The Plant-Level View of Korea's Growth Miracle

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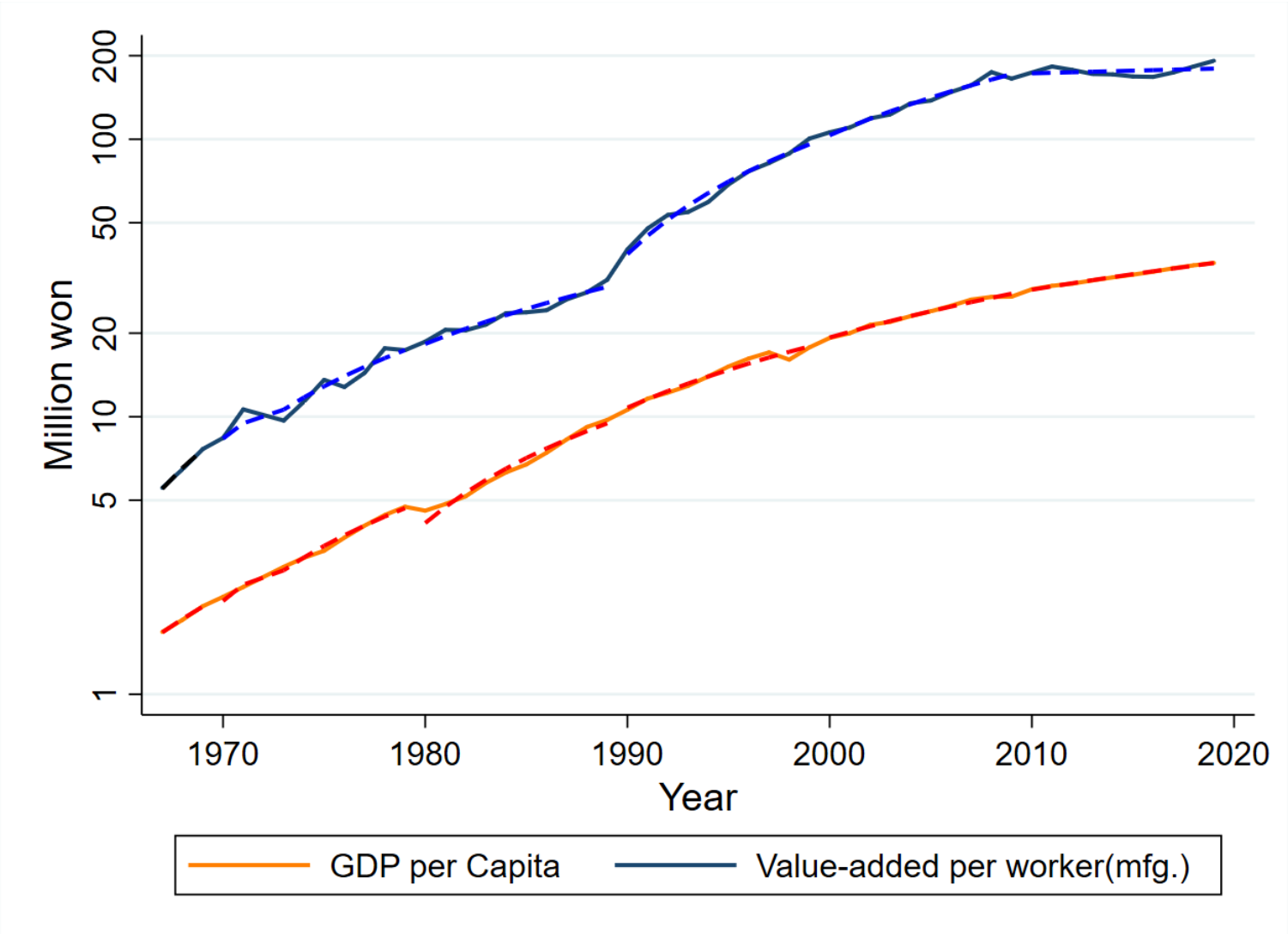
June 5, 2023

Introduction

- South Korea is one of the rare economies that went from poor to rich in one generation.
- Is there a systematic pattern at the micro-level behind the macro-level growth?
- Our findings
  1. No clear relationship between macro-level growth and the plant size distribution or static measures of allocative efficiency.
  2. Growth slowdown coincides with a reduction in dynamism.

Korea's Economic Miracle

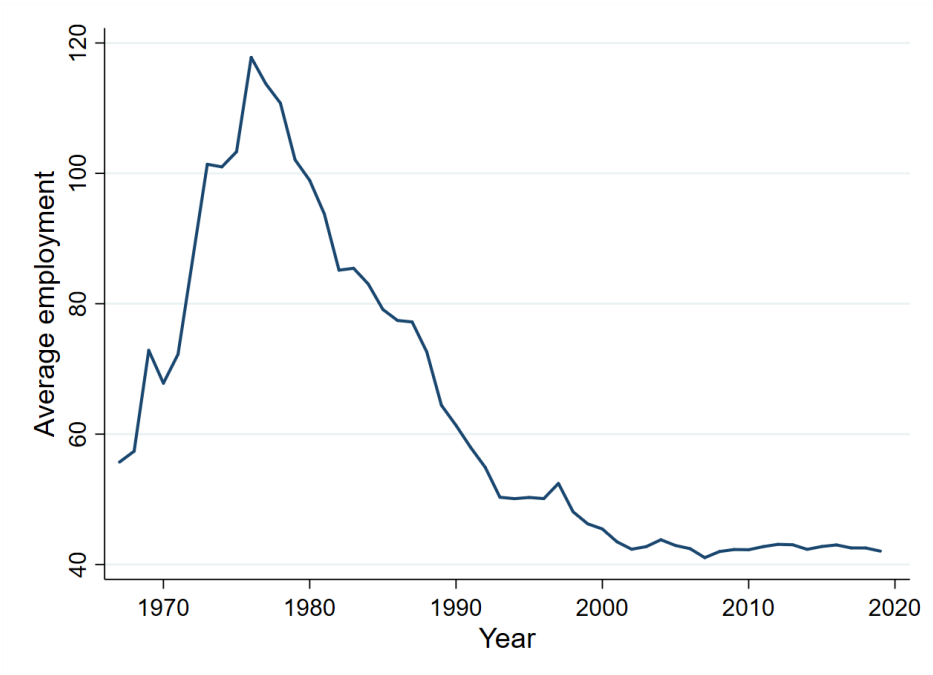


Note: GDP per capita is deflated by GDP deflator (2015=100), and value-added per worker is deflated by manufacturing industry deflator (2015=100).

