Barriers to Entry and Regional Economic Growth in China

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Overview

- Important contribution of non-state (private) sector to economic growth over time (Zhu, 2012); also, huge differences in the sector's growth in the cross section (provinces or prefectures)
- Behavior linked in the cross section with the early size of the state sector, *s*
  - : 1978-1995 – growth negatively related Figure
  - : 1995-2008 – positively related
- Reversal appears correlated with major policy reform of SOE sector that was accompanied by:
  - : Fiscal reform and recentralization
  - : Financial and banking sector reforms
  - : WTO Entry
- New firms most important source of growth in industry through contributions on both intensive and extensive margin (Brandt et al., 2012)

Key Questions

- How much have SOEs influenced growth in the non-state sector through their effect on new firm behavior?
- What is the precise channel through which SOEs matter?
  - : Capital constraints?
  - : Higher costs of labor?
  - : Taxes/subsidies?
  - : Entry costs?
- What effect did the major policy changes of the mid-to-late 1990s have on the nexus between SOEs and new firm behavior?

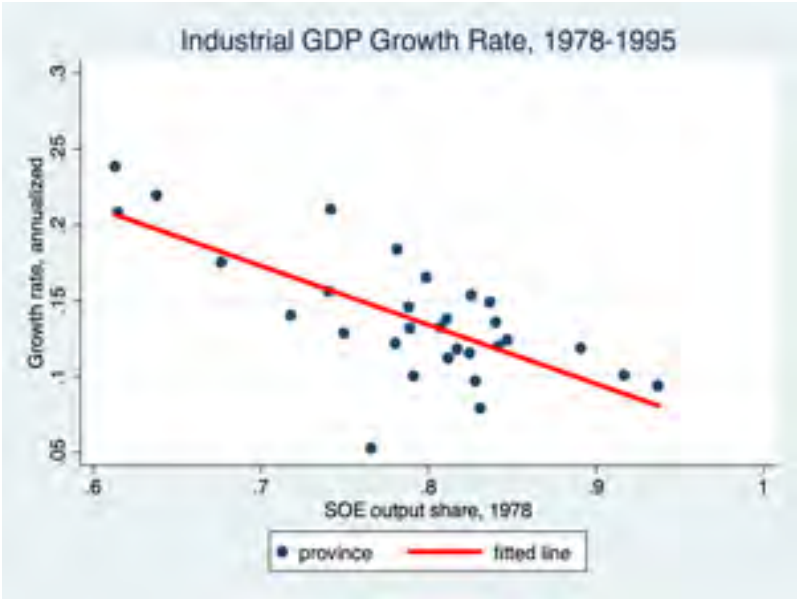
What We Do

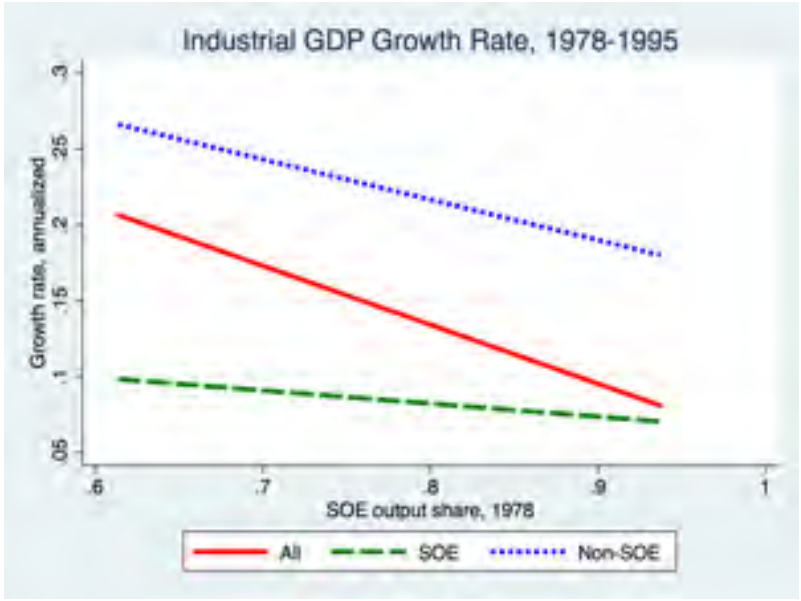
- Draw on census data for 1995, 2004 and 2008 to examine links between state sector and new firm behavior at the prefecture level
- Estimate standard capital and output wedges at the prefecture level
- Build a Hopenhayn model of firm entry that incorporates output and capital wedges and allows for entry wedges
- Analyze the behavior of entry wedges in the cross section and over time and their links with the size of the SOE sector and policy changes

Key Findings

- Entry wedges key to explaining differences in new firm behavior in the cross section and over time
  - : positively correlated with the “Cost of Doing Business in China Survey, 2008”
- In levels and changes, highly correlated with the size of the state sector as well as state sector profitability and local fiscal capacity
- Partial convergence after 1995 in growth in output, wages and TFP of new firms tied to downsizing of the state sector

The Effect of the State Sector: 1978-1995

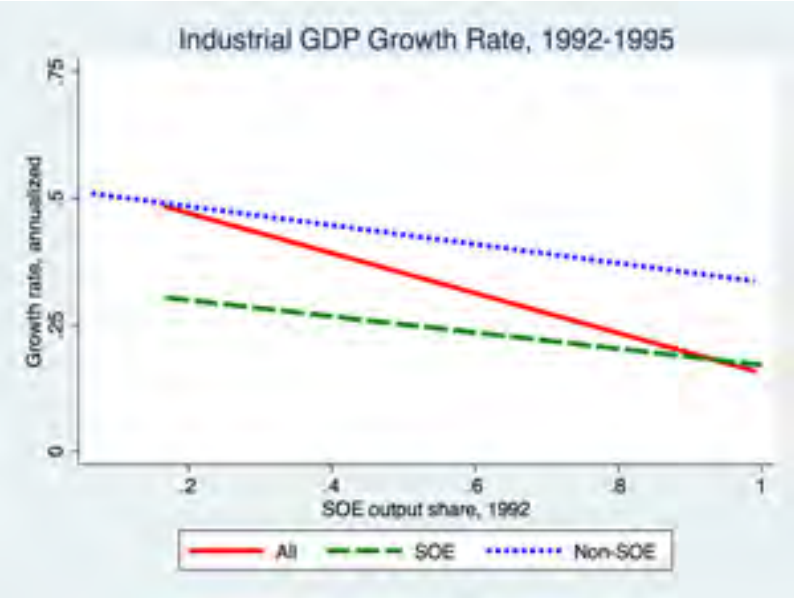


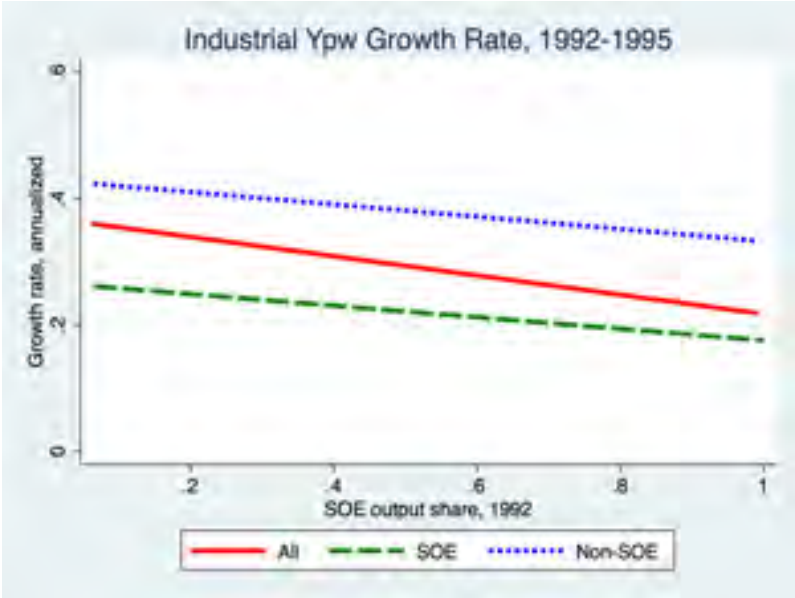


- At the province level, industrial output
- The SOE share of output, *s*, in 1978 is negatively correlated with the
  - 1978-1995 growth in provincial GDP (left panel); and
  - 1978-1995 growth in prov. overall, SOE, and NSOE GDP (right panel).

