Corporate Taxation and the Decline of the Labor Share

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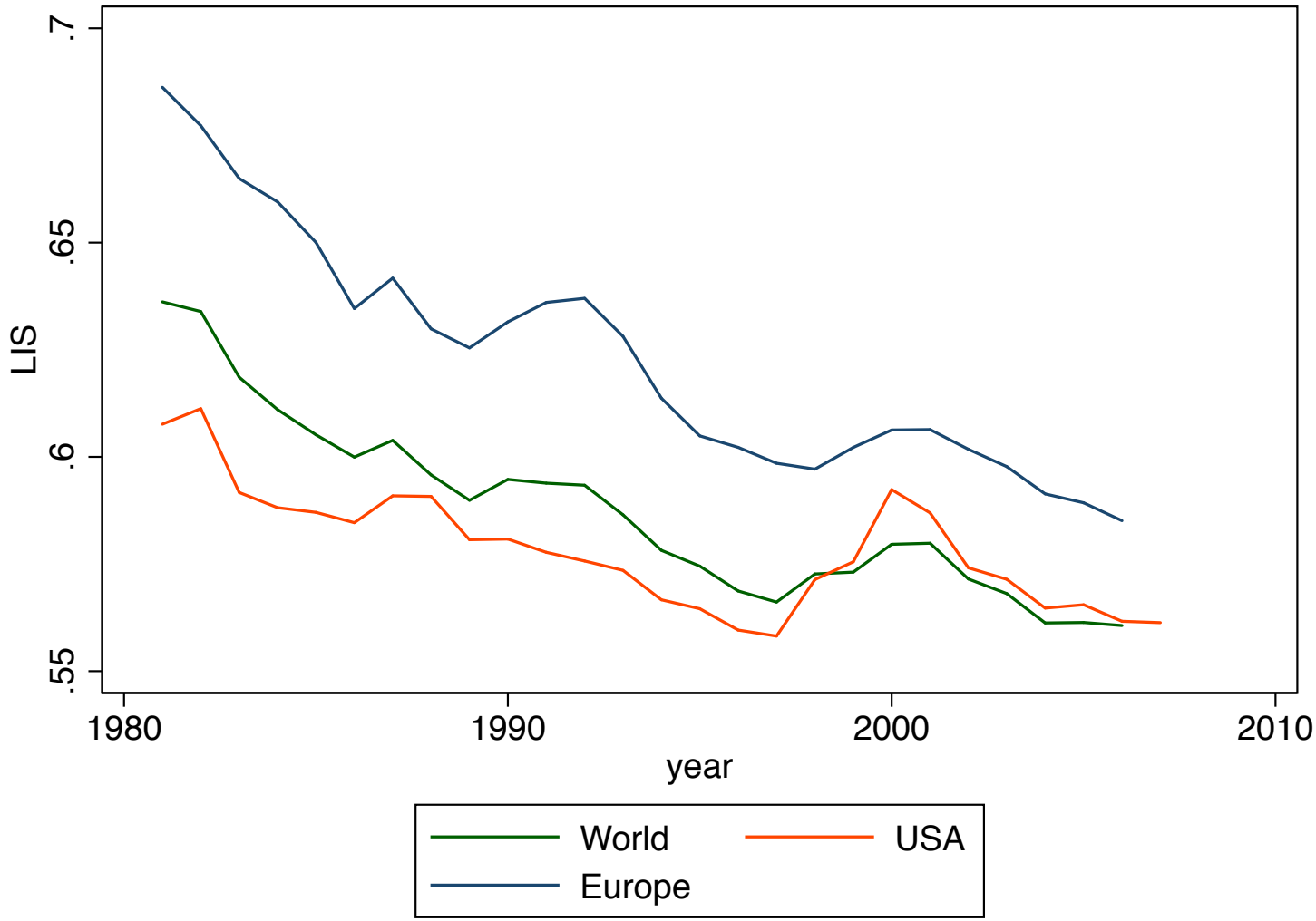
Global decline of the labor share



Theories

- Production Function
  - CES with $\sigma < 1$ and decreasing K/L (Lawrence, 2015)
  - CES with $\sigma > 1$ and increasing K/L (Karabarbounis and Neiman, 2013)
- Market Elements
  - More competition (Autor et al., 2017)
  - Less competition (De Loecker and Eeckhout, 2017)
  - Trade (Elsby et al., 2013)
- Institutional Elements
  - Unions ? (Elsby et al., 2013)
  - Corporate Taxation

