Good Firms, Bad Policies:

The Dynamics of Informality and Policy in Shaping Economic Growth

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Motivation

- **Regulations** are common policy tools
  1. Promoting employee protection
  2. Protection of strategic industries
  3. Supporting small firms.

- A particular class of policies: **Size-dependent** regulations:
  1. Slows down **firm growth**, Aghion et al (2023).
  2. Act as a tax for larger firms, Garicano et al (2016).
  3. Increase in **informal employment**, Dabla-Norris et al. (2018).

Research Question

- How do **size-dependent** policies affect **firm dynamics** in an economy with an **informal** sector?
  1. Firm **growth**
  2. Productivity dynamics
  3. Share of **informality**

- **Regulations** to firms with over 50 employees in Turkey
  1. Hiring disabled workers and ex-victims.
  2. Health and safety board.
  3. Physician, health unit and safety specialist.
  4. More frequent government inspection

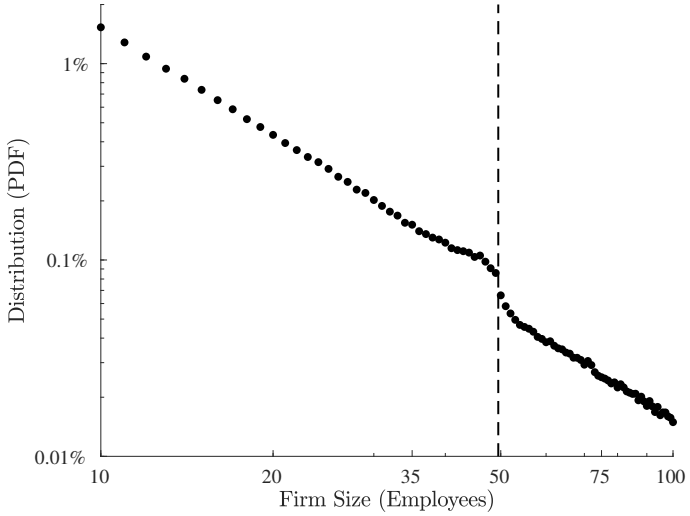
This Paper

- Build a general equilibrium of **firm dynamics** model with:
  1. Firm heterogeneity.
  2. **Size-dependent** regulations.
  3. **Informality**.
- Calibrate the model to Turkish data.
  1. Sales **Growth**
  2. **Informality**
  3. Bunching
- Counterfactual exercises.
  1. Welfare implications.
  2. Role of **informality** and firm heterogeneity.

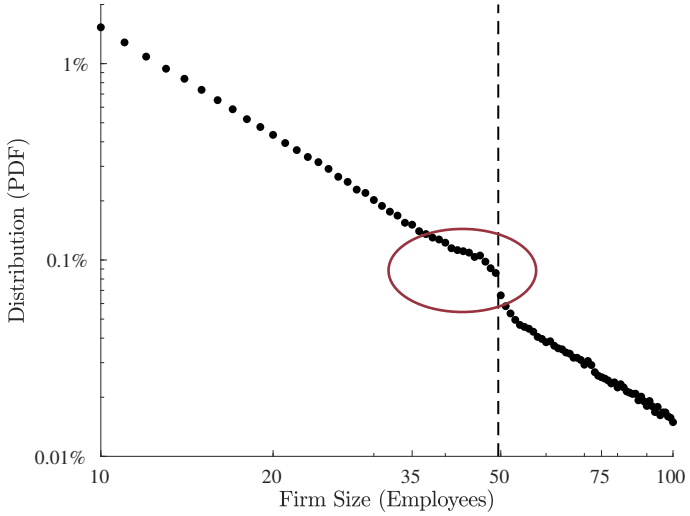
Preview of the Results

- **Size-dependent policies** reduce incentives to **grow** near the threshold.
  1. Mainly affects firms with high **growth potential**.
  2. Lower aggregate **productivity growth**.
- Firms lean more **informality** near the policy threshold:
  1. Bunching below the **policy threshold** in the firm size distribution.
  2. Permanent loss of mass after **policy threshold**.
- **Size-dependent policies** have a negative effects on welfare.
  1. Mainly driven by heterogeneity in **growth** potential.
  2. **Informality** gives firms an alternative to **grow** and dodge the **tax**.