[Back]

The Effect of the State Sector: 1992-1995





- At the prefecture level, industrial output (per worker)
- The SOE share of output (per worker), *s*, in 1992 is negatively correlated with the
  - 1992-1995 growth in prefecture GDP (left panel); and
  - 1992-1995 growth in pref. overall, SOE, and NSOE GDP (right panel).

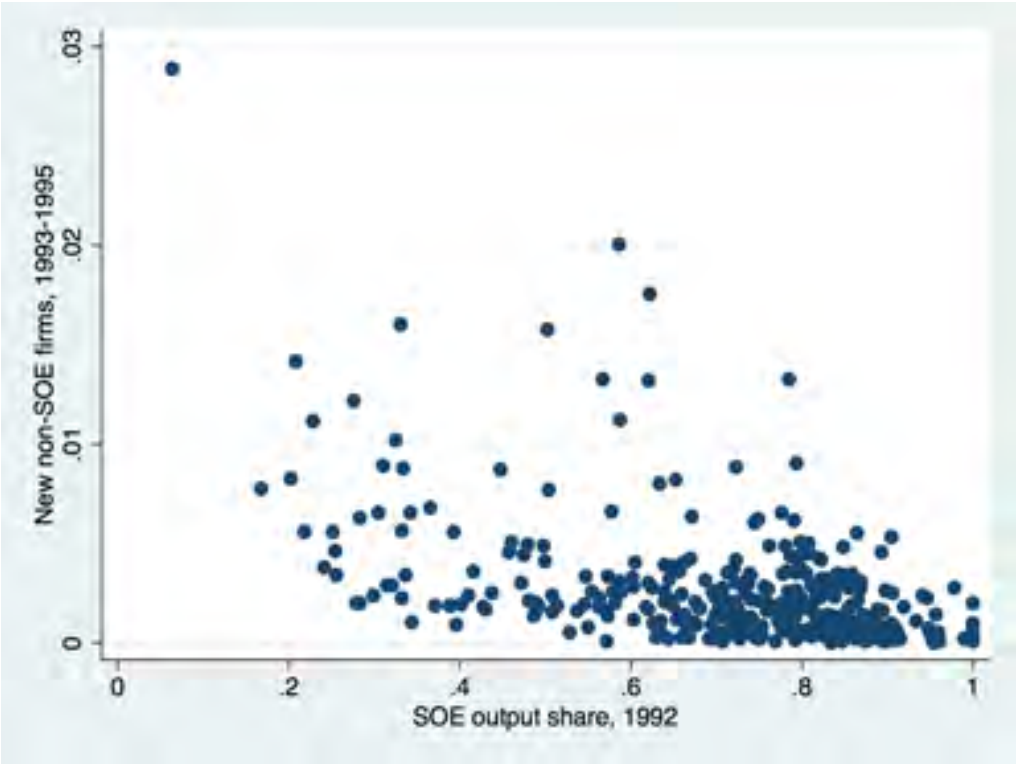
[Y/N]

[Back]

TFP, Wages, Output, and Capital in Manufacturing

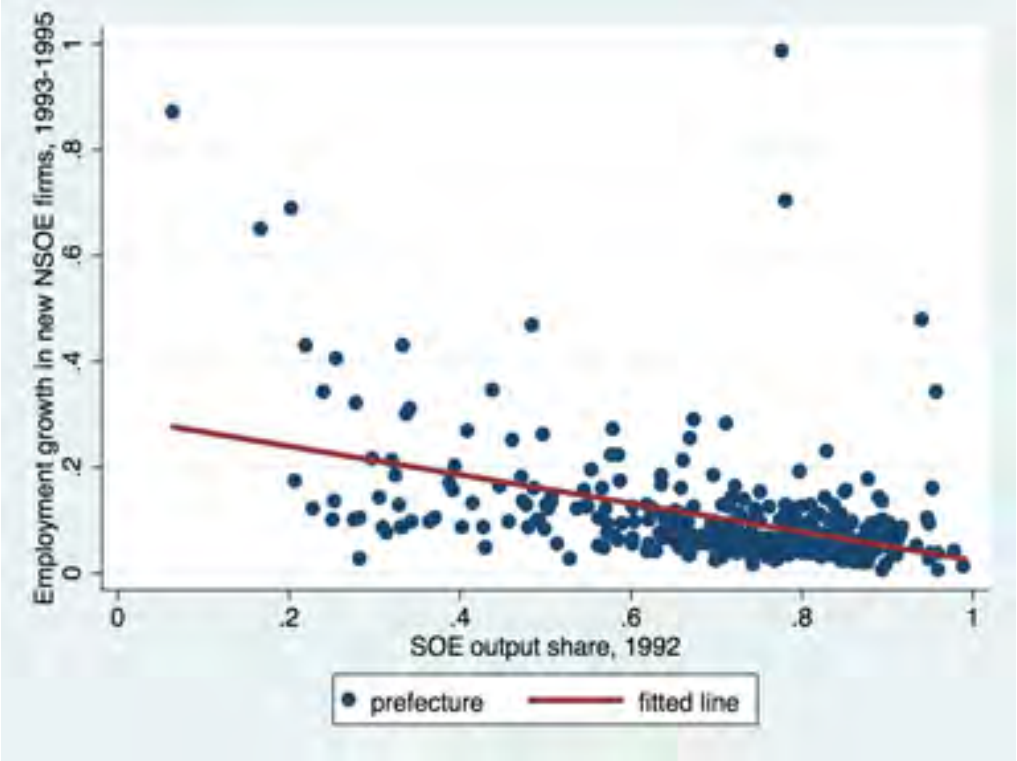
- Chinese Industrial Census (CIC)
- CIC: (1992), 1995, 2004, 2008
- Large: covers most of the manufacturing sector
- Rich: firm-level observations on value added, employment, capital stock, wage bill, year of birth, ownership, sector
- Data work (issues)
  - make prefectures consistent across years
  - define the SOE sector (especially in 2004 and 2008)
  - construct measures of real capital
- Look initially at the 1995 cross-section for clues into the 1978-1995 patterns

Non-SOE Entry in 1995



- Distribution of new non-SOE firms (1993-1995 entrants)
- Most are in the low *s* prefectures