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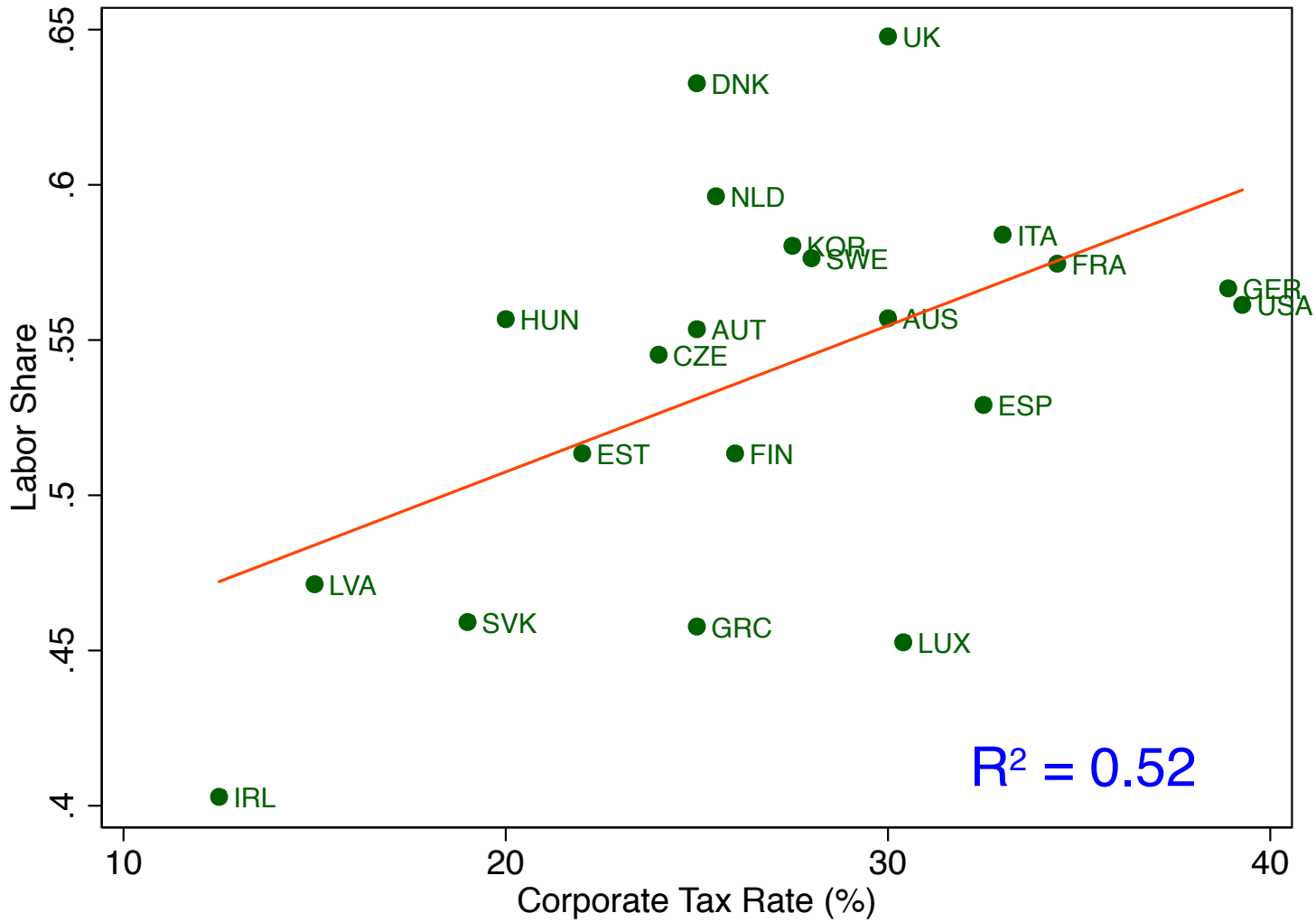
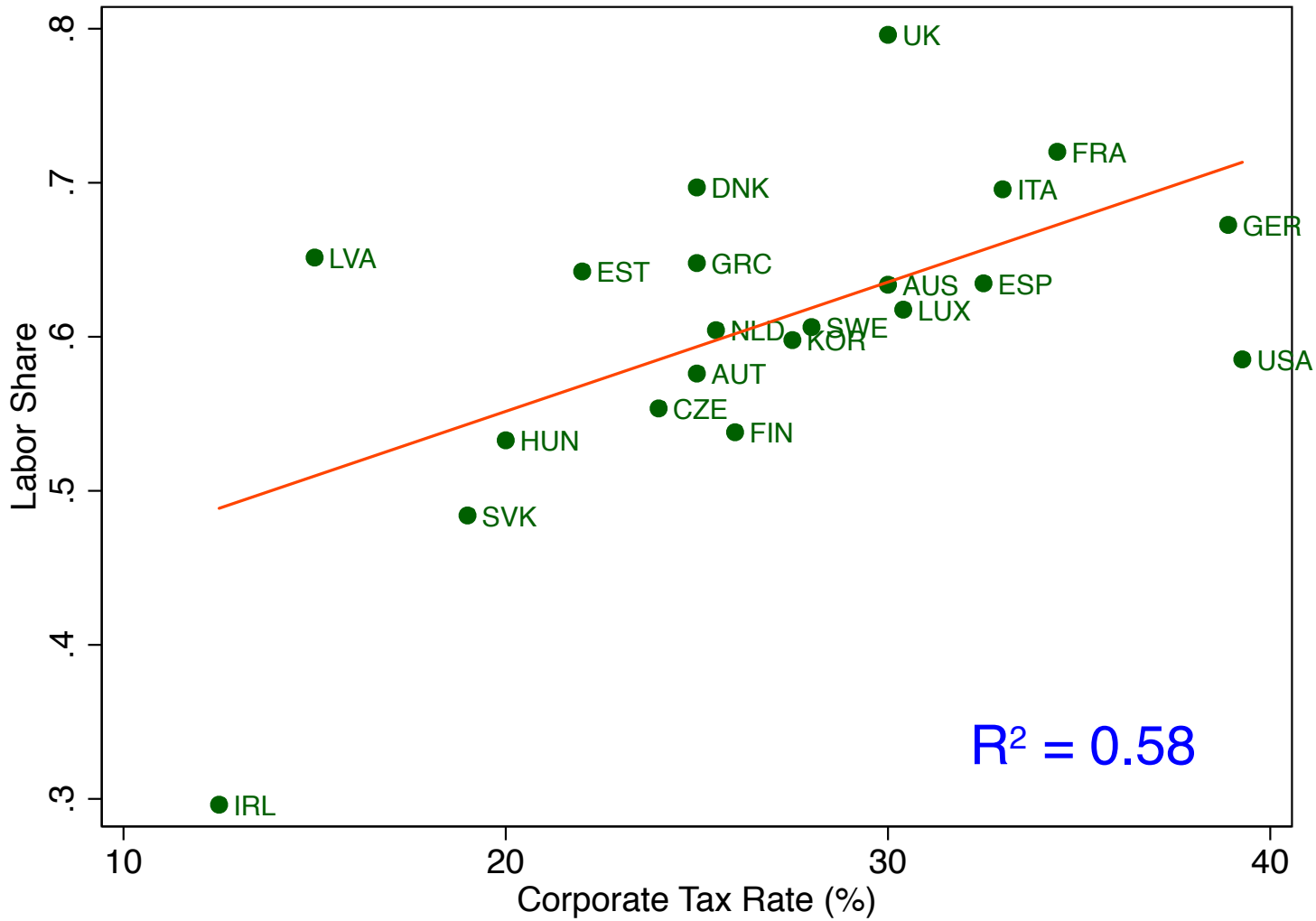
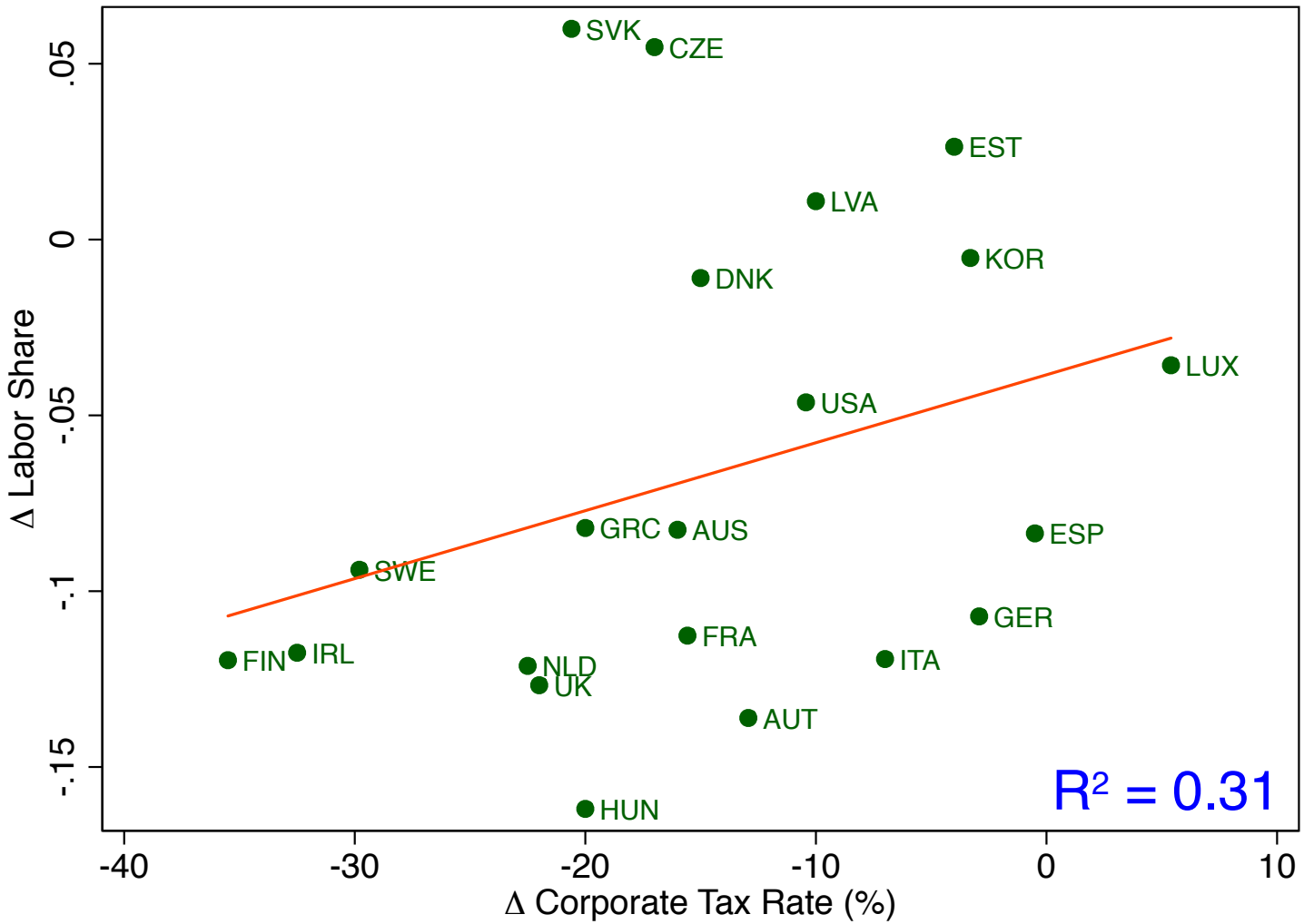
Corporate taxation and the labor share : 2007