Firm Size Distribution



Firm Size Distribution



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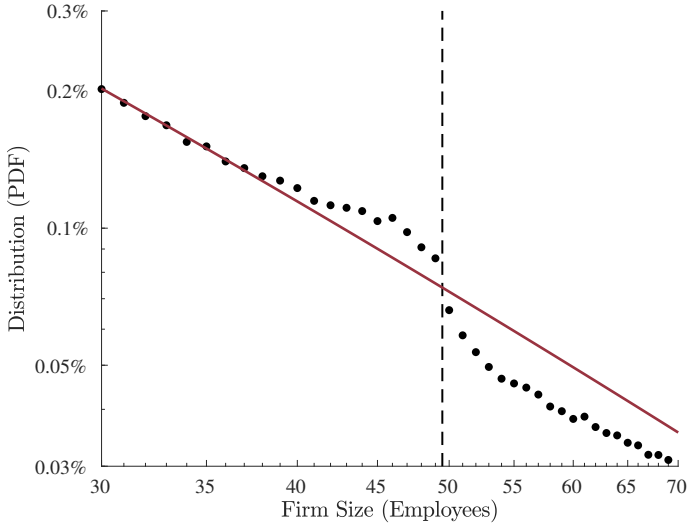

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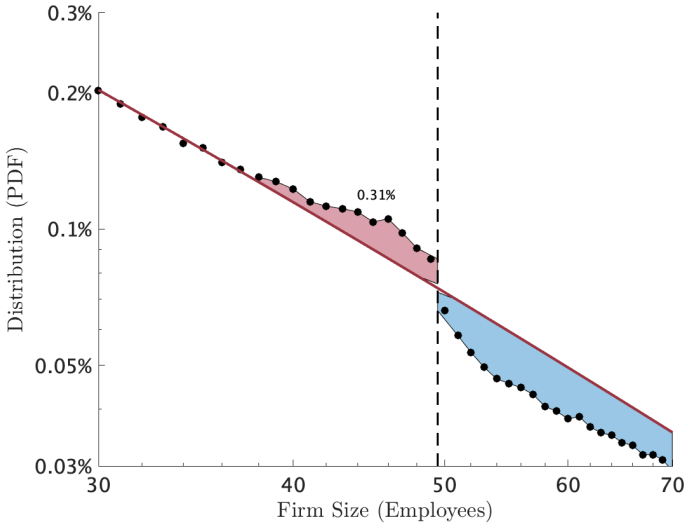
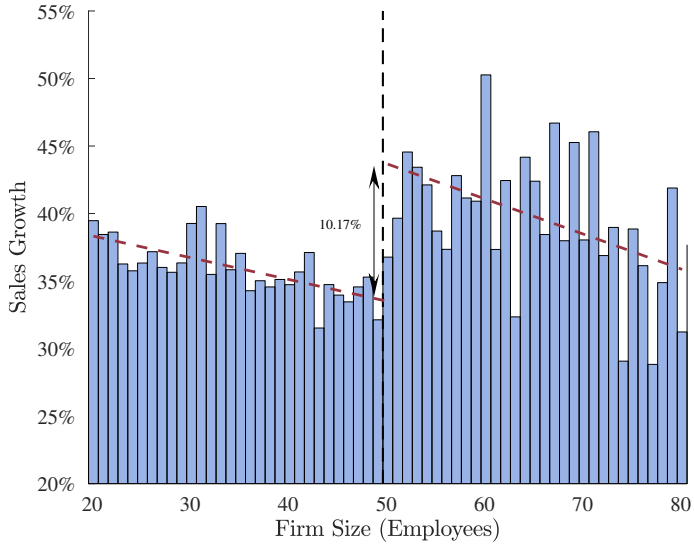
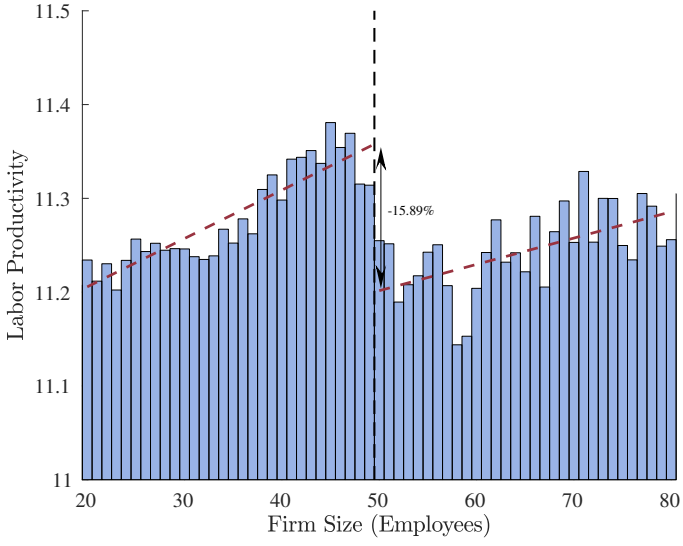