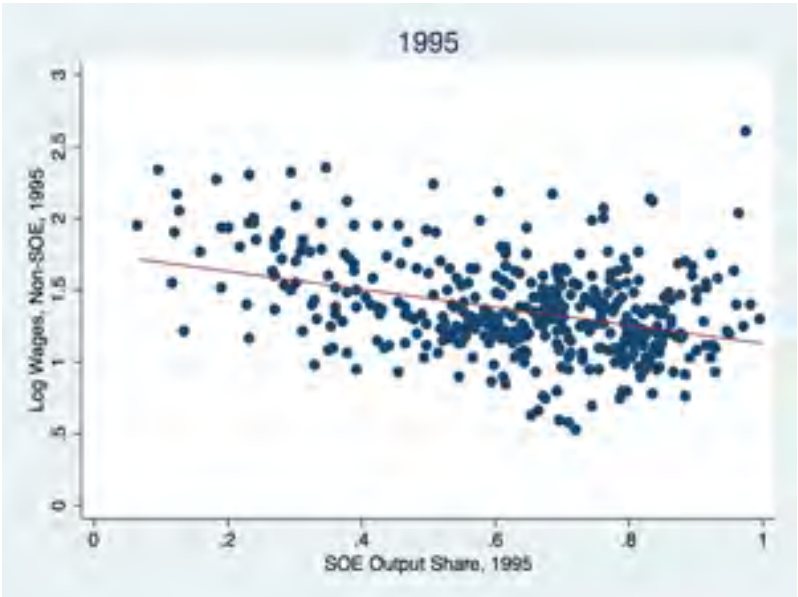
Non-SOE Entry in 1995

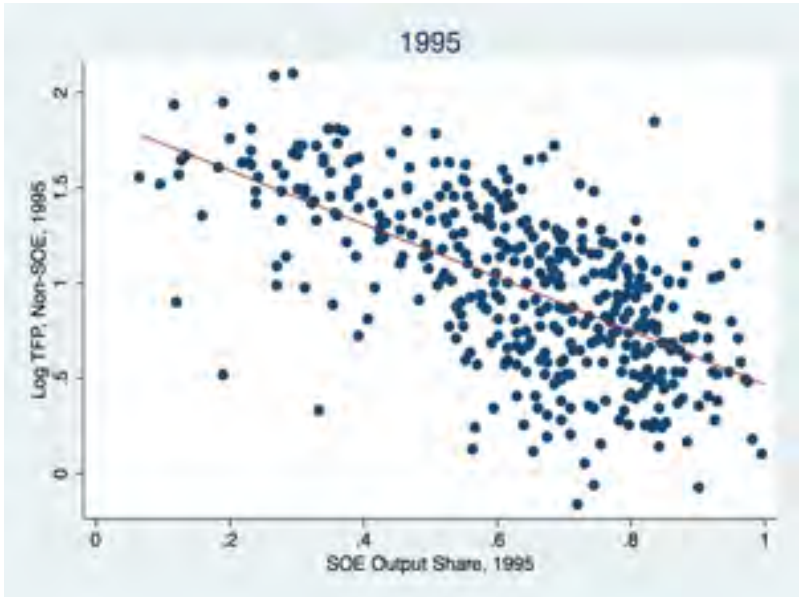


- Employment in new non-SOE entrants (1993-1995) relative to the employment in all firms in 1992
- Lower in high *s* prefectures

[Number of firms]

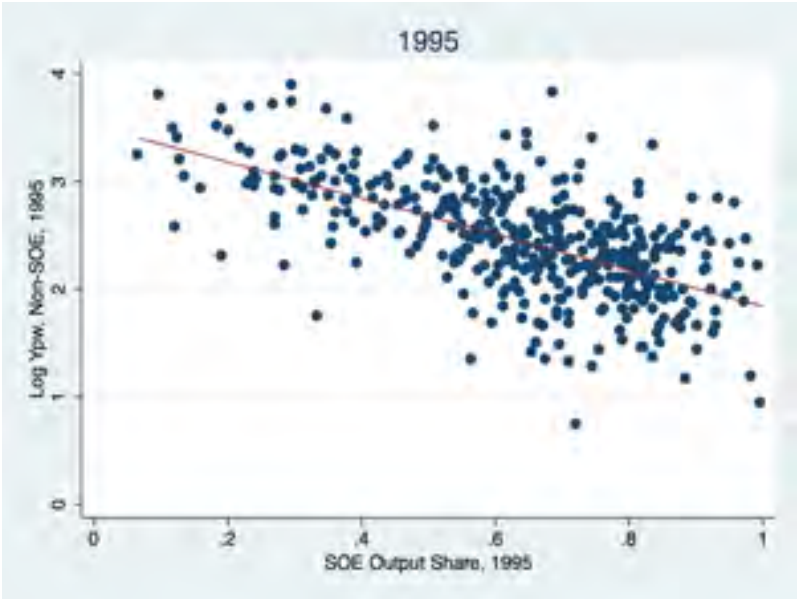
Non-State Sector, 1995

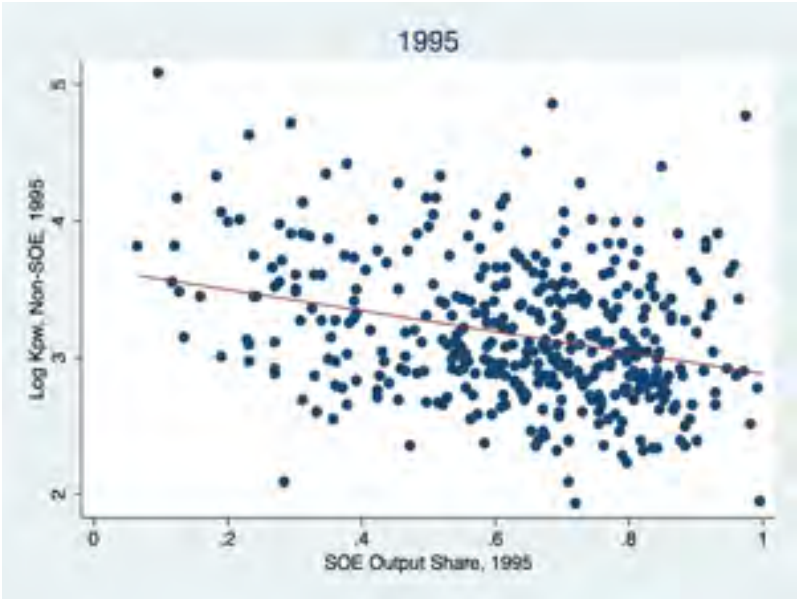




- The SOE share of output, *s*, is negatively correlated with NSOE
  - wages; *s* accounts for 12% of the variation
  - TFP (defined as Solow residual); *s* accounts for 40% of the variation