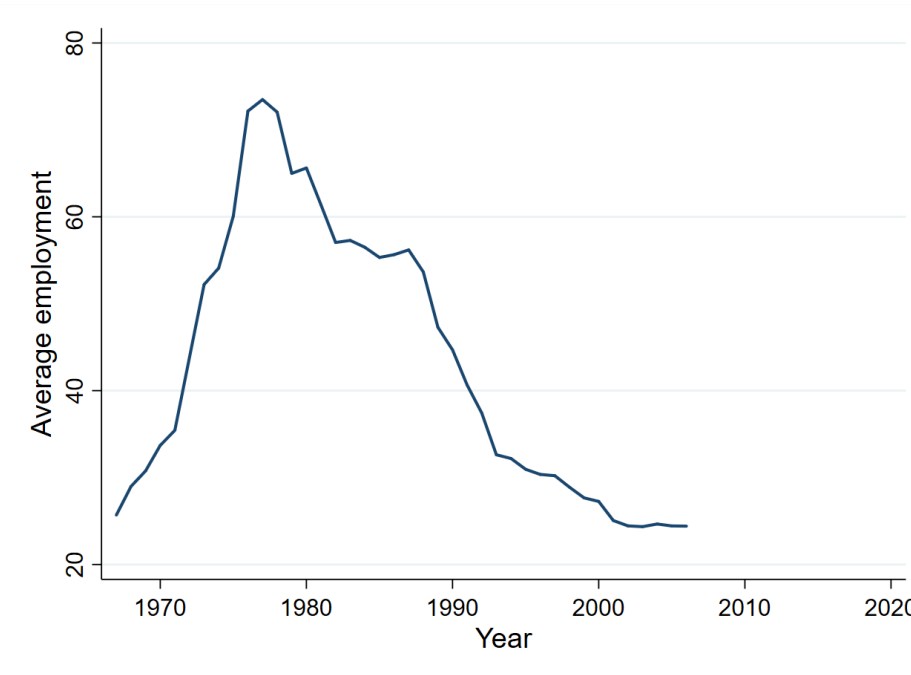
Data

- Newly digitized Mining and Manufacturing Survey (MMS), 1967-2019
- Advantages
  1. A unique source of plant-level data covering all plants with 5+ workers (10+ from 2007)
  2. Detailed information on input and output
  3. When aggregated, replicates aggregate statistics
- Limitations
  1. Panel dimension only after 1981
  2. Capital stock is available only in 1968 and after 1978

Plant Size Distribution (Number of Employees)