Firm Growth


55%
50%
45%
40%
35%
30%
25%
20%
Sales Growth
10.17%
20
30
40
50
60
70
80
Firm Size (Employees)

Labor Productivity



Model Overview

- **Firms dynamics** embedded in endogenous growth a la Klette & Kortum (2004)
  - Firm level investment decision to **grow**.
  - Competition between incumbents and entrants.
  - Heterogeneity in **growth** potential.

- **Size dependent distortion**
  - Extra tax for "large" firms.

- **Informality**
  - Taxation is avoided through **informality**.
  - **Informality** is monitored by the government.

Basic Set-up

- The final good is aggregated with technology:

$$\ln(Y) = \int_0^1 \ln(y_j)dj,$$

- Each intermediate good is produced by a firm with technology, $y_j = q_j l_j$
- Limit pricing: $p_i = mc_{fringe} = \frac{w}{\frac{q_i}{\lambda}}$
- Profits $\pi = (1 - \frac{1}{\lambda})Y$
- Labor $l_j = \frac{1}{\omega\lambda}$, $\omega = \frac{w}{Y}$
- A firm is a collection of products
  - Investment to capture other product lines by improving their productivity.
  - Shrinks due to other firms' investment.

Firms and Regulations

- Firms can have **formal** and **informal** product lines (workers).
  - Pay a tax τ for **formal** product lines.
  - No tax for **informal** product lines.
- **Size dependent tax** s: Extra tax for $n_f \geq \bar{n}$.
- The profits of a firm with n_f **formal** and n_i **informal** product lines are

$$\Pi(n_i, n_f) = \begin{cases} (1-\tau)\pi n_f + n_i \pi & \text{if } n_f < \bar{n} \\ (1-\tau-s)\pi n_f + n_i \pi & \text{if } n_f \geq \bar{n} \end{cases}.$$

- Government auditing for **informality**.
  - Informal product lines are lost with rate

$$\kappa(n_i, n_f) = \kappa_1 n_i^{\alpha} + \mathbb{1}_{\{n_f \geq \bar{n}\}} \kappa_2 n_i$$

Dynamics

- Firms are heterogeneous in their **growth potential** $\theta \in \{\theta^h, \theta^l\}$:
  - High efficiency $\Longrightarrow$ High **productivity of expansion**.
  - θ^h becomes θ^l at a rate ϕ.
  - By spending R (of final good), **firm expands** at the rate
$$x(\theta) = \theta R^{\eta}(n_i + n_f)^{1-\eta}$$

- Firms dynamics:
  1. Expands to a new product line at a rate $x_n(\theta^i)$ (endogenous).
  2. Choose the new product line as **formal/informal**.
  3. Lose any product line at a rate γ (creative destruction).
  4. Lose **informal product line** at an additional rate
$$\kappa(n_i, n_f) = \kappa_1 n_i^{\alpha} + \mathbb{1}_{\{n_f \geq \bar{n}\}} \kappa_2 n_i$$

.