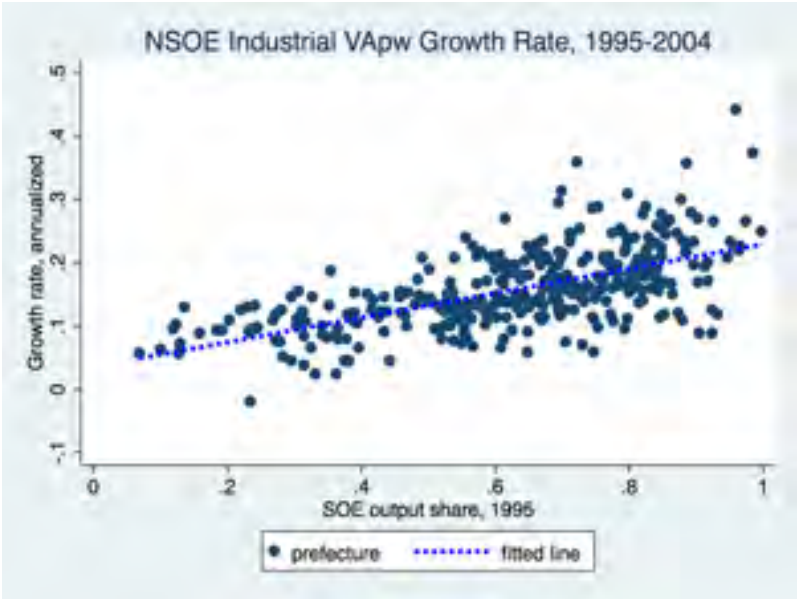
Non-State Sector, 1995

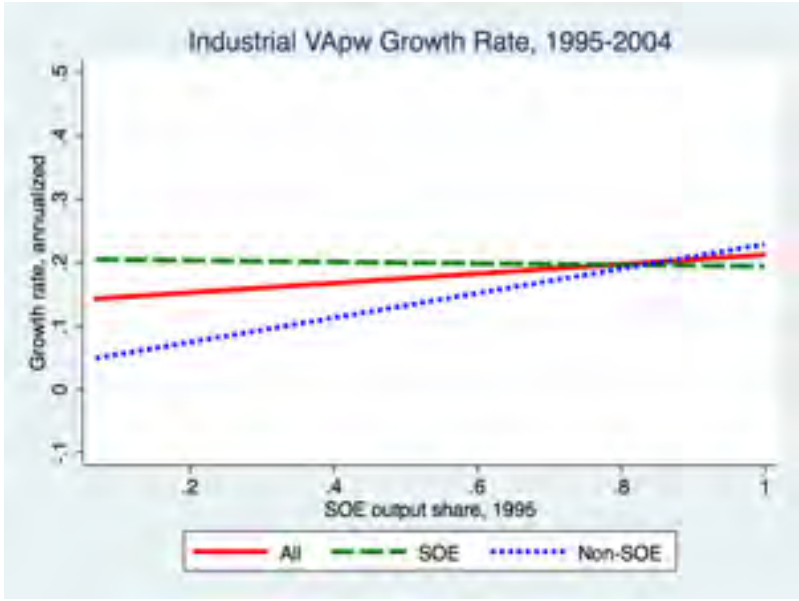




- The SOE share of output, *s*, is negatively correlated with NSOE
  - output per worker; *s* accounts for 39% of the variation
  - capital per worker; *s* accounts for 9% of the variation

Growth Rate in VApw, 1995-2004





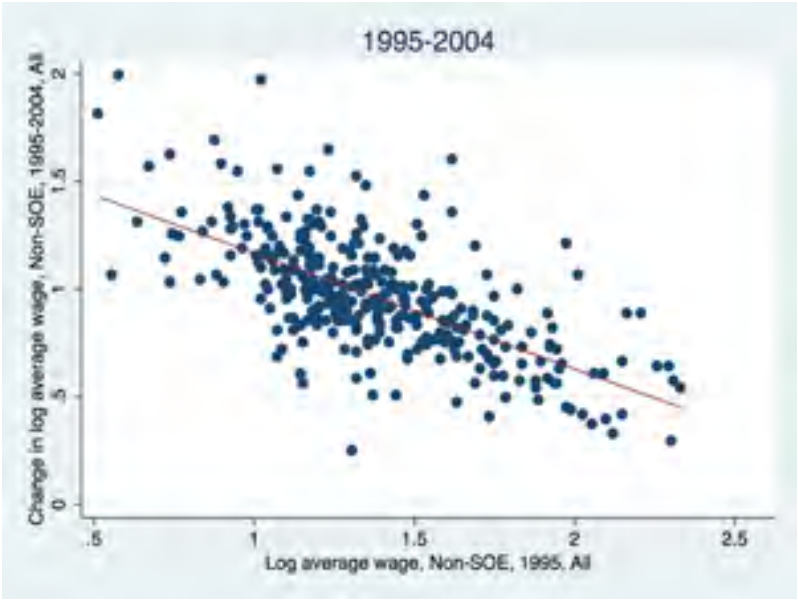
- The SOE share of output, *s*, in 1995 is positively correlated with the
  - 1995-2004 growth in prefecture NSOE VApw (left panel); and
  - 1995-2004 growth in pref. overall and NSOE VApw (right panel).

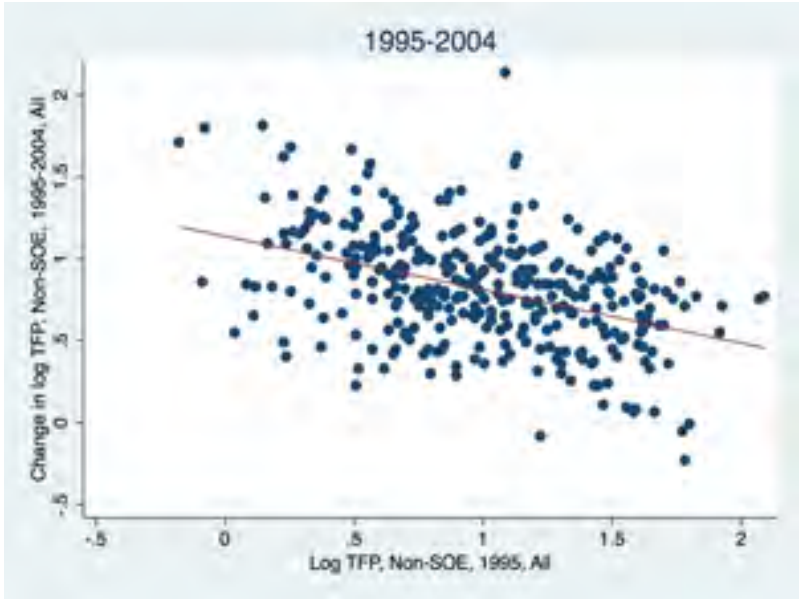
[Output per worker]

[Output]

[2004-2008]

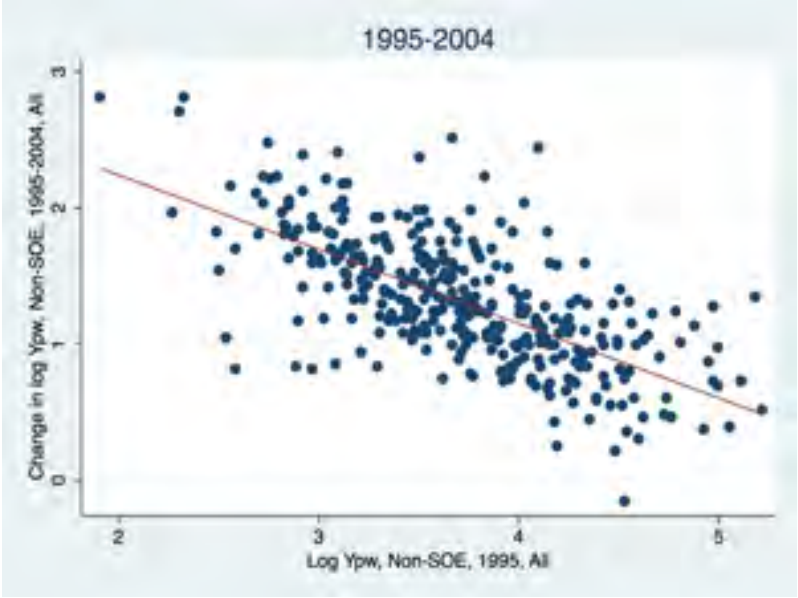
Non-State Sector Convergence, 1995-2004

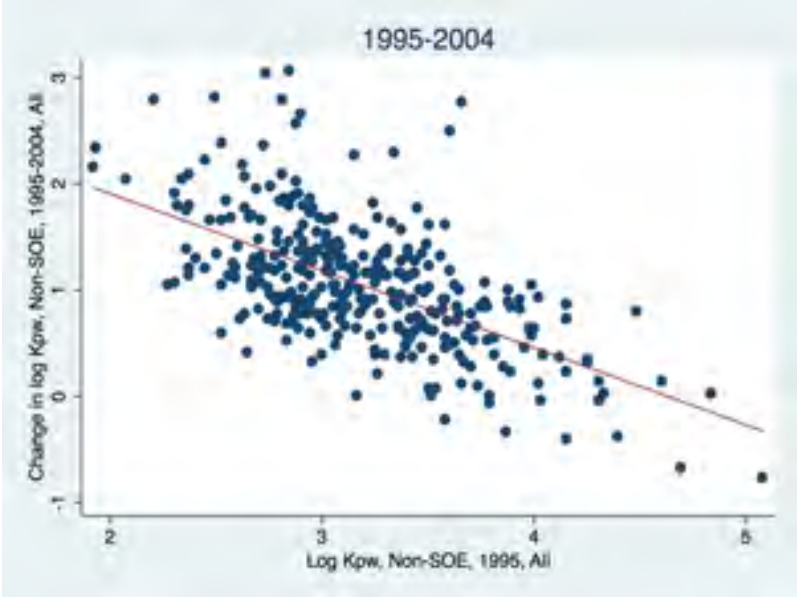




- There is a 1995-2004 convergence in the NSOE sector in
  - wages; rate of convergence is 8.3%
  - TFP (calculated as Solow resid.); rate of convergence is 4.4%