Corporate taxation and the labor share : manufacturing 2007



Corporate taxation and the labor share : 1981 – 2007



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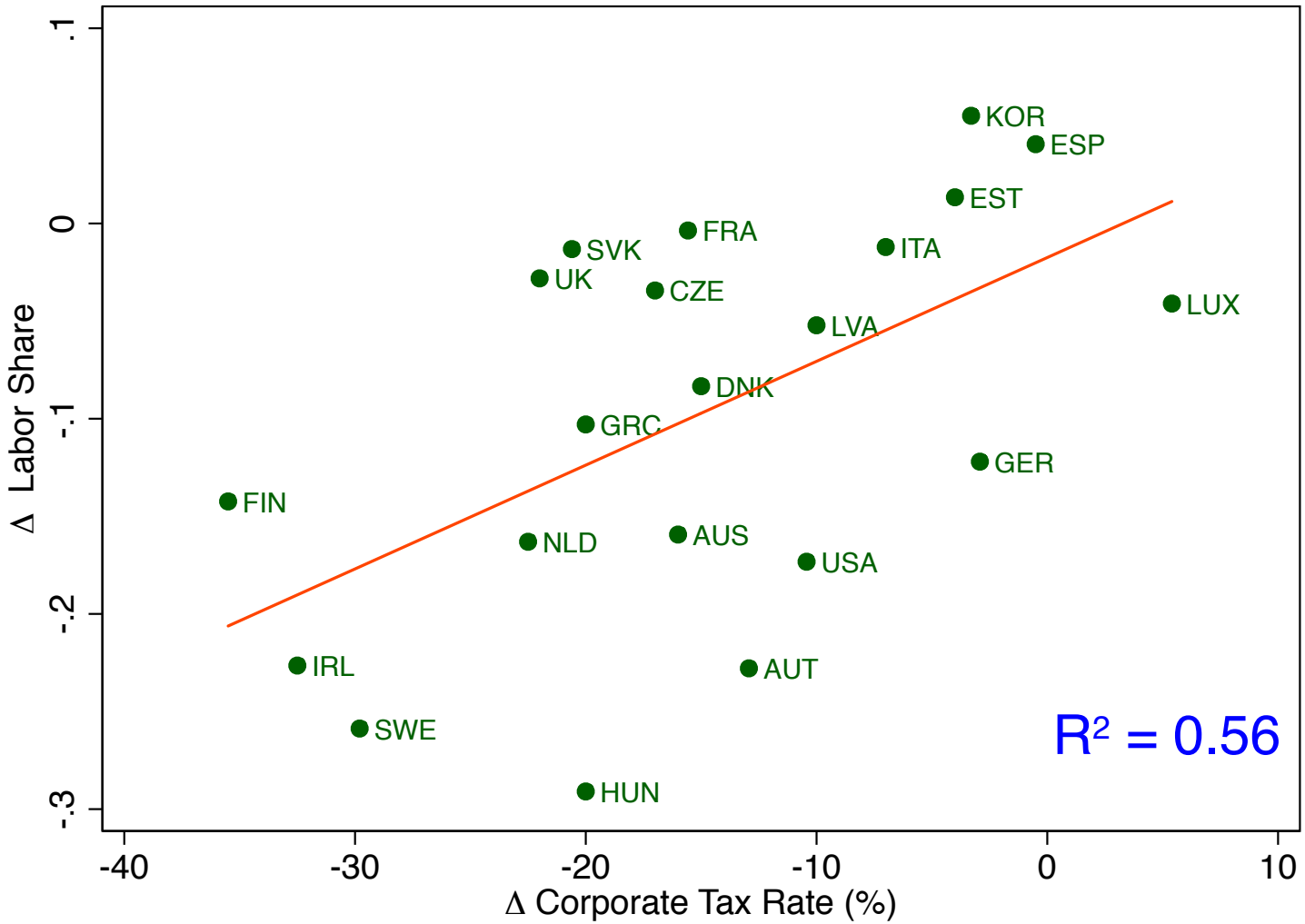
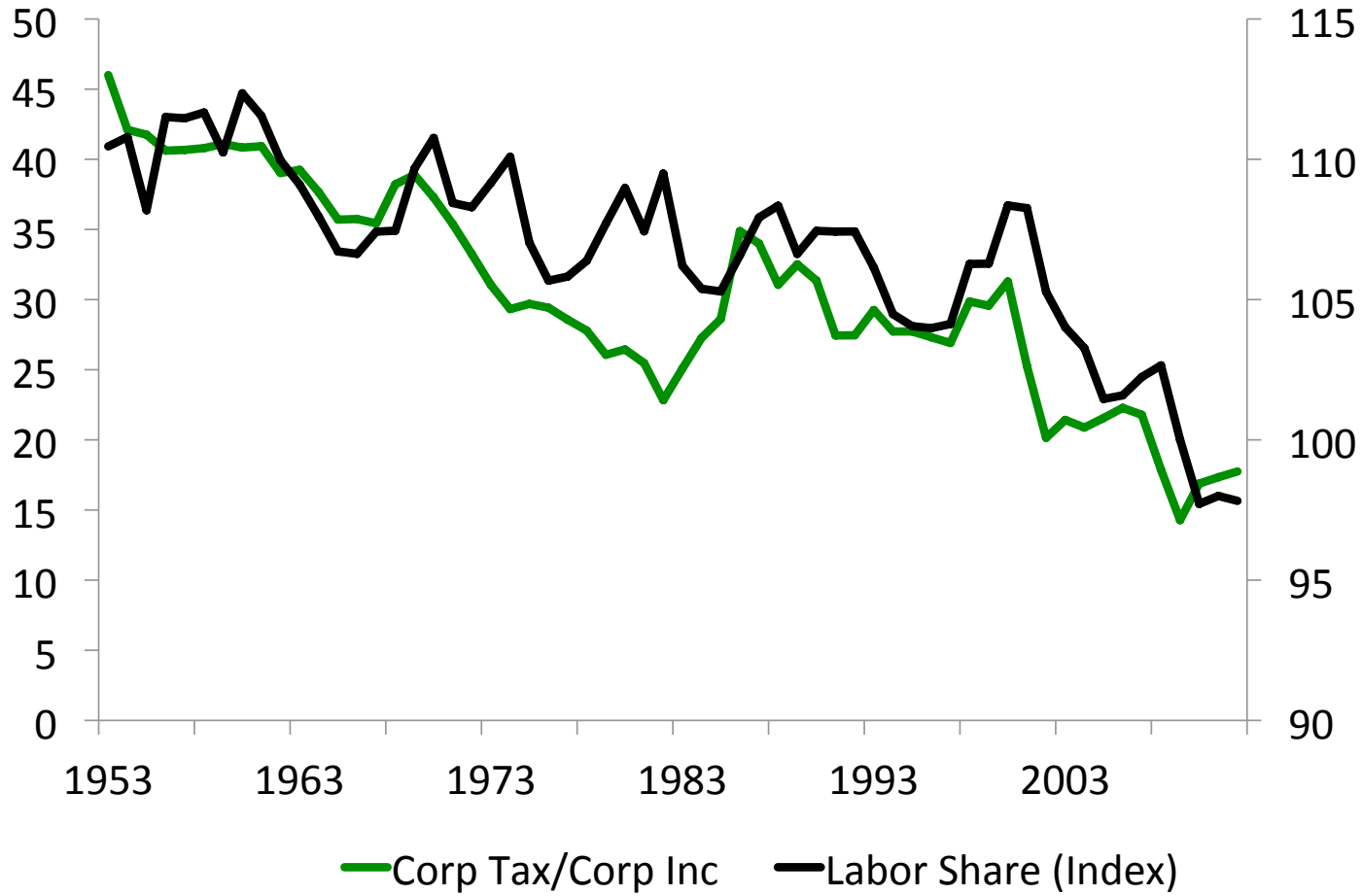


Corporate taxation and the labor share

	Manufacturing	Services	Aggregate
corporate tax rate	0.37^{**}	0.06	0.16^{**}
w/o country trends	(0.10)	(0.05)	(0.05)
corporate tax rate	0.22^{**}	0.15^{*}	0.17^{**}
with country trends	(0.06)	(0.06)	(0.06)
N	528	528	528

Note.– * $p < 0.05$, ** $p < 0.01$. Data comes from KLEMS database and OECD 1981 to 2007. Dependent variable is labor's share of income. All specifications control for fixed year and country effects. Standard errors are clustered at the country level.