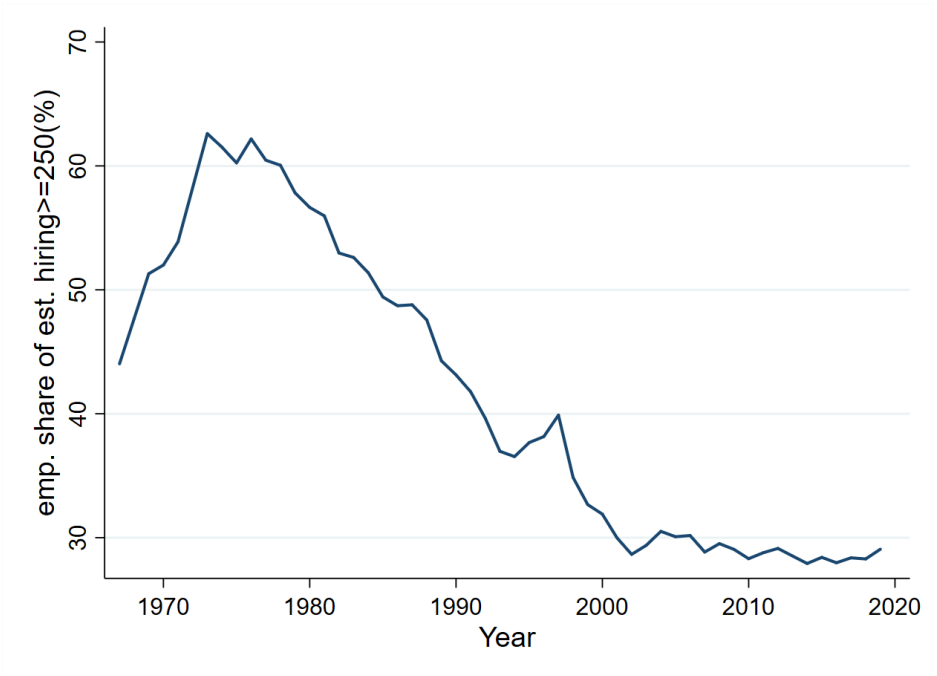


(a) Avg. of plants w/ 10+

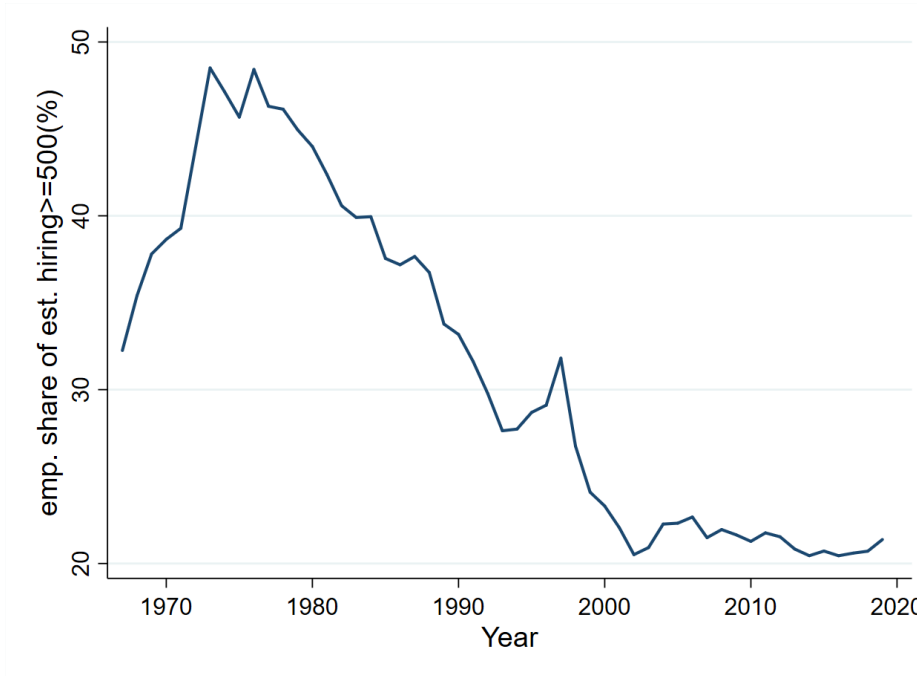


(b) Avg. of plants w/ 5+

Plant Size Distribution



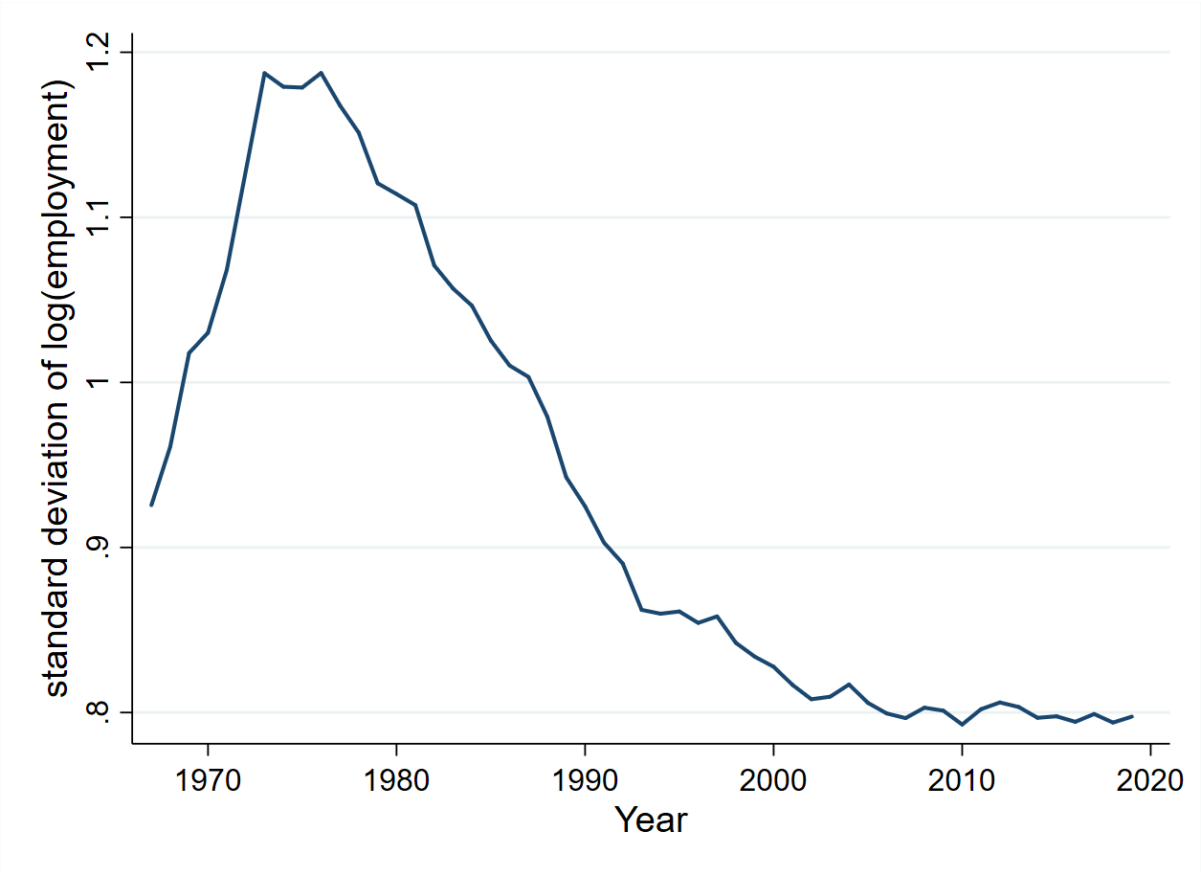
(a) Empl. share of plants w/ 250+



(b) Empl. share of plants w/ 500+

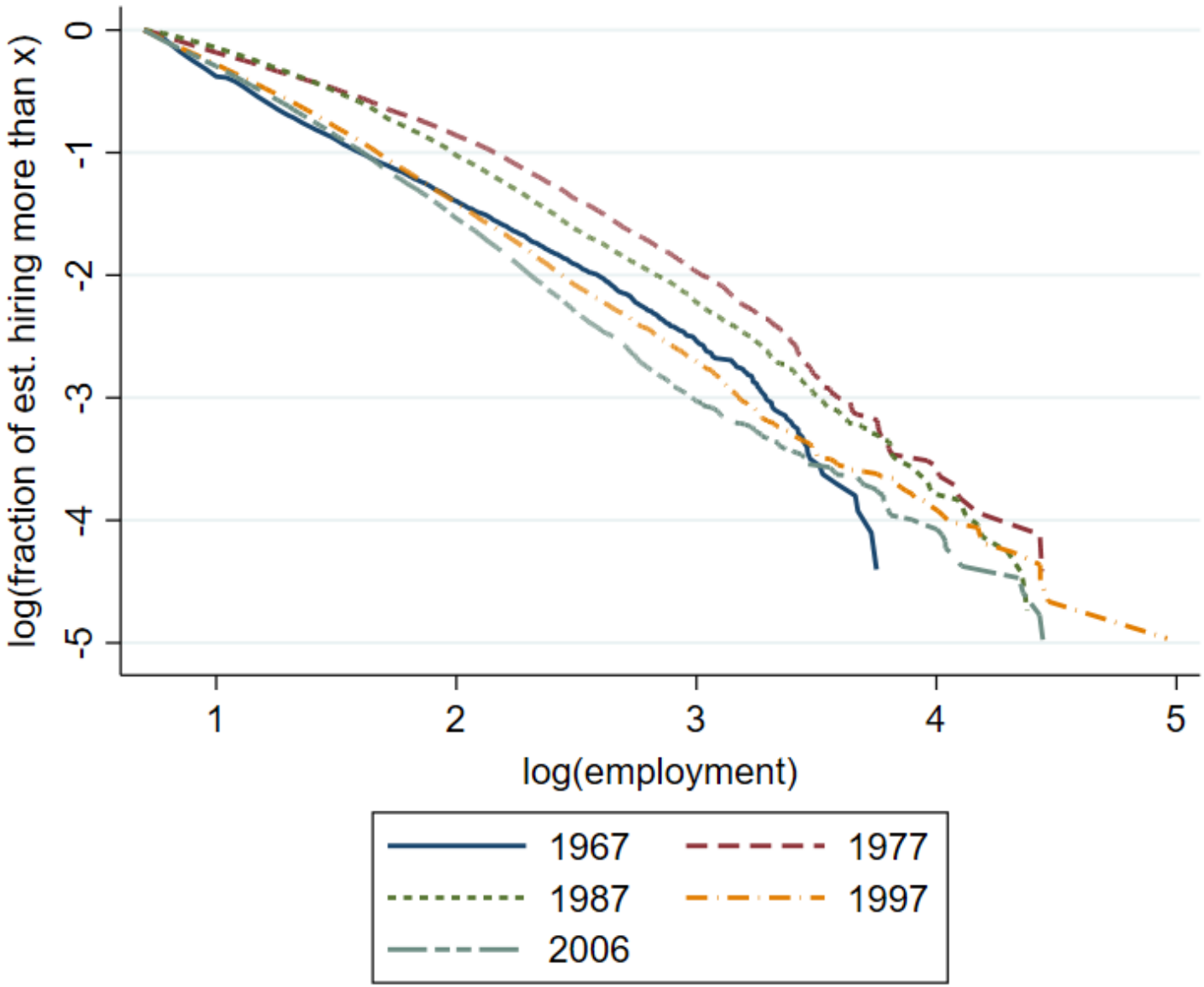
▸ Fraction of plants

Plant Size Distribution

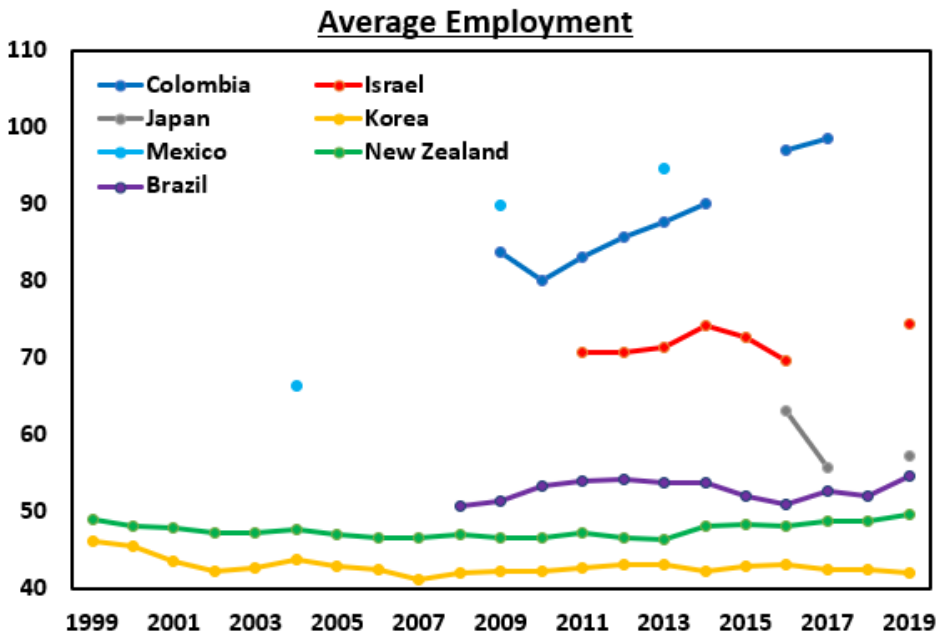


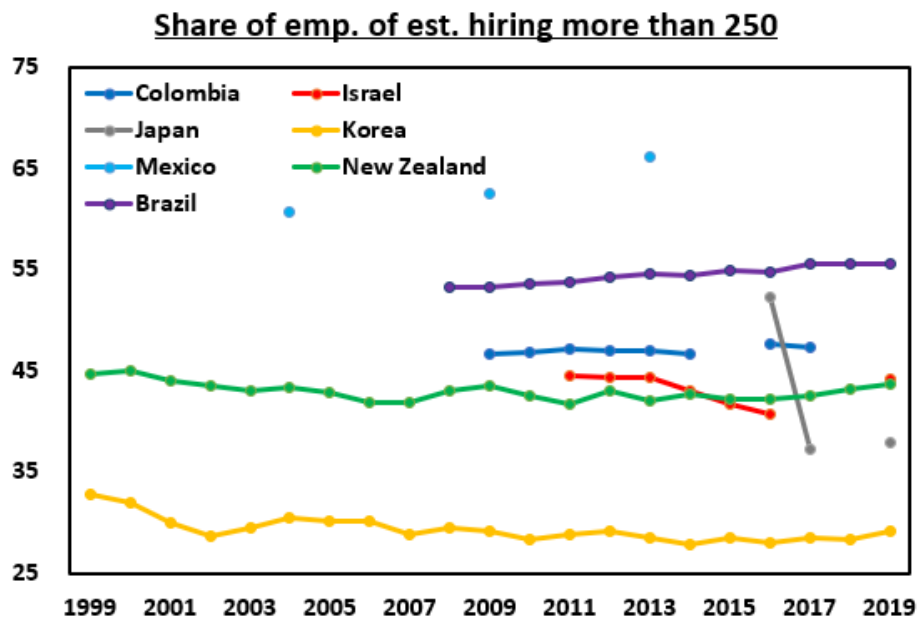
Standard deviation of log employment

Plant Size Distribution (Log-Log Plot)



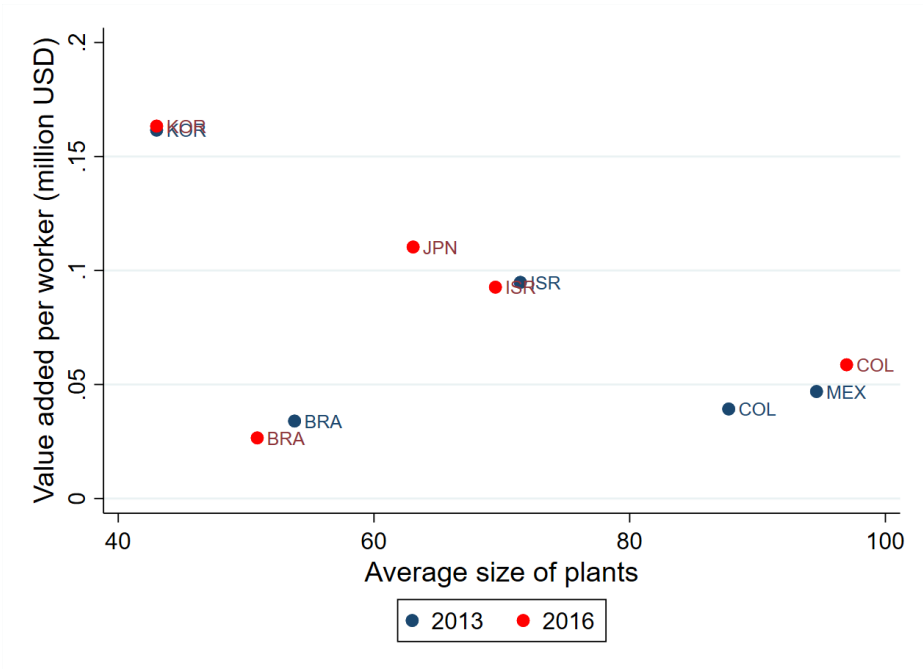
Plant Size: Comparison with Other Countries

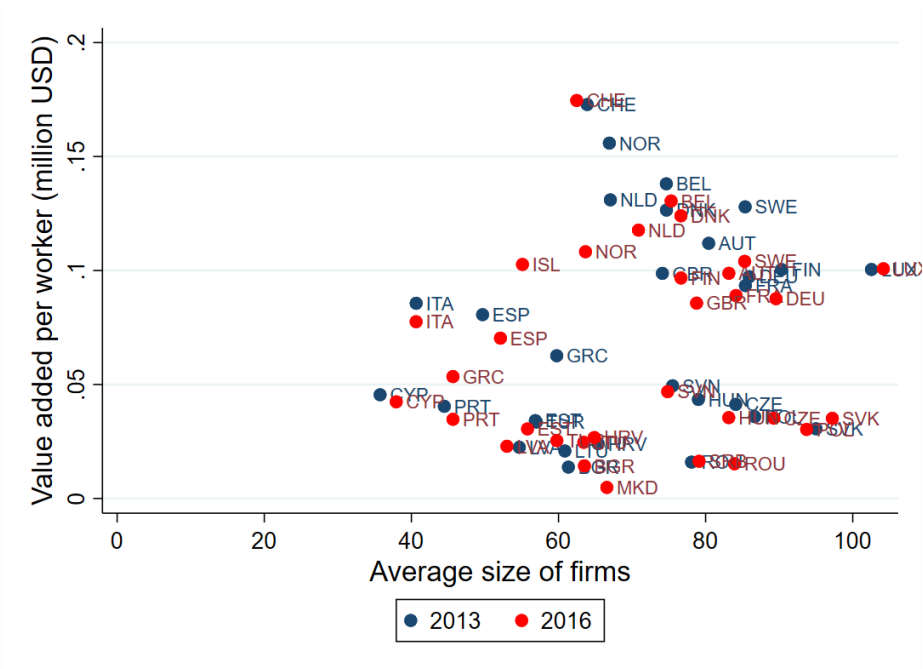