Non-State Sector Convergence, 1995-2004





- There is a 1995-2004 convergence in the NSOE sector in
  - output per worker; rate of convergence is 8.5%
  - capital per worker; rate of convergence is 13.5%

Accounting Exercise: Output and Capital Wedges

$$y_i = z_i^{1-\eta} \left(k_i^{1-\alpha_j} n_i^{\alpha_j} \right)^{\eta},$$

- firms have a common production function
- industry j
- $0 < \eta < 1$: decreasing returns to scale
- common rental rate of capital $(r + \delta)$
- prefecture-specific wage rate w_i
- distortions: output tax τ_i^y and capital tax τ_i^k; assume no labor wedge

Accounting Exercise: Output and Capital Wedges

- The firm's objective is

$$\max_{k_i, n_i} \left\{ \left(1 - \tau_i^y\right) y_i - w_i n_i - \left(1 + \tau_i^k\right) (r + \delta) k_i \right\}.$$

- Using the firm's first-order conditions for k and n we obtain

$$\begin{aligned} \left(1 - \tau_i^y\right) &= \frac{1}{\alpha_j \eta} \frac{w_i n_i}{y_i} \\ \left(1 + \tau_i^k\right) &= \frac{1 - \alpha_j}{\alpha_j} \frac{w_i n_i}{(r + \delta) k_i} \end{aligned}$$

Accounting Exercise: Output and Capital Wedges

- Gross output wedge in the prefecture, Δ^y [More]

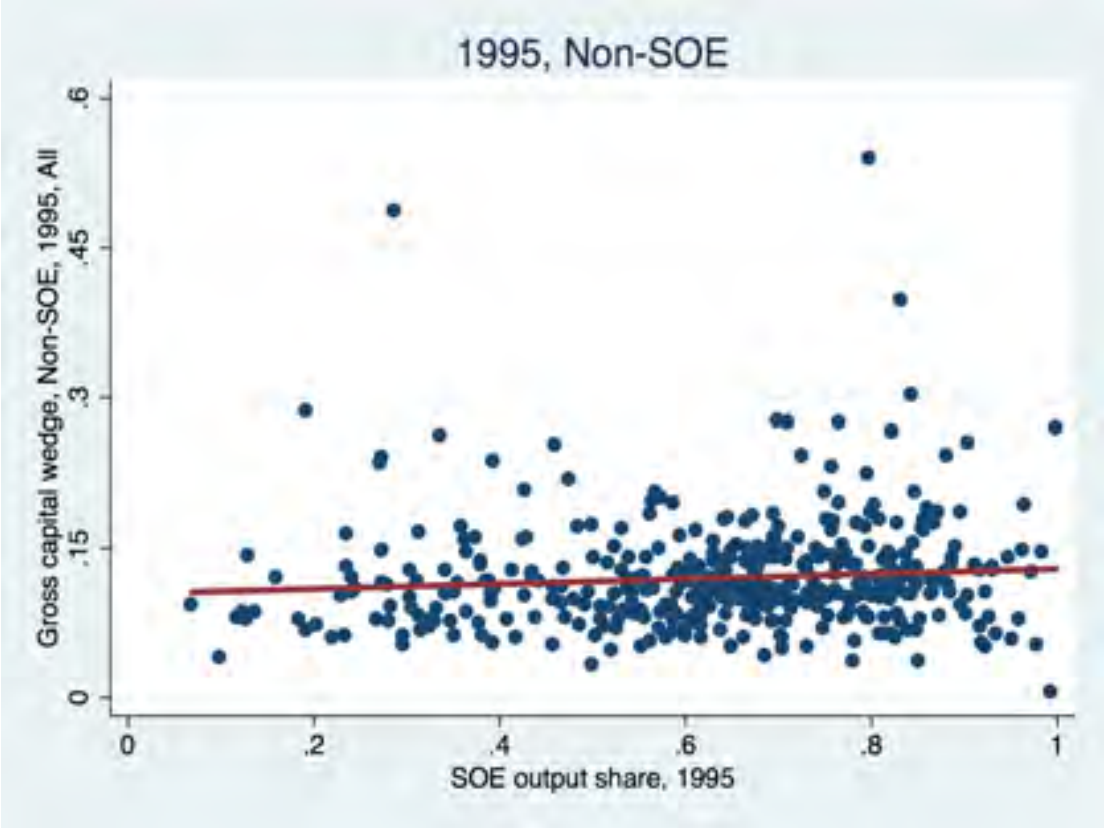
$$\Delta^y = (1 - \tau^y) = \sum_i \frac{1}{\alpha_j \eta} \frac{w_i n_i}{y_i} \frac{y_i}{\sum_i y_i}$$

- Gross capital wedge in the prefecture, Δ^k

$$\Delta^k = (1 + \tau^k)(r + \delta) \quad = \quad \sum_i \frac{1 - \alpha_j}{\alpha_j} \frac{w_i n_i}{k_i} \frac{k_i}{\sum_i k_i}$$

- Compute Δ^y and Δ^k for each prefecture in the dataset
- Use the 1995 Chinese Industrial Census
  - value added: y_i
  - wage bill: $w_i n_i$
  - estimated real capital: k_i
- Labor share, $\alpha_j \eta$: Hsieh and Klenow (2009)
- Decreasing returns, η
  - Restuccia and Rogerson (2008): $\eta = 0.85$