Corporate Taxes and Labor Share in the US



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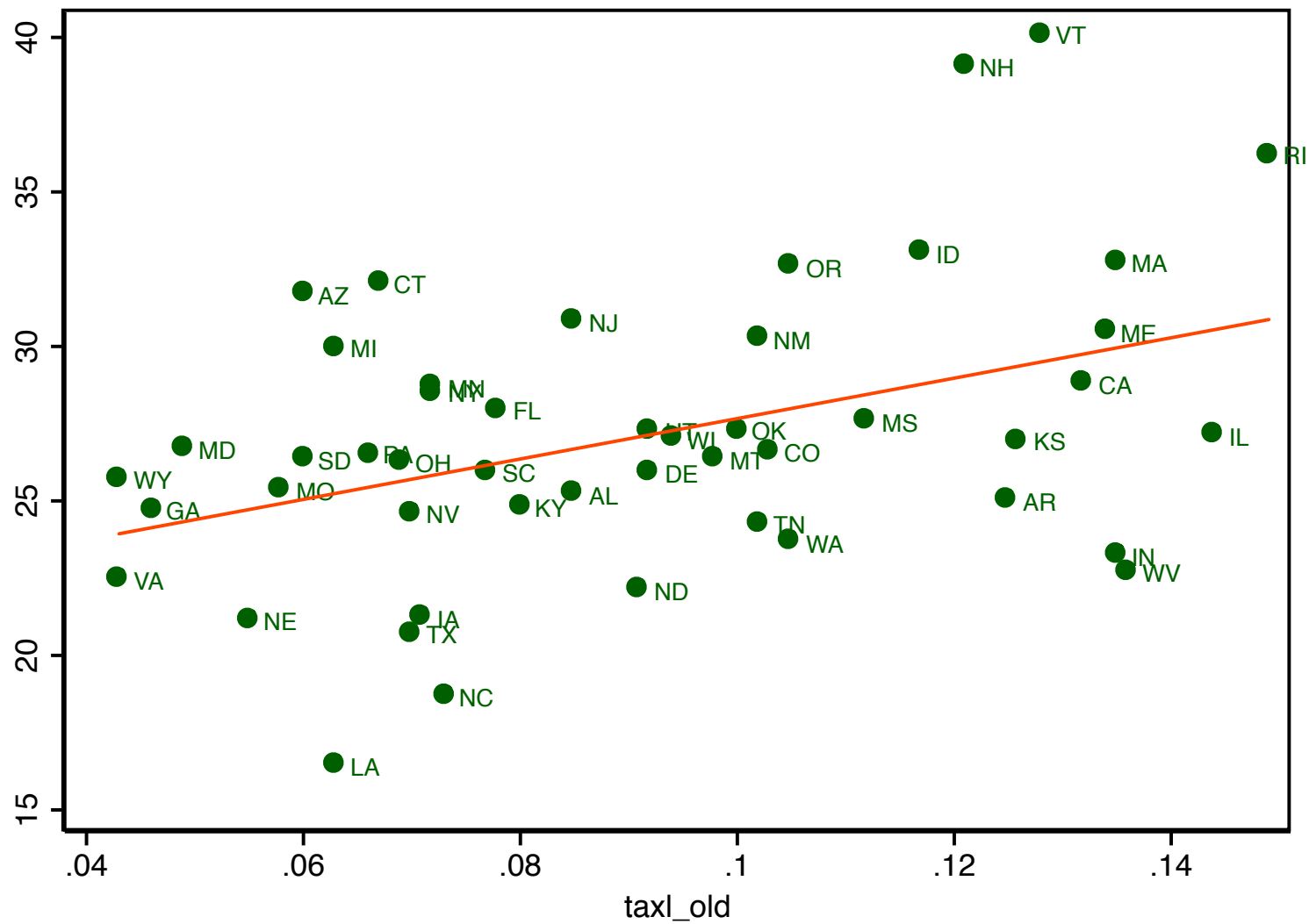
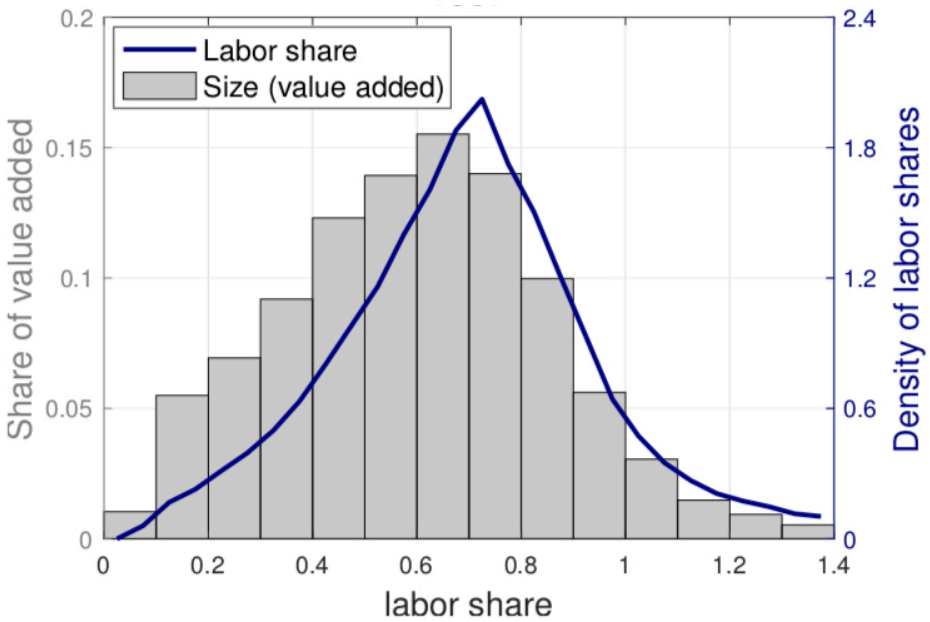


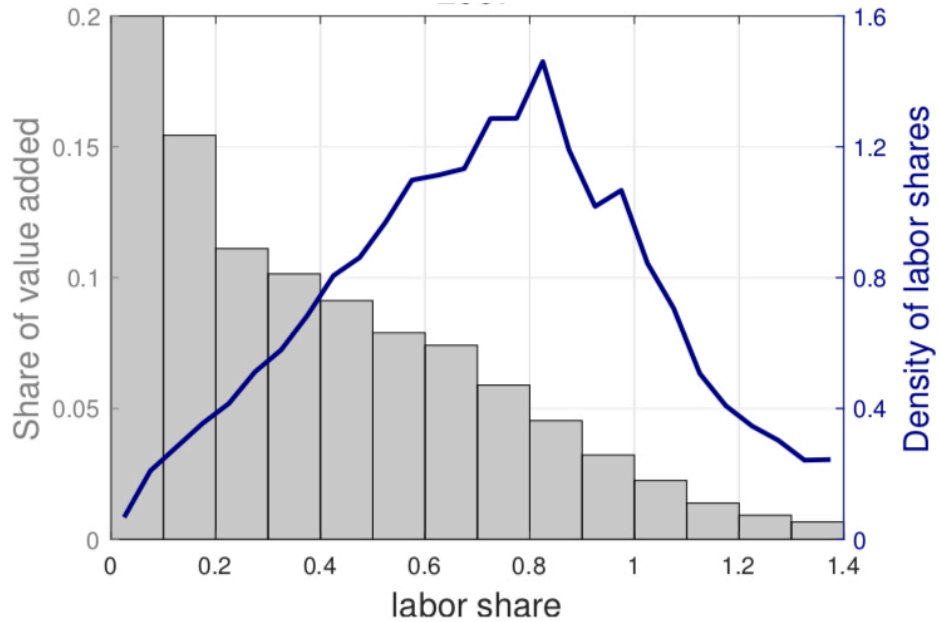
Anatomy of the Decline in the US

1. large declines *within* industries, primarily in K-intensive sectors
2. limited decline *within* establishments
3. rising share of K-intensive firms in output
4. roughly stable employment size distribution