Source: Structural and Demographic Business Statistics (SDBS), OECD
Only plants hiring 10+ included for comparability

Plant/Firm Size and Labor Productivity





Source: Structural and Demographic Business Statistics (SDBS), OECD
Original data in local currency deflated by their own manufacturing deflator and converted into USD using the period-average exchange rate.

Allocative Efficiency

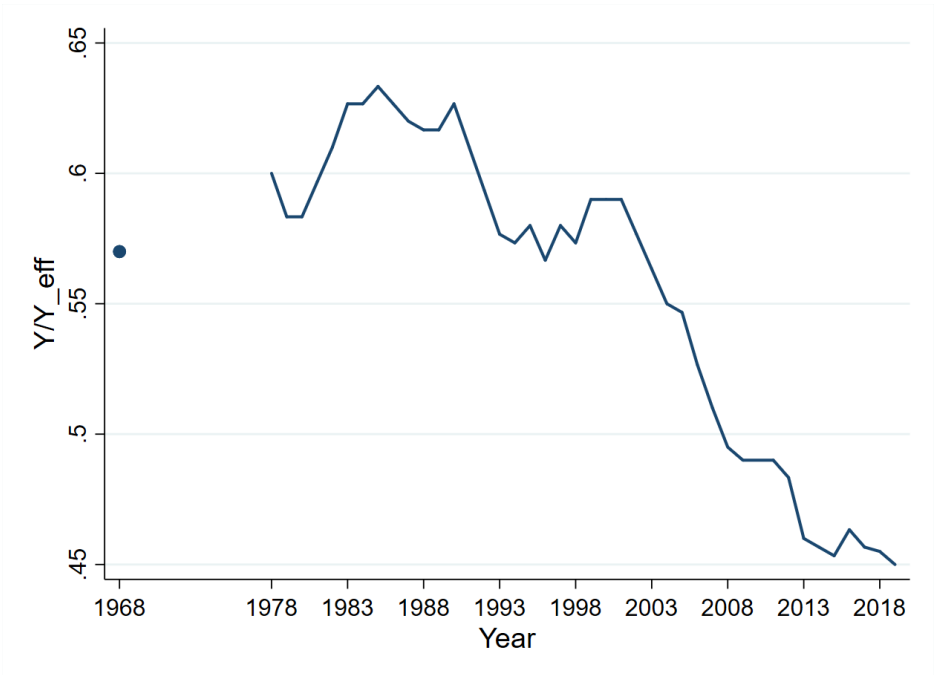
- Hsieh and Klenow (2009)'s methodology of measuring misallocation:

$$TFPQ_{si} = A_{si} = \frac{(P_{si} Y_{si})^{\frac{\sigma}{1-\sigma}}}{K_{si}^{\alpha_s} L_{si}^{1-\alpha_s}}$$