Gross Capital Wedge: Δ^k

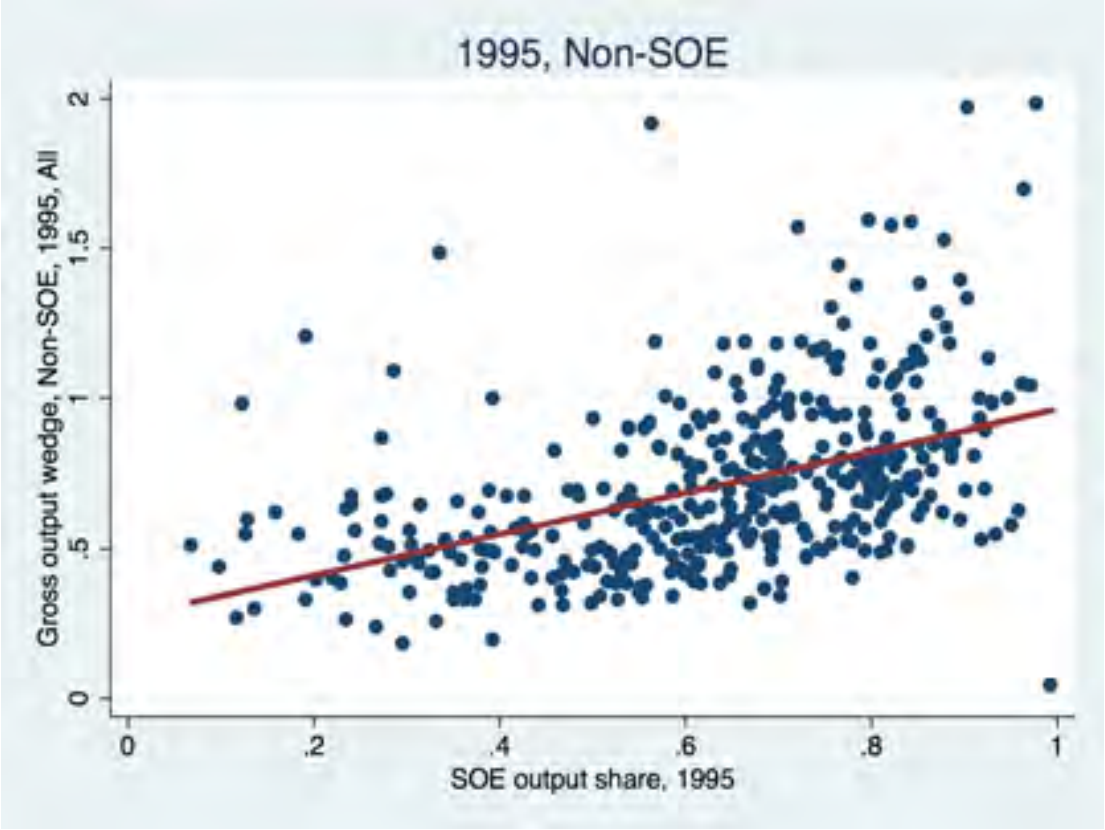


- Higher capital taxes in high s pref. for non-SOE firms

[Entrants]

[SOEs]

Gross Output Wedge: Δ^y



- Lower output taxes (higher subsidies) in high s pref. for non-SOE firms

[Entrants]

[SOEs]

Needed: Entry Wedges

Fact 1: $(1-\tau^y)$ increases sharply with s

Fact 2: $(1+\tau^k)$ increases slightly with s

- If τ^y dominates, then one should expect to see ...
  - $\uparrow$ entry with s
  - $\uparrow$ wages w with s
- Consider Hopenhayn model with heterogeneity in "entry wedges" ψ
  - only a fraction $(1-\psi)$ of potential entrants can get a licence
  - randomly chosen
  - $\downarrow (1-\psi) \Rightarrow \downarrow$ number of entrants, $\downarrow w$, $\downarrow \frac{Y}{N}$, and $\downarrow z$

A Hopenhayn Model of Heterogeneous Entrepreneurs and Barriers to Entry

A Hopenhayn Model with Entry Wedges

- As before, firms have the same production function
  - and face prefecture-specific wage rate w and wedges τ^k and τ^y
- Large (but finite) number M of potential entrepreneurs in each prefecture
- Entrepreneurs differ in TFP z, distributed with c.d.f. $F(z)$
- If entrepreneur operates a firm, a fixed cost v must be paid
- Key friction: only a fraction $(1-\psi)$ of potential entrants are allowed to enter
  - this is random

Entry Decision

- $f(z)$ is Pareto distributed

$$f(z) = \underline{z}^{\xi} \xi z^{-\xi-1},$$

: $\xi > 1$
: $\underline{z} \geq 1$, $z \in [\underline{z}, \infty)$

- The firm problem implies:

$$\begin{aligned}
y &= z\left(\left(1-\tau^{y}\right)\eta\right)^{\frac{\eta}{1-\eta}} \left(\frac{1-\alpha}{\left(1+\tau^{k}\right)(r+\delta)}\right)^{\frac{(1-\alpha)\eta}{1-\eta}} \left(\frac{\alpha}{w}\right)^{\frac{\alpha\eta}{1-\eta}} \\
&\equiv z \cdot \bar{y} \\
n &= z \cdot \alpha\eta \left(\frac{1-\tau^{y}}{w}\right) \cdot \bar{y} \\
k &= z \cdot (1-\alpha)\,\eta \frac{1-\tau^{y}}{\left(1+\tau^{k}\right)(r+\delta)} \cdot \bar{y} \\
\Pi &= z \cdot \left(1-\tau^{y}\right)(1-\eta) \cdot \bar{y}.
\end{aligned}$$

Entry Decision

- Only entrpreneurs with $z \geq z^*$ will operate, where

$$z^* = \frac{\nu}{(1-\tau^y)(1-\eta)\cdot\bar{y}}$$

- The measure Γ of all operating entrepreneurs is

$$\Gamma(z \geq z^*) = M(1-\psi)\int_{z^*}^{\infty} \underline{z}^{\xi}\,\xi\, z^{-\xi-1}\,dz = M(1-\psi)\underline{z}^{\xi}\,(z^*)^{-\xi}$$

- The equilibrium wage w clears the labor market

$$M(1-\psi)\int_{z^*}^{\infty} n(z)\,f(z)\,dz = N$$

- Normalize by the size of the labor force in the prefecture

Equilibrium mechanism

- Suppose $(1-\psi)$ is small
- Low $(1-\psi)$ implies that few firms enter
- Low entry implies low wages required to clear the labor market (since little competition for workers)
- Low wages implies low z^* (since labor is cheap)
- Low z^* implies low TFP and low Y/N

Equilibrium Wage: w

$$\begin{aligned}\ln w &= \frac{1-\eta}{1-\eta+\xi\alpha\eta}\ln\left(\frac{(1-\psi)\underline{z}^{\xi}}{N}\right)-\frac{(1-\eta)(\xi-1)}{1-\eta+\xi\alpha\eta}\ln(v)\\ &+\frac{\xi}{1-\eta+\xi\alpha\eta}\ln(1-\tau^{y})\\ &-\frac{(1-\alpha)\xi\eta}{1-\eta+\xi\alpha\eta}\ln\left(\left(1+\tau^{k}\right)(r+\delta)\right)\\ &+\Omega(\alpha,\eta,\xi)\end{aligned}$$

$$\frac{\partial \ln w}{\partial \ln\left(1+\tau^{k}\right)} = \frac{\partial \ln w}{\partial \ln(r+\delta)} = -\frac{(1-\alpha)\xi\eta}{1-\eta+\xi\alpha\eta} < 0$$

$$\frac{\partial \ln w}{\partial \ln(1-\tau^{y})} = \frac{\xi}{1-\eta+\xi\alpha\eta} > 0$$

$$\frac{\partial \ln w}{\partial \ln(1-\psi)} = -\frac{\partial \ln w}{\partial \ln N} = \frac{1-\eta}{1-\eta+\xi\alpha\eta} > 0$$

Equilibrium: Output per Worker

$$\ln \frac{Y}{N} = \ln w - \ln(1-\tau^y) - \ln(\alpha\eta)$$

$$\begin{aligned}
\frac{\partial \ln \frac{Y}{N}}{\partial \ln\left(1+\tau^k\right)} &= \frac{\partial \ln w}{\partial \ln(r+\delta)} = -\frac{(1-\alpha)\xi\eta}{1-\eta+\xi\alpha\eta} < 0 \\
\frac{\partial \ln \frac{Y}{N}}{\partial \ln(1-\tau^y)} &= \frac{\xi\eta(1-\alpha)+(\xi-1)(1-\eta)}{1-\eta+\xi\alpha\eta} > 0 \\
\frac{\partial \ln \frac{Y}{N}}{\partial \ln(1-\psi)} &= -\frac{\partial \ln w}{\partial \ln N} = \frac{1-\eta}{1-\eta+\xi\alpha\eta} > 0
\end{aligned}$$