Value Function

The value function for a firm of type $k \in \{l, h\}$

$$\begin{aligned}\rho V_k(n_i, n_f) = \max_x \Bigg\{ & \Pi(n_i, n_f) - N \left[\frac{x}{\theta^k}\right]^{\frac{1}{\eta}} \\ & + Nx \left(\max\left\{V_k(n_i + 1, n_f), V_i(n_i, n_f + 1)\right\} - V_k(n_i, n_f)\right) \\ & + \phi \left(V_l(n_i, n_f) - V_h(n_i, n_f)\right) \mathbb{1}\{k = h\} \\ & + n_i \left(\gamma + \kappa(n_i, n_f)\right) \left(V_k(n_i - 1, n_f) - V_k(n_i, n_f)\right) \\ & + \gamma n_f \left(V_k(n_i, n_f - 1) - V_k(n_i, n_f)\right) \Bigg\}\end{aligned}$$

where $N = n_i + n_f$.

Data

- We use firm level data from Turkey to calibrate the model.
  1. Entrepreneurship Information System (EIS) data from Turkish Ministry of Industry and Technology.
  2. Time span 2010-2016.
  3. Finance and public sectors are excluded from the EIS.
- We use the Labor Force Survey (L.F.S) to get informality estimates.

Identification

- Our model has 13 parameters

$$\Omega \equiv \{\underbrace{\tau, s, \kappa_1, \kappa_2, \alpha}_{\text{Regulations}}, \underbrace{\theta^h, \theta^l, \eta, \delta, \theta_E, \phi}_{\text{Firm dynamics}}, \underbrace{\lambda, \rho}_{\text{Macro}}\}.$$

  We fix $(\lambda, \rho, \alpha, \eta)$ and calibrate the remaining 9 parameters.

- We target 16 moments in the data.

  1. Firm Size Distribution
  2. Informality
  3. Bunching
  4. Sales Growth

Using bunching in calibration

- Constrained OLS

$$\ln(\mu(n)) = \beta_0 + \sum_{m=1}^{p} \beta_m \ln(n)^m + \sum_{m=0}^{q} \alpha_m \mathbb{1}_{\{n \geq \bar{n}\}} \ln(n)^m + \sum_{m=n^-}^{\bar{n}-1} \delta_m \mathbb{1}_{\{n=m\}} + \varepsilon.$$

  subject to

$$\beta_0 = -\ln\left(\sum_{n=1}^{\infty} \exp\left(\sum_{m=1}^{p} \beta_m \ln(n)^m\right)\right)$$

- Target the coefficients
  1. $\delta_{\bar{n}-2}$: Bunching.
  2. $\delta_{\bar{n}-1}$: Bunching.

Calibration

Table (1) Parameters

External Calibration					
Innovation Step Size	λ	1.2	Discount Rate	ρ	0.05
Convexity of expansion costs	η	0.5	Convexity of confiscation	α	2
Joint Calibration					
Formality Tax	τ	0.14	Size Dependent Tax	s	0.085
Expansion efficiency (High)	θ^h	0.678	Expansion efficiency (Low)	θ^l	0.394
Scale of confiscation rate	κ_1	0.01	Constant confiscation rate after threshold	κ_2	0.026
Share of high types	δ	0.326	Transition between types	ϕ	0.285
Entry Efficiency	θ_E	0.062			

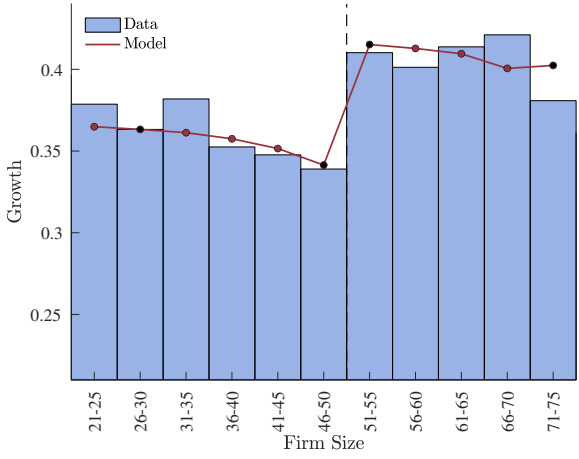
Goodness of fit

Table (2) Moments

	Model	Data
Share of Informality (%)	22.45	20.00
Share of Informality (%) (15,24)	17.74	16.83
Share of Informality (%) (50+)	2.81	5.25
Bunching (40-44)	0.10	0.13
Bunching (45-49)	0.12	0.20
Large Firms (+50)	2.50	2.40
Entry rate (%)	4.50	6.00
TFP Growth	2.16	2.65
Sales Growth	See Figure **??**	