Labor share and value added in US Manufacturing



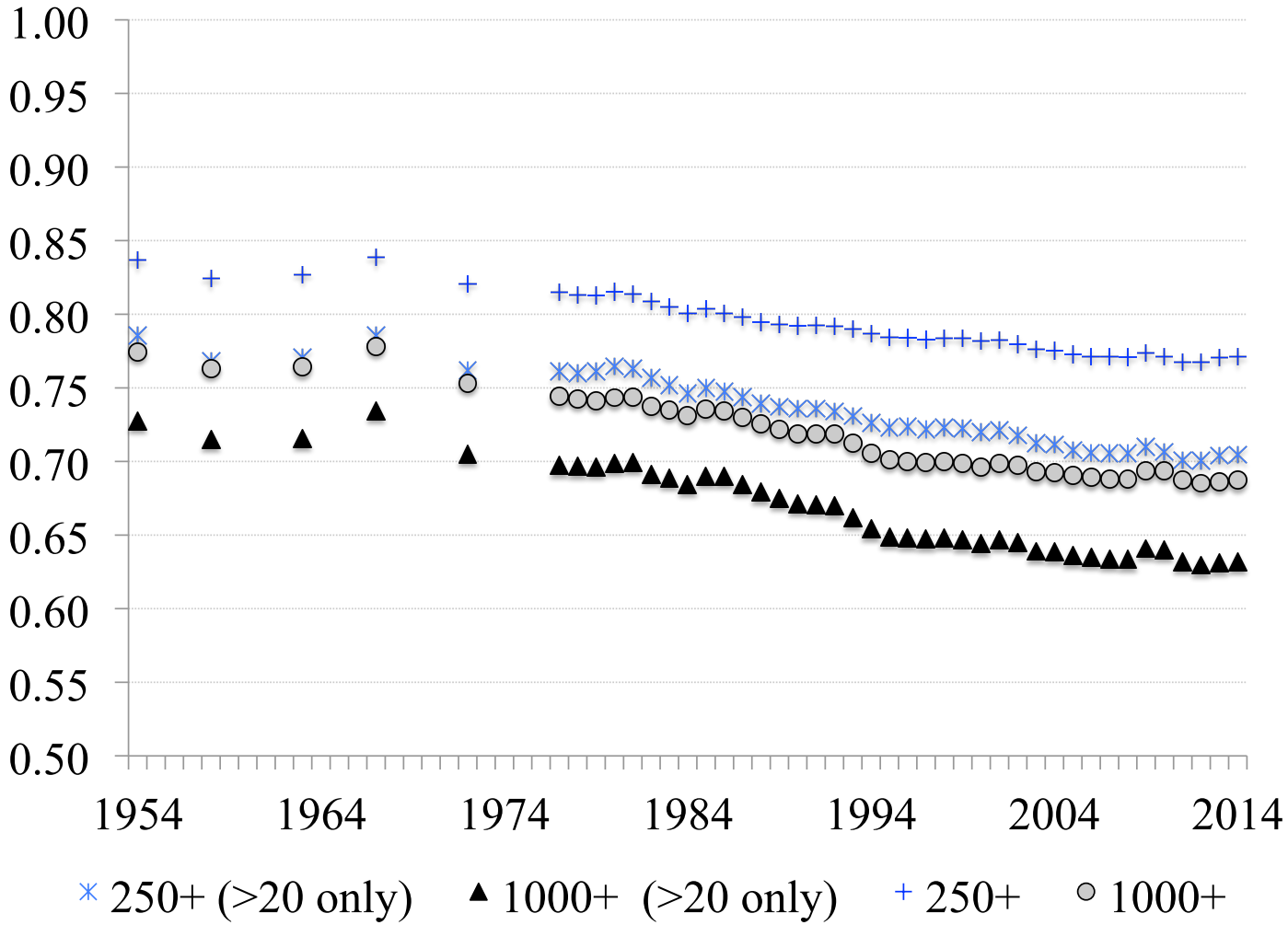
(a) 1967



(b) 2007

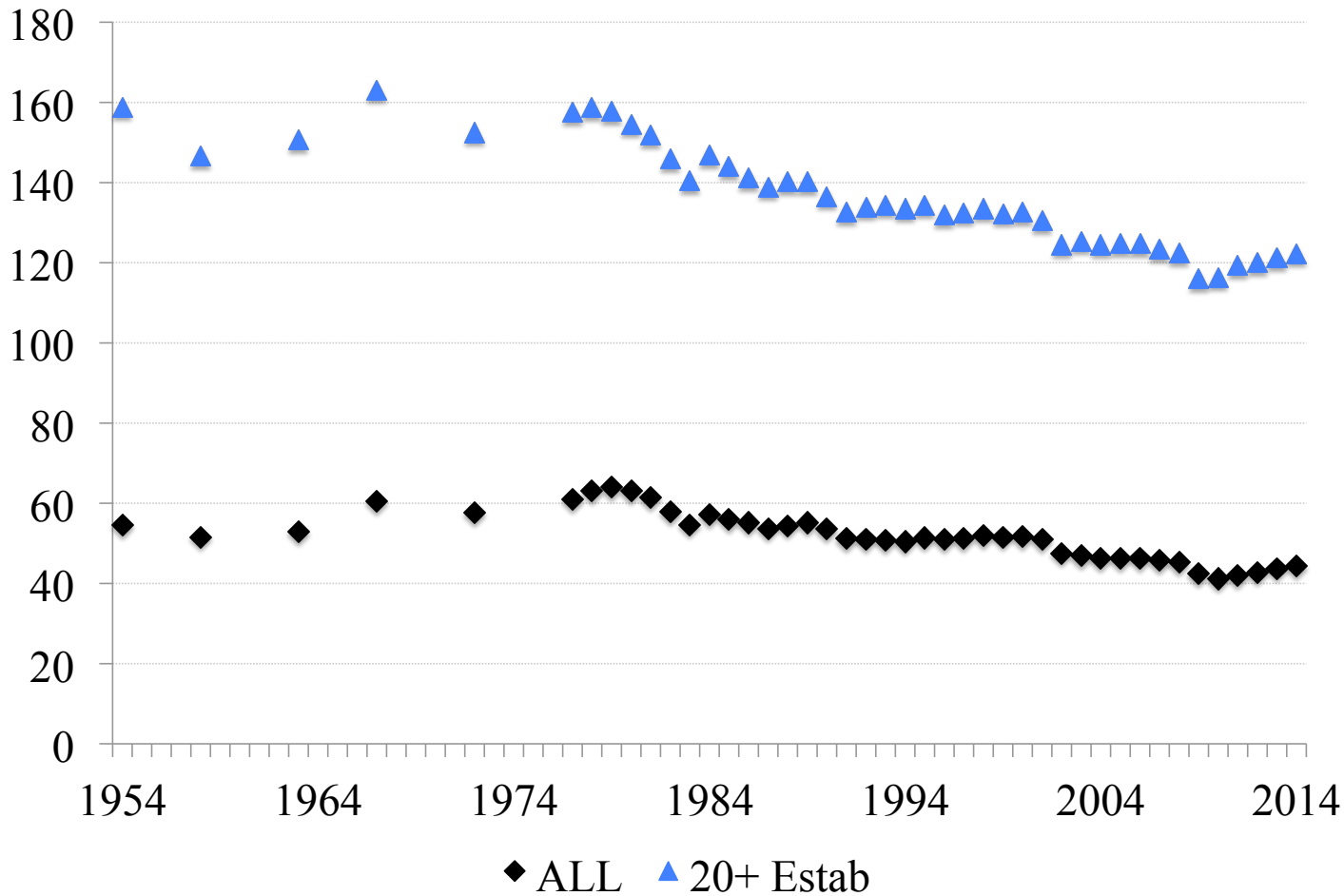
Source : Kehrig and Vincent (2017).

Employment Concentration in Manufacturing



Note.– Graph shows the inverse Pareto indexes implied by the employment shares of establishments with more than 250 and 1000 employees.

Average Establishment Employment in Manufacturing



MODEL

Model Outline

- General Equilibrium Model of Industry Dynamics (Hopenhayn and Rogerson, 1993)
- Firms differ in capital intensity as well as productivity
- Entry, exit and production decisions
- Income is subject to corporate taxation
- Representative household

Production

- Output

$$q_{it} = \varepsilon_{it}(k_{it}^{\alpha_i} n_{it}^{\beta_i}) \text{ with } \alpha_i + \beta_i = \gamma < 1$$

- Productivity

$$\log \varepsilon_{it} = \rho \log \varepsilon_{it-1} + \sigma_\varepsilon \eta_{it}, \text{ where } \eta_t \sim N(0,1)$$

- Capital Intensity

$$\alpha_i \sim G(\alpha) \text{ drawn once at entry}$$

Timing of events

1. production stage
   - given capital, hire labor and carry out production
   - sell product and pay taxes on net income
2. research stage
   - incumbents observe productivity for the next investment cycle
   - entrants observe productivity and production technology
3. planning stage
   - if exit, dissolve company, distribute capital/profits to shareholders
   - if stay (or entrant), decide how much to invest in capital for the next period

pick up between stages 2 and 3

Incumbent Firm's Problem

$$V(m,\varepsilon,\alpha) = \max\left\{V_x(m), V_c(m,\varepsilon,\alpha)\right\}$$

– Continuing Firms

$$V_c(m,\varepsilon,\alpha) = m + \max_{k,n}\left\{-pk + \rho\mathbb{E}_{\varepsilon'|\varepsilon}V(m',\varepsilon',\alpha)\right\}$$

subject to

$$\begin{aligned} m' &= \pi_b(k,n;\varepsilon,\alpha) - \tau\cdot\max\left\{0,\pi_b(k,n;\varepsilon,\alpha)\right\} + pk \\ \pi_b(k,n;\varepsilon,\alpha) &= p\varepsilon k^{\alpha}n^{\beta} - wn - wc_f - \delta pk \end{aligned}$$

– Exiting Firms

$$V_x(m) = m$$

Entry

- free entry
- large mass of potential entrants
- pay wc_e to draw α and ε

$$wc_e = V^e = \int \int V(0, \varepsilon, \alpha) dH(\varepsilon) dG(\alpha).$$

Distribution of Firms

Track resources

$$\mathcal{B}(\mathcal{M}) = \left\{ m : m'(m, \varepsilon, \alpha) \in \mathcal{M} \quad \text{for any } (\varepsilon, \alpha) \in (\mathcal{E} \times \mathcal{A}) \right\}$$

