

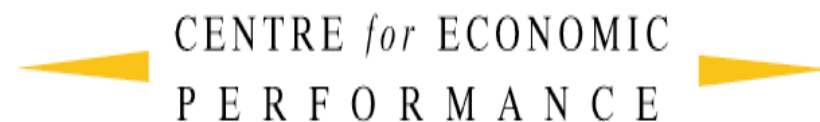
# **Firm Size Distortions and the Productivity Distribution: Evidence from France**

**Luis Garicano** (LSE, CEP, CEPR)

Claire Lelarge (INSEE)

John Van Reenen (LSE, CEP, NBER)

OECD, October 22, 2013



# Or..... “Lucas in France”



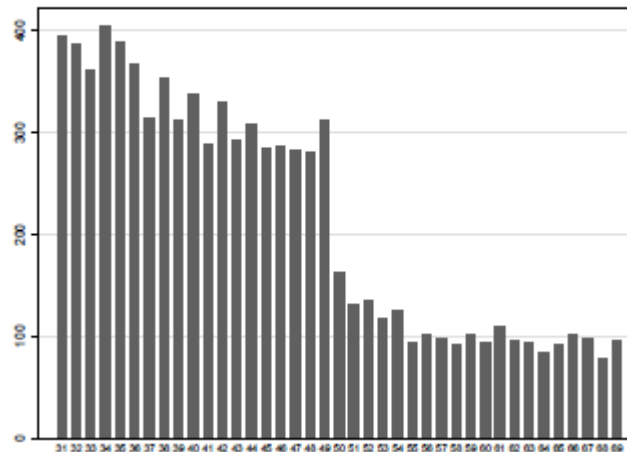
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## Firms in the manufacturing in

### 1. FICUS



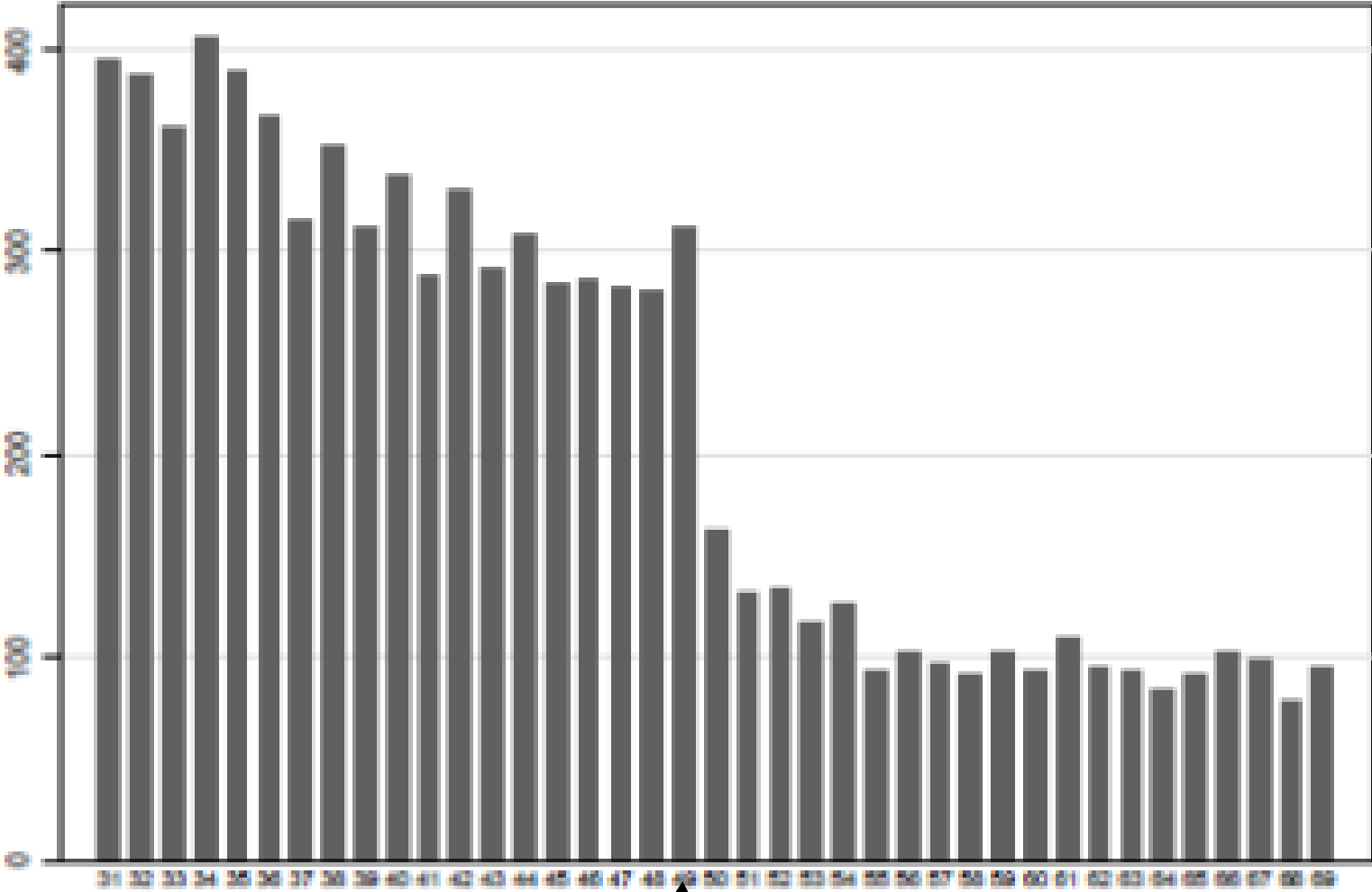
# MOTIVATION

1. **Reallocation:** bigger share of economic activity to more productive/efficient firms. Important in understanding:
  - Aggregate productivity changes over time within countries (e.g. Bailey et al, 1992) & within industries
  - Trade with heterogeneous firms (e.g. Melitz, 2003)
  - Aggregate productivity across countries (Hsieh & Klenow, 2009; Bartelsman, Haltiwanger & Scarpetta, 2013)
2. **Labor market regulation.**
  - How do we estimate the cost of labor regulations? OECD Employment Protection Index.
  - Our alternative: back out implicit regulatory “tax” using theory & data
    - Labor Reform is hot political issue in EU due to crisis
    - In France regulation increases for firms >50 workers
    - Affordable Care Act will penalize firms with >50 workers who don't offer health insurance, but not smaller firms<sup>3</sup>

## SUMMARY

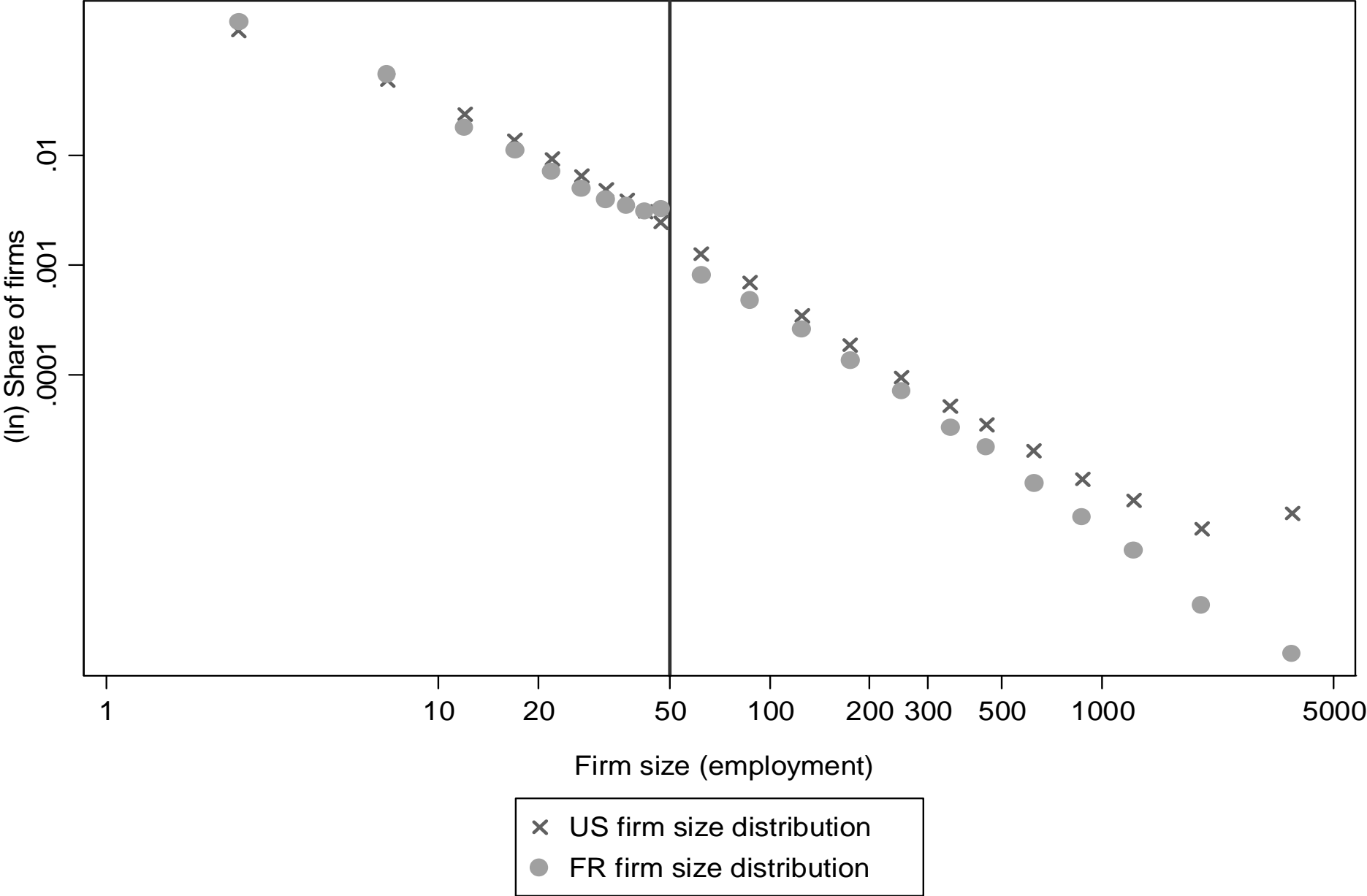
- Focus on major labor regulations in GE setting:
- Method for estimating effects of size-related regulation
  - Extension of Lucas (1978)
  - Exploit discontinuity in size-distribution (“Broken power law”) & theory for structural estimation
- **Findings:**
  - Big distributional effects: workers & large firms lose; SMEs gain
  - Welfare costs potentially large: 4-5% GDP if downwardly inflexible real wages; ~1% if real wages flexible (US/France contrast?)

# RAW DATA ON NUMBER OF FIRMS BY EACH SIZE CLASS (INTEGER NUMBER OF EMPLOYEES)



Exactly 49 employees

**FIG 1: FIRM SIZE DISTRIBUTION: US DOESN'T HAVE A BREAK AT 49 WORKERS LIKE FRANCE**



## WHY THE BREAK AT 49 WORKERS?

- Sharp increase in regulation at 50 workers
  - Creation of “work council” (“comité d’entreprise”) with minimum budget 0.3% of total payroll.
  - Firm has to offer union representation
  - Health & safety committee
  - Profit sharing scheme
  - Collective dismissal requires “social plan” to facilitate re-employment through training, job search, etc.  
Negotiated/monitored by unions & Labor Ministry
- These costs make firms reluctant to grow: an implicit tax on firm size (e.g. Bentolila & Bertola, 1990)

# EXAMPLES OF RELATED PREVIOUS LITERATURE

- **Lucas model applications**
  - *Braguinsky et al (2011)*; Murphy et al (1991); Guner et al (2006, 2008); Restuccia & Rogerson (2008); Atkeson & Kehoe (2005); Garcia-Santana & Pijoan-Mas (2010); Gourio and Roys (2012)
- **Firm Size Distribution**
  - Gibrat (1931); Axtell (2001); Ramsden & Kiss-Hapal (2000); Giovanni et al (2010)
- **Labor Market Regulation**
  - Kramarz & Michaud (2010); Schivardi and Torrini (2008); Abidoye et al (2009); Ceci-Renaud & Chevallier (2010), Petrin & Sivadassan (2012)
- **Productivity and Firm Size distribution**
  - Hsieh & Klenow (2009); Bartelsman, Haltiwanger & Scarpetta (2013); European Commission (1996); Banerjee & Duflo (2005)
- **Discontinuities related to tax kinks & notches**
  - Saez (2010); Chetty, et al (2011); Kleven et al (2011); Kleven & Wassoum (2012)



# OUTLINE

## 1. Theory: “Lucas in France”

## 2. Empirical Implementation

## 3. Data

## 4. Results

- Main findings
- Robustness/Extensions

# THEORY

- One input, one sector a la Lucas (1978)
- Distribution of managerial ability ( $\alpha$ )
- **Ability**: how much an agent can raise a team's output:
  - Manager with ability  $\alpha$  and  $n$  workers produces
$$y = \alpha f(n)$$
  - $f'(n) > 0$ ,  $f''(n) < 0$  from managerial span of control problem (e.g.  $f(n) = n^\theta$ ,  $\theta < 1$ )
  - More able managers run bigger firms

# INDIVIDUAL OPTIMIZATION

- Firm size (employment)  $n$
- Economy-wide wage,  $w$
- **Profits**

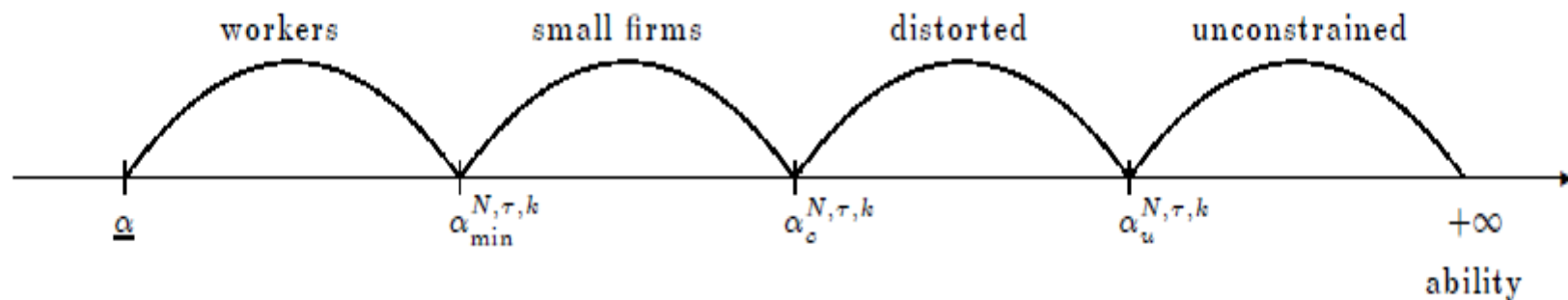
$$\pi(\alpha) = \max_n \alpha f(n) - w\bar{\tau}n - \bar{k}, \quad \text{with } \begin{cases} \bar{\tau} = 1, \bar{k} = 0 & \text{if } n \leq N \\ \bar{\tau} = \tau, \bar{k} = k & \text{if } n > N \end{cases}$$

- Once employment exceeds  $N=49$  regulation implies implicit tax,  $\tau$  & possibly a fixed cost,  $k$
- First order condition at each side of threshold:

$$\alpha f'(n^*) - \bar{\tau}w = 0,$$

# EQUILIBRIUM (1/3)

1. Wage level  $w$
2. An allocation  $\mathbf{n}(\alpha)$ : firm size ( $n$ ) function of ability ( $\alpha$ )
3. A triple of cutoffs
  - $\{\alpha_{\text{MIN}}, \alpha_{\text{C}}, \alpha_{\text{U}}\}$



# EQUILIBRIUM (2/3)

1. Labor supply = labor demand
2. No agent wishes to change occupation from manager to worker or to change from unconstrained to constrained
3. The choice of  $\mathbf{n}(\boldsymbol{\alpha})$  for each manager is optimal given their skills  $\boldsymbol{\alpha}$ , taxes  $\boldsymbol{\tau}$ ,  $\mathbf{k}$  and wage  $\mathbf{w}$

**“Marginal Manager” at  $\alpha_U$**

**Profits at threshold**

**Profits above threshold**

$$\alpha_u^{N,\tau,w,k} f(N) - wN = \alpha_u^{N,\tau,w,k} f(n_{N,\tau,w}^*(\alpha_u^{N,\tau,w,k})) - w\tau n_{N,\tau,w}^*(\alpha_u^{N,\tau,w,k}) - k$$

## EQUILIBRIUM (3/3)

- Firm size & productivity:

$$\begin{aligned}n_{N,\tau,k}^*(\alpha) &= 0 && \text{if } \alpha < \alpha_{\min}^{N,\tau,k} \\n_{N,\tau,k}^*(\alpha) &= f'^{-1}\left(\frac{w_{N,\tau,k}^*}{\alpha}\right) && \text{if } \alpha_{\min}^{N,\tau,k} \leq \alpha \leq \alpha_c^{N,\tau,k} \\n_{N,\tau,k}^*(\alpha) &= N && \text{if } \alpha_c^{N,\tau,k} \leq \alpha < \alpha_u^{N,\tau,k} \\n_{N,\tau,k}^*(\alpha) &= f'^{-1}\left(\frac{\tau w_{N,\tau,k}^*}{\alpha}\right) && \text{if } \alpha_u^{N,\tau,k} \leq \alpha < \infty\end{aligned}$$

**Workers**

**`Small Firms`**

**`Constrained`**

**`Unconstrained`**

# MANAGERIAL ABILITY DISTRIBUTION

- Following Lucas (1978) assume:
  - The managerial returns to scale function has a constant 'elasticity' form. We assume  $f(n) = n^\theta$
  - A power law in firm size requires a power law in the ability distribution. Assume pdf of ability is:

$$\phi(\alpha) = c_\alpha \cdot \alpha^{-\beta_\alpha}$$

# EMPIRICAL IMPLEMENTATION

- Equilibrium Firm Size Distribution (pdf of  $n^*$ ):

$$\chi^*(n) = \begin{cases} \left(\frac{1-\theta}{\theta}\right)^{1-\beta} (\beta-1)n^{-\beta} & \text{if } \theta/(1-\theta) \leq n \leq N \\ \left(\frac{1-\theta}{\theta}\right)^{1-\beta} (N^{1-\beta} - Tn_u^{1-\beta}) & \text{if } n = N \\ 0 & \text{if } N < n < n_u^{N,\tau,k} \\ \left(\frac{1-\theta}{\theta}\right)^{1-\beta} (\beta-1)Tn^{-\beta} & \text{if } n_u^{N,\tau,k} \leq n \end{cases}$$