Equilibrium: Entrants

$$\Gamma\left(z \geq z^*\right) = (1-\psi)\underline{z}\left(\frac{(1-\tau^y)(1-\eta)\cdot\bar{y}}{\nu}\right)^{\xi}$$

$$\begin{aligned}
\frac{\partial \ln \Gamma}{\partial \ln\left(1+\tau^k\right)} &< 0 \\
\frac{\partial \ln \Gamma}{\partial \ln\left(1-\tau^y\right)} &> 0 \\
\frac{\partial \ln \Gamma}{\partial \ln(1-\psi)} &> 0
\end{aligned}$$

Equilibrium: TFP Z

$$\begin{aligned}\ln Z &= \frac{\alpha\eta(1-\eta)}{1-\eta+\xi\alpha\eta}\ln\left(\frac{(1-\psi)\underline{z}^{\xi}}{N}\right) - \frac{\alpha\eta(1-\eta)(\xi-1)}{1-\eta+\xi\alpha\eta}\ln(v) \\ &\quad - \frac{1-\eta}{1-\eta+\xi\alpha\eta}\ln(1-\tau^{y}) \\ &\quad + \frac{(1-\eta)(1+(\xi-1)\alpha\eta)}{1-\eta+\xi\alpha\eta}\ln\left(\left(1+\tau^{k}\right)(r+\delta)\right) \\ &\quad + \Omega(\alpha,\eta,\xi)\end{aligned}$$

$$\begin{aligned}\frac{\partial \ln Z}{\partial \ln\left(1+\tau^{k}\right)} &= \frac{\partial \ln Z}{\partial \ln(r+\delta)} = \frac{(1-\eta)(1+(\xi-1)\alpha\eta)}{1-\eta+\xi\alpha\eta} > 0 \\ \frac{\partial \ln Z}{\partial \ln(1-\tau^{y})} &= -\frac{1-\eta}{1-\eta+\xi\alpha\eta} < 0 \\ \frac{\partial \ln Z}{\partial \ln(1-\psi)} &= -\frac{\partial \ln Z}{\partial \ln N} = \frac{\alpha\eta(1-\eta)}{1-\eta+\xi\alpha\eta} > 0\end{aligned}$$

Estimating the Gross Entry Wedge: $(1-\psi)$

- Calibrate some key parameters
  - : labor share, $\alpha\eta$: Hsieh and Klenow (2009)
  - : $\eta = 0.85$, Restuccia and Rogerson (2008):
  - : $\xi = 1.05$, Pareto parameter, use 30% of the most productive firms

$$\frac{E(z|z \geq z^*)}{z^*} = \frac{\xi}{\xi - 1}$$

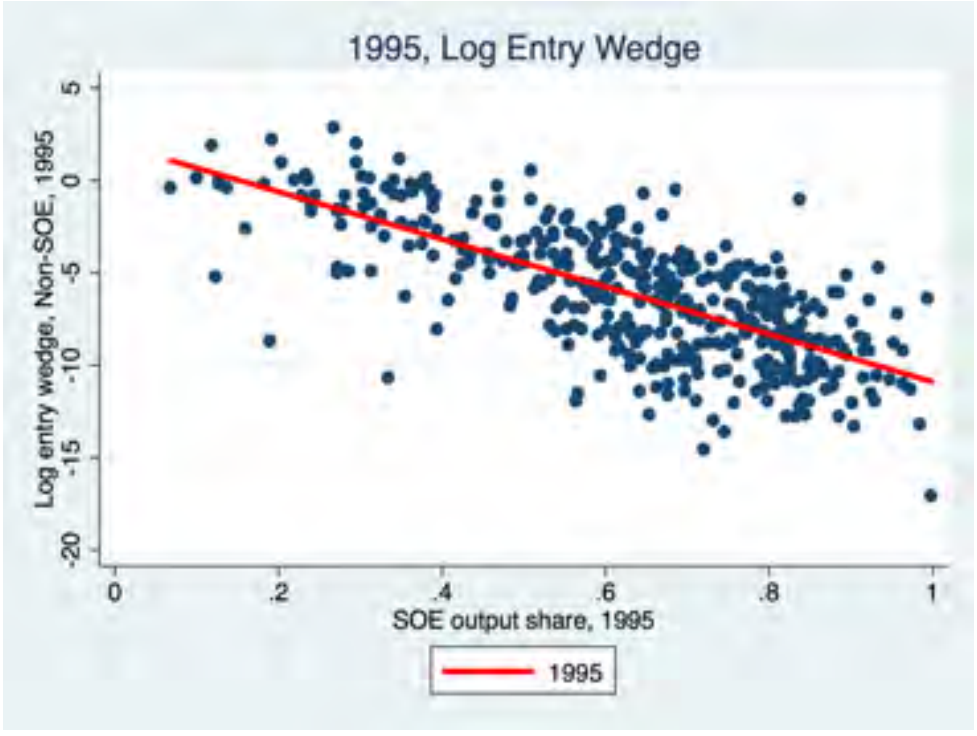
- calibrate v such that $n^*(z^*) = 1$ in the lowest s prefectures
- calibrate $\underline{z}$ such that $\psi = 0$ in the lowest s prefectures

Estimating the Gross Entry Wedge: $(1-\psi)$

- Estimate ψ_j in prefecture j from the equilibrium condition

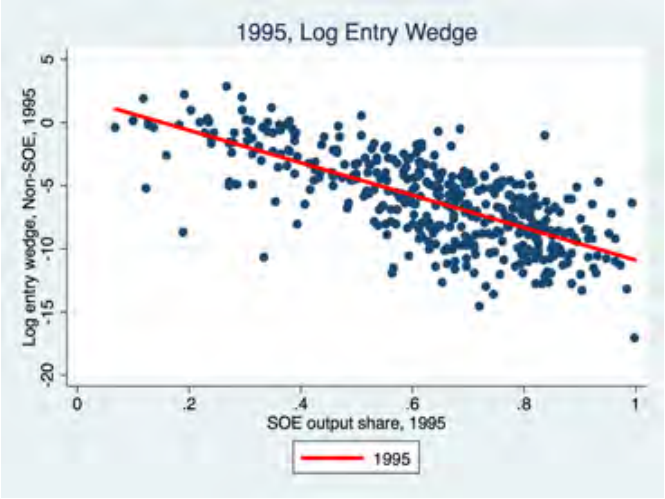
$$\begin{aligned}
\ln(1-\psi_j) \quad = \quad & \ln N + \frac{1-\eta+\xi\alpha\eta}{1-\eta}\ln w_j \\
& - \frac{\xi}{1-\eta}\ln(1-\tau_j^y) \\
& + \frac{\xi\eta(1-\alpha)}{1-\eta}\ln\left[(1+\tau_j^k)(r+\delta)\right] \\
& + (\xi-1)\ln v + \Omega(\alpha,\eta,\xi,\underline{z})
\end{aligned}$$

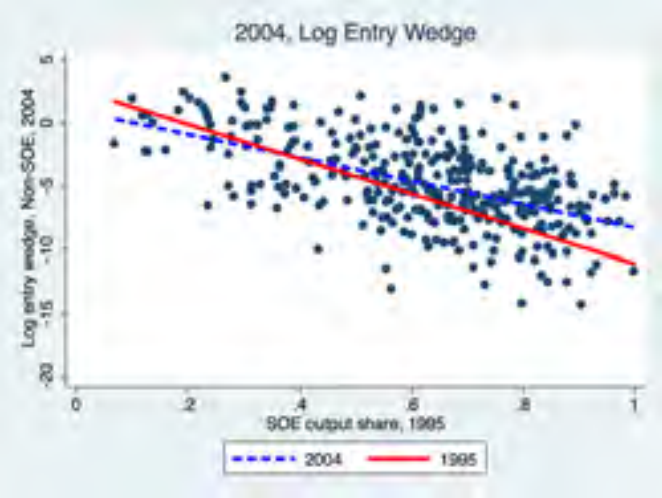
1995 Gross Entry Wedge in the NSOE Sector

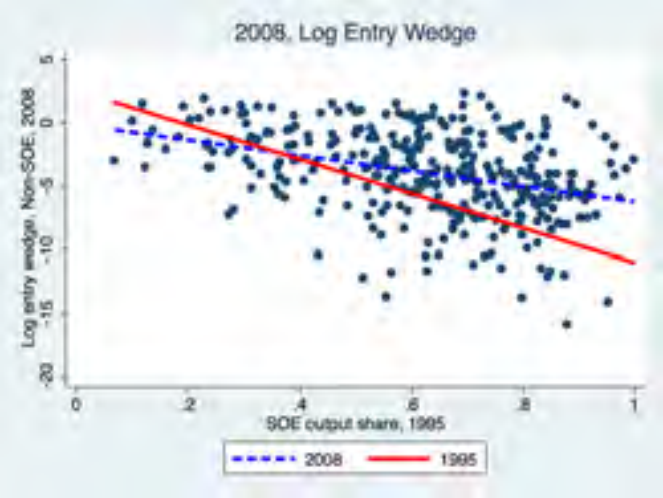


- Log gross entry wedge $\ln(1-\hat{\psi})$
- SOE share accounts for 52% of the variation in the entry wedge

Entry Wedge $(1-\psi)$ in the NSOE Sector



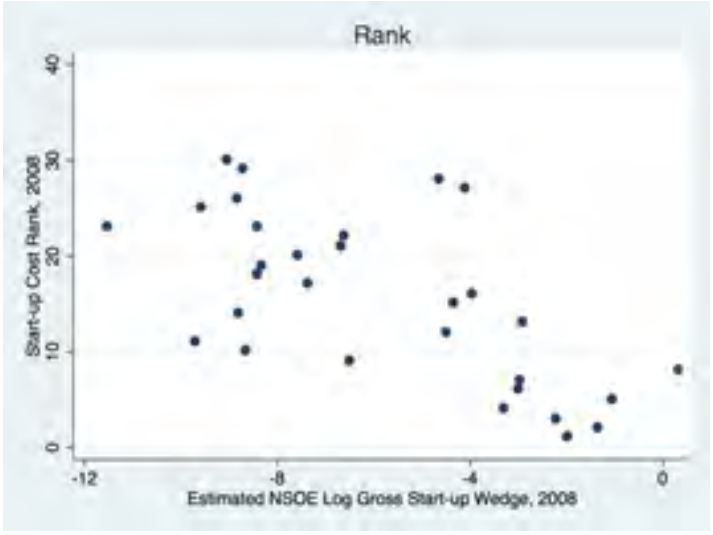


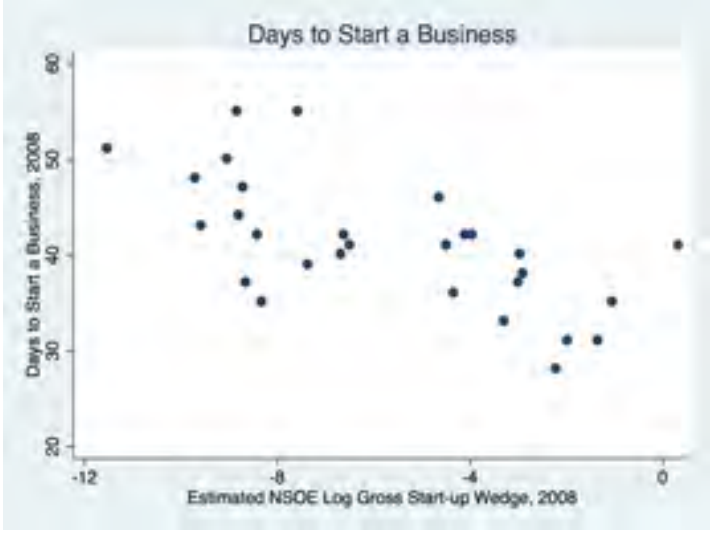


2008 Costs of Starting a Business in China

- "Doing Business in China 2008" Report
  - : The World Bank Group (2008)
  - : provides various measures of the cost of starting a business in main provincial cities
- Measures
  - : Rank: from easy (1) to hard (30) to start a business
  - : Days it takes to start a business
  - : Cost of starting a business: as a % of provincial GDP per capita

"Doing Business in China" and Entry Wedges, 2008





Entry Rates and Wedges

- Non-SOE entry rates were not targeted in the estimation of the model
- Entry rate measure $\Gamma^e_{p,t}$ for prefecture p in period $t = 1995, 2004, 2008$

$$\Gamma^e_{p,t} = \frac{N^e_{p,t}}{N_{p,t} - N^e_{p,t}}$$

: $N^e_{p,t}$ is employment in new non-SOE firms

: $N_{p,t}$ is total employment

: new firms are started in period $t-1$ or $t-2$

: firms started in period t are dropped

Entry Rates and Wedges

$$\ln \Gamma^{e}_{p,t} = \beta_0 + \beta_1 \ln(1-\tau^{y}_{p,t}) + \beta_2 \ln[(1+\tau^{k}_{p,t})(r+\delta)] + \beta_3 \ln(1-\psi_{p,t}) + \varepsilon_{p,t}$$

	β_1	β_2	β_3
1995	0.188*	-0.161*	0.106**
2004	0.107	0.042	0.046**
2008	0.239**	-0.073	0.039**

Note: ** – statistically significant at 1%; * – statistically significant at 10%.

Entry Rates and Wedges

$$\Delta \ln \Gamma^{e}_{p,t} = \gamma_0 + \gamma_1 \Delta \ln(1-\tau^{y}_{p,t}) + \gamma_2 \Delta \ln[(1+\tau^{k}_{p,t})(r+\delta)] + \gamma_3 \Delta \ln(1-\psi_{p,t}) + \varepsilon_{p,t}$$

	γ_1	γ_2	γ_3
1995-2004	-0.084	-0.187*	0.033*
2004-2008	0.162*	-0.093*	0.042**

Note: ** – statistically significant at 1%; * – statistically significant at 10%.

Variance in TFP and Wedges

$$\begin{aligned} Var[\ln Z] \quad \approx \quad & a_1^2 Var[\ln(1-\psi)] + a_1^2 Var[\ln N] \\ & + a_3^2 Var[\ln\left(1-\tau^y\right)] + a_4^2 Var[\ln(1+\tau^k)(r+\delta)] \end{aligned}$$

- covariance terms do not play a role
- variation of a_i across prefectures ignored: does not play a role
- compute the contribution of each term in $Var[\ln Z]$

Variance in TFP and Wedges

	Var_{ψ}	Var_{N}	Var_{τ^y}	Var_{τ^k}
1995	0.76	0.02	0.06	0.07
2004	0.68	0.03	0.03	0.05
2008	0.62	0.02	0.05	0.09
1995-2004	0.63	0.03	0.05	0.10
2004-2008	0.60	0.01	0.10	0.15

Variance in Wages and Wedges

$$
\begin{aligned}
Var[\ln w] \quad \approx \quad & a_1^2\, Var[\ln(1-\psi)] + a_1^2\, Var[\ln N] \\
& + a_3^2\, Var[\ln\left(1-\tau^y\right)] + a_4^2\, Var[\ln(1+\tau^k)(r+\delta)] \\
& + 2a_1 a_3\, Cov[\ln(1-\psi), \ln(1-\tau^y)] \\
& - 2a_3 a_4\, Cov[\ln(1-\tau^y), \ln(1-\tau^k)]
\end{aligned}
$$

- the other covariance terms do not play a role
- variation of a_i across prefectures ignored: does not play a role
- compute the contribution of each term in $Var[\ln w]$

Variance in Wages and Wedges

	Var_ψ	Var_