Entrants

$$\mu(\mathcal{M}, \mathcal{E}, \mathcal{A}) = M \int_{\mathcal{A}} \int_{\mathcal{E}} dH(\varepsilon) dG(\alpha) \text{ and } m_0 \in \mathcal{M}, \text{ and 0 otherwise.}$$

Evolution of firm distribution

$$\begin{aligned} \Gamma'(\mathcal{M}, \mathcal{E}, \mathcal{A}) \quad = \quad & \int_{\mathcal{A}, \mathcal{E}, B(\mathcal{M})} (1 - x(\varepsilon, \alpha))\, d\Gamma(m, \varepsilon, \alpha) dH(\varepsilon' | \varepsilon) dG(\alpha) \\ & + \mu(\mathcal{M}, \mathcal{E}, \mathcal{A}) \end{aligned}$$

Households

$$\max_{c,n} \frac{c^{1-\sigma}}{1-\sigma} - \theta \frac{n^{1+\phi}}{1+\phi} \qquad s.t. \;\; c = wn + d + T$$

A **stationary recursive competitive equilibrium** consists of value functions $V(m,\varepsilon,\alpha)$, $V_c(m,\varepsilon,\alpha)$ and $V_x(m)$, policy functions $k(m,\varepsilon,\alpha)$, $n(m,\varepsilon,\alpha)$, $m'(m,\varepsilon,\alpha)$, and $x(\varepsilon,\alpha)$, a price p, labor supply $L^s(w)$, a measure of incumbent firms Γ and a measure of entrants μ such that :

1. $V(m,\varepsilon,\alpha)$, $V_c(m,\varepsilon,\alpha)$, $V_x(m)$, $k(m,\varepsilon,\alpha)$, $n(m,\varepsilon,\alpha)$, $m'(m,\varepsilon,\alpha)$ and $x(\varepsilon,\alpha)$ solve the incumbent firm's problem.
2. The free entry condition is satisfied
3. The labor market clears
$$\int [n(m,\varepsilon,\alpha) + c_f]\, d\Gamma + Mc_e = L^s(w)$$
4. The financial market clears
$$d = \int [\pi_b(m,\varepsilon,\alpha) - \tau \cdot \max\{0, \pi_b(m,\varepsilon,\alpha)\} + m - (1 - x(m,\varepsilon,\alpha)) \cdot k(m,\varepsilon,\alpha)]$$
5. Government budget is balanced :
$$T = \tau \int \max\{0, \pi_b(m,\varepsilon,\alpha)\} d\Gamma$$
6. The distribution of incumbent firms is stationary : $\Gamma' = \Gamma$.

Simplified Model Analysis

Assumptions

- exogenous exit at rate x
- $c_f = 0$
- $w = 1$
- $N^s = 1$

Factor Demands

$$\begin{aligned} \bar{w} &\equiv \frac{w}{p} = \beta \varepsilon k^{\alpha} n^{\beta-1} \\ r_{\tau} &\equiv \frac{1-\rho}{\rho \cdot (1-\tau)} + \delta = \alpha \varepsilon k^{\alpha-1} n^{\beta} \end{aligned}$$

Output

$$q = \varepsilon^{\frac{1}{1-\gamma}} \left(\frac{\alpha}{r_\tau}\right)^{\frac{\alpha}{1-\gamma}} \left(\frac{\beta}{\bar{w}}\right)^{\frac{\beta}{1-\gamma}}.$$

$$\eta_{qr_\tau} = \frac{\alpha}{1-\gamma} \qquad \eta_{q\bar{w}} = \frac{\beta}{1-\gamma}$$

K-intensive (L-intensive) firms are more sensitive to r_τ ($\bar{w}$).

Profits

After tax profits :

$$\Pi_a(p,\tau) = (1-\tau)pq(\varepsilon,\bar{w},r_\tau)\left(1-\beta-\alpha\frac{\delta}{r_\tau}\right)$$

$$\frac{\partial \Pi_a}{\partial r_\tau} < 0 \qquad \frac{\partial \Pi_a}{\partial \tau} < 0 \qquad \frac{\partial \Pi_a}{\partial p} > 0$$

Entry and Market Clearing

- **lower taxes reduce (increase) equilibrium prices (wages)**

$$V_e = \frac{1}{1-\rho(1-x)}\mathbb{E}_{\alpha,\varepsilon}\Pi_a(\overset{+}{p},\overset{-}{\tau}) = c_e$$

- **employment shifts towards K-intensive firms**

$$\eta_{qr_\tau} = \frac{\alpha}{1-\gamma} \qquad \eta_{q\bar{w}} = \frac{\beta}{1-\gamma}$$

- **total effect on employment and industry size is ambiguous**

$$c_e + \int n(\overset{-}{p},\overset{-}{\tau})d\Gamma = 1/M$$

Quantitative Question

What was the role of lower corporate tax rates in the decline of the labor share in US Manufacturing ?

Approach

- calibrate to 1960s manufacturing industry
- simulate lower corporate tax rate

Today's Assumptions

- inelastic labor supply
- exogenous exit

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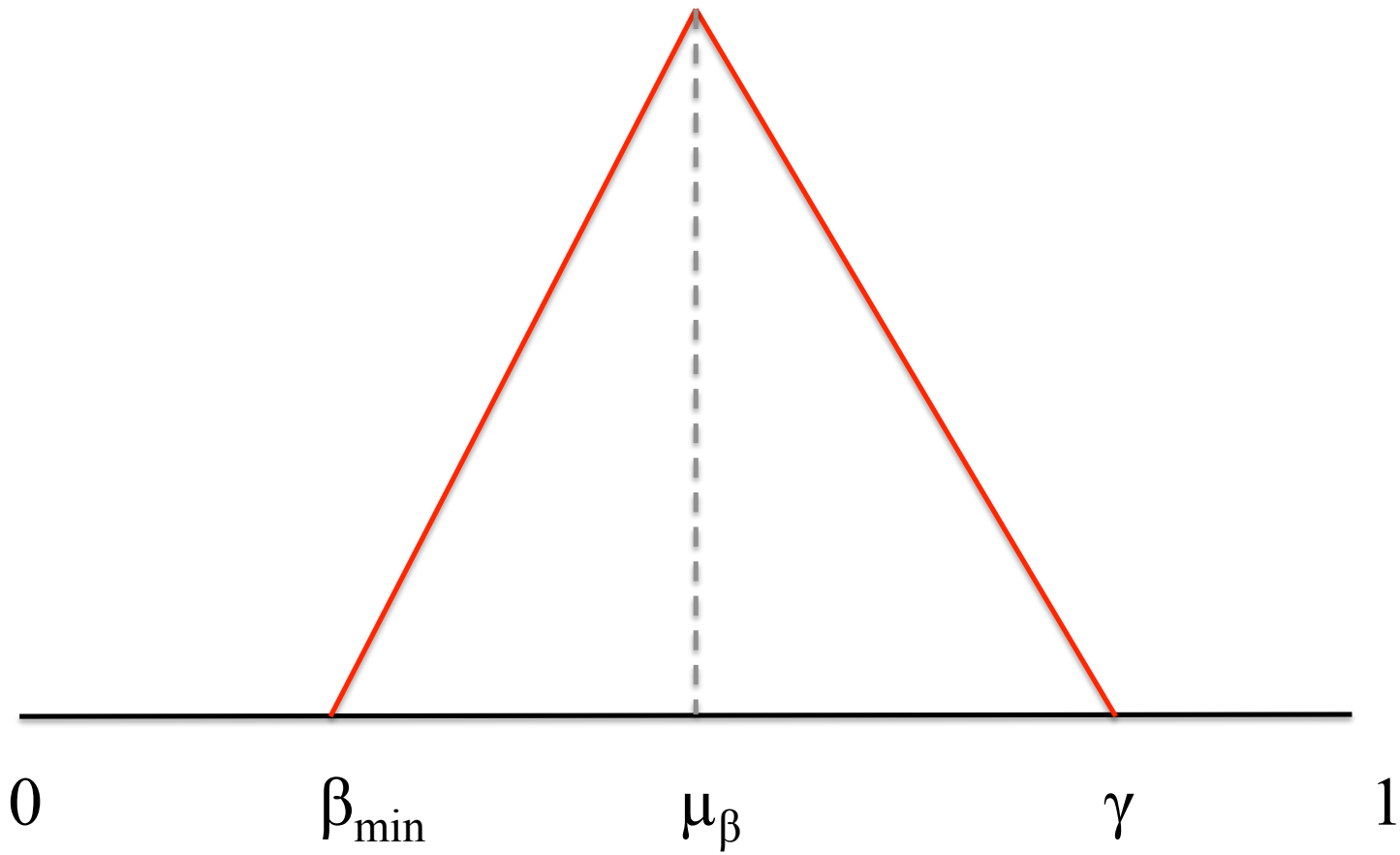
Calibration : Preset Parameters