**Small Firms**

**“Bulge”**

**“Valley”**

**Large Firms**

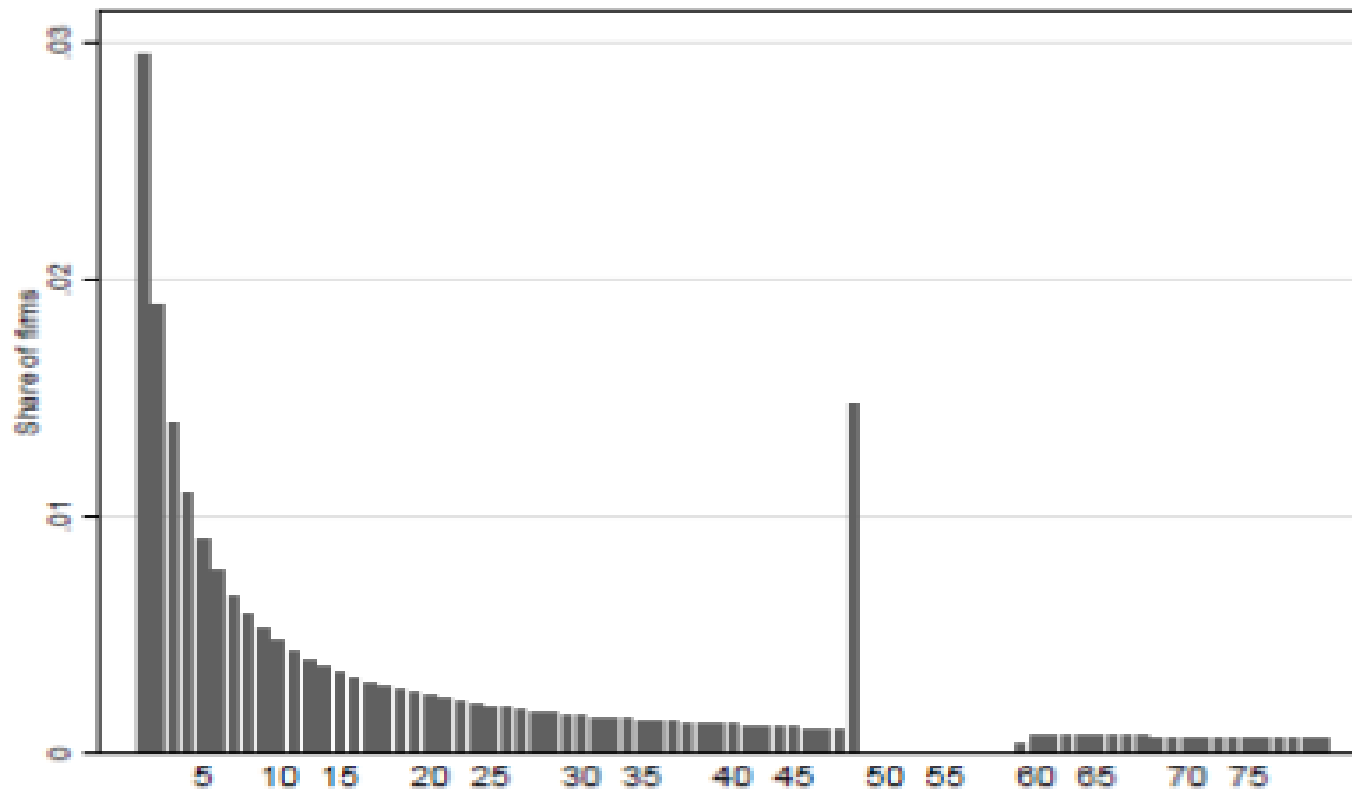
- $\beta$  = “slope” of power law in firm size =  $\beta_\alpha(1-\theta) + \theta$
- Tax  $\tau$ , affects shift in ‘intercept’ of power law & size of ‘bulge’ & ‘valley’

$$T = \tau^{-\frac{\beta-1}{1-\theta}}$$



# THEORY: FIRM SIZE DISTRIBUTION (FIG 3)

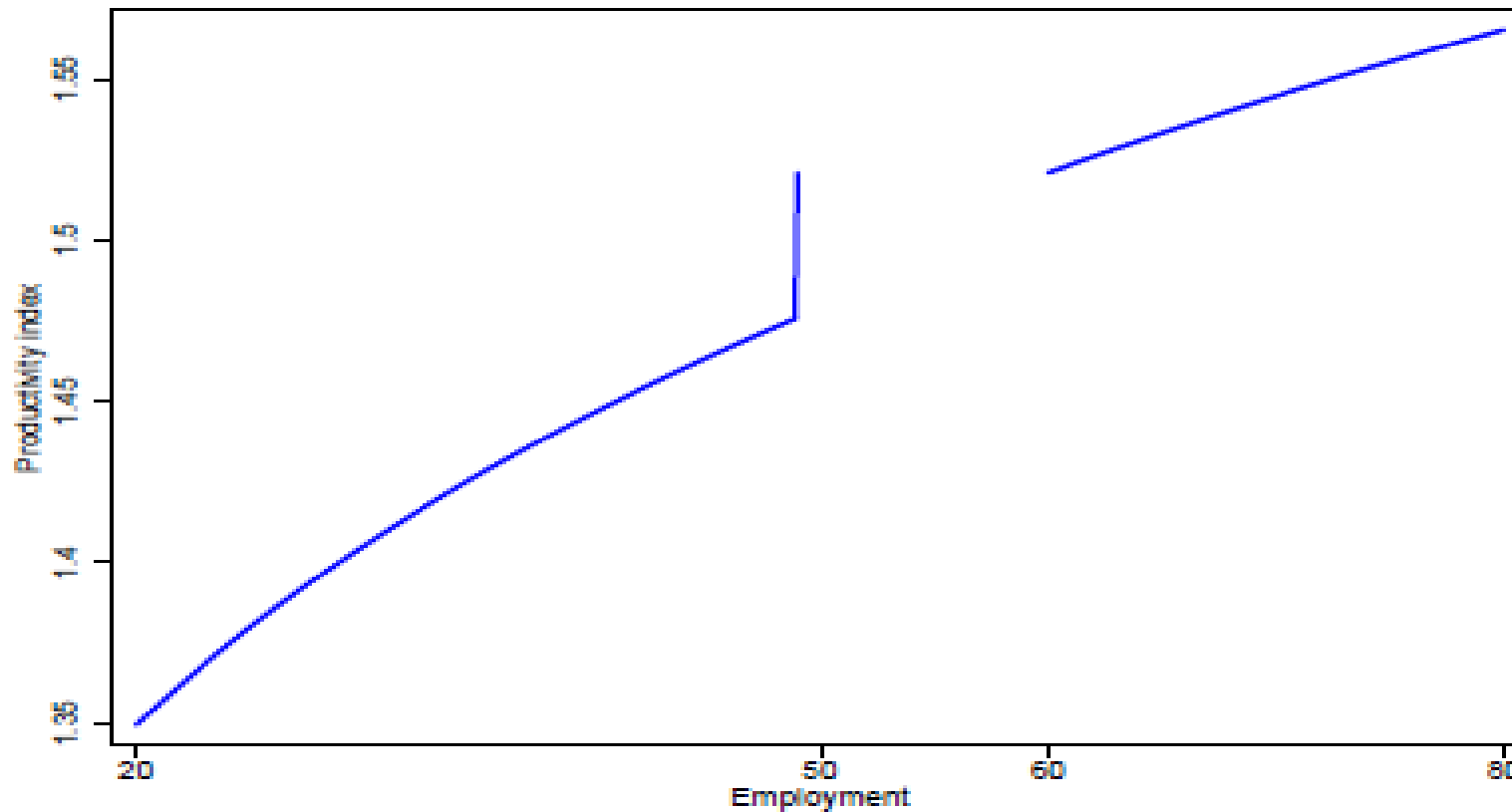
Firm Size Distribution



**Notes:** parameter values are  $\beta_\alpha=1.6$ ,  $\tau=1.01$ ,  $n_u=60$ ,  $\beta=1.06$ ,  $k=0$

# THEORY: SIZE AND PRODUCTIVITY (FIG. 4)

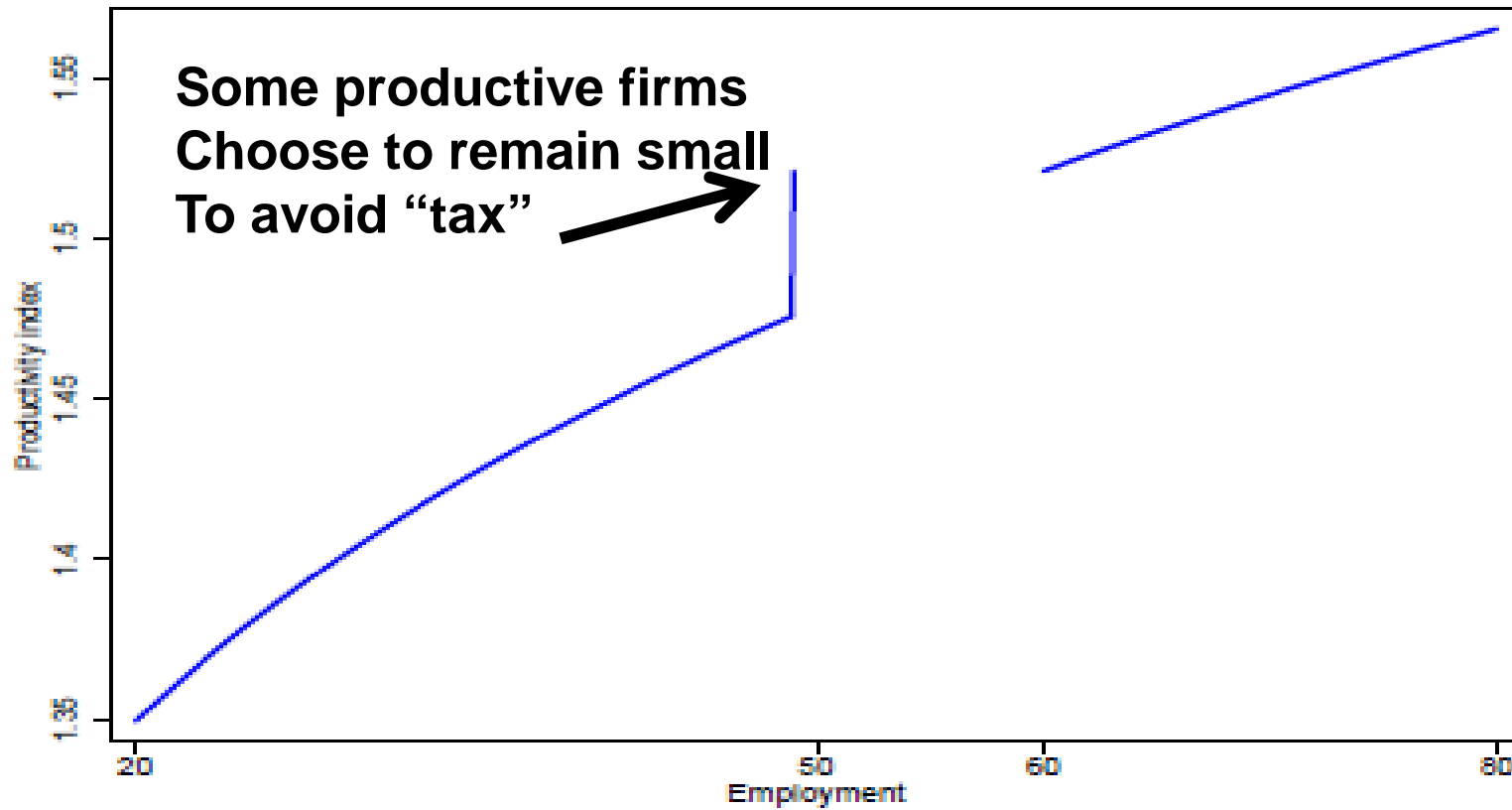
TFP/Size Relation



**Notes:** parameter values are  $\beta_\alpha=1.6$ ,  $\tau=1.01$ ,  $n_u=60$ ,  $\beta=1.06$ ,  $k=0$

# THEORY: SIZE AND PRODUCTIVITY (FIG. 4)

TFP/Size Relation



# LABOR REGULATION GENERATES 'TOO MANY' SMALL FIRMS FOR TWO REASONS

- Firms choosing to remain small to avoid the regulation
- Equilibrium wage lower as workers bear some of the incidence of tax
  - This encourages low managerial ability individuals to form firms instead of remaining workers
  - And smaller firms enjoy lower labor costs
- 'Too many' small firms in Europe?
  - Braguinsky, Branstetter & Regateiro (2011) on Portugal
  - European Commission (1996,2006)

# OUTLINE

1. Theory: Lucas in France

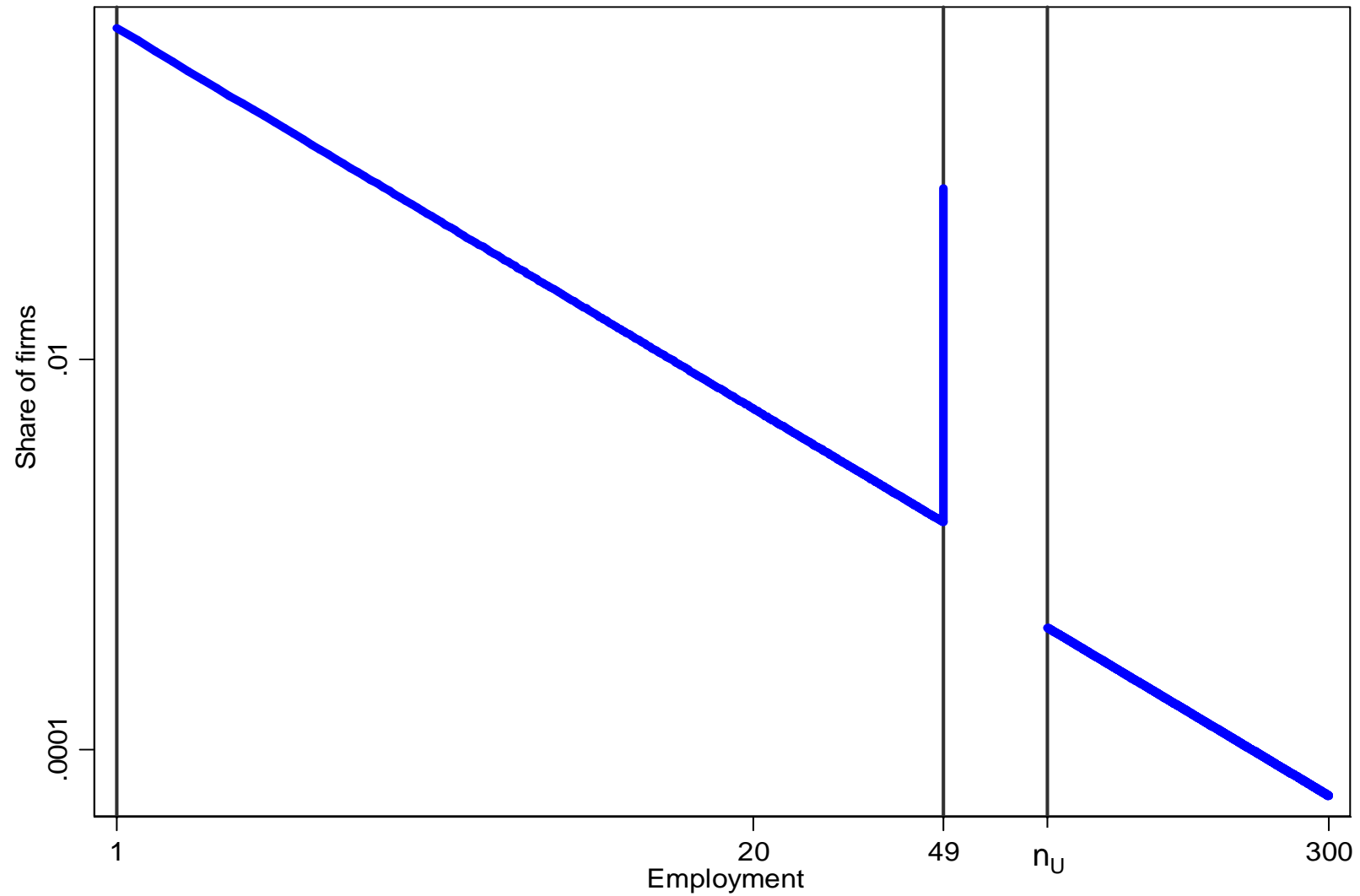
**2. Empirical Implementation**

3. Data

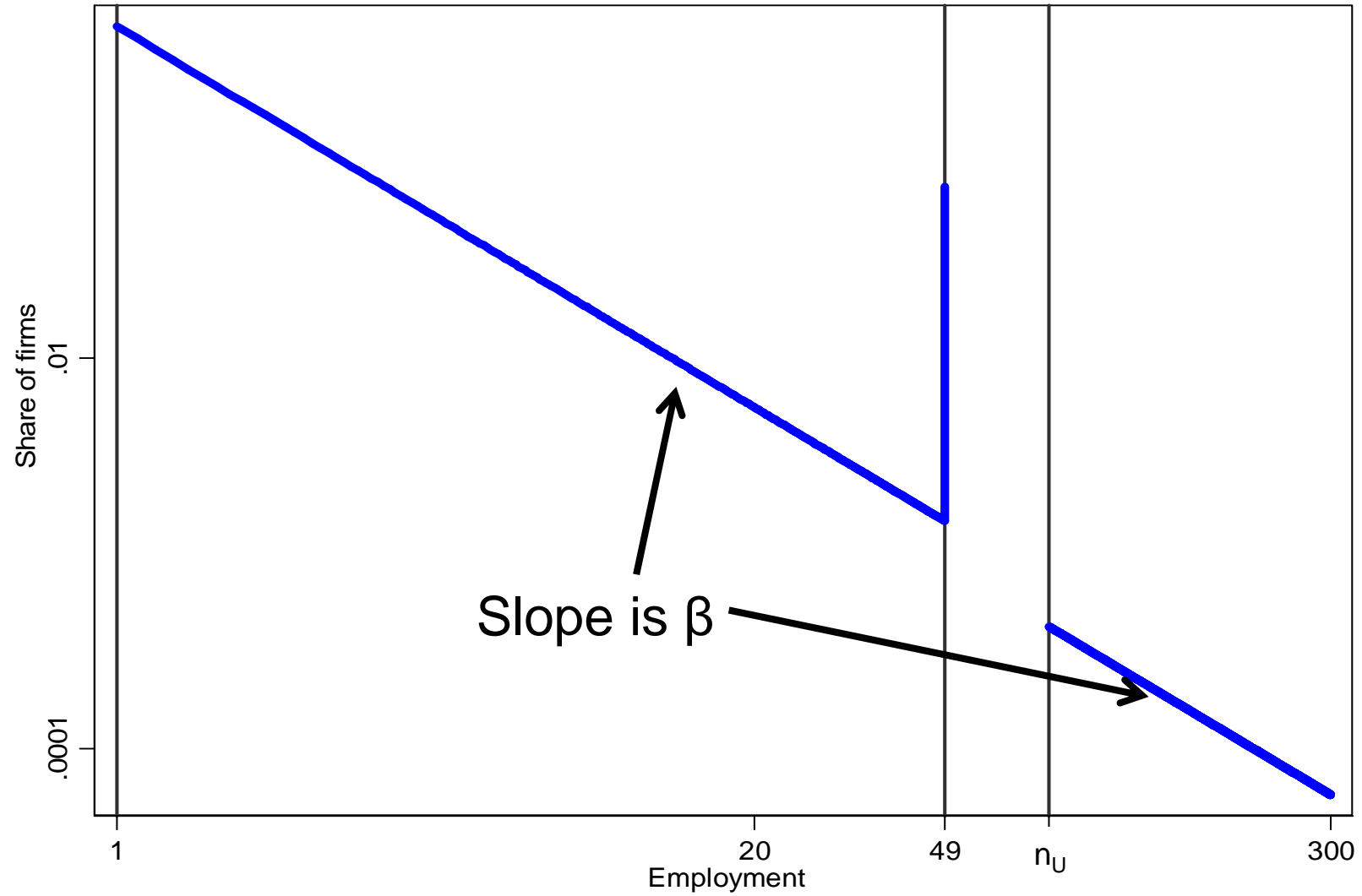
4. Results

- Main findings
- Robustness/Extensions

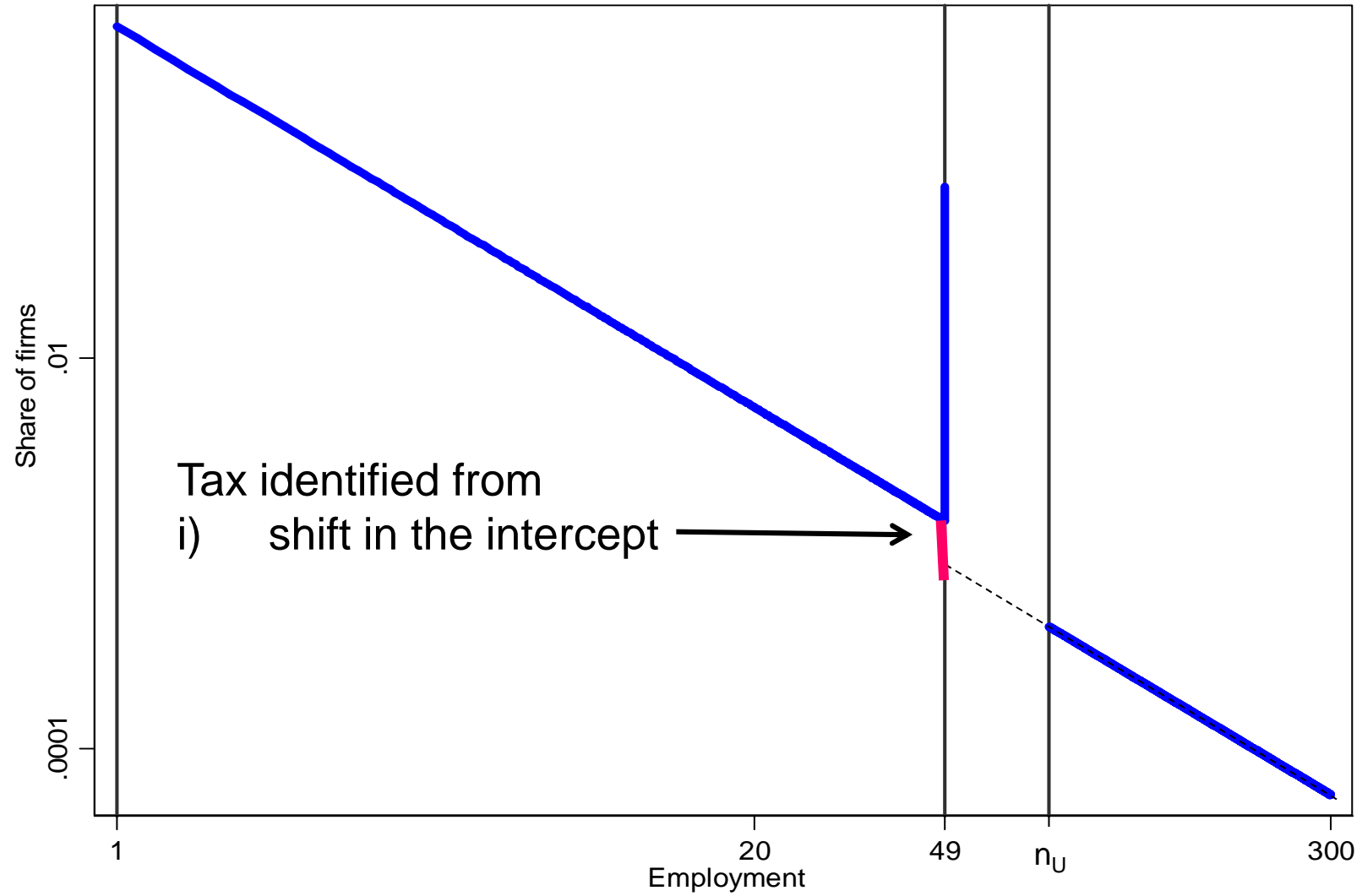
# IDENTIFICATION OF THE TAX (FIRM SIZE POWER LAW IN LOG-LOG SPACE)