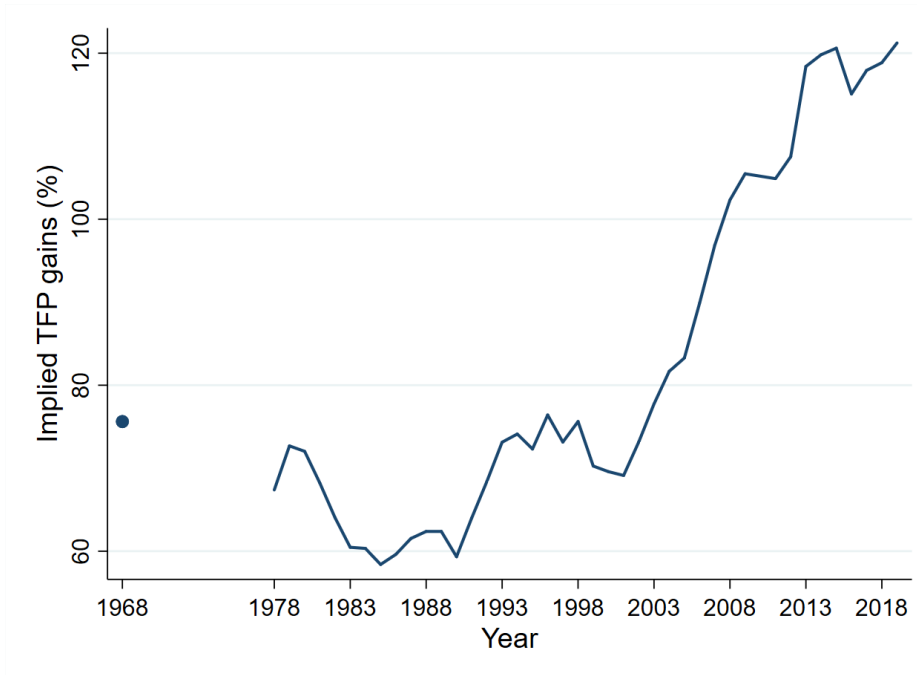
$$TFPR_{si} = P_{si} A_{si} = \frac{P_{si} Y_{si}}{K_{si}^{\alpha_s} L_{si}^{1-\alpha_s}}$$

- 4-digit level industries. Plants winsorized at 1 percent.