Goodness of fit

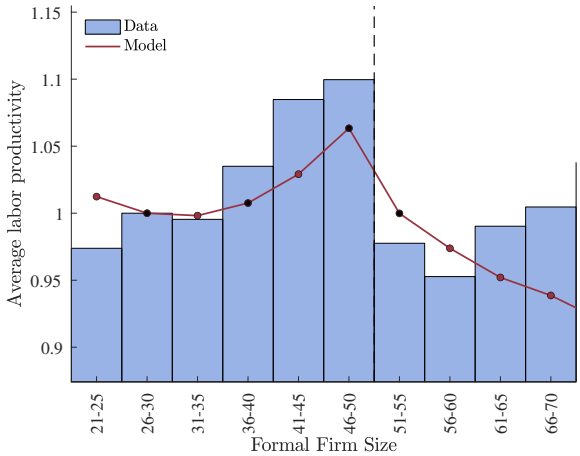
Figure (1) Growth by firm size



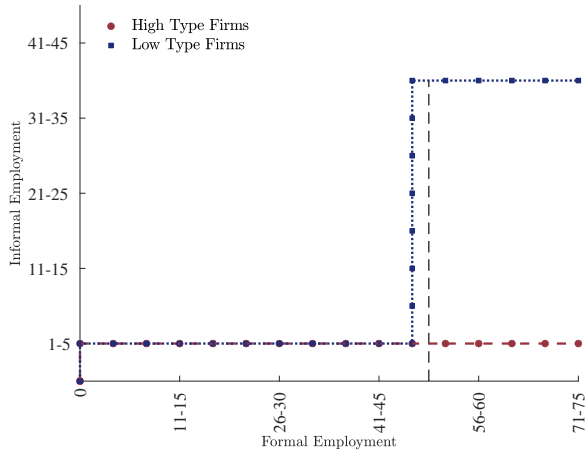
Labor Productivity

Non-targeted

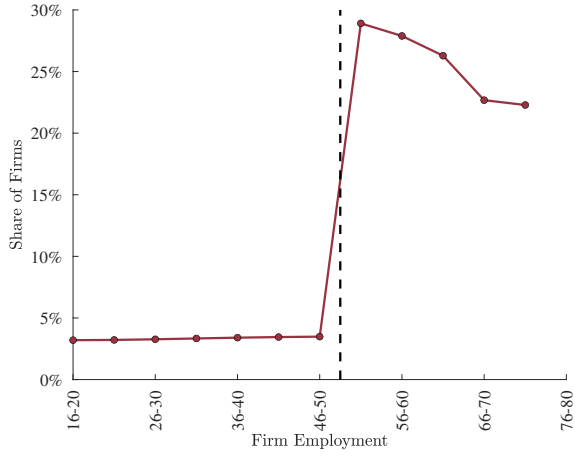
Figure (2) Labor Productivity by firm size



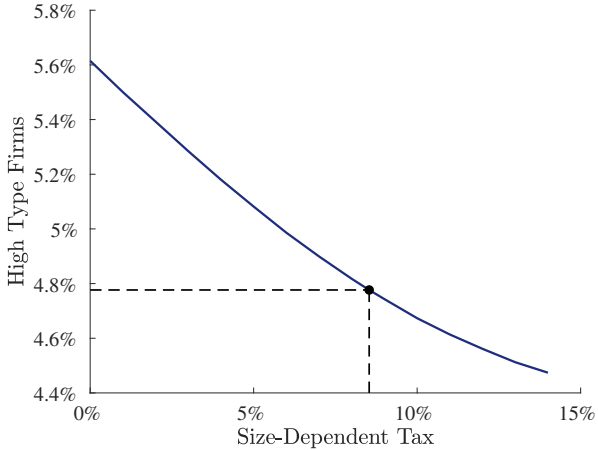
Life Cycle


High Type Firms
Low Type Firms
41-45
31-35
21-25
11-15
1-5
Informal Employment
0
11-15
26-30
41-45
56-60
71-75
Formal Employment