# IDENTIFICATION OF THE TAX

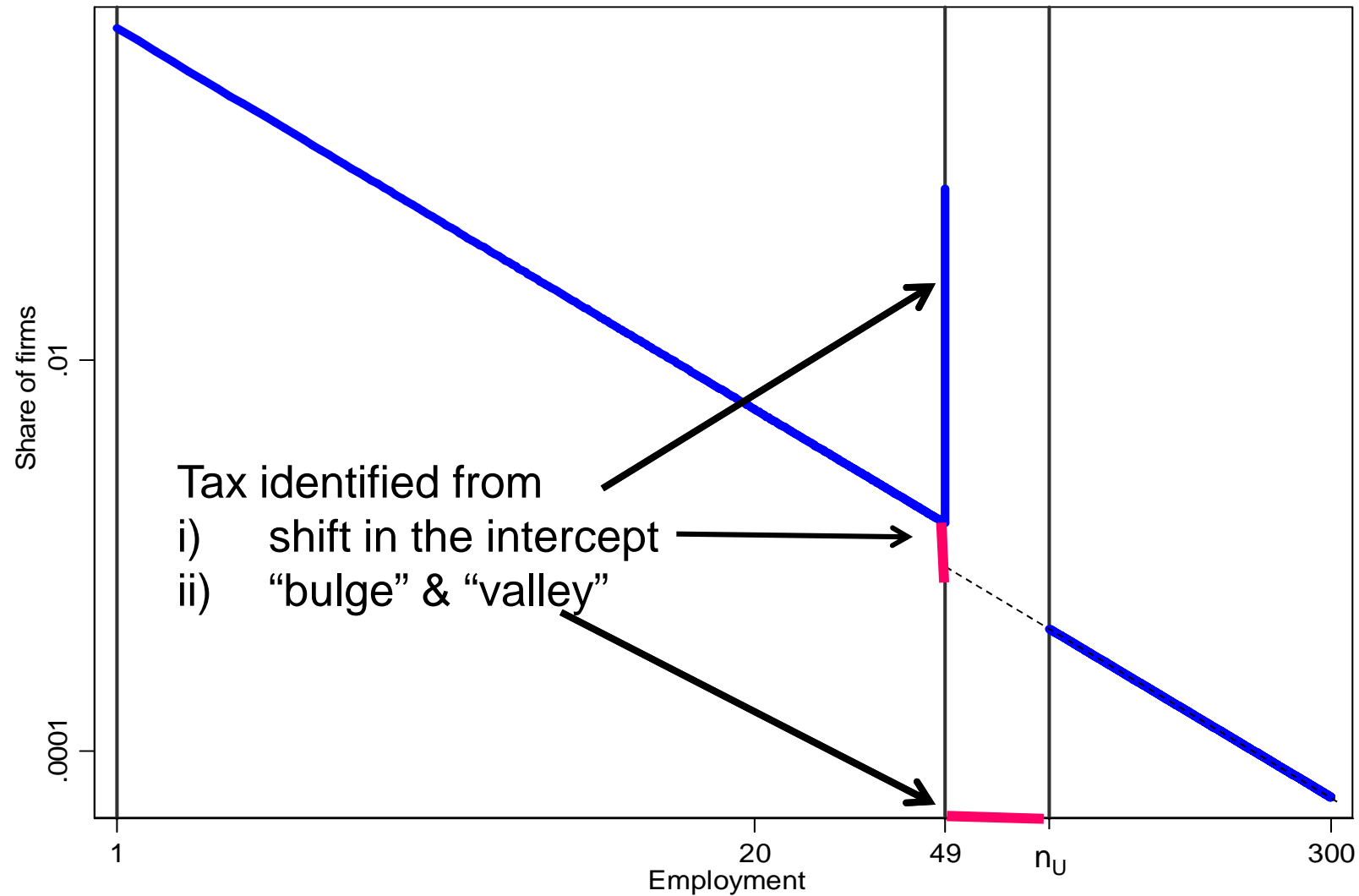


# IDENTIFICATION OF THE TAX





# IDENTIFICATION OF THE REGULATORY TAX



Note: Fixed cost of regulation,  $k$ , does not affect intercept

# FIRM SIZE MEASURED WITH ERROR

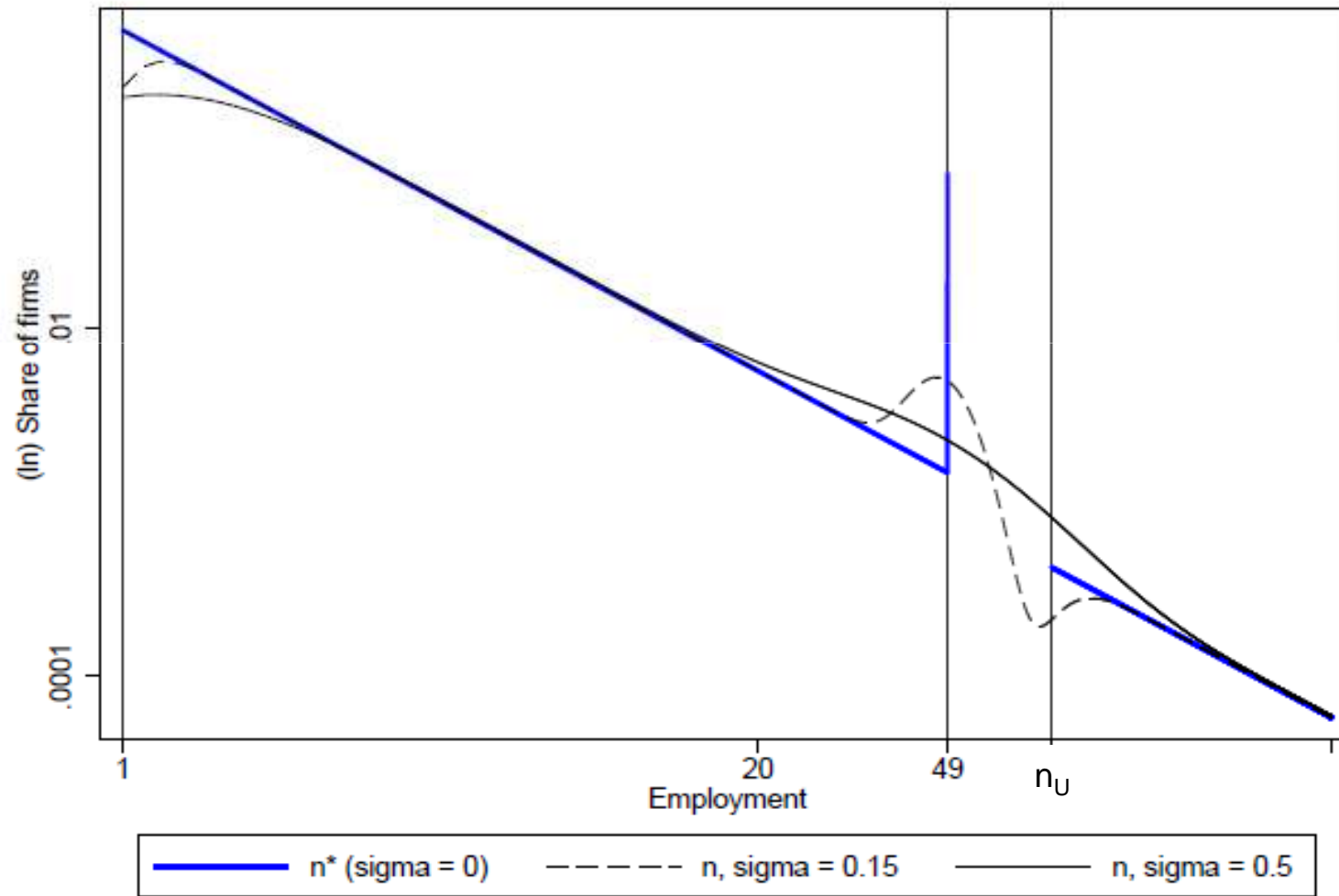
- Observed size (allow for measurement error)

$$n(\alpha, \varepsilon) = n^*(\alpha) \cdot e^\varepsilon$$

- measurement error log-normal with mean 0, SD  $\sigma$
- Conditional cdf

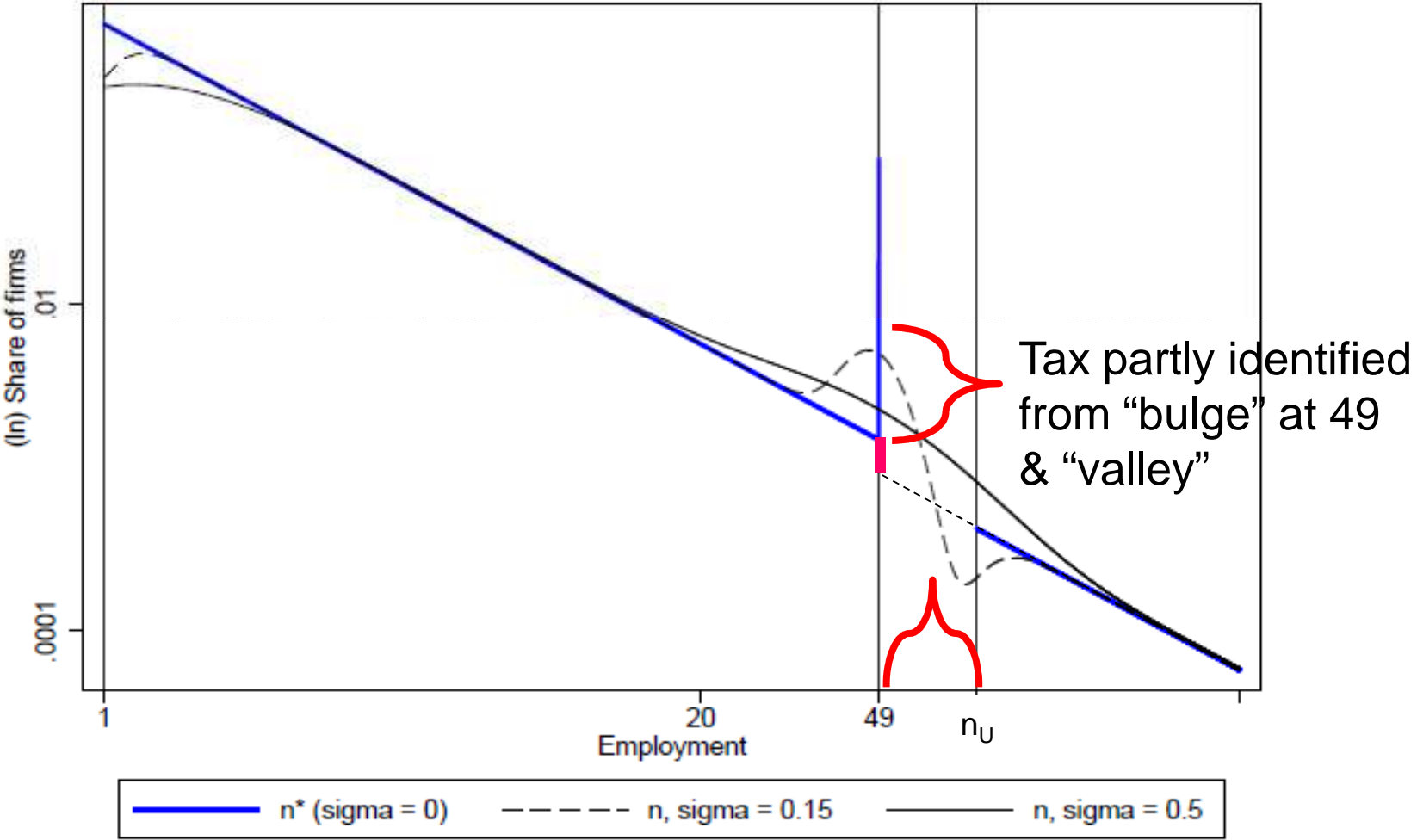
$$\mathbb{P}(x < n | \varepsilon) = \begin{cases} 0 & \text{if } \ln(n) - \ln\left(\frac{\theta}{1-\theta}\right) < \varepsilon \\ 1 - \left(\frac{1-\theta}{\theta}\right)^{1-\beta} (ne^{-\varepsilon})^{1-\beta} & \text{if } \ln(n) - \ln(N) \leq \varepsilon \leq \ln(n) - \ln\left(\frac{\theta}{1-\theta}\right) \\ 1 - \left(\frac{1-\theta}{\theta}\right)^{1-\beta} T(n_u^{N,\tau,k})^{1-\beta} & \text{if } \ln(n) - \ln(n_u^{N,\tau,k}) < \varepsilon \leq \ln(n) - \ln(N) \\ 1 - \left(\frac{1-\theta}{\theta}\right)^{1-\beta} T(ne^{-\varepsilon})^{1-\beta} & \text{if } \varepsilon \leq \ln(n) - \ln(n_u^{N,\tau,k}) \end{cases}$$

# FIG 5: THEORETICAL FIRM SIZE DISTRIBUTION (WITH MEASUREMENT ERROR, $\sigma$ )



# EMPIRICAL IMPLEMENTATION

- 
- 
- 



# ECONOMETRICS

- Since we have fully characterized firm size distribution we estimate parameters by straightforward ML to obtain  $\beta$ ,  $T(\tau, \beta, \theta)$ ,  $n_U$ ,  $\sigma$  and  $k$
- ML estimation of broken power law follows physics literature (e.g. Howell, 2002), but we also compare with OLS + structural breaks (e.g. Bai and Perron, 1998)
- Also need estimate of  $\theta$ , returns to scale to identify the implicit tax:

$$T = \tau^{-\frac{\beta-1}{1-\theta}}$$

# HOW TO ESTIMATE RETURNS TO SCALE ( $\theta$ )?

- In principle can estimate from the size distribution (but hard in practice as relies on marginal worker)
- Alternative more robust methods:
  - Calibrate from existing estimates (e.g. Basu and Fernald, 1997; Atkeson-Kehoe, 2005; Hsieh-Klenow, 2009)
  - Use firm-level production function estimates (Olley & Pakes, 1996); Levinsohn & Petrin, 2003; Blundell & Bond, 2000; Solow residual, etc.)
  - Use the TFP-size relationship
- We look at all these methods to show robustness of the estimates of the regulation

# OUTLINE

1. Theory: Lucas in France

2. Empirical Implementation

**3. Data**

4. Results

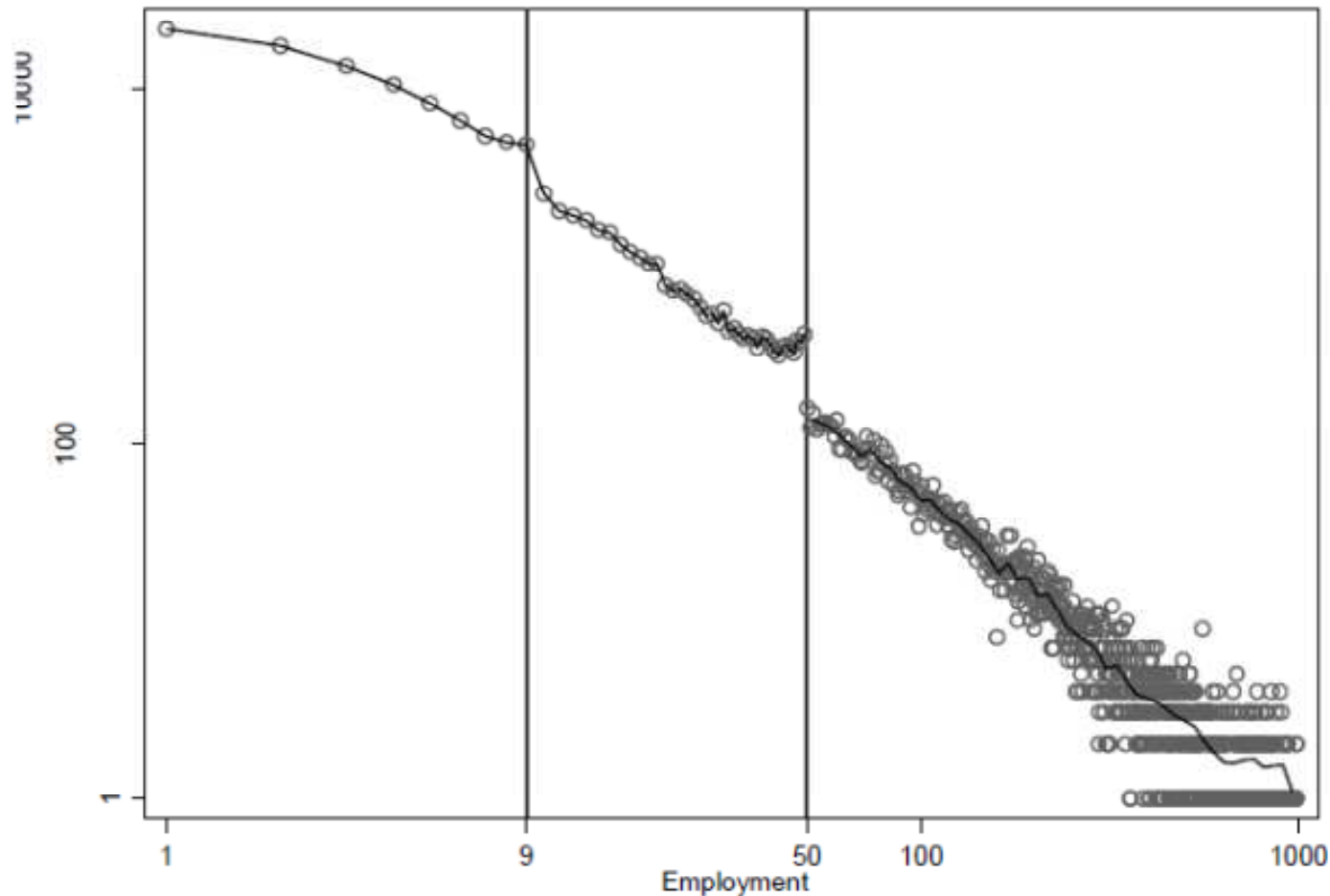
- Main findings
- Robustness/Extensions

# DATA

- Universe of French firms between 2002 - 2007
  - Mandatory fiscal returns of all French firms ("FICUS")
  - DADS (for some extra info on workers, e.g. hours, skills)
  - This is the administrative unit that the main law pertains to.
- FICUS has balance sheet information on value added, labor, capital, investment, wage bills, materials, 4 digit industry, etc.
  - Use this to calculate TFP via several methods (Levinsohn-Petrin, Olley Pakes, Solow residual, etc.)

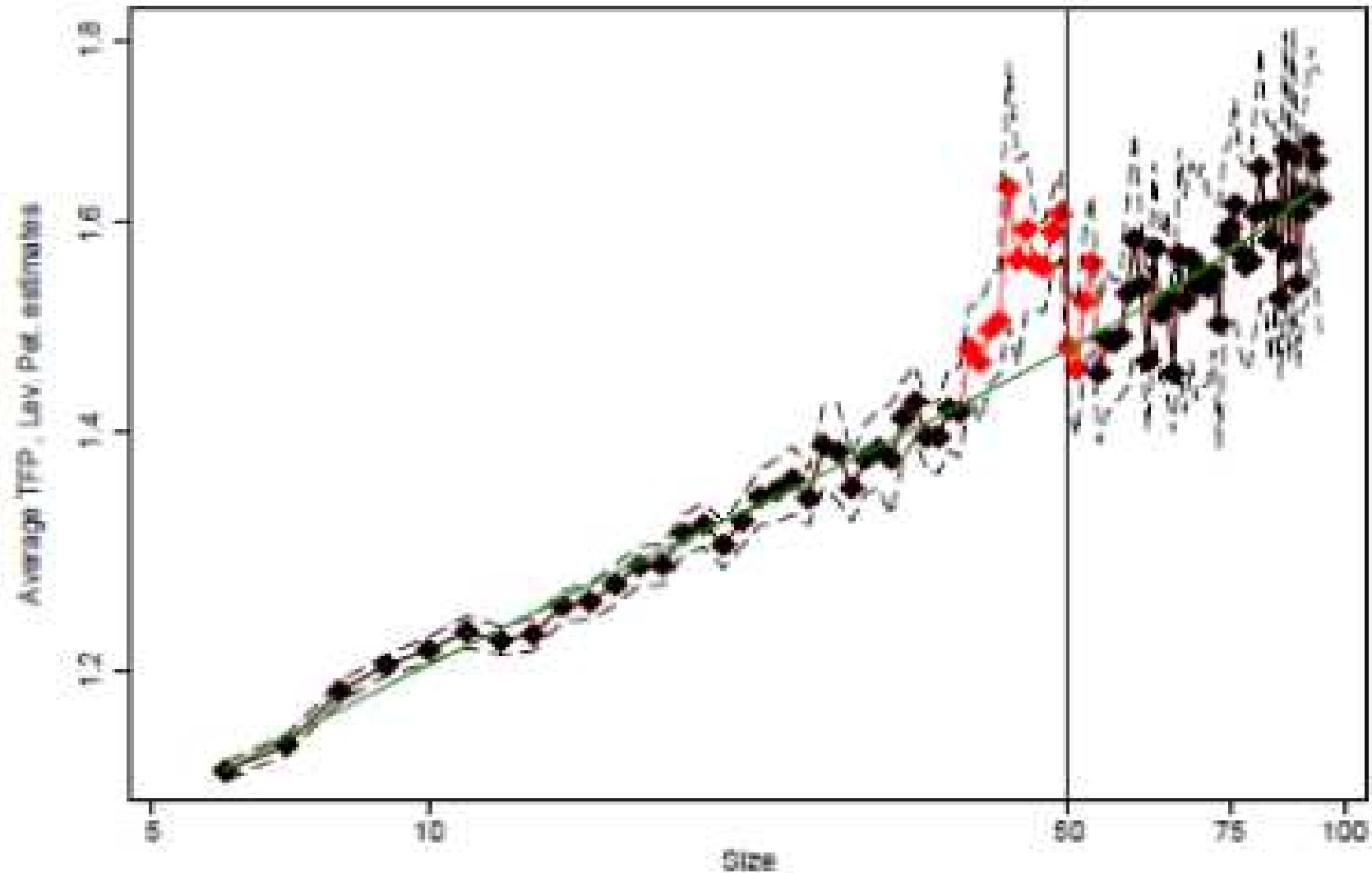


# FIG 7: EMPIRICAL FIRM SIZE DISTRIBUTION – SLOPE, BULGE, VALLEY & INTERCEPT SHIFT



**Note:** Another regulatory break at 10 so focus econometrics on firms between 10 and 1000 (& check robustness)

**FIG 8: TFP & SIZE RELATIONSHIP: CONSISTENT WITH THEORY THERE IS A BULGE IN TFP AROUND THE REGULATORY THRESHOLD**



# OUTLINE

1. Theory: Lucas in France
2. Empirical Implementation
3. Data

## **4. Results**

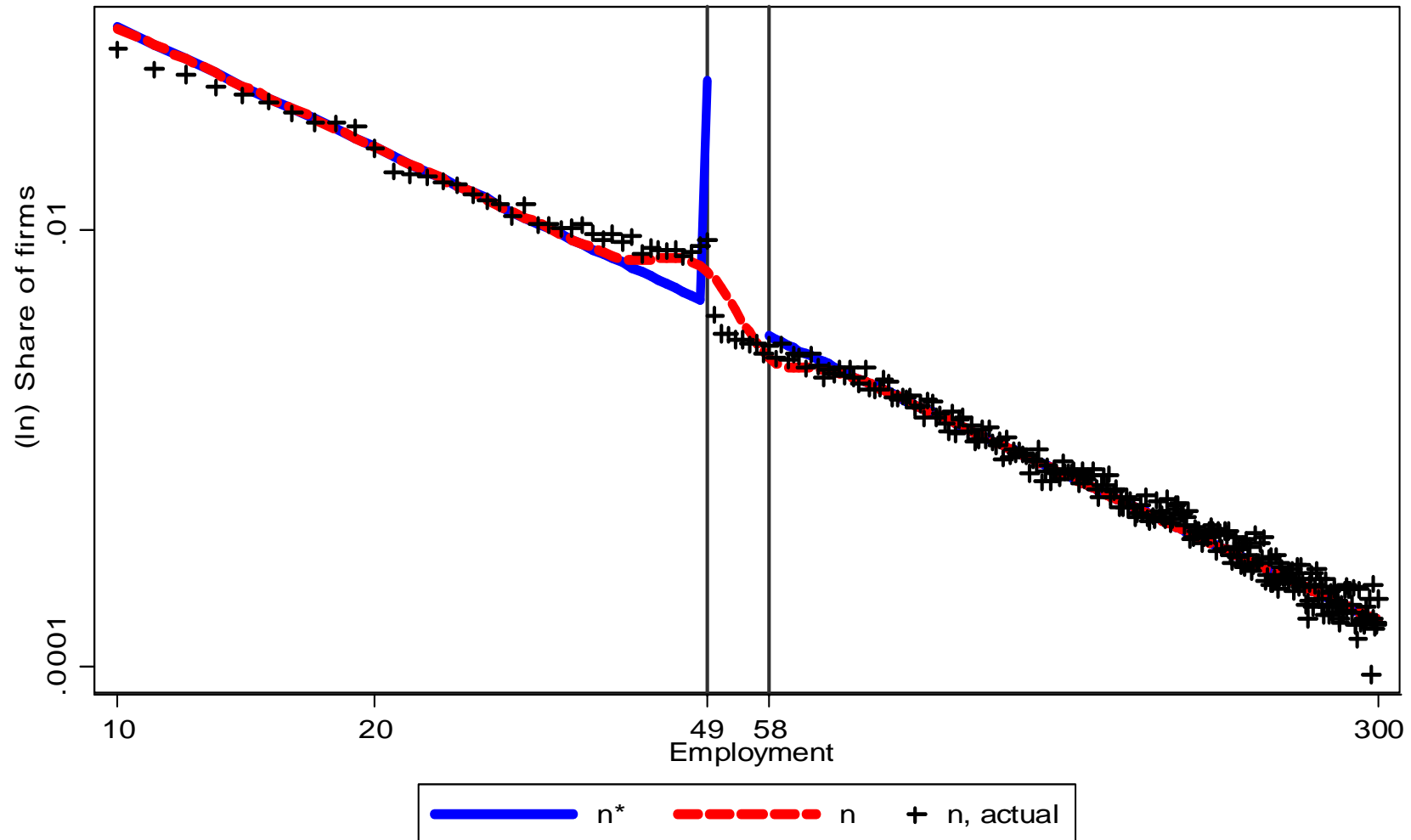
- **Main findings**
- Robustness/Extensions

**TABLE 1: ML ESTIMATES OF PARAMETERS**

$\theta$ , Ret Scale (calibrated)	0.8 (Basu- Fernald)	0.85 (Atkes on-Kehoe)	$\theta=0.5$ (Hsieh-K)	$\theta=0.9$
$\tau$ , Implicit variable tax	1.013 (0.005)	1.010 (0.004)	1.033 (0.013)	1.004 (0.002)
$\beta$ , power law $\frac{1-\beta}{T} = \tau^{1-\theta}$	1.822 (0.059)	1.822 (0.059)	1.822 (0.059)	1.829 (0.057)
	0.948 (0.018)	0.948 (0.018)	0.948 (0.018)	0.965 (0.015)
$n_u$ , upper emp. cutoff	57.898 (0.024)	57.898 (0.024)	57.898 (0.024)	52.562 (0.002)
$\sigma$ , msremnt. error	0.104 (0.025)	0.104 (0.025)	0.104 (0.025)	0.036 (0.008)
$k/w$ , Fixed cost of tax	-0.496 (0.257)	-0.372 (0.192)	-1.243 (0.653)	-0.201 (0.099)

**Notes:** 57,008 firms and 238,701 obs (manufacturing size 10-1000); estimates by ML with standard errors clustered at the 4 digit level.

# FIG 9 FIRM SIZE DISTRIBUTION: ACTUAL AND FITTED



Notes: Baseline specification Table 1 column (1).

# TAB 5 COMPARISON OF ACTUAL DATA WITH ESTIMATES OF OUTPUT (NOT USED IN ESTIMATION)

(Actual data)	Firms having 10 to 48 workers	Firms having 49 to 57 workers	Firms having 58 to 10,000 workers	Total
Distribution of firms (actual)	0.762	0.035	0.204	1
Distribution of firms (predicted)	0.760 (0.016)	0.039 (0.007)	0.201 (0.016)	1
Distribution of employment (actual)	0.295	0.032	0.672	1
Distribution of employment (predicted) <small><math>n=n^*[\alpha].e^\varepsilon; \sigma_\varepsilon = 0.104</math></small>	0.277 (0.024)	0.035 (0.007)	0.688 (0.027)	1
Distribution of output (actual)	0.242	0.029	0.728	1
Distribution of output (predicted) <small><math>y = \alpha.n^\theta = \alpha. (n^*[\alpha])^\theta .e^{\theta\varepsilon}, \sigma_\varepsilon = 0.104</math></small>	0.275 [0.219;0.331]	0.034 [0.020;0.048]	0.691 [0.635;0.747]	1

## TABLE 2: ML ESTIMATES – USING PRODUCTIVITY

Experiment	Baseline	Production Function	TFP/Size	High Tech (with PF)	Low Tech (with PF)
$\theta$ , Ret Scale	0.8	0.855 (0.013)	0.799 (0.025)	0.882 (0.012)	0.848 (0.016)
$\tau$ , Implicit variable tax	1.013 (0.005)	1.010 (0.004)	1.013 (0.005)	1.001 (0.003)	1.013 (0.007)
$\beta$ , power law	1.822 (0.059)	1.822 (0.052)	1.822 (0.055)	1.625 (0.063)	1.864 (0.063)
$T$	0.948 (0.018)	0.948 (0.020)	0.948 (0.023)	0.997 (0.012)	0.929 (0.032)
$n_u$ , upper emp. cutoff	57.898 (0.024)	57.899 (1.133)	57.898 (1.342)	50.000 (2.474)	58.328 (1.603)
$\sigma$ , msremnt. error	0.104 (0.025)	0.104 (0.020)	0.104 (0.024)	0.000 (0.029)	0.114 (0.034)
Obs	238,701	238,701	238,701	38,713	199,988

**Notes:** 57,008 firms (manufacturing size 10-1000); estimates by ML with standard errors clustered at the 4 digit level.

# WELFARE COSTS OF REGULATION

$$\begin{aligned}
 \Delta Y &= Y(N, \tau, k) - Y(N, 1, 0) \\
 &= \int_{\alpha_{\min}^{N, \tau, k}}^{\alpha_{\min}^{N, 1, 0}} \alpha [f(n_{N, \tau, k}^*(\alpha))] \phi(\alpha) d\alpha + \int_{\alpha_{\min}^{N, 1, 0}}^{\alpha_c^{N, \tau, k}} \alpha [f(n_{N, \tau, k}^*(\alpha)) - f(n_{N, 1, 0}^*(\alpha))] \phi(\alpha) d\alpha \\
 &\quad + \int_{\alpha_c^{N, \tau, k}}^{\alpha_u^{N, \tau, k}} \alpha [f(N) - f(n_{N, 1, 0}^*(\alpha))] \phi(\alpha) d\alpha \\
 &\quad + \int_{\alpha_c^{N, \tau, k}}^{\infty} \alpha \{ [f(n_{N, \tau, k}^*(\alpha)) - f(n_{N, 1, 0}^*(\alpha))] \} \phi(\alpha) d\alpha
 \end{aligned}$$

- **Losses**

Productive firms choose to be at the “bulge” (**second row**)

Very large firms are smaller because of tax (**last row**)

- **Gains (first row)**

Some marginal workers become firms

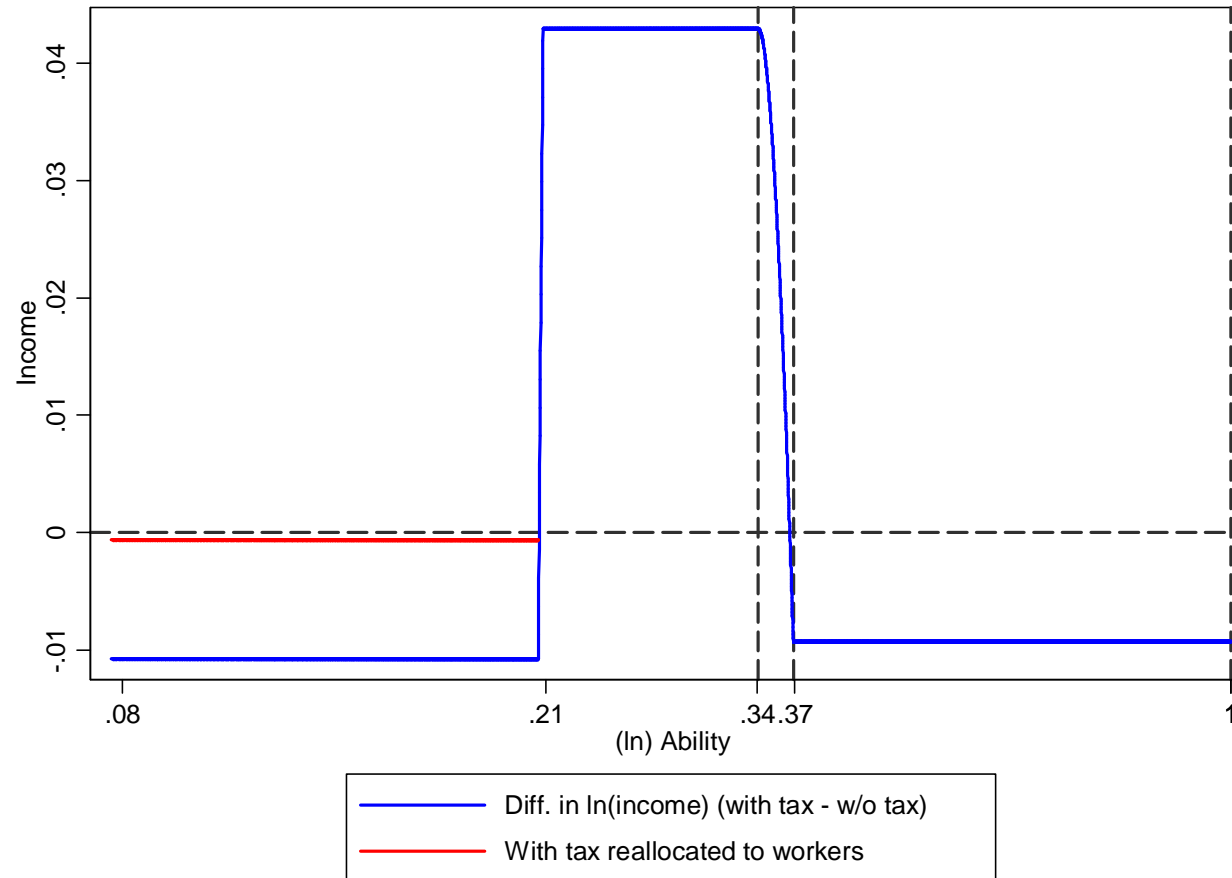
Small firms bigger because lower equilibrium wage



# TABLE 3 WELFARE & DISTRIBUTION

(Regulated Economy – Unregulated Economy)	FLEXIBLE WAGES	RIGID WAGES
Unemployment rate	0%	5.217%
Percentage of firms avoiding the regulation	3.593%	3.438%
Percentage of firms paying tax (compliers)	9.036%	8.646%
Change in labor costs (wage reduction), Small firms (below 49)	-1.074%	0
Change in labor costs (wage reduction but tax increase), Large firms (above 49)	0.232%	1.306%
Excess entry by small firms (percent increase in number of firms)	4.419%	4.409%
Increase in size of small firms	5.370%	0
Increase in size of large firms	-1.160%	-6.530%
Annual welfare loss (as % of GDP):		
Implicit Tax	0.804%	0.801%
Output loss	0.016%	4.302%
<b>Total (implicit tax + output loss)</b>	<b>0.820%</b>	<b>5.103%</b>
Winners and losers:		
<i>Change in expected wage for those in labor force</i>	-1.074%	-5.358%
Average gain by entering entrepreneurs of small firms	1.603%	-2.687%
Average profit gain by small unconstrained firms	4.296%	0
Average profit gain by firms constrained at 49	2.447%	-1.849%
<i>Change in profit for large firms</i>	-0.928%	-5.224%

# FIGURE 12: DISTRIBUTIONAL EFFECTS OF REGULATION ACROSS AGENTS



## WELFARE COSTS: SUMMARY

- With flexible wages welfare costs small (under 1% of GDP) as ranking of firm size stays the same (Hopenhayn, 2012)
- But big distributional change
  - Workers lose as they bear cost of regulation through lower wages
  - Large firms lose as lower wages do not fully offset regulation costs
  - Small Firms gain from lower costs & more entrepreneurs
- With inflexible wages (unions, minimum wages, etc.) much bigger welfare costs due to unemployment (4-5% of GDP)
  - Similar pattern of redistribution
- And further losses from other size-related regulations

# OUTLINE

1. Theory: Lucas in France
2. Empirical Implementation
3. Data

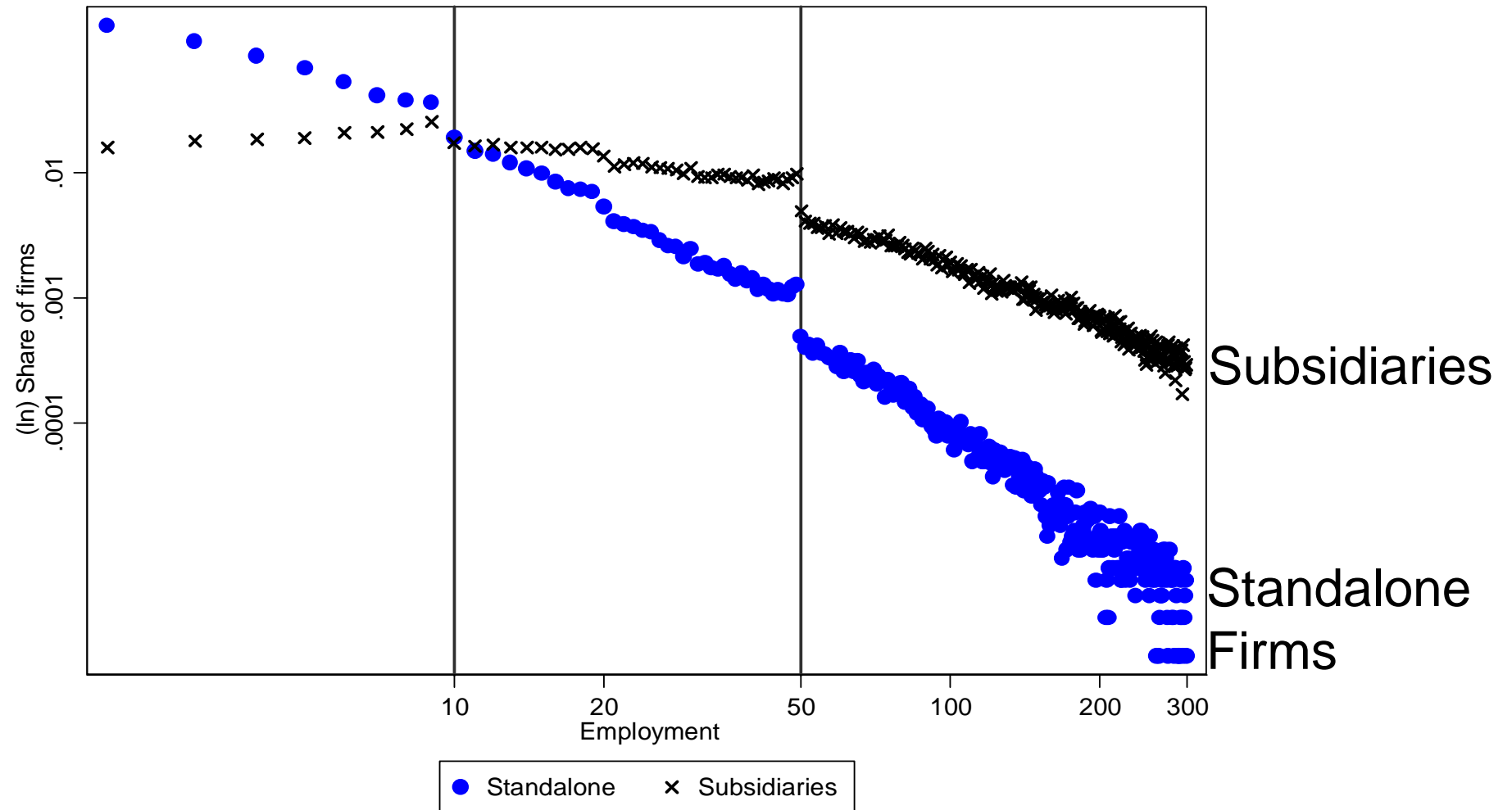
## **4. Results**

- Main findings
- **Robustness/Extensions**

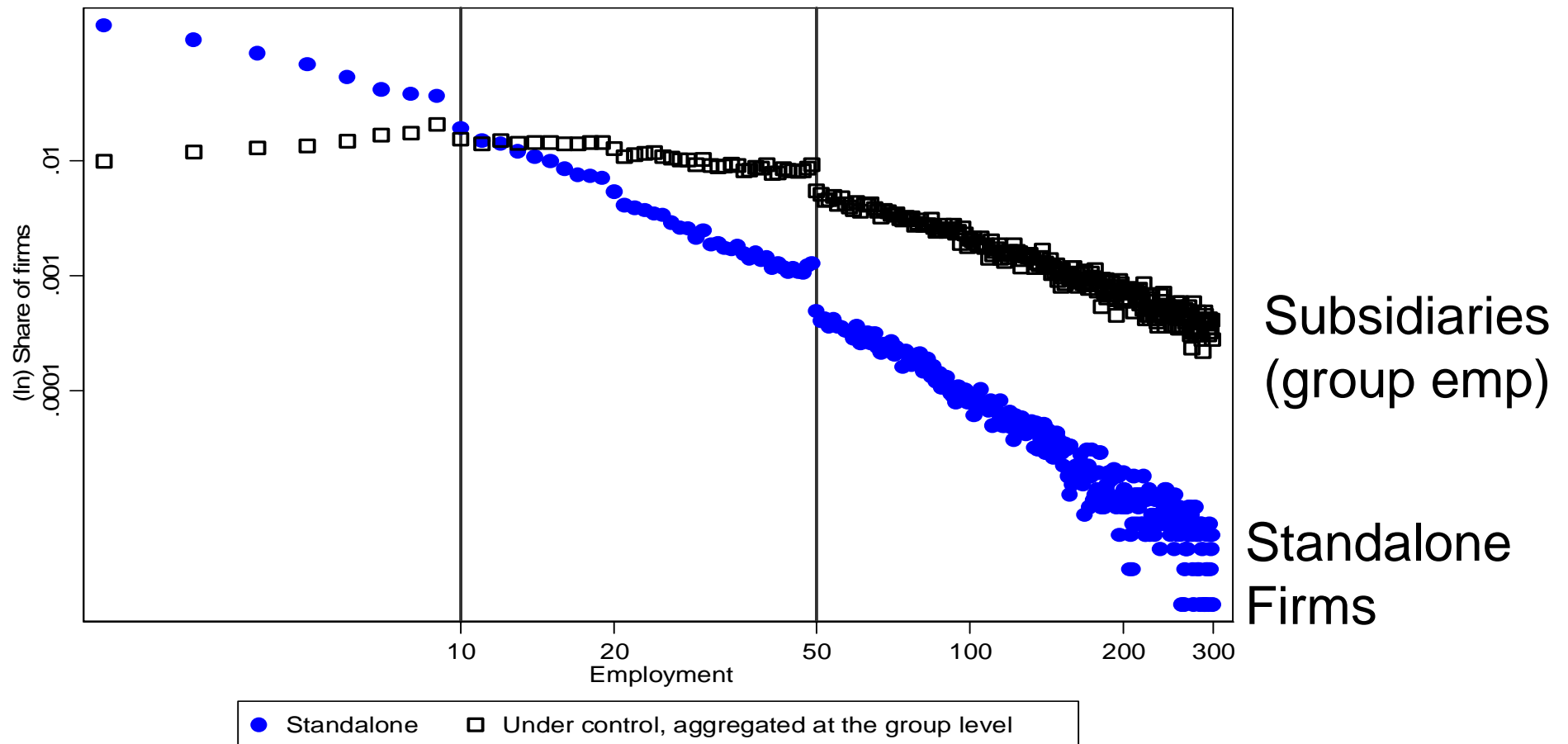
# EXTENSIONS & ROBUSTNESS

- **Big firms pretending to be small?**
  - We see effects for standalone firms as well as those part of business groups
  - Misreporting
- Other margins of adjustment (e.g. hours)
- Workers benefit from “insurance” & take lower wages (Lazear, 1990)?
- Industry Heterogeneity
- Other Explanations for the “Valley”
  - Growth around the threshold

# RESULTS NOT DRIVEN BY BIG BUSINESS GROUPS PRETENDING TO BE SMALL (FIG 14A)



# RESULTS NOT DRIVEN BY BIG BUSINESS GROUPS PRETENDING TO BE SMALL (FIG 14B)

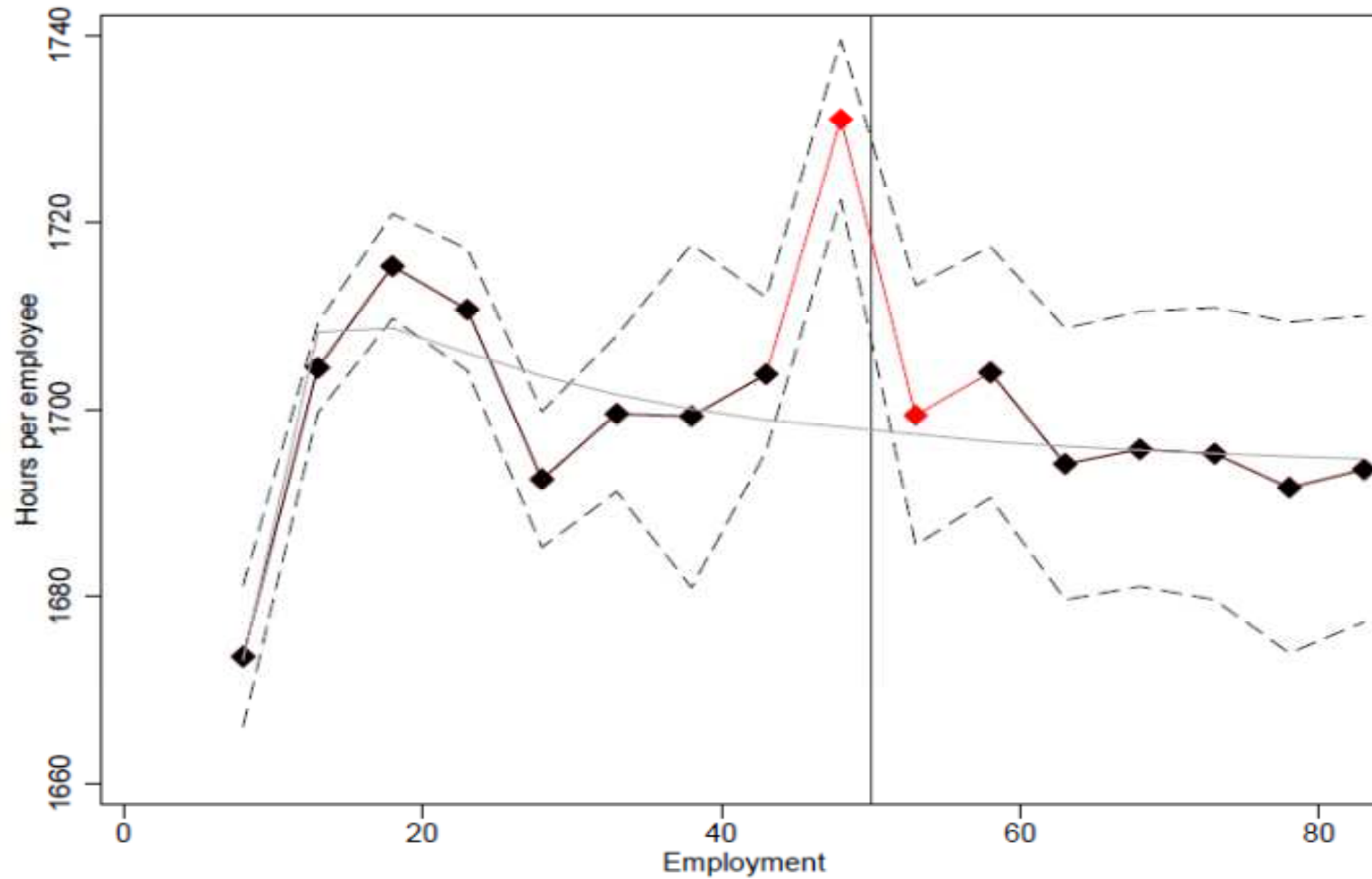


# EXTENSIONS

- Big firms pretending to be small?
- **Other margins of adjustment**
  - Hours, capital, skills, outsourcing, etc.
  - $y = \alpha[h(n, x)]^\theta$  instead of  $y = \alpha n^\theta$
  - Substitution reduces costs to firms, but still distortion unless perfect substitutes
  - Our good predictions on output suggest these other margins of substitution are not first order



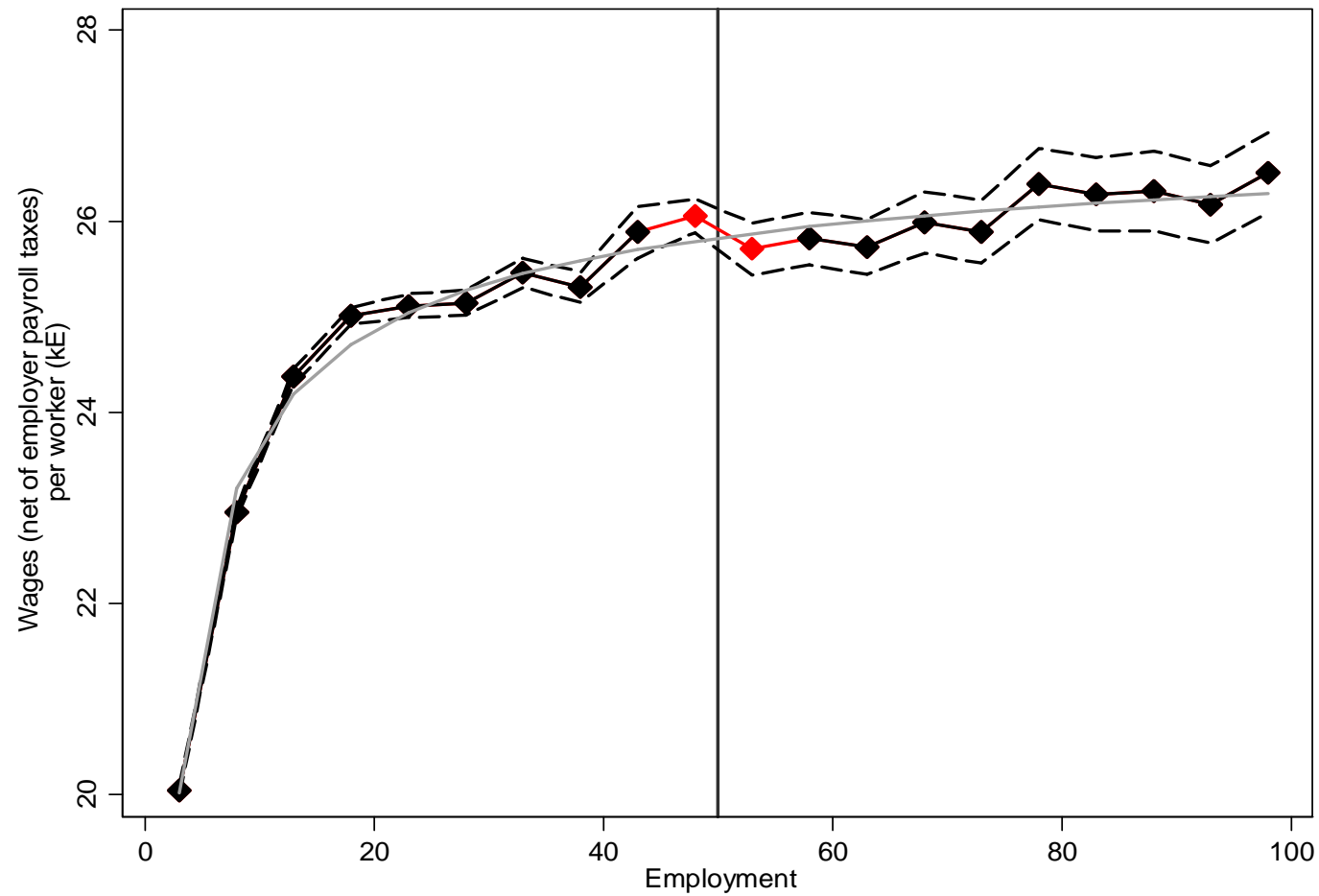
**FIG 15 - OTHER ADJUSTMENTS AROUND THE THRESHOLD: MORE HOURS PER WORKER**



# EXTENSIONS

- Big firms pretending to be small?
- Other margins of adjustment
- **Workers benefit from “insurance” & take lower wages (Lazear, 1990)?**

# FIG 13: NO EVIDENCE THAT WORKERS ARE ACCEPTING LOWER WAGES IN RETURN FOR TOUGHER REGULATION



# EXTENSIONS

- Big firms pretending to be small?
- Other margins of adjustment
- Workers benefit from “insurance” & take lower wages (Lazear, 1990)?
- **Industry heterogeneity**
  - Some heterogeneity (e.g. high/low tech in Table 2; Table 3 over)
  - Estimate separately for each 3 digit industry
  - Sensible heterogeneity, e.g. higher implicit tax when labor a larger share of total value added

# TABLE 3: INDUSTRY HETEROGENEITY

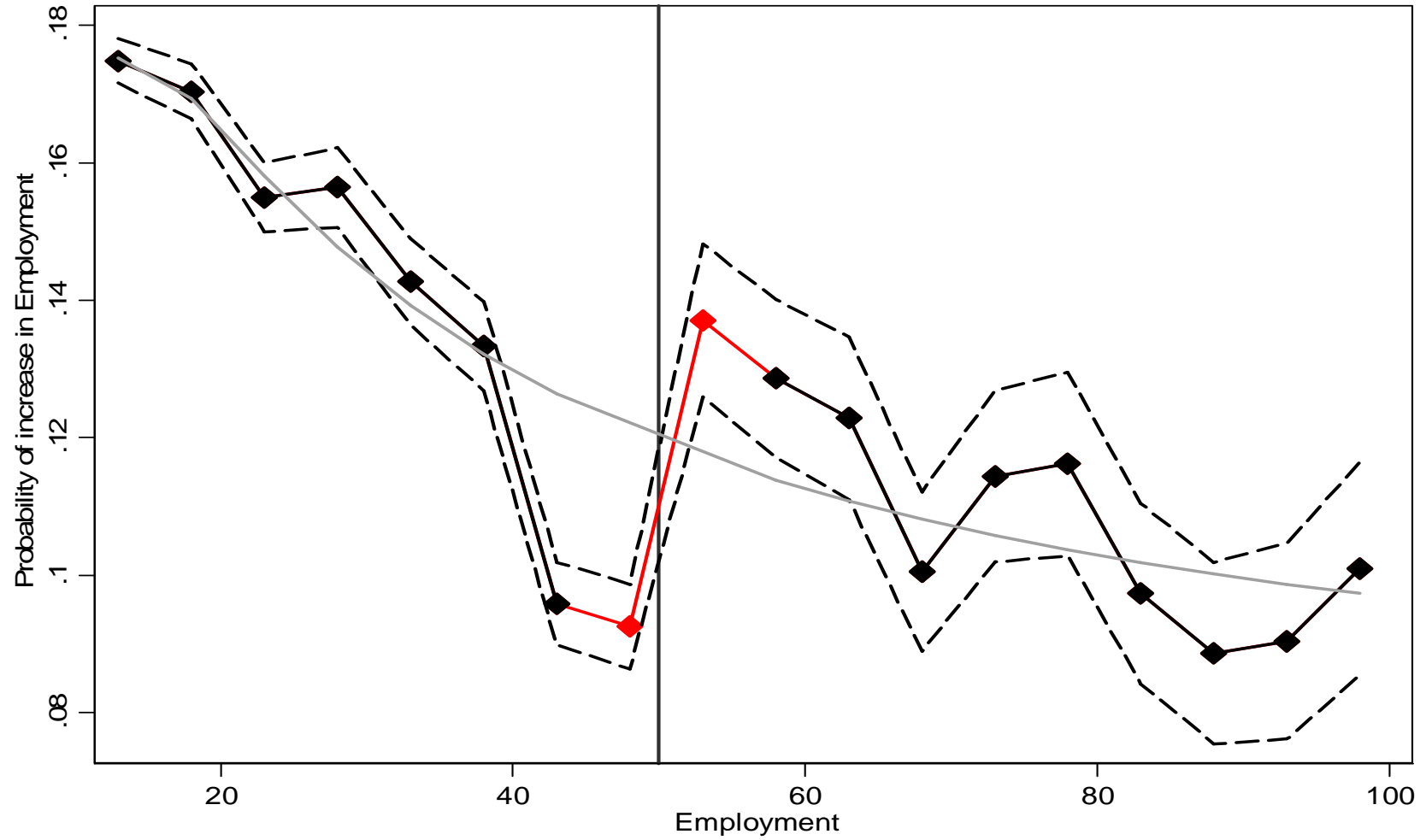
Experiment	Manufactur ing	Transport	Construct- ion	Wholesale & Dist.	Business Services
$\theta$ , Ret Scale	0.8	0.8	0.8	0.8	0.8
$\tau$ , Implicit variable tax	1.013 (0.005)	1.025 (0.010)	1.020 (0.004)	1.022 (0.006)	1.003 (0.004)
$\beta$ , power law	1.822 (0.059)	1.878 (0.098)	2.372 (0.147)	2.128 (0.100)	2.001 (0.087)
$T$	0.948 (0.018)	0.898 (0.029)	0.871 (0.016)	0.885 (0.022)	0.984 (0.020)
$n_u$ , upper emp. cutoff	57.898 (0.024)	55.312 (0.016)	57.874 (0.013)	57.151 (0.015)	58.254 (0.018)
$\sigma$ , msremnt. error	0.104 (0.025)	0.060 (0.023)	0.089 (0.037)	0.084 (0.050)	0.106 (0.024)
Obs	238,701	70,479	159,440	255,812	205,835

Notes: size 10-1000 employees; estimates by ML with standard errors clustered at the 4 digit level.

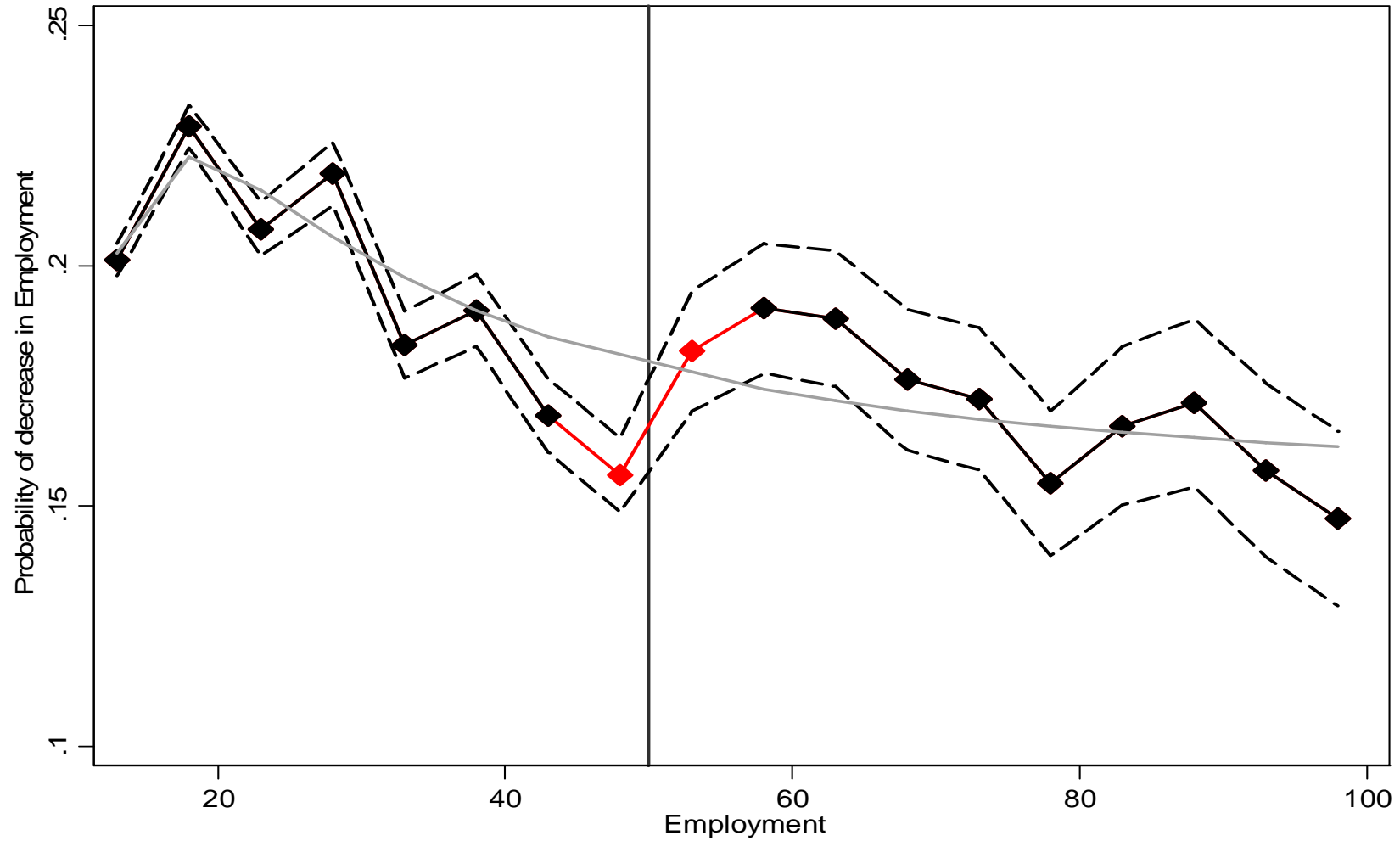
# EXTENSIONS

- **Other explanations for the Valley to right of 50 than measurement error**
  - *Adjustment costs*
    - Growth around threshold consistent with adjustment costs (but also measurement error)
    - But would suggest a spike at 49, not a bulge 45-49 as in data

# FIG 16A PROPORTION OF FIRMS GROWING BY MORE THAN 10%



# FIG 16B PROPORTION OF FIRMS SHRINKING BY MORE THAN 10%

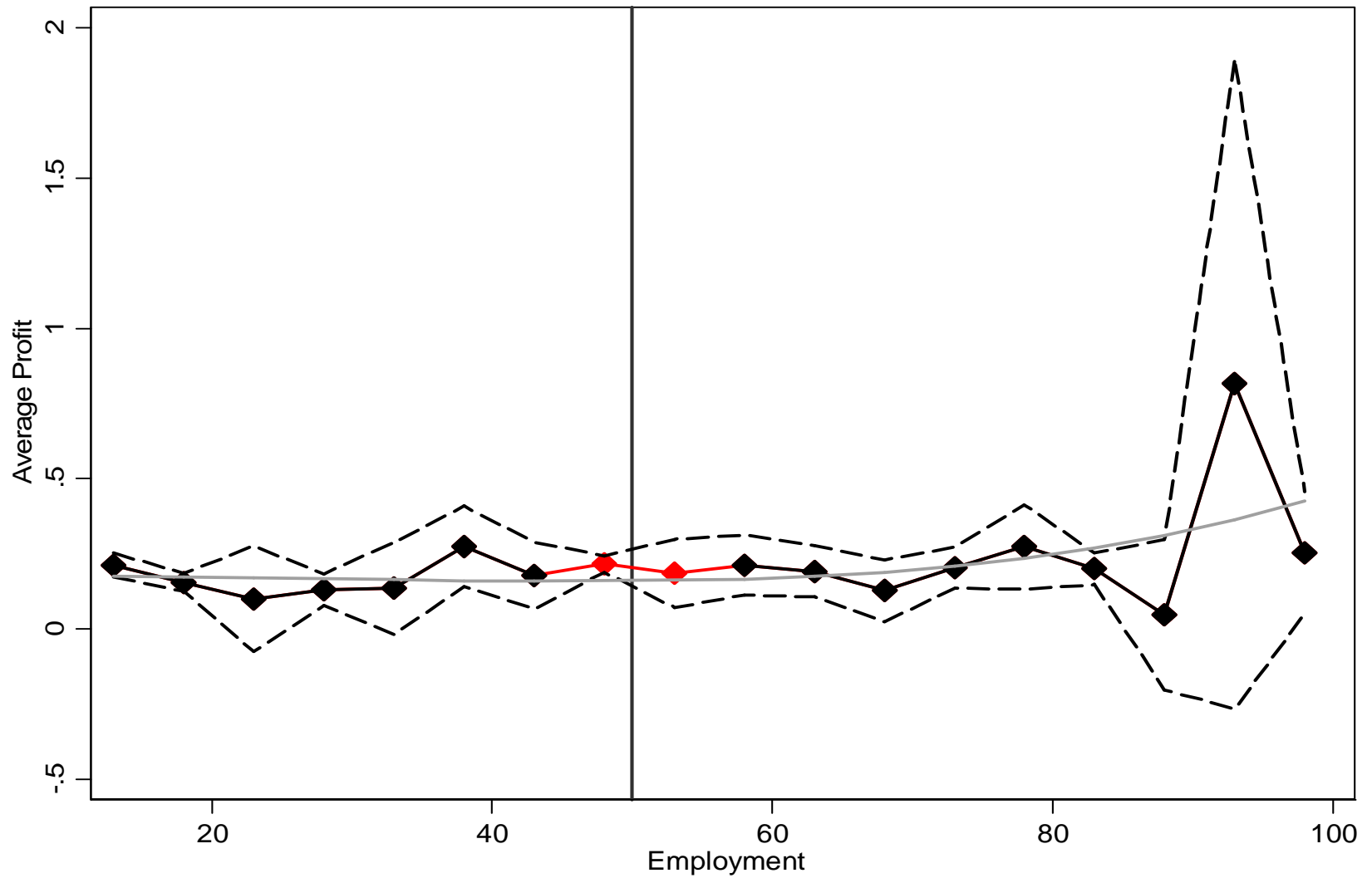




# EXTENSIONS

- **Other explanations for the Valley to right of 50 than measurement error**
  - *Adjustment costs*
    - Growth around threshold
    - But would suggest a spike at 49, not a bulge 45-49 as in data
  - *Shocks to quits*
    - but would expect spike prior to 49
  - *Leontief production*
    - Wouldn't see the pattern of growth dynamics
  - *Bounded rationality*
    - Could rationalize findings if completely behavioral
    - But no evidence of lower profits in valley

# FIGURE 17 PROFITABILITY NOT UNUSUALLY LOW IN VALLEY

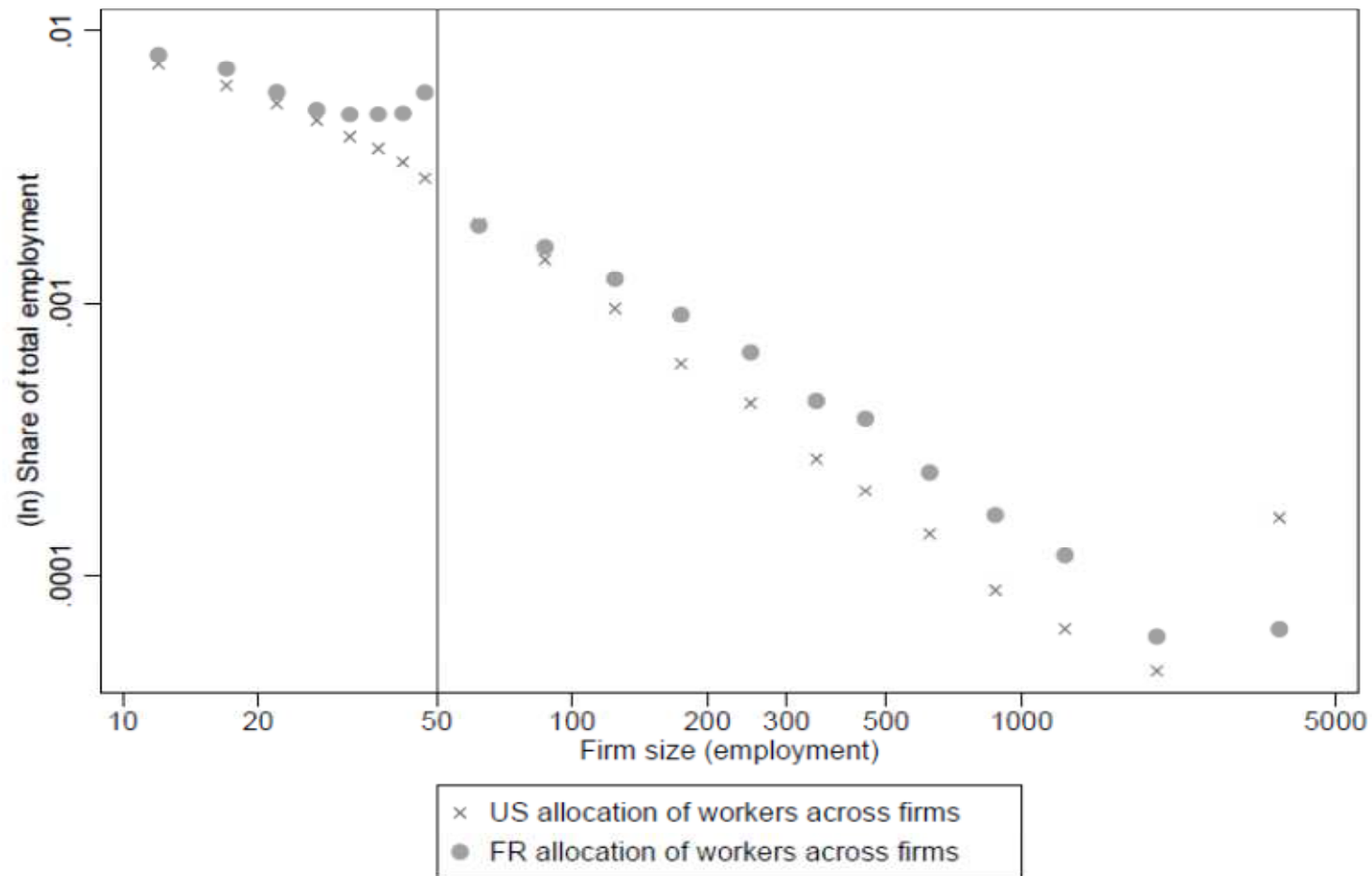


# CONCLUSIONS

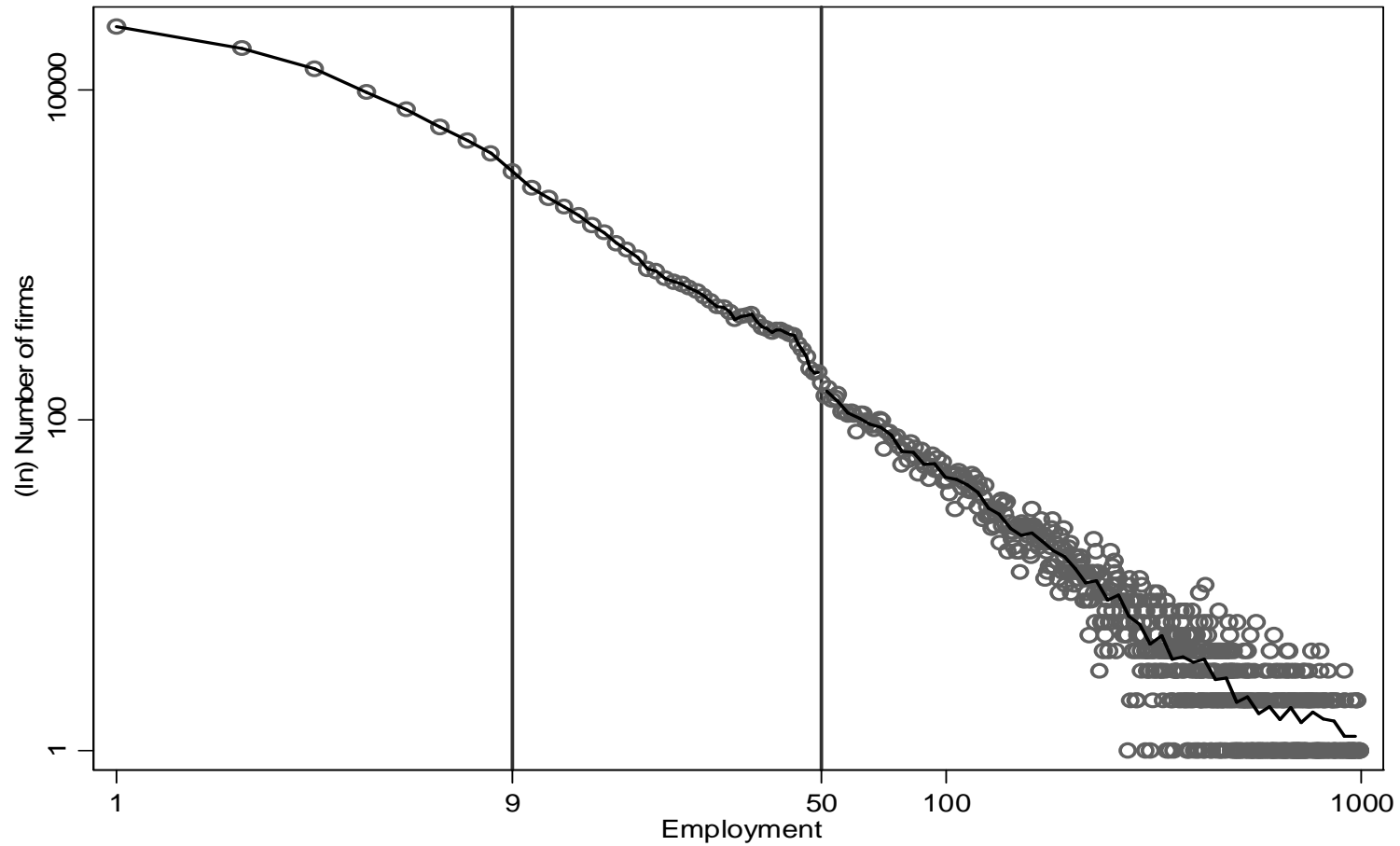
- Simple methodology for quantifying effect of size-related regulations
- Helps explain qualitative & quantitative features of data
- Big changes in distribution: workers & large firms lose but smaller firms win
- Loss of GDP 4-5% with inflexible wages
- **Next Steps:**
  - Lower bound to welfare loss? If endogenous change in TFP to change, increased penalty of growing may reduce investment incentives
  - Dynamics
  - Build in other size-related regulations
  - Other settings for methodology

Back Up

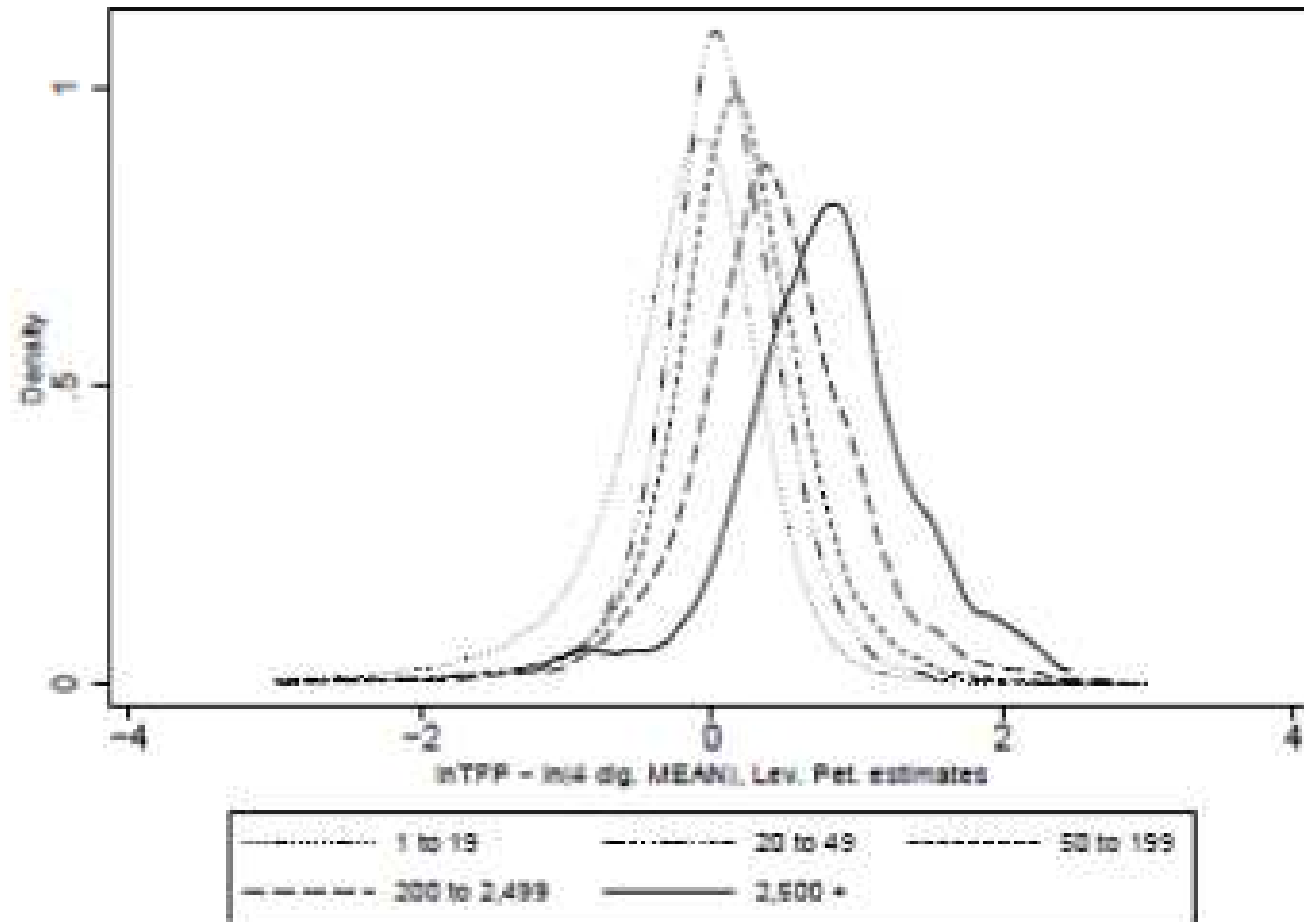
# FIRM SIZE DISTRIBUTION IN US AND FRANCE – A “BULGE” OF EMPLOYMENT IN FRENCH FIRMS WITH JUST UNDER 50 WORKERS



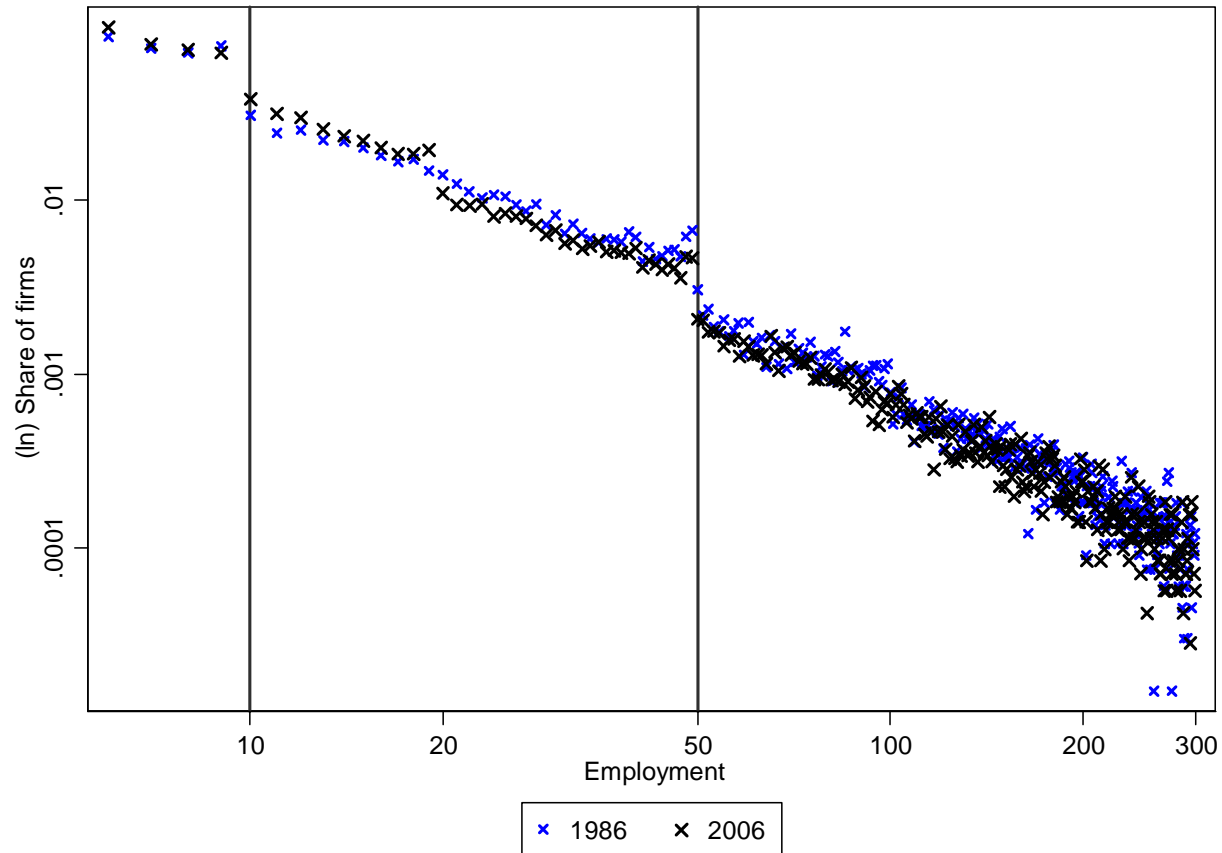
**FIG 6: THE IMPORTANCE OF USING GOOD DATA:  
FULL TIME EQUIVALENTS DADS**



# LARGER FIRMS ARE MORE PRODUCTIVE

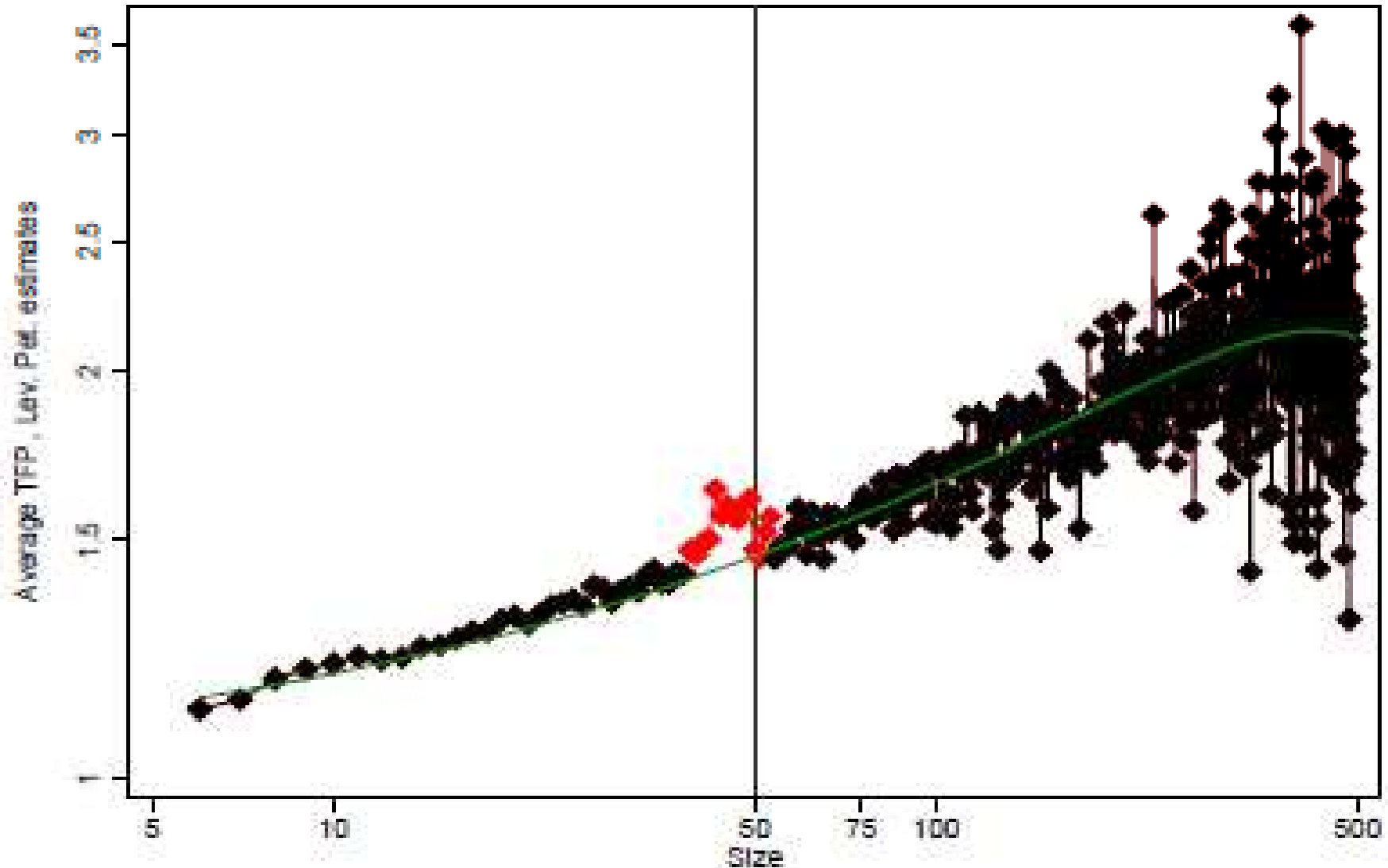


# Manufacturing industries, 1986 vs 2006

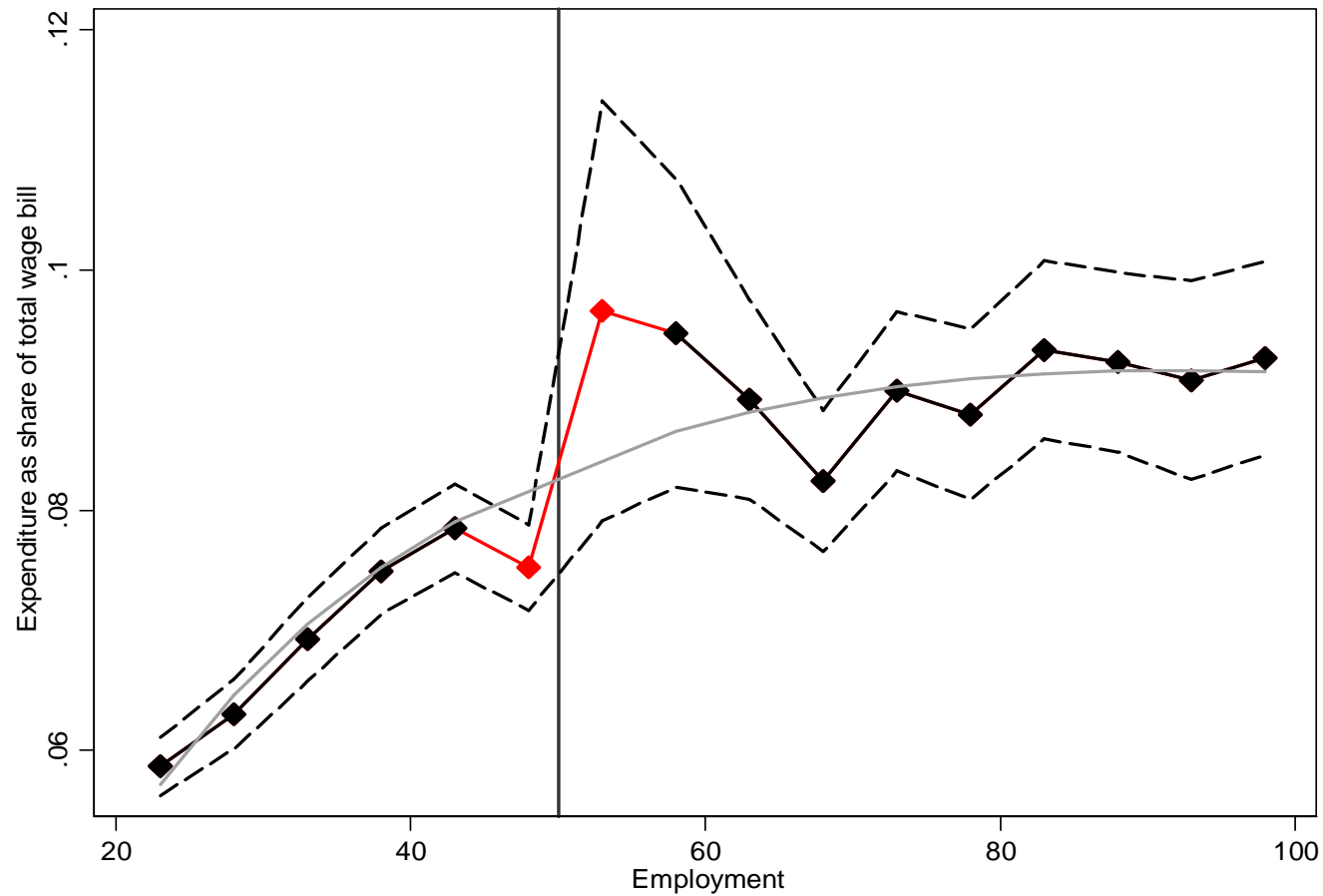




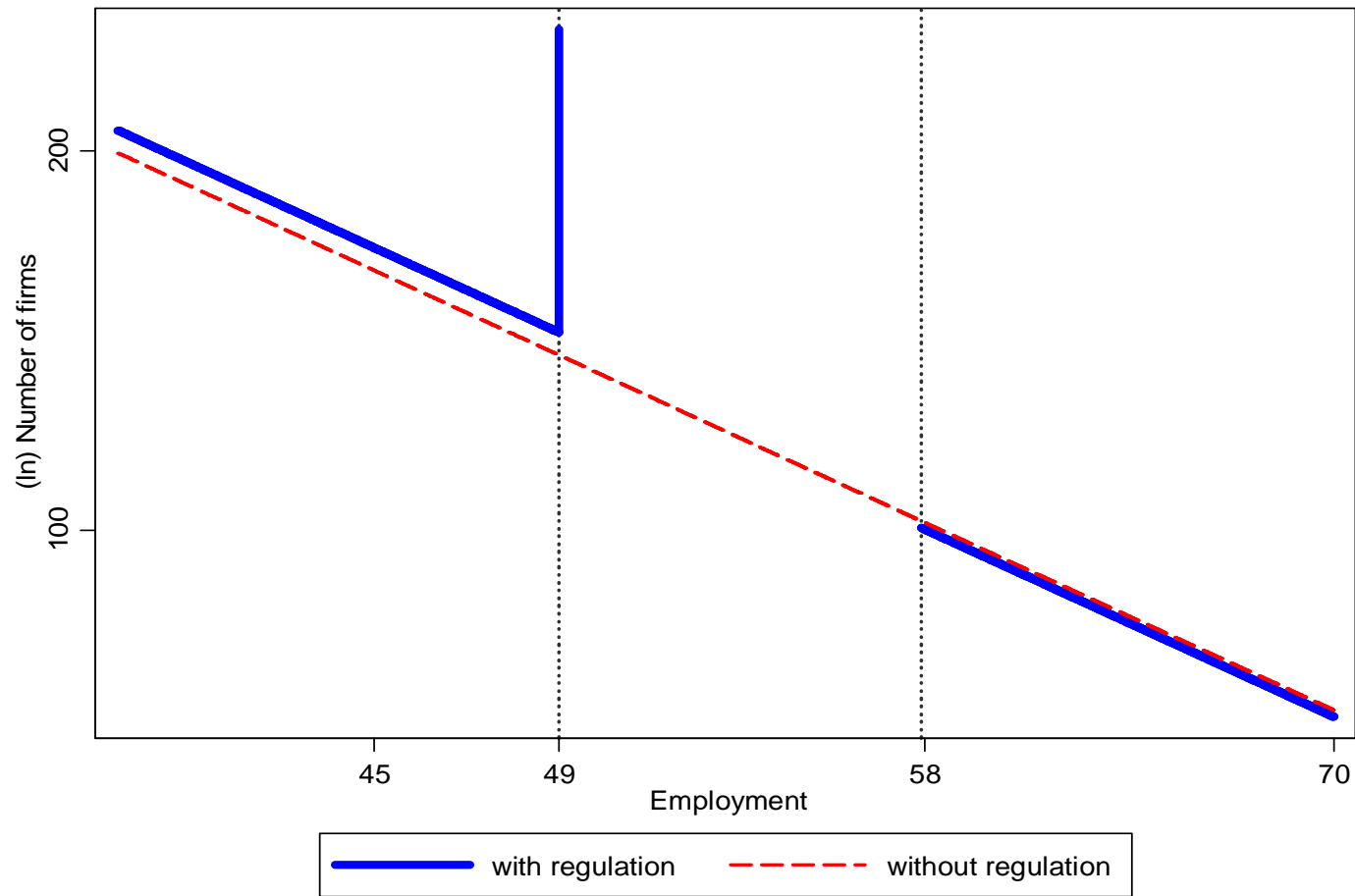
# TFP & SIZE RELATIONSHIP: CONSISTENT WITH THEORY THERE IS A BULGE IN TFP AROUND THE REGULATORY THRESHOLD



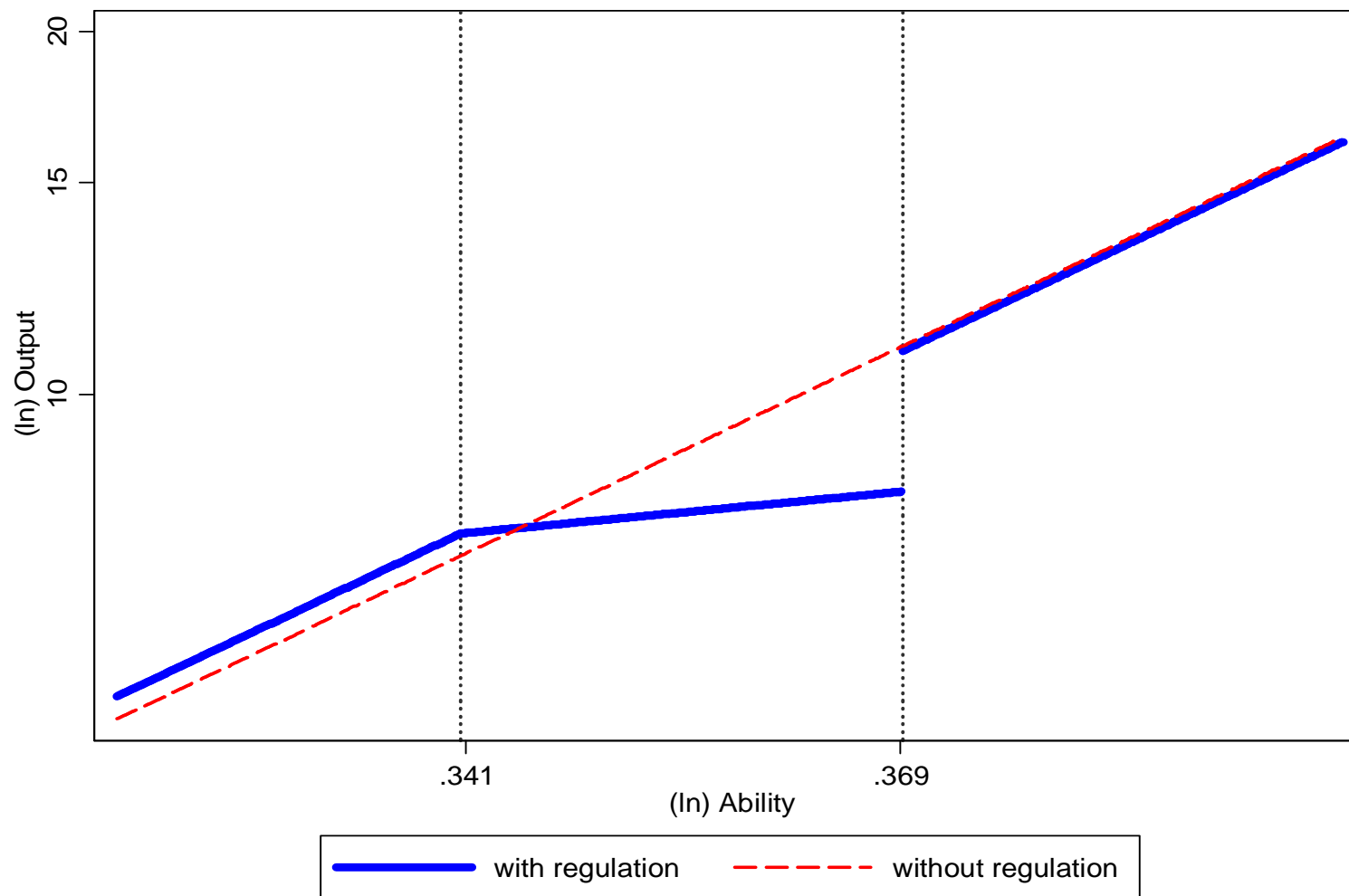
# OTHER MARGINS OF ADJUSTMENT AROUND THE THRESHOLD: MORE OUTSOURCED WORKERS



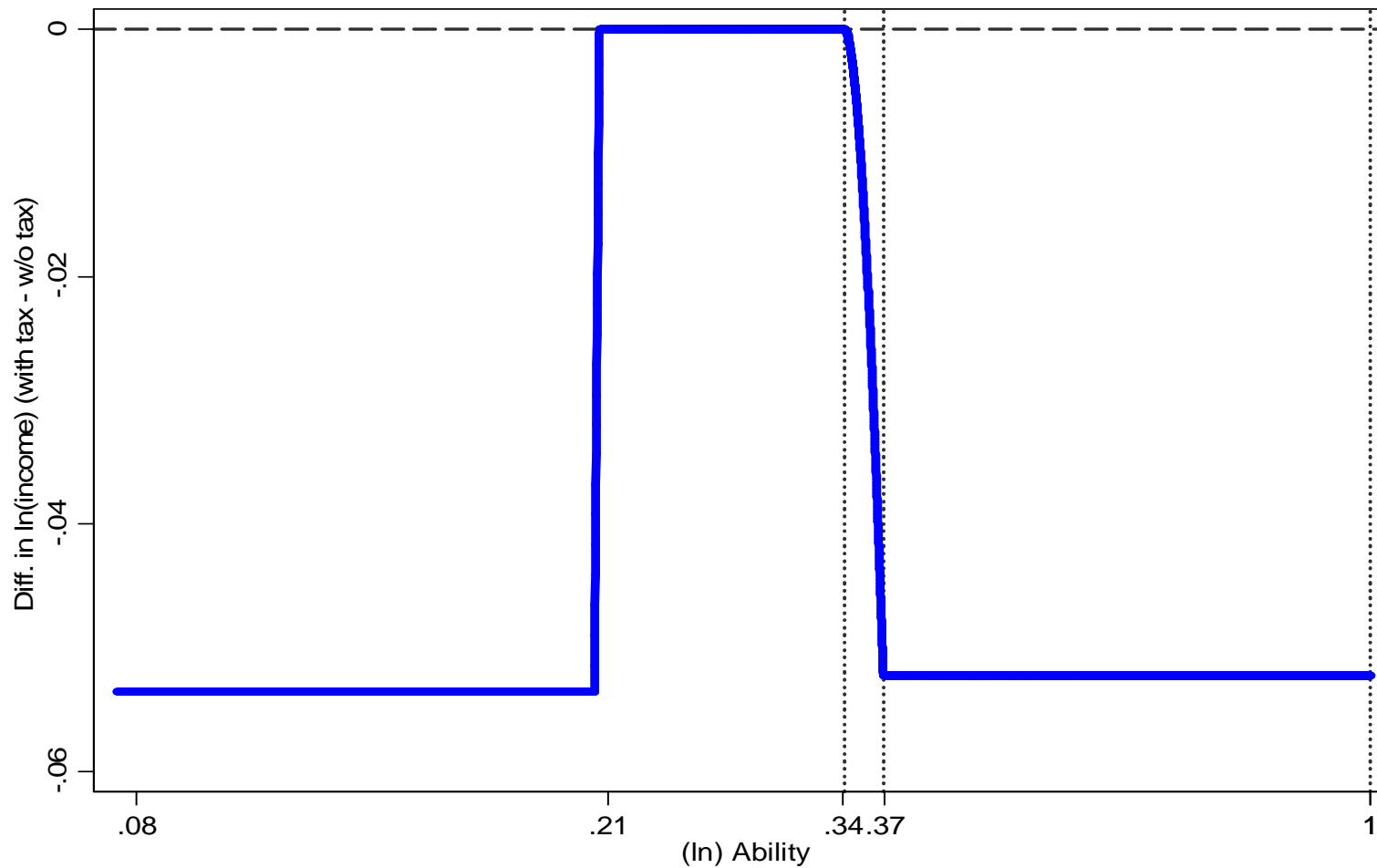
# TABLE 10: SIZE DISTRIBUTION WITH AND WITHOUT REGULATION



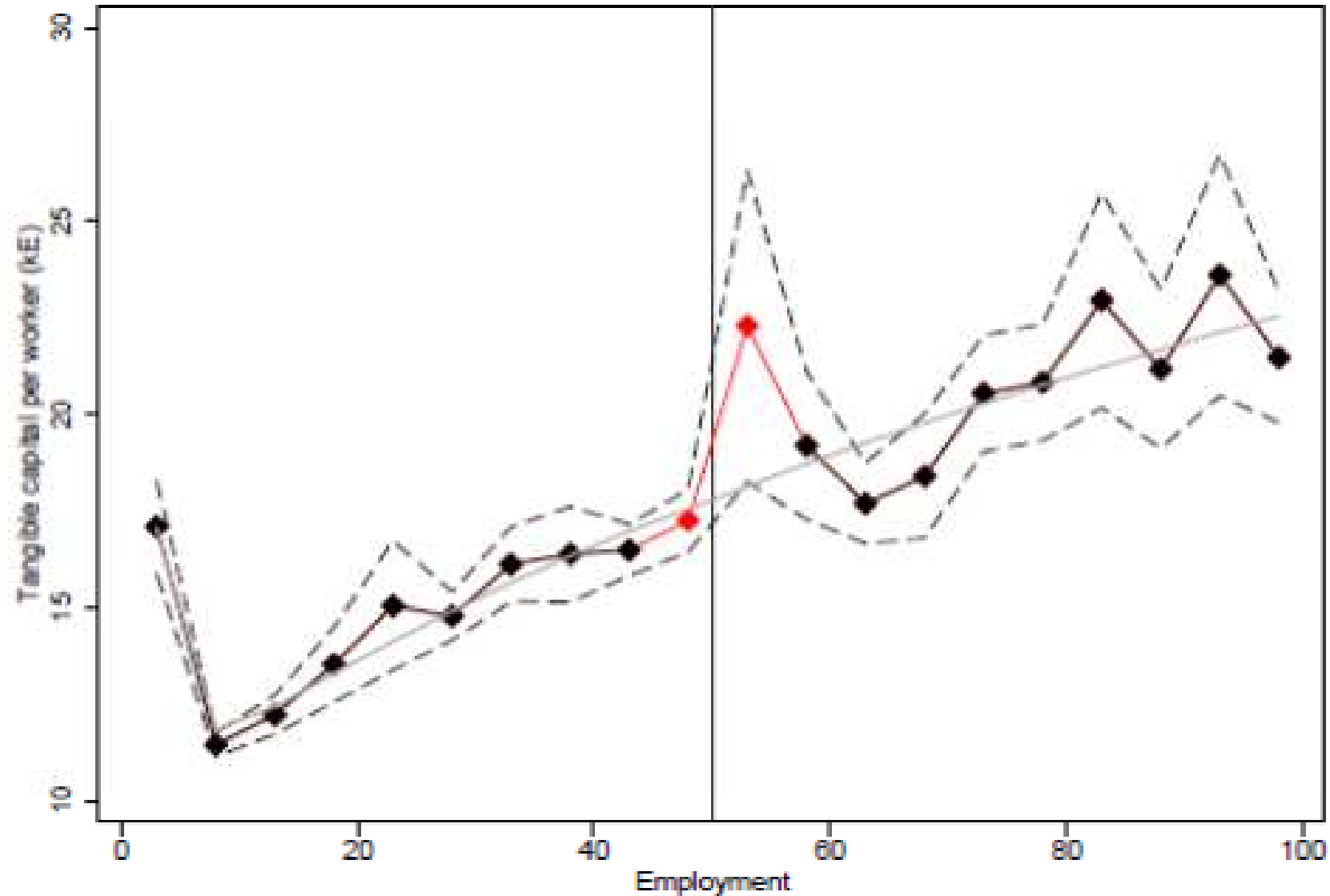
# TABLE 11: OUTPUT DISTRIBUTION BY ABILITY LEVEL



# FIGURE 12A: DISTRIBUTIONAL EFFECTS OF REGULATION ACROSS AGENTS (RIGID WAGES)

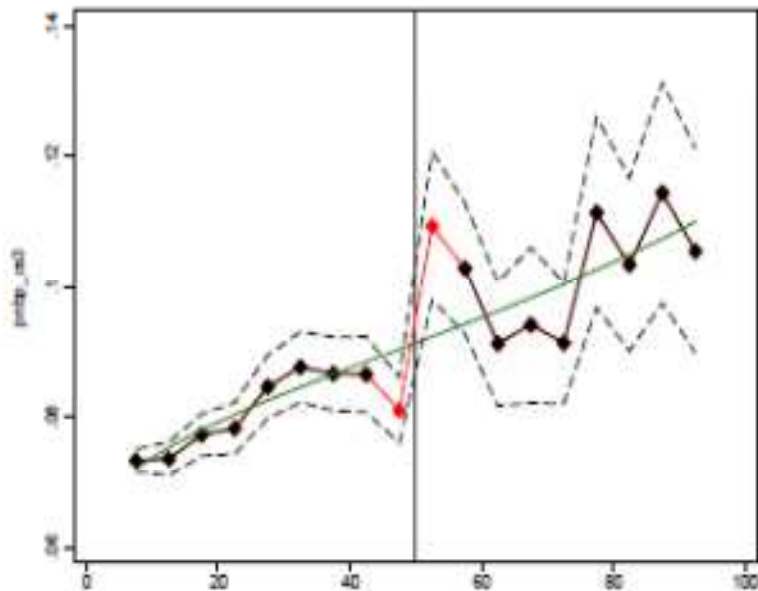


# OTHER MARGINS OF ADJUSTMENT AROUND THE THRESHOLD: MORE CAPITAL PER WORKER

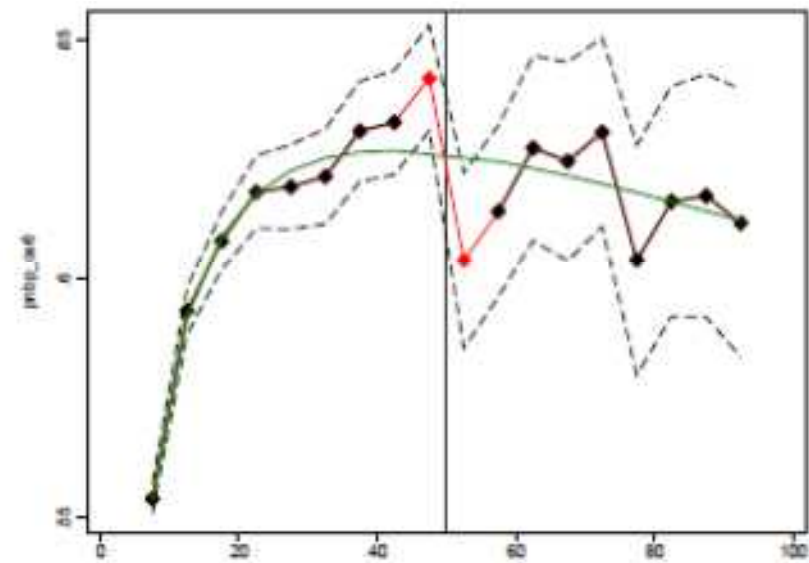


# OTHER MARGINS OF ADJUSTMENT AROUND THE THRESHOLD: MORE SKILLS

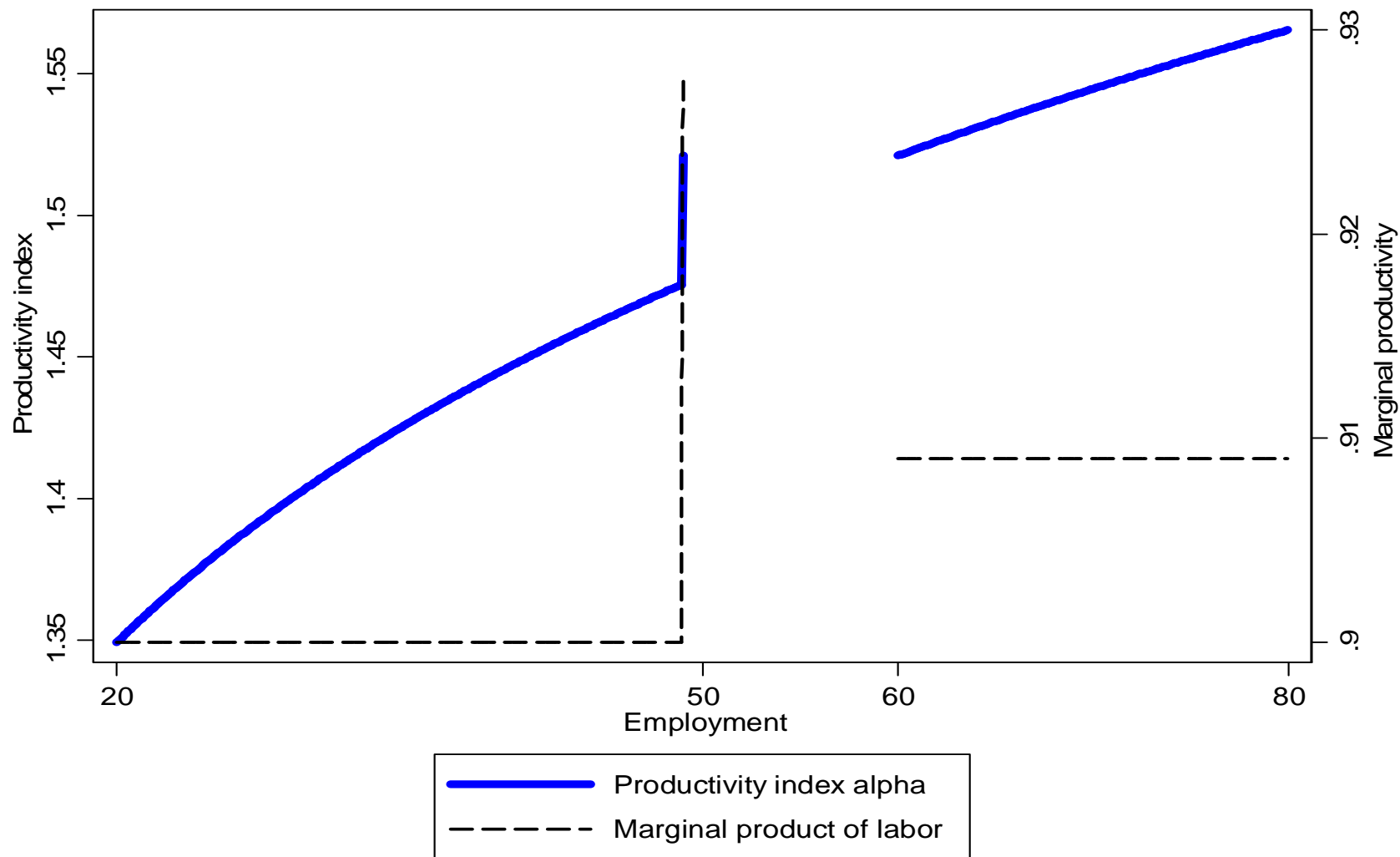
Share of managerial & professional up



Share of blue collar workers down

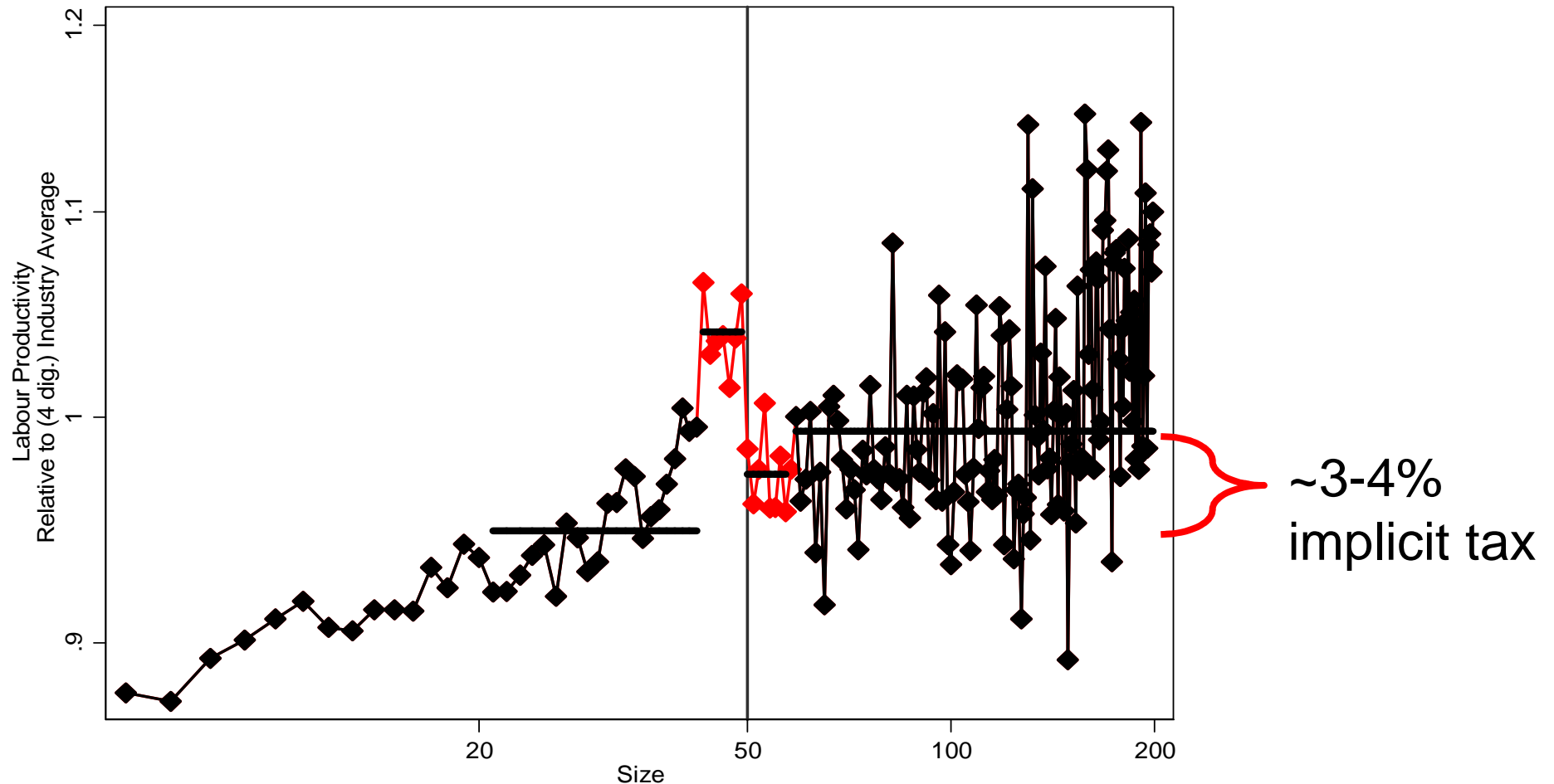


# COMPARISON WITH HSHIEH-KLENOW APPROACH: MARGINAL REVENUE PRODUCTIVITY OF LABOR





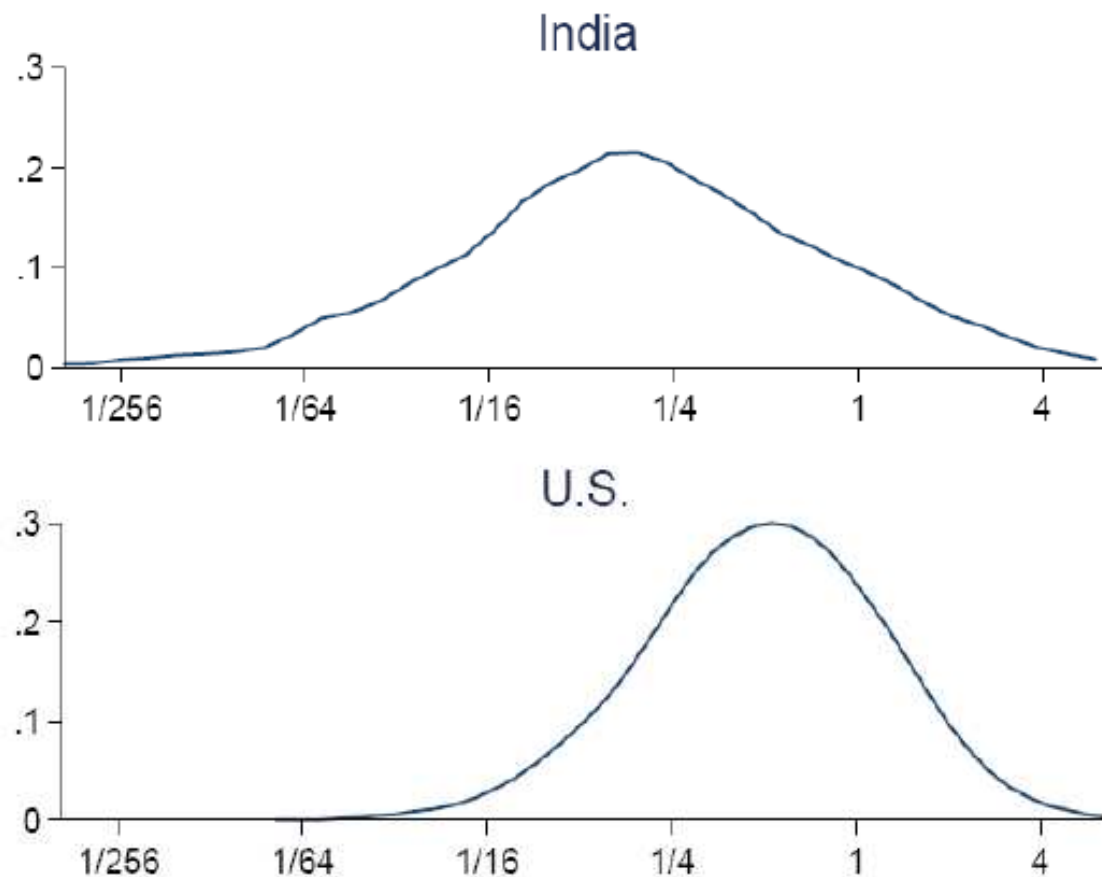
# FIG A3: MRPL SUGGESTS A TAX OF 3-4% (SAME AS US WHEN WE USE H-K $\theta=.5$ )



**Note:** This is data on value added per worker relative to the four digit industry average

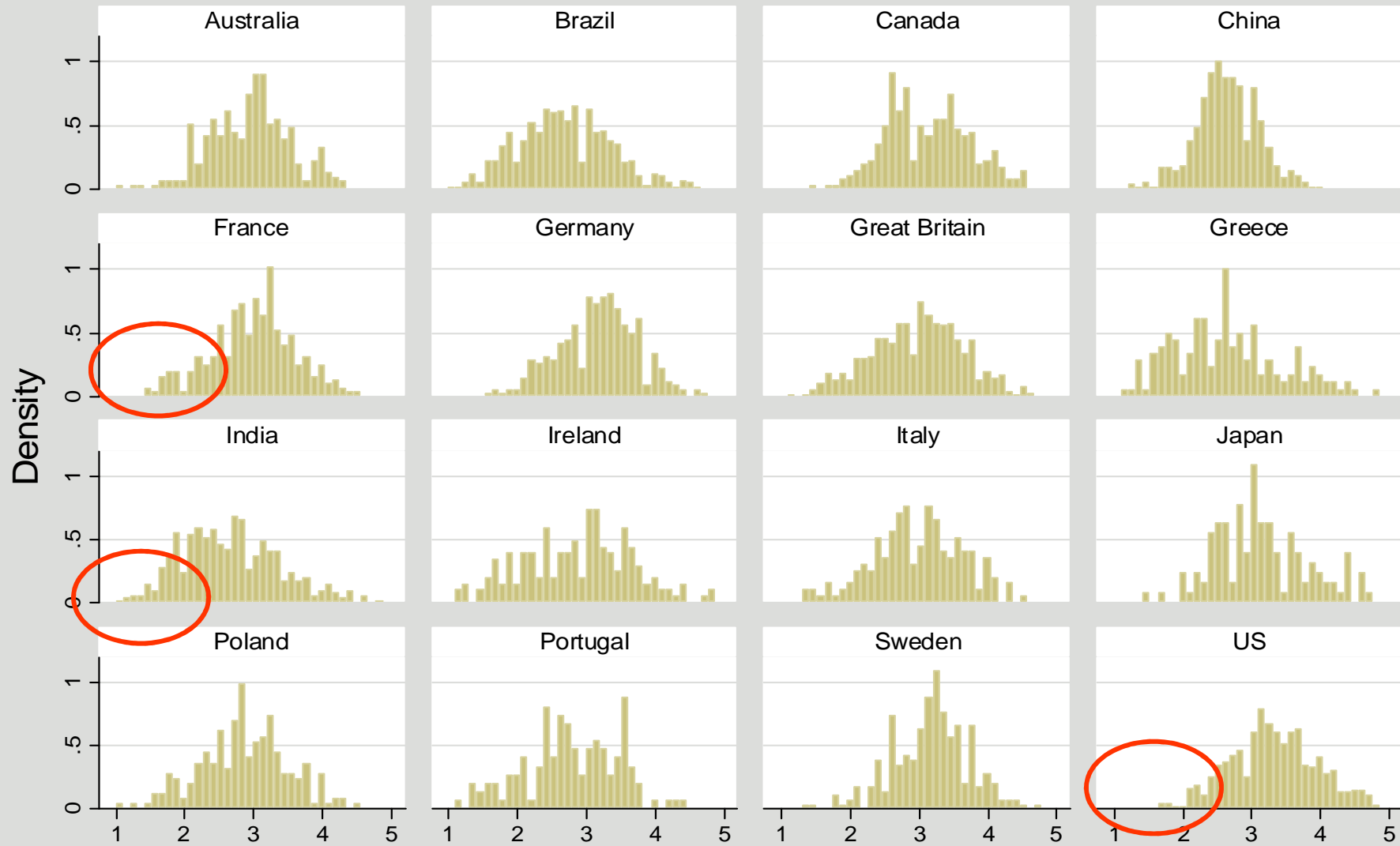
# DISTRIBUTION OF PLANT TFP DIFFERENCES IN US VS. INDIA

## HIGHER US TFP DUE TO REALLOCATION - THINNER "TAIL" OF LESS PRODUCTIVE PLANTS



Source: Hsieh and Klenow (2009); US mean=1

# MANAGEMENT QUALITY DISTRIBUTION ACROSS FIRMS WITHIN COUNTRIES BLOOM & VAN REENEN DATA. TAIL OF VERY BADLY MANAGED FIRMS SMALLEST IN US



Firm-Level Management Scores (1=worst, 5=Best)