Allocative Efficiency

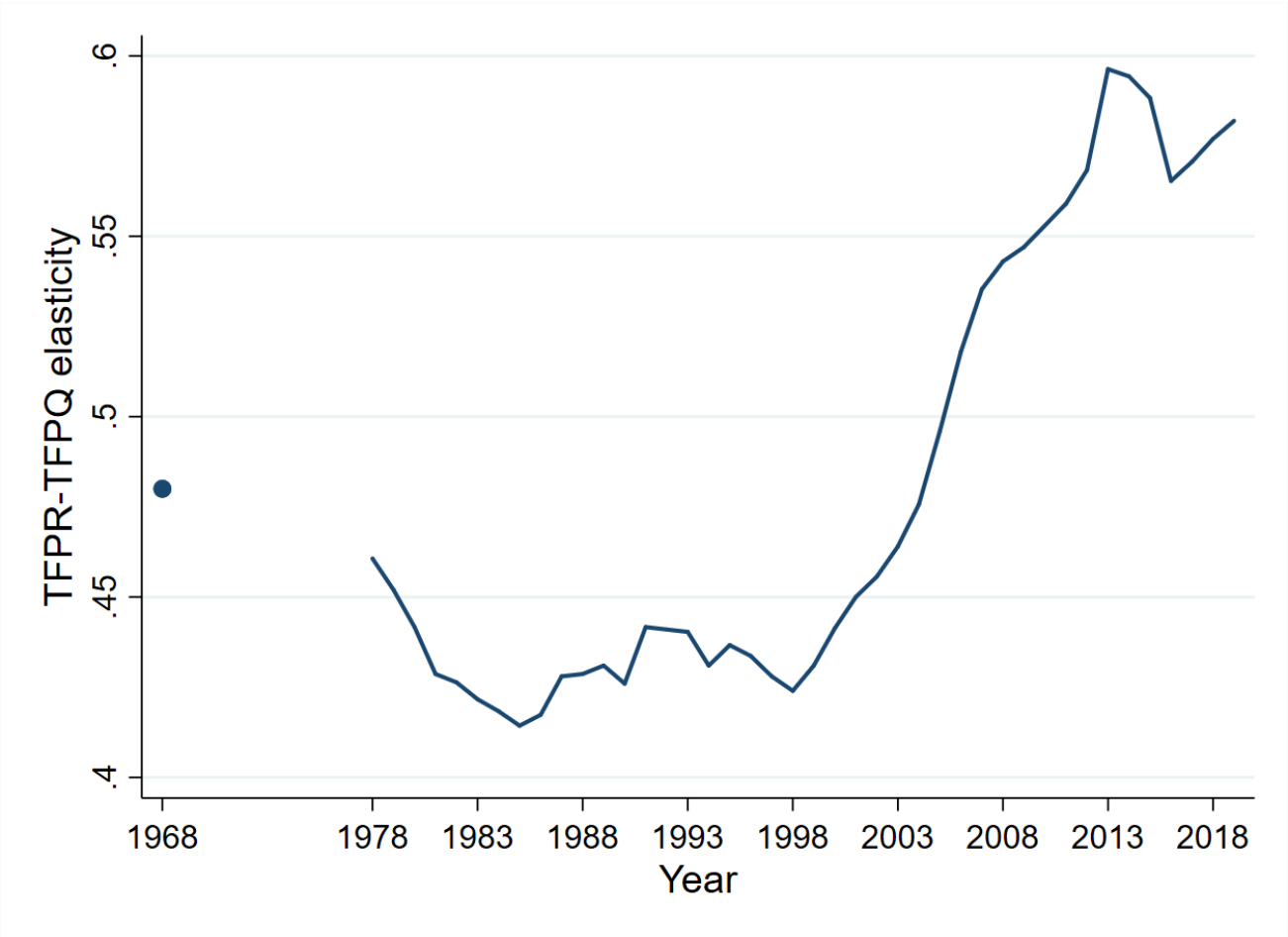


Y/Y_{eff}



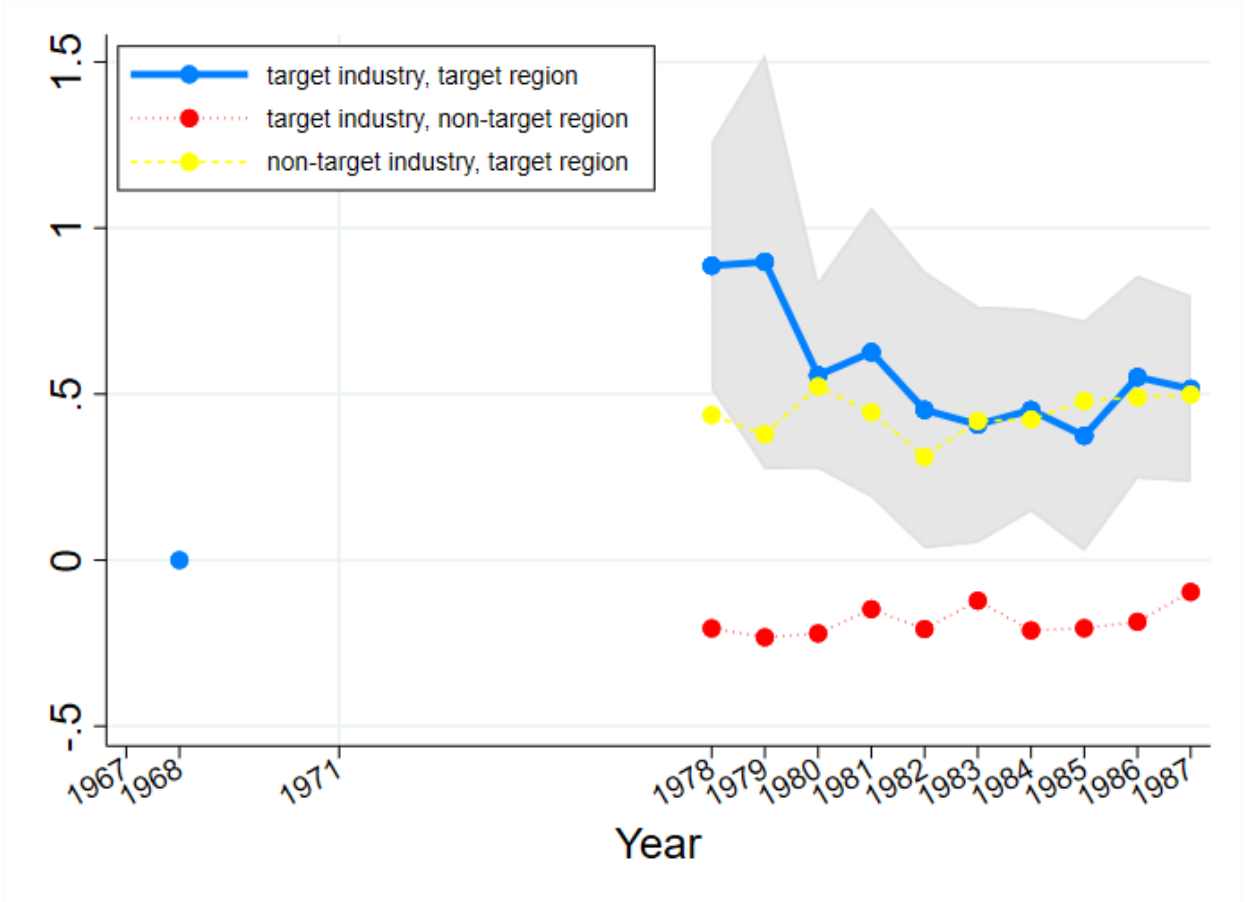
Implied TFP gain

Allocative Efficiency



TFPR-TFPQ elasticity

Allocative Efficiency



Distortion-TFPQ correlation

- Kim,Lee and Shin (2022) shows misallocation across plants within targeted industries/regions got worse during the HCI project (1973-79).

Dynamism 1: Churning

Average size

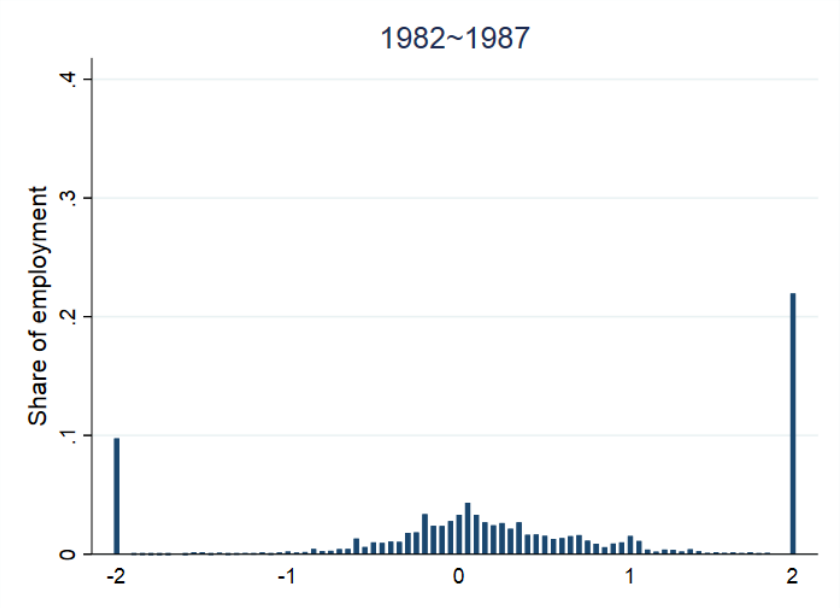
Divided by avg. size of incumbents

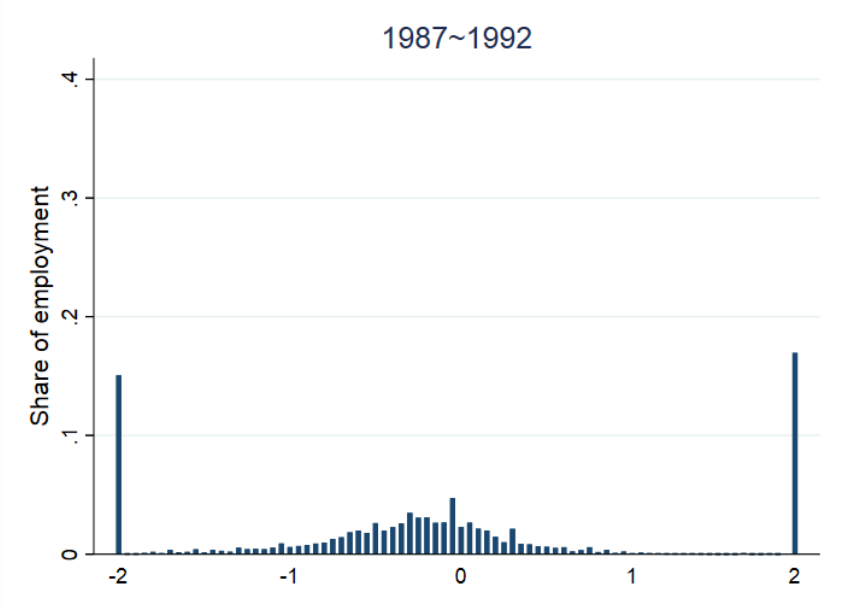
Dynamism 1: Churning

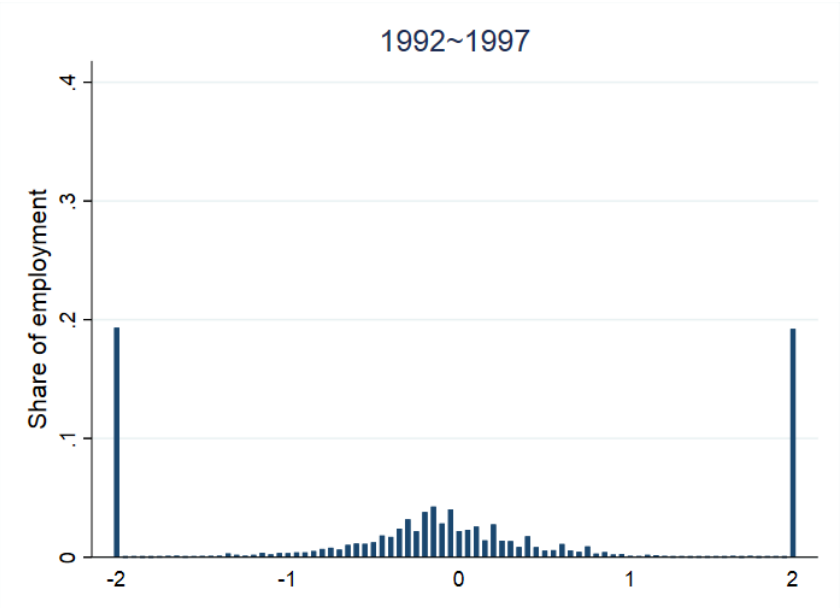
- We calculate the Davis/Haltiwanger/Schuh growth rates of employment (5 years windows)
  - DHS growth rates: $g_{i,t1} = \frac{emp_{i,t1} - emp_{i,t0}}{0.5 \times emp_{i,t1} + 0.5 \times emp_{i,t0}}$