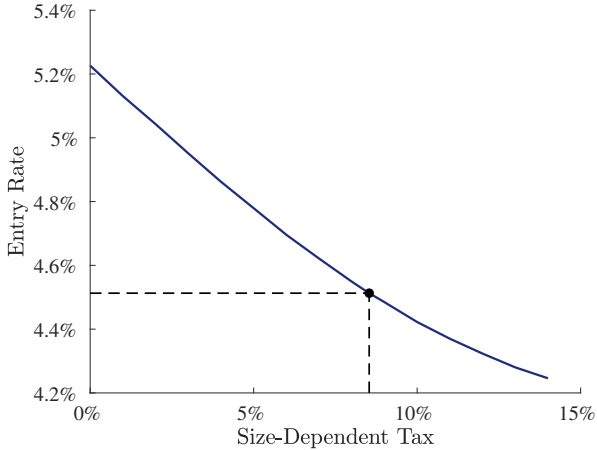
Share of High Type Firms



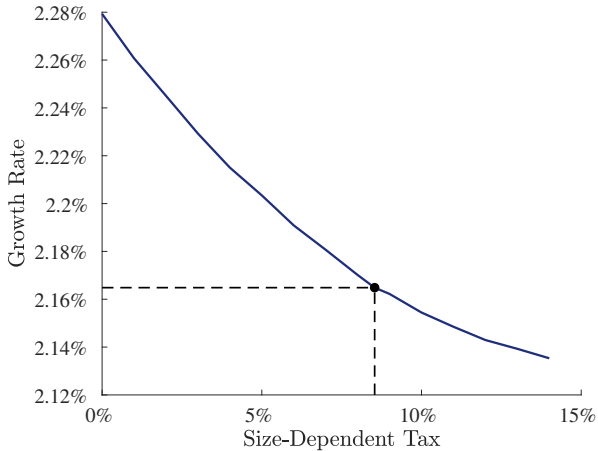
Size-Dependent Policies: Selection



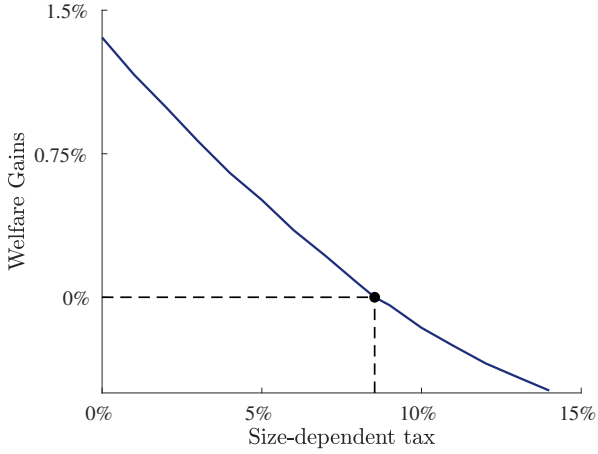
Size-Dependent Policies: Entry



Size-Dependent Policies: Productivity Growth



Size-Dependent Policies: Welfare



Taking Stock

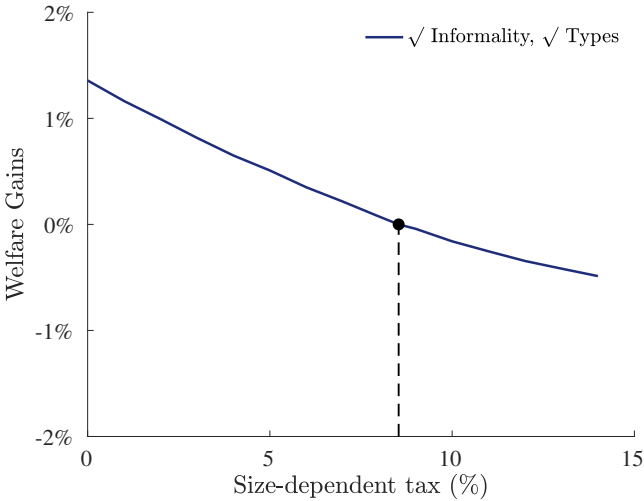
Without the size-dependent regulation:

