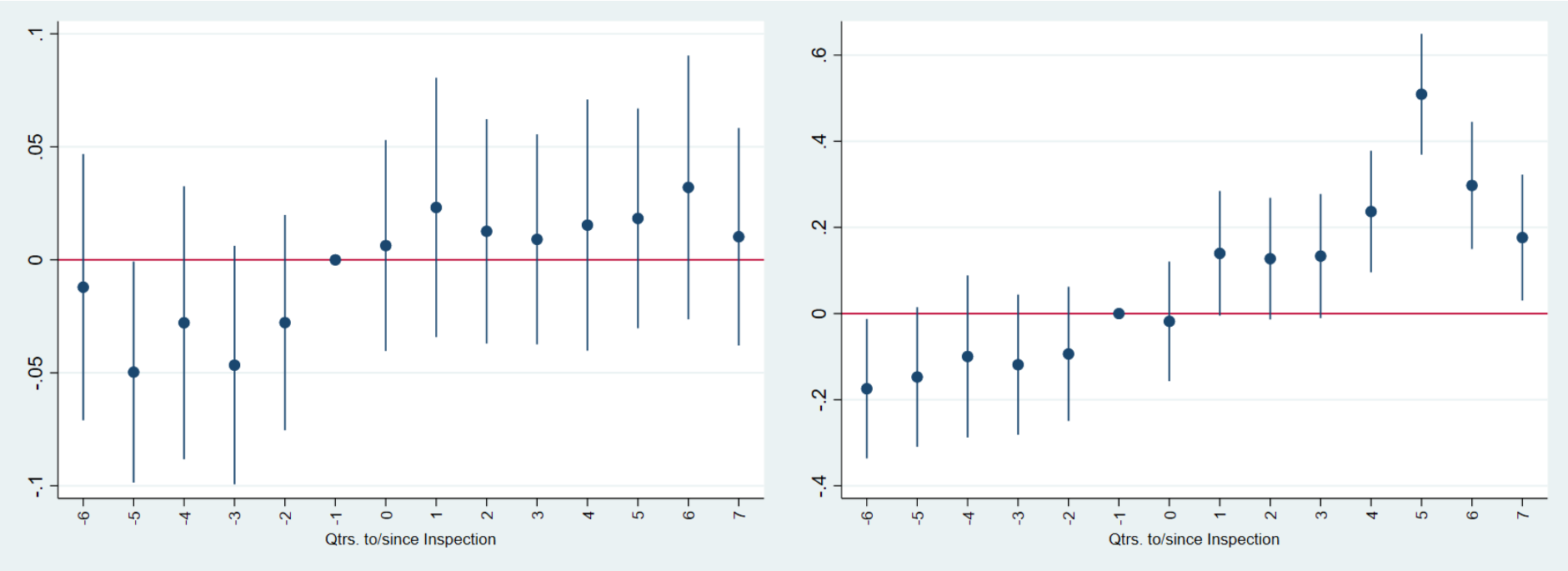
Excludes violations of labor regulations beyond STPS's direct jurisdiction, including, informal employment.

Source: Own calculations using the National Firm Directory (STPS) and Inspections logs 2005-2016. Information request no. 0001400017316 National Institute for Transparency, Access to Information and Personal Data Protection (INAI).

Back

Firm Outcomes (III)

Figure: Formal Job Hires



(a) From Outside the Formal Sector

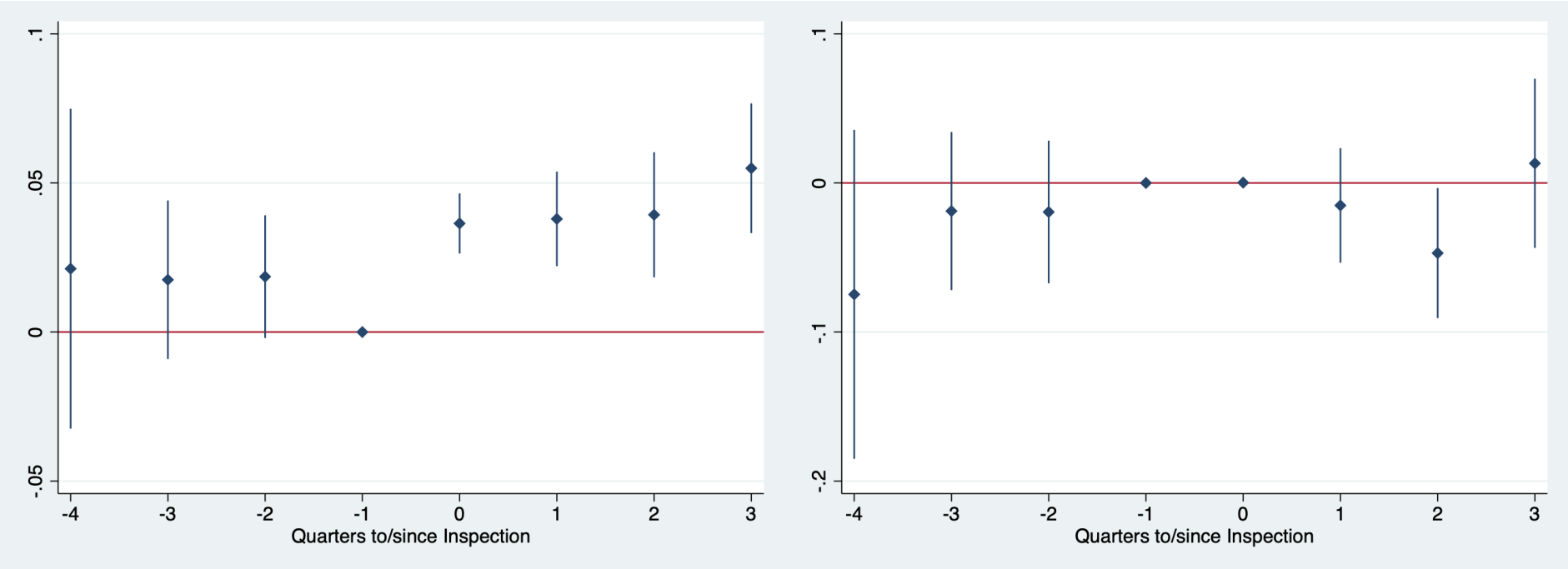
(b) From Within the Formal Sector

Back

Formal Worker Outcomes (I)

Let $I[S_{i,t} = x]$ be an indicator function equal to 1 if worker i is in labor market state x in period t.

$$I[S_{i,t} = x] = \sum_{q=-4}^{4} \beta_q^x \, Treated_i \times I[q_{i,t})] + \sum_{q=-4}^{4} \alpha_q^x I[q_{i,t}] + \lambda_i + \gamma_{c_{i,t}} + \epsilon_{i,j,t}$$

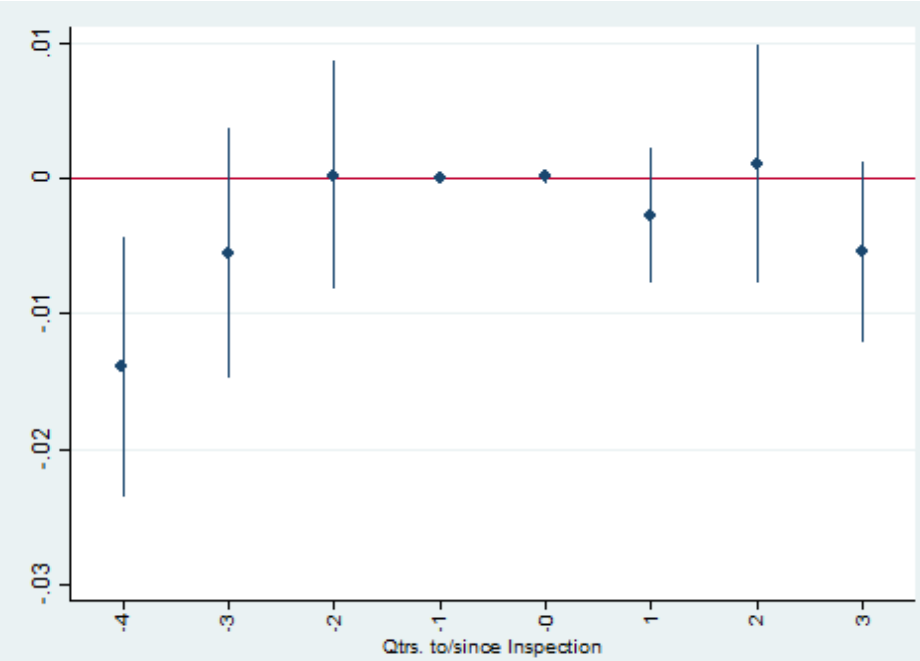


(a) Formal Employment

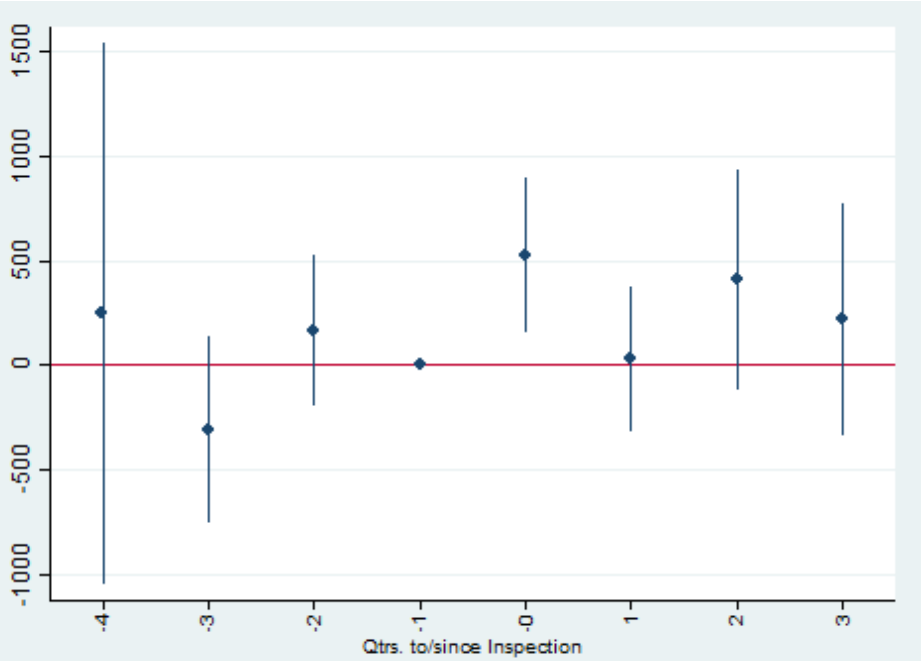
(b) At Inspected Employer (any contract)

Back

Formal Worker Outcomes (II)



(c) Unemployed



(d) Formal Workers: Monthly Wage ($MXN)

Back