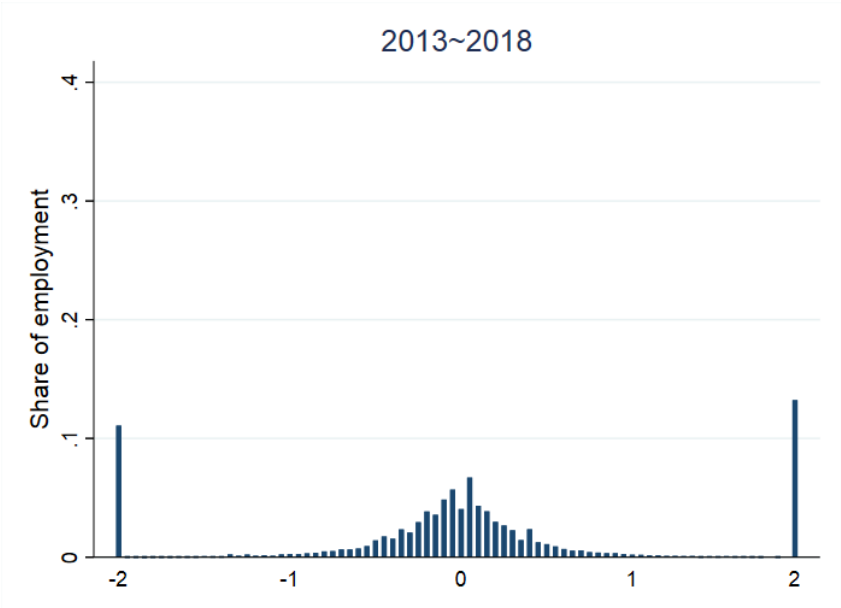
Dynamism 1: Churning

▸ Other years









Dynamism 2: Responsiveness to Productivity

- We estimate the responsiveness of businesses to shocks following Decker, Haltiwanger, Jarmin and Miranda (2020).
- $g_{jt+1} = \beta_0 + \beta_1 a_{jt} + T(a_{jt}, t) + \beta_2 e_{jt} + T(e_{jt}, t) + X'_{jt}\Theta + \varepsilon_{jt+1}$
  - g is DHS employment growth, a is log productivity, e is log employment, and X is other controls
- We also used investment as a dependent variable.

Dynamism 2: Responsiveness to Productivity

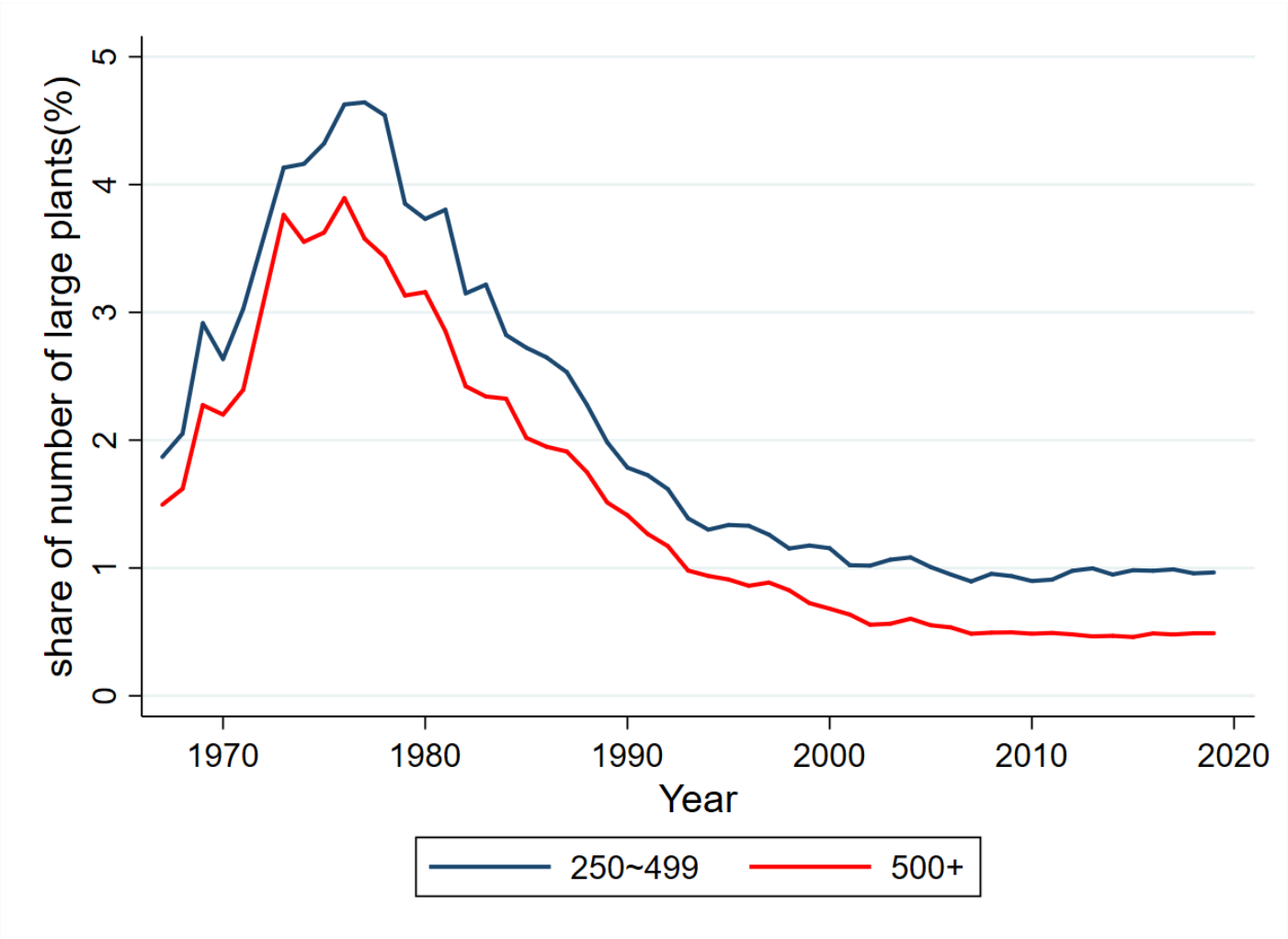
	Employment growth		Capital growth	
Productivity: β_1	0.0274^{***}		0.2000^{***}	
	(0.0047)		(0.0082)	
prod$\times$trend: δ	-0.0003		-0.0038^{***}	
	(0.0002)		(0.0003)	
prod$\times$1980s: λ_{80s}		0.0199^{***}		0.1835^{***}
		(0.0046)		(0.0087)
prod$\times$1990s: λ_{90s}		0.0278^{***}		0.1508^{***}
		(0.0057)		(0.0097)
prod$\times$2000s: λ_{00s}		0.0239^{***}		0.1069^{***}
		(0.0051)		(0.0064)
prod$\times$2010s: λ_{10s}		0.0135^{***}		0.0758^{***}
		(0.0056)		(0.0051)

Taking Stock

1. No clear correlation between macro-level growth and the plant size distribution or static measures of allocative efficiency.
2. Growth slowdown coincides with a reduction in dynamism.
    - More data requirement for research
    - Identifying frictions and policy responses