- Share of High Types increases by 18.17%.
- Economic Welfare: increases by 1.4%.
- Share of firms with 50+ workers increases by almost 200%.
- Informality decreases by 23.5%
- Average Expansion Rate
  1. Increases by 9.63% for high types
  2. Decreases by 7.37% for low types

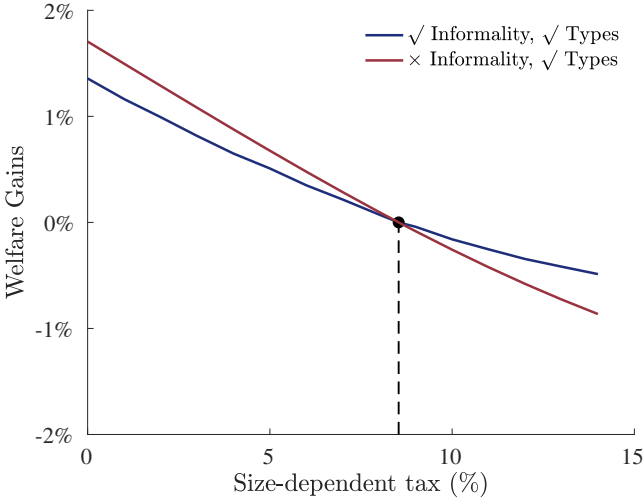
Decomposing the effect of s

- How much of the welfare effect is driven by types?
- What is the role of **informality**?
  1. Is **informality** good for the economy?
  2. How does **size-dependent** policies shape the incentives for **informality**?

Size-Dependent Policies on Welfare



Size-Dependent Policies on Welfare



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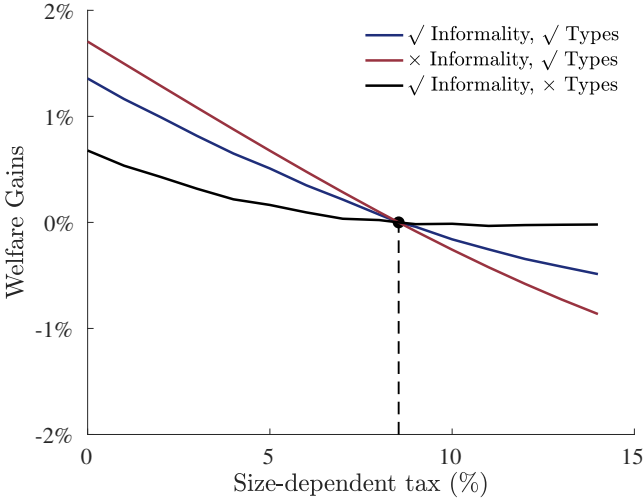

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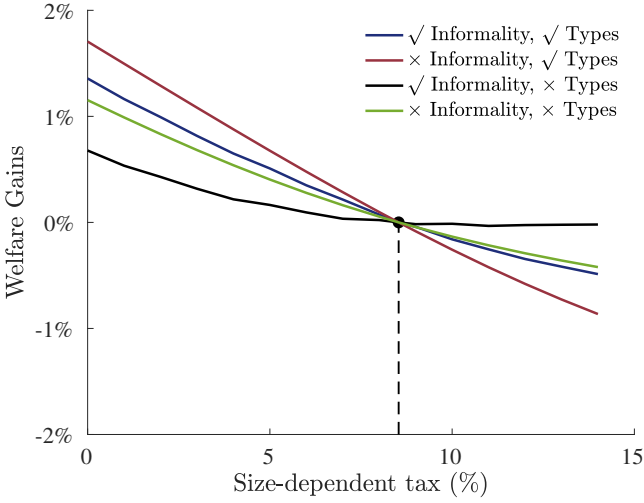

Conclusions

- What are the effects of **size-dependent** policies on the **firm dynamics**?
- We build an endogenous **growth** model with
  1. **Informality**
  2. Heterogeneous Firms
- **Size-dependent** policies have negative effects on economic welfare
  1. Slows down **growth** of firms.
  2. It tolls mainly firms with high **growth** potential
  3. The effect is even bigger when **informality** is shut down.
- **Size-dependent** policies incentives the use of **informality** for "big firms".

Thank you