Parameter	Value	Interpretation	Reason
δ	0.10	depreciation rate	NIPA
γ	0.85	returns to scale	—
ρ	0.96	discount factor	annual $r \approx 4\%$
w	1.0	wage	numéraire
τ	0.52	corporate income tax	Gravelle (2004)

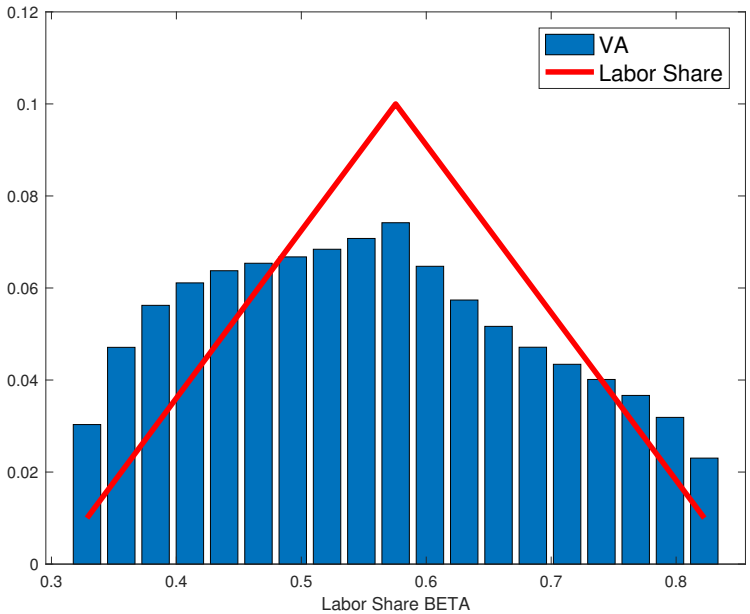
Distribution of Labor Intensity

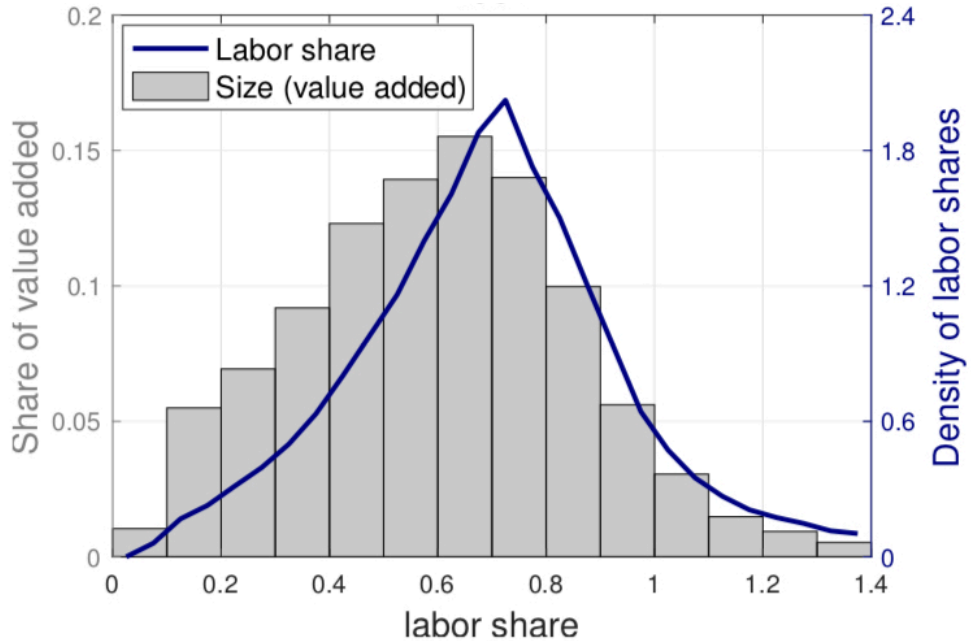


Calibration : SMM

Parameter	Value	Targets from 1967	Data	Model
ρ_ε	0.745	emp. share : smallest 65% of establishments	5.6	5.6
σ_ε	0.195	emp. share : largest 4.25% of establishments	60.1	60.0
μ_ε	0.569	average firm size —->	60.5	60.5
β_{min}	0.301	manufacturing labor share	55.6	55.6
c_e	14.50	VA-weighted p50(LS)/median(LS)	88.6	90.5

Distribution of Labor Shares : Model vs. Data





Note.– The joint distribution of labor shares and value added. On the left are results from our model. The figure on the right is taken from Kehrig and Vincent (2017).

Impact of Corporate Taxes on the Labor Share

decrease the corporate tax rate to 20%

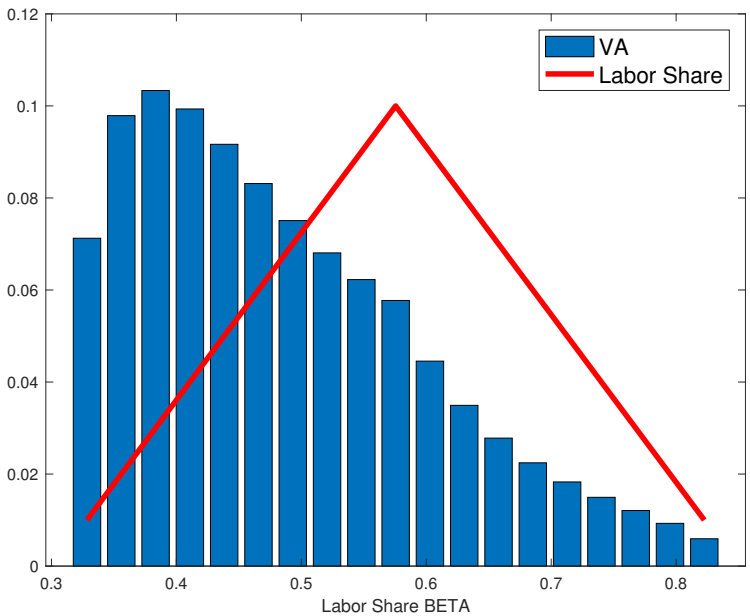
Impact of Corporate Taxes on the Labor Share

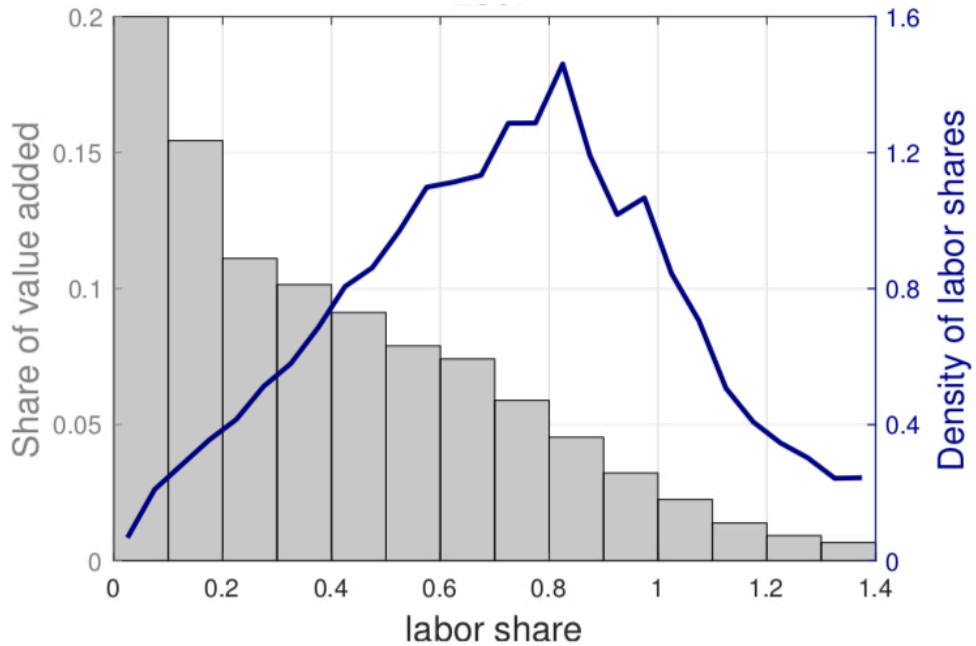
Corporate Tax Rate	52%	20%
Manufacturing labor share	0.556	0.485
Price Level	0.872	0.643
Aggregate Output	1.665	2.173
Employment in smallest 65% of establishments	0.056	0.049
Employment in largest 4.25% of establishments	0.600	0.625
VA-weighted p50(LS)/median(LS)	0.905	0.666
Average Firm Size	60.50	32.0