Fraction of Large Plants

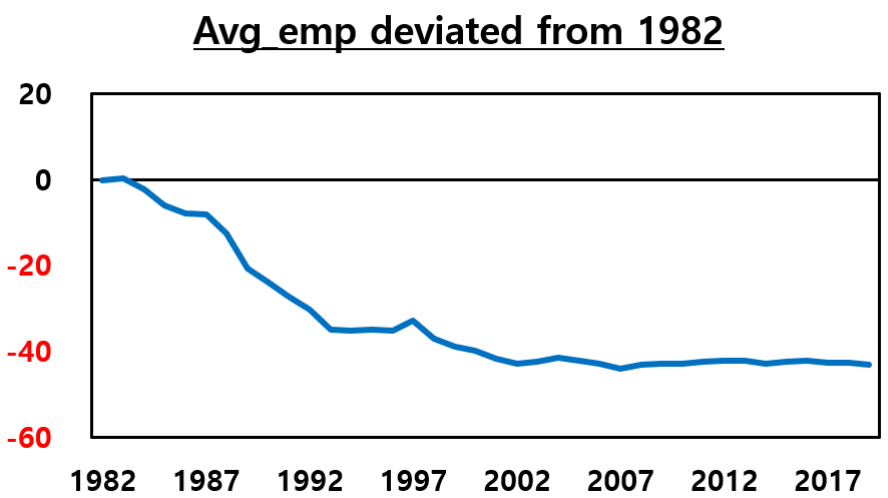
Back

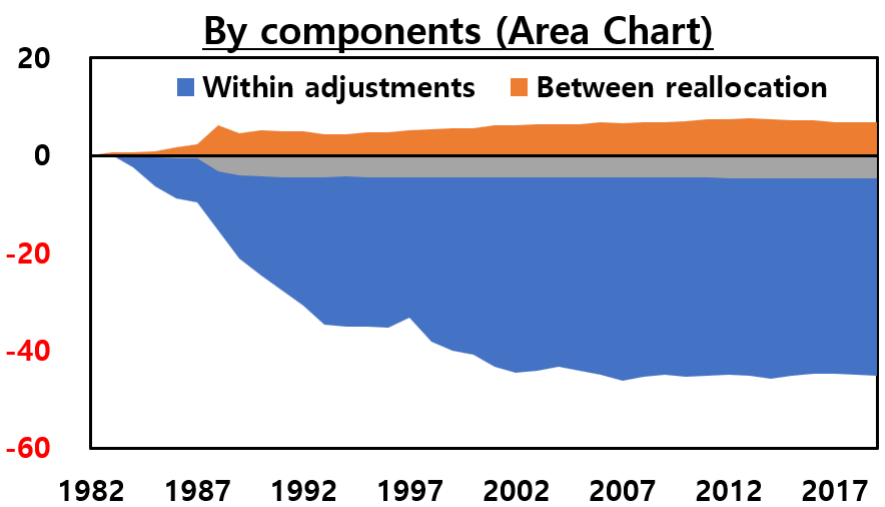


Size Distribution: Within vs. Between Industries

- m_t is aggregate average employment defined as the weighted sum of each industry's average employment:
  - $m_t = \sum_i w_{i,t} m_{i,t}$, where w_i is the employment share of industry i
- We can decompose m_t:
  - $\Delta m_t = \sum_i w_{i,t-1} \Delta m_{i,t} + \sum_i \Delta w_{i,t} m_{i,t-1} + \sum_i \Delta w_{i,t} \Delta m_{i,t}$
  - The first term is within adjustment, and the second term is between adjustment.

Size Distribution: Within vs. Between Industries

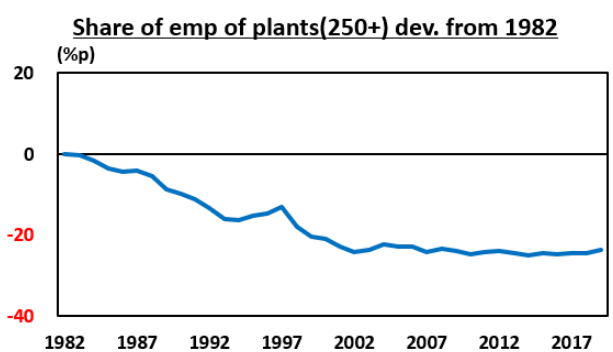


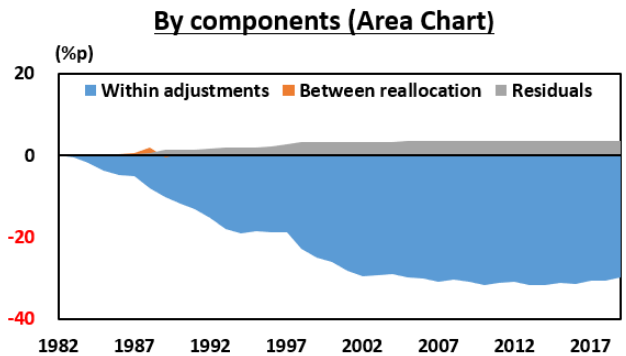


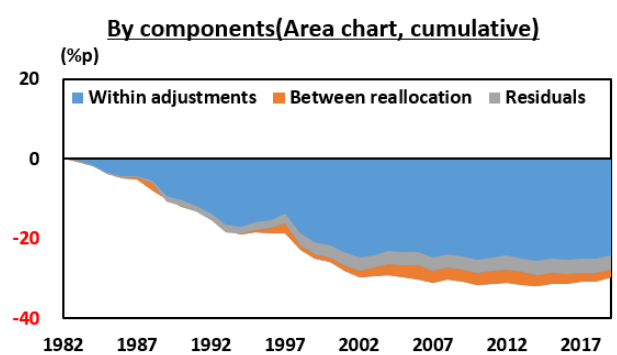
▸ Decomposition of large plants

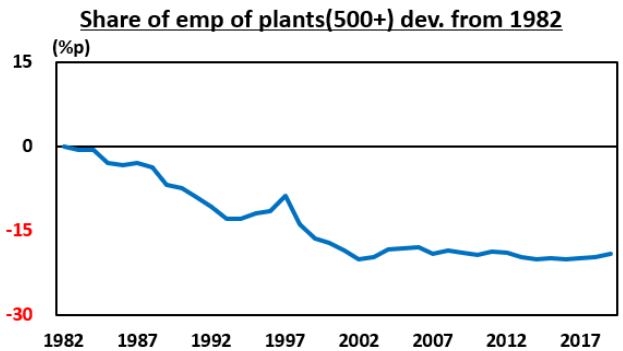
Decomposition of Change in Large Plant Share

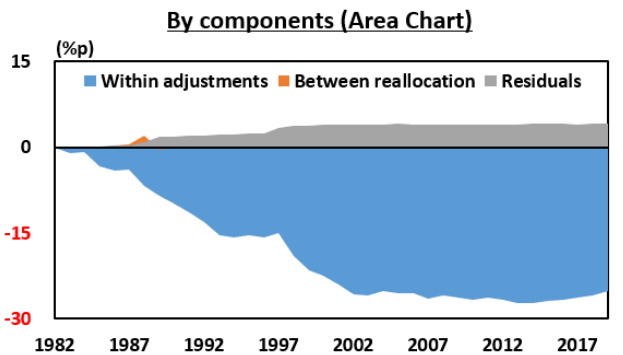
Back

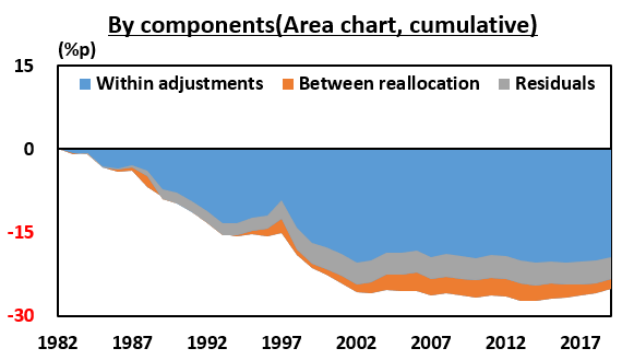












Churning

Back