

Optimal Taxation in an Informal Economy

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Economics of Informality - Universidad del Rosario

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Introduction

Goals:

- Identify optimal tax policy with imperfect enforcement (informality).
 - Develop occupational choice model
 - Two dimensions of informality: informal workers and profit evasion
- Quantify welfare gains from implementing such a policy.
 - Solve decentralized version of model and calibrate it to the Peruvian economy with actual tax system.
 - Solve planner's problem to identify maximum welfare gains from optimal tax policy.

Outline

- 1 Data & Institutional Framework of Peru
- 2 Model
- 3 Next steps

Data & Institutional Framework of Peru

- SUNAT (Tax administration) administrative records.
 - Tax reports of all formal firms (2010-2017).
 - Revenue, costs, profits, employees, taxes paid.
- Economic Census (2008).
 - Information of all (formal and informal) establishments.
 - All sectors except agriculture, mining, public administration, defense, and economic activities not performed in fixed establishments.
 - Taxes paid, prices and quantities sold, payroll, financial statements, among others.
- Household Survey (ENAHO).
 - Standard household survey. Demographics, income and expenses, education.
 - Work characteristics. (in)formal job, characteristics of work place (number of workers, formal firm).

Data & Institutional Framework of Peru

- Peruvian economy is characterized by high levels of informality
 - 70% of workers are informal (ENAHO)
 - 40% of businesses are not registered (Economic Census, 2008)
- Five different tax regimes for businesses
 - RUS: 2 categories (5 until 2017). Monthly fixed payments of (6USD-19USD), for firms with annual sales under (19,000USD).
 - RER: Revenue tax of 1.5% for firms with annual sales under (165,000USD).
 - MYPE (Since 2017): Firms with annual sales under 200,000USD → Progressive marginal tax rates on profits up to 29.5%.
 - General regime
 - Corporate profit tax rate 29.5%.
 - 20+ employees → distribute between 5%-10% of after tax profits with workers.

Data & Institutional Framework - Peru

We restrict our sample to Lima Metropolitan region to have a homogenous urban sample.

Table: Share of establishments/workers/capital/Value Added/taxes/informality by firm size (Economic Census)

Employees	Establishments	Employees	Capital	Value Added	Taxes	Informal
[0 – 5]	0.9	0.3	0.06	0.11	0.16	0.97
[6 – 10]	0.05	0.07	0.04	0.05	0.01	0.02
[11 – 50]	0.04	0.13	0.13	0.17	0.09	0.01
[50+],	0.01	0.5	0.77	0.68	0.75	0

- Most firms are small and informal.
- Large firms are less prevalent. Explain large proportion of tax payment, value added, capital and employment.

Data & Institutional Framework - Peru

Table: Distribution of occupational categories and informality (ENAH0-2008)

	% in labor force	% who are informal
Employee	59.38	53.46
Employer	5.81	75.91
Non-remunerated	6.30	100.00
Other	0.14	100.00
Self-employed	28.36	92.38
Total	100.00	68.80

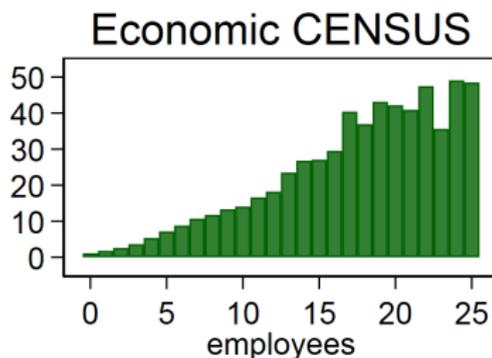
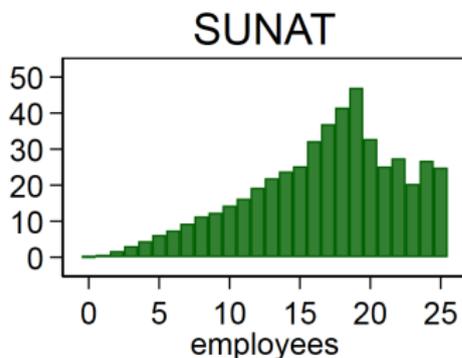
- Majority of workers are employees. \approx evenly distributed between informality and formality.
- Other occupational categories are largely informal.

Data & Institutional Framework - Peru

Tax regulation reveals firm behavior revealing information to identify parameters of the economic model.

- Firms with 20+ employees distribute 5%-10% of profits with workers.

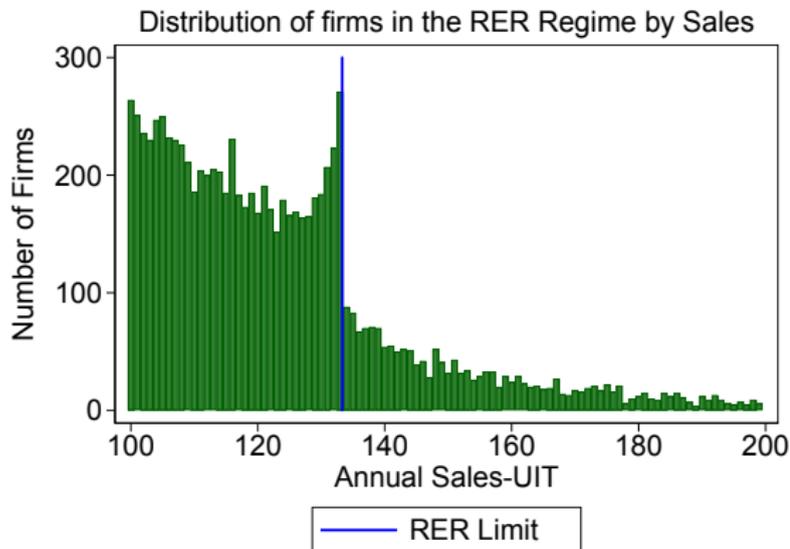
Median annual profits by number of employees (thousands of USD)



- Discontinuity in reported profits to tax administration but not in Census. Evidence suggestive of tax evasion.

Data & Institutional Framework - Peru

- Firms with annual sales under 133 UIT (\$525,000 S/; \$ US160,000) are eligible for the RER scheme.
- Firms pay 1.5% tax on revenue rather than 29% on profits



Data & Institutional Framework - Peru

- Firms can adapt to changes in tax rates by constraining size or evading.
- Smaller firms are more prevalent, more likely to be informal (evade taxes), less productive.
- Majority of self-employed or employers are informal.
- Employees \approx evenly distributed between informality and formality. In large firms, less likely to be informal.

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Primitives

- Continuum of individuals characterized by entrepreneurial and working skills $\Theta = [\theta_e, \theta_w]$ and a government
- Individuals choose work for a wage or become entrepreneurs
- Workers: Maximize consumption subject to budget constraint
 - Chose working in formal and informal market (no personal income taxes).
 - Costly to provide work, costlier if informal
- Entrepreneurs: Maximize profits choosing number of formal and informal workers, and evasion levels.
 - Informal workers \rightarrow no payroll taxes. Convex hiring costs.
 - Evasion \rightarrow no corporate profit taxes. Convex costs of evasion.
- Government: raise taxes to pay for transfers and expenses.
 - Trades off efficiency and redistribution
 - Information frictions: informality and tax evasion

Worker's problem

$$V(\theta_w | w_f, w_l) = \max_{l_f, l_i} \theta_w (w_f l_f + w_l l_i) - \chi \frac{(l_f + l_i)^{1+\psi}}{1+\psi} - \frac{\kappa (\theta_w l_i)^{1+\rho}}{1+\rho} - T(\theta_w w_f l_f)$$

- Formal and informal labor income
- Disutility from working
- Penalty from informal income
- Personal Income tax

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Entrepreneurs

Operating profits $\pi(\theta_e, n_i, n_f)$:

$$\pi(\theta_e, n_i, n_f) = \theta_e(n_i + n_f)^\alpha - w_i n_i - w_f n_f - T_n(n_f)$$

Total Profits

$$\Pi(\theta_e) = \max_{n_f, n_i, Z} \pi(\theta_e, n_i, n_f) - T_c(\pi(\theta_e, n_i, n_f) - Z)$$

$$- \frac{\delta}{1 + \gamma} n_i^{1 + \gamma} - \frac{\beta}{1 + \sigma} Z^{1 + \sigma}$$

- Total production
- Formal and informal labor cost
- Payroll taxes
- Corporate profit taxes
- Reported profits. $Z \rightarrow$ evasion
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Allocations

An allocation in this economy is defined by:

$$\{c(\theta), i(\theta), l_f(\theta), l_i(\theta), n_f(\theta), n_i(\theta), z(\theta)\}_{\theta \in \Theta}.$$

- Consumption
- Entrepreneurial decision
- Formal and informal labor supply
- Formal and informal labor demand
- Evasion levels

Allocation is feasible if clears the three markets.

Details

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Details

Equilibrium

An equilibrium with taxes consist of an allocation and wagea w_f , w_i such that

- $i(\theta) = 1$ whenever $\Pi(\theta_e) > W(\theta_w)$
- If $i(\theta) = 1$, the allocation for θ solves entrepreneur's problem, given taxes and prices.
- If $i(\theta) = 0$, the allocation for θ solves worker's problem, given taxes and prices.
- The allocation is feasible.
- The government budget is balanced

$$G = \int_{\Theta} \left\{ \left(T_c(\pi(\theta_e)) + T_n(w_n f(\theta_e)) \right) i(\theta) + T_p(w \theta_w l(\theta)) (1 - i(\theta)) \right\} dF(\theta)$$

Planner's problem

Find **implementable** allocations to maximize a social welfare function:

$$\int_{\Theta} W(U(\theta)) f(\theta) d\theta$$

$$U(\theta) = c(\theta) - (1 - i(\theta)) \frac{\chi}{1 + \psi} (l_i + l_f)^{1+\psi}$$

- **Implementable:** If there exists set of $T_n(\cdot)$, $T_c(\cdot)$, $T_p(\cdot)$, w_f , w_i such that allocations + tax functions + wages \rightarrow equilibrium.
- Planner proposes allocation but does not observe informality n_i , l_i nor tax evasion z_i . Should satisfy incentive compatibility constraint.
- Once optimal allocations found, back-up tax functions to solve for optimal tax policy. [Details](#)

Outline

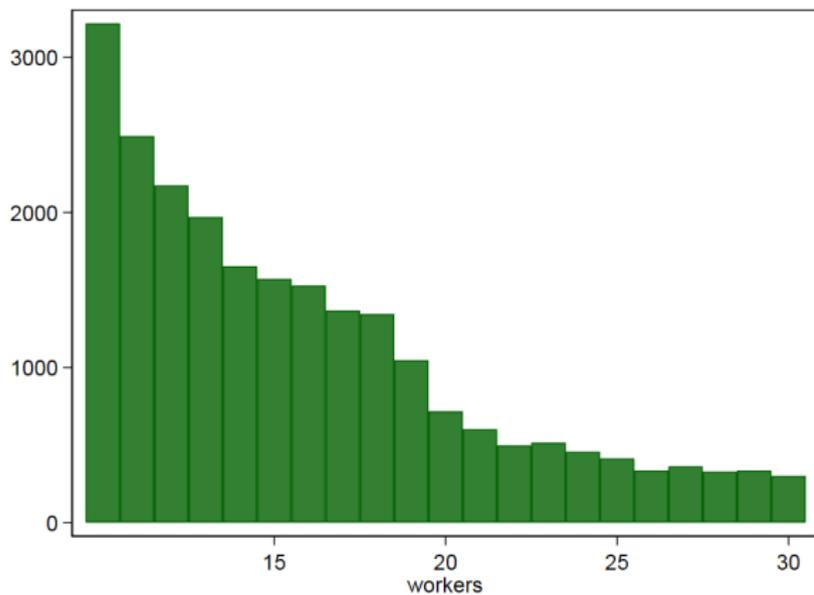
- 1 Data & Institutional Framework of Peru
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Next steps

- Find set of parameters ϕ to minimize distance between empirical and theoretical moments in the decentralized economy.
 - Find $\hat{\phi} \in \arg \min_{\phi} Q(m - \hat{m}(\phi))$
 - m Vector of empirical moments
 - $\hat{m}(\phi)$ vector of model-moments
 - Informality costs: distribution of informal workers.
 - Discontinuities in reported profits and differences in reports to tax administration and economic census.
- With $\hat{\phi}$ compare welfare in decentralized economy and optimal tax policy.
- Characterization of optimal policy and quantify how much can be gained from implementing it.

Appendix

Distribution of firms by size



Feasible allocation

$$\int_{\Theta} c(\theta) dF(\theta) + G =$$

$$\int_{\Theta} \left\{ \left[\theta_e q(n(\theta_e)) - k_n(n_i(\theta_e)) - k_c(z(\theta_e)) \right] i(\theta) - k_l(\theta_w l_i(\theta_w))(1 - i(\theta)) \right\} dF(\theta) \quad (1)$$

$$\int_{\Theta} n_f(\theta_e) i(\theta) dF(\theta) = \int_{\Theta} \theta_w l_f(\theta) (1 - i(\theta)) dF(\theta) \quad (2)$$

$$\int_{\Theta} n_i(\theta_e) i(\theta) dF(\theta) = \int_{\Theta} \theta_w l_i(\theta) (1 - i(\theta)) dF(\theta) \quad (3)$$

- Goods (G: Government expenses)
- Formal labor
- Informal labor

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- Goods (G: Government expenses)
- Formal labor
- Informal labor

Details of Planner problem

- Planner's proposed allocation constitutes a direct mechanism
- Individual of type θ must weakly prefer proposed allocation to any alternative
- Information frictions: observable choices are formal labor supply, demand, and reported profits.
- Workers hide informal labor, entrepreneurs evade profits and hide part of their labor force.
- Mechanism prescribing \hat{l}_i, \hat{l}_f to individual who is worker of type θ must satisfy

$$\hat{l}_i \in \arg \max_{l_i} w_i \theta_w l_i - \frac{\chi}{1 + \psi} \left(\hat{l}_f + l_i \right)^{1 + \psi} - \kappa \frac{(\theta_w l_i)^{1 + \rho}}{1 + \rho}$$

- Similarly, prescribing $\hat{n}_f, \hat{n}_i, \hat{z}$ for type θ , should satisfy that \hat{n}_i, \hat{z} solve entrepreneur's problem given \hat{n}_f

- Prescribe $n_f(\theta')$, $n_i(\theta')$, $z(\theta')$.
- Planner observes formal labor demand $n_f(\theta')$ and reported sales $\theta_e (n_f(\theta') + n_i(\theta'))^\alpha - z(\theta')$
- For a given level of informal labor demand \check{n}_i , the corresponding level of profit hiding ins

$$\check{z}(\check{n}_i, \theta'; \theta) = z(\theta') - \theta_e (n_f(\theta') + n_i(\theta'))^\alpha + \theta_e (n_f(\theta') + \check{n}_i)^\alpha$$

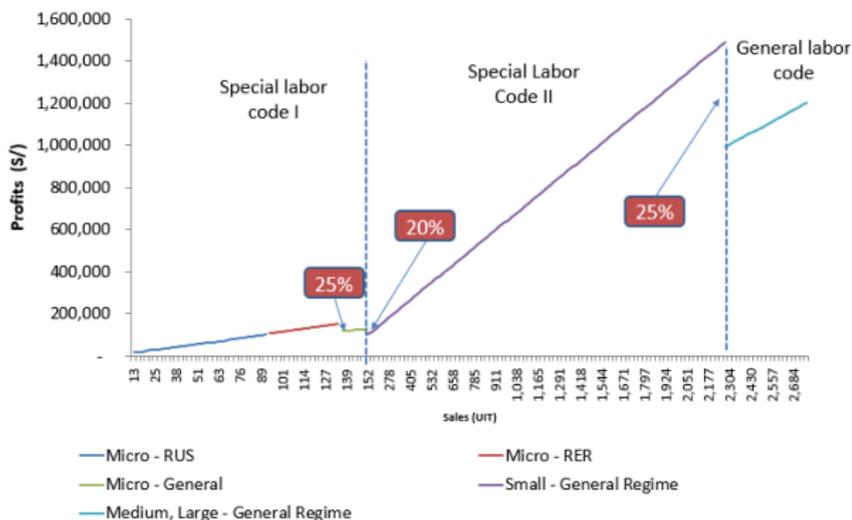
- Problem of agent type θ pretending to be type θ' is

$$\check{\Pi}(\theta'; \theta) = \max_{\check{n}_i} \theta (n_f(\theta') + \check{n}_i)^\alpha - w_i \check{n}_i - \frac{\delta \check{n}_i^{1+\gamma}}{1+\gamma} - \beta \frac{\check{z}(\check{n}_i, \theta'; \theta)^{1+\sigma}}{1+\sigma}$$

- Informal labor demand prescribed to type θ should solve this problem.

Data Analysis – Some evidence from Peru

Predicted Profits of Firm according to Labor and Tax Regime



1 UIT=3,950 S/. 1 S/=0.31 US\$

Firms with ≥ 20 workers distribute between 5%-10% of profits with workers.

Eligibility for RER regime also includes having < 10 workers

[Details](#)

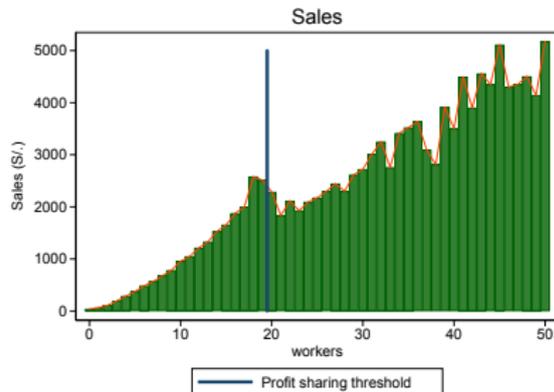
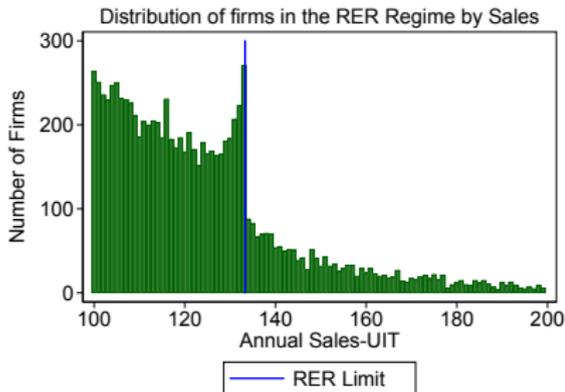
[MYPE regime](#)

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Data Analysis – Some Evidence from Peru

Transition from “Régimen Especial de Impuesto a la Renta” (RER) to Régimen General (RG)

Firms with more than 20 are required to distribute between 5% to 10% of profits with their workers



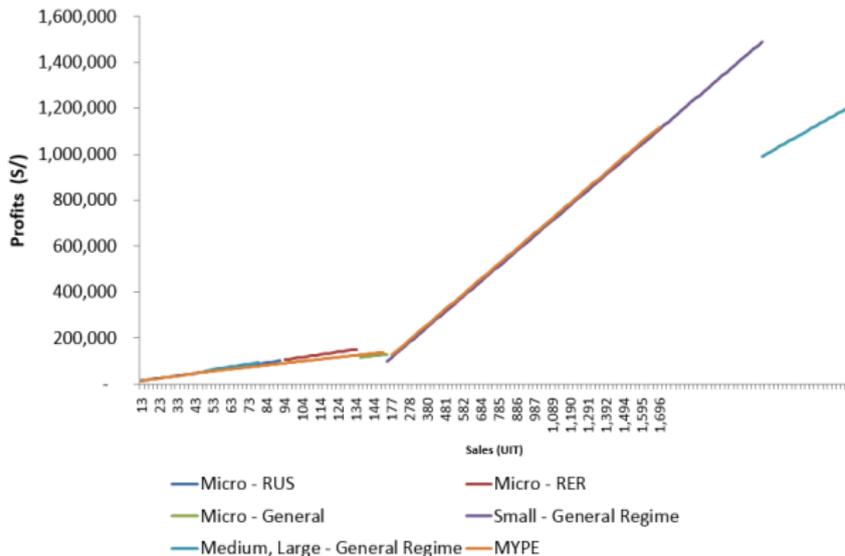
RER: 1.5% tax rate on net income

General Regime: Tax rate of 28% on profits

Source: LMK, FMM joint work with SUNAT (2017) data

MYPE regime

Predicted Profits of Firm according to Labor and Tax Regime



1 UIT=3,950 S/. 1 S/=0.31 US\$

MYPE: 10% corporate tax on first 15 UIT. 29% for each additional UIT beyond 15.

Special Tax Regime	Requirements	Income or Profit Tax
Régimen Único Simplificado (RUS)	Gross annual income < S/360,000 All activities should be done in only one establishment Assets value < S/. 70,000 Acquisitions of goods and services < S/. 360,000	Monthly payment depending on value of sales. From S./20 until S./600.
Régimen Especial Impuesto a la Renta (RER)	Net annual income < S/. 525,000 Assets </.s 126,000 Workers < 10	1.5% over net monthly incomes
Régimen General		29.5% tax rate over profits
Régimen MYPE*	Annual sales < 6'885,000	Profit tax rate of 10% until 10 UIT** Profit tax rate of 29.5% for each UIT exceeding 10 UIT**

*Regime introduced in 2017

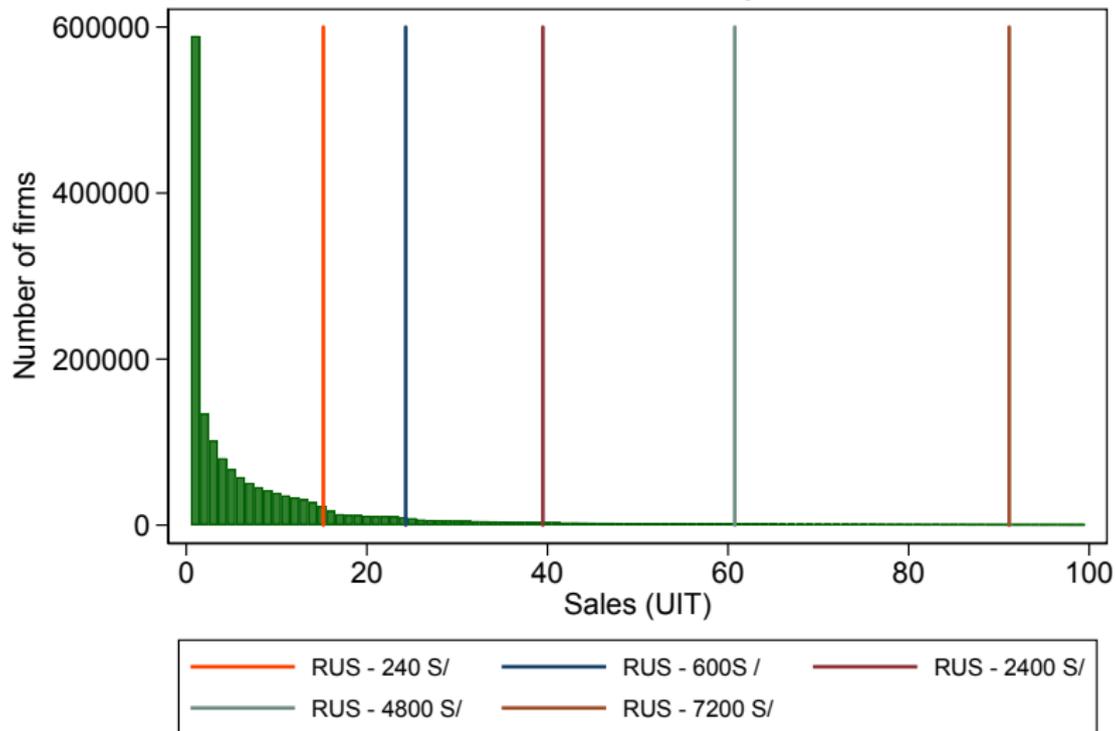
** 1 UIT=4,050 in 2017

[Back](#)[Details of Labor regimes](#)

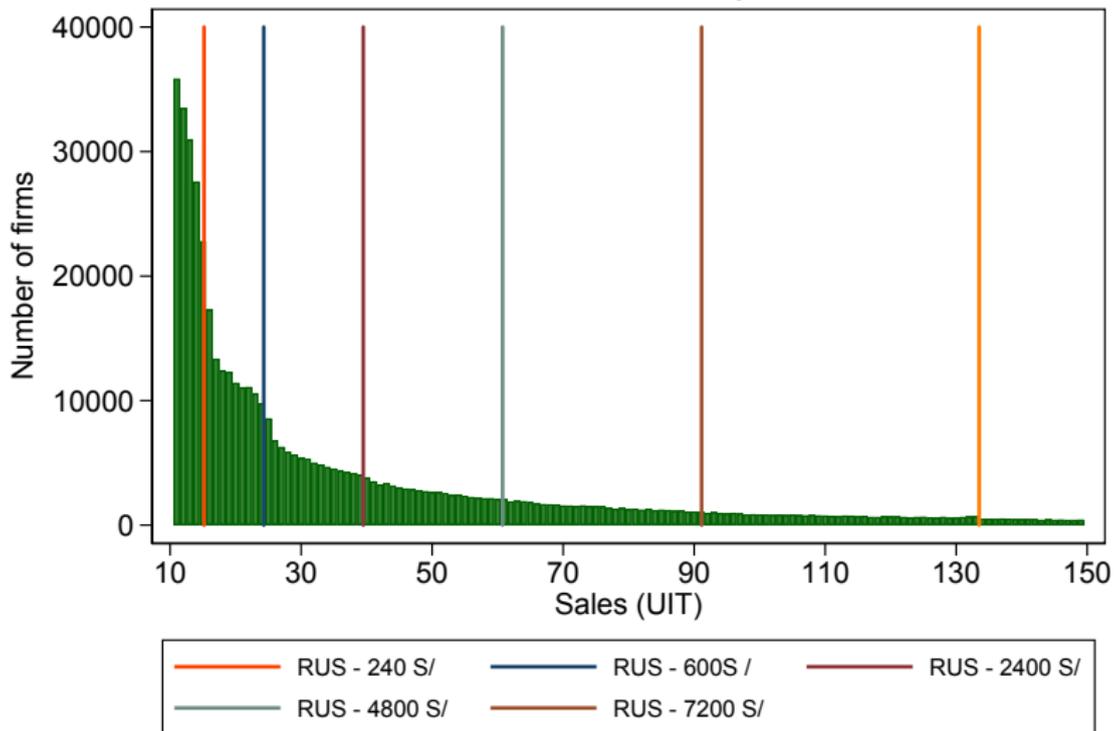
Concept / Regime	General	Pequeña	Micro
Holidays	30 calendar days	15 calendar days	15 calendar days
Extra-hours	Extra 35% 10:00pm - 6:00am	Extra 35% 10:00pm - 6:00am	No
Gratificaciones	Two extra wages a year	Two extra wages a year	No
Health Insurance	9% payed by employer	9% payed by employer	No
Firing cost	Up to one year of compensation	Up to 0.5 years of compensation	Up to 90 days of compensation
Asignacion Familiar	Yes	No	No

[Back](#)

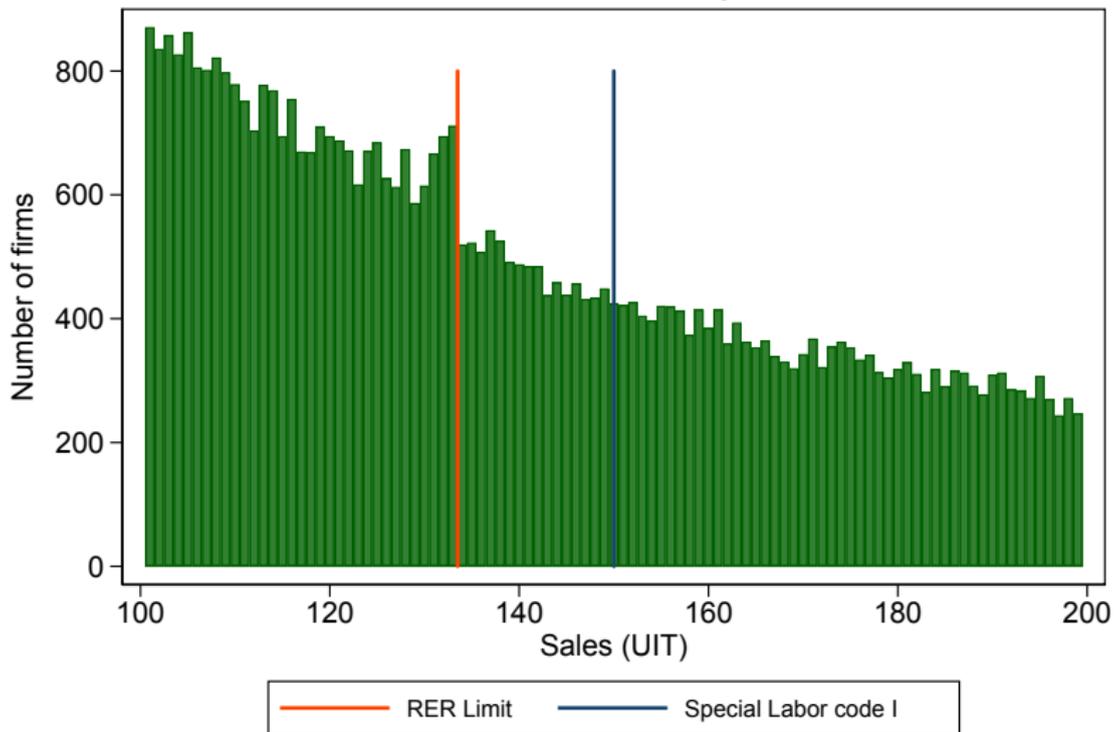
Distribution of total firms by annual sales



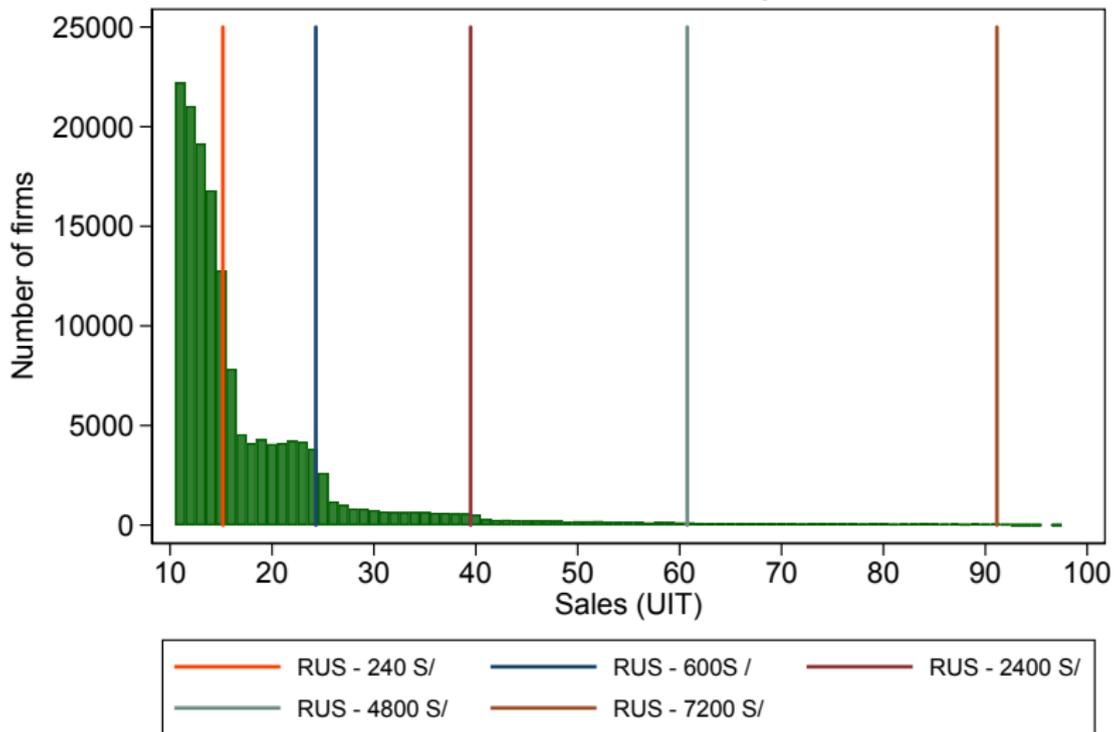
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