The Role of General Equilibrium Effects

Effect	Effect on Labor Share
Total change	-7.1pp
drop in r_τ	-4.1pp
drop in p	-3.4pp

The Rise in Concentration : Model vs. Data





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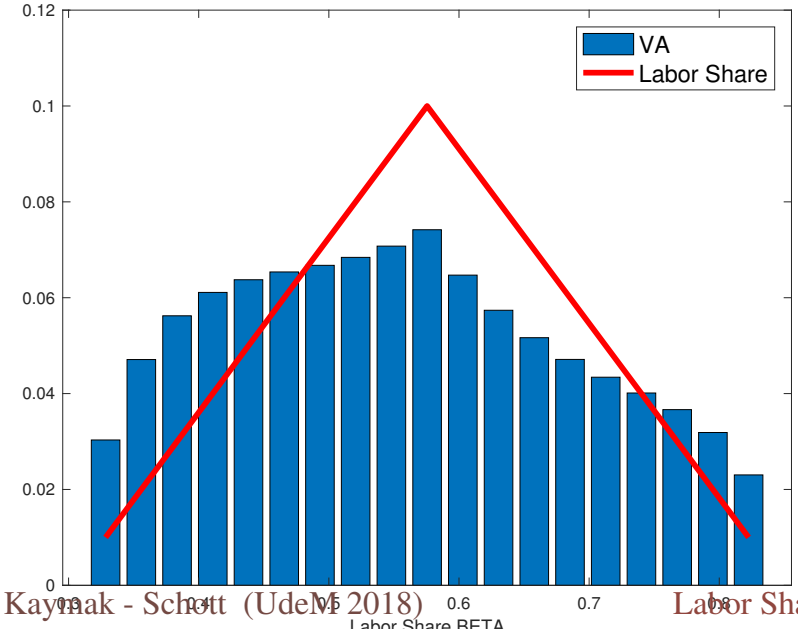
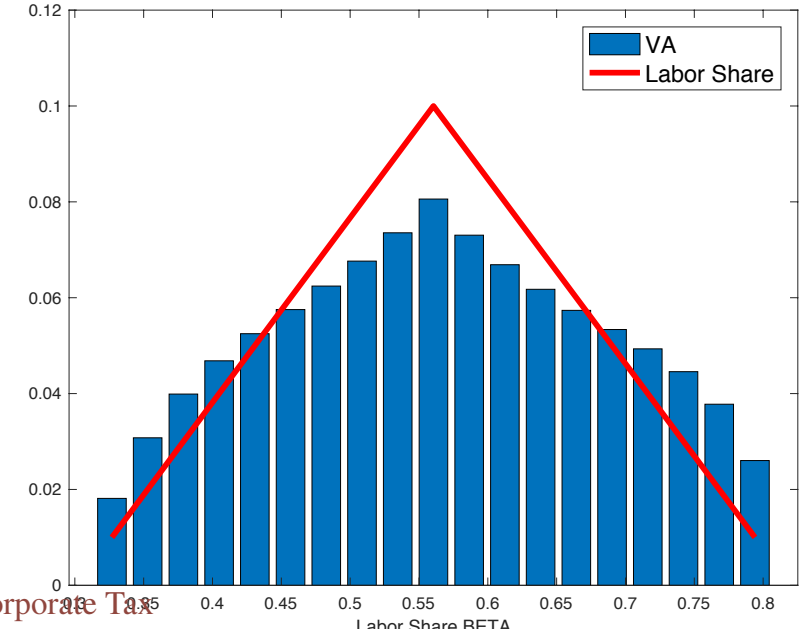
Alternative Explanations

Rising Markups : $\gamma \searrow$

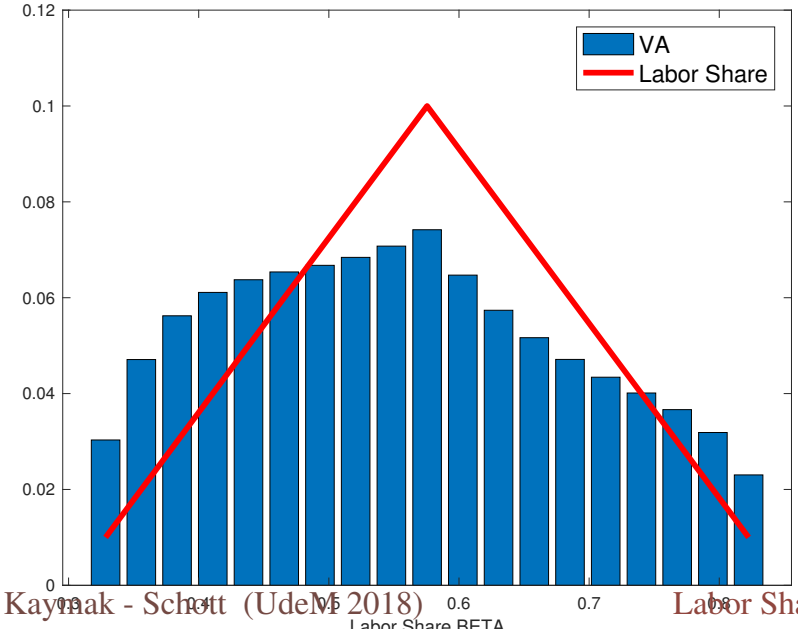
Span of Control	0.85	0.82
Manufacturing labor share	0.556	0.565
Price Level	0.872	1.055
Aggregate Output	1.665	1.358
Employment in smallest 65% of establishments	0.056	0.10
Employment in largest 4.25% of establishments	0.600	0.48
VA-weighted p50(LS)/median(LS)	0.905	1.04
Average Employment	60.50	51.2

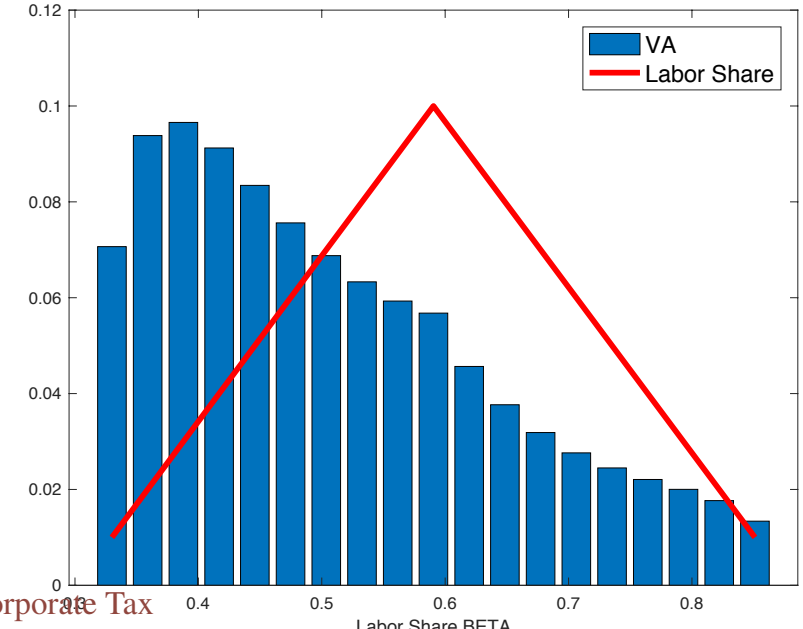




Rising Price Elasticity : $\gamma \nearrow$

Span of control	0.85	0.88
Manufacturing labor share	0.556	0.511
Price Level	0.872	0.666
Aggregate Output	1.665	2.300
Employment in smallest 65% of establishments	0.056	0.017
Employment in largest 4.25% of establishments	0.600	0.779
VA-weighted p50(LS)/median(LS)	0.905	0.656
Average Firm Size	60.50	71.1





Discussion

- Corporate tax cuts are responsible for a third of the decline in the labor share in US manufacturing.
- Endogenous exit
- Industry elasticity of substitution
- Alternative explanations
- Empirical US

K-biased technical change ?

L-biased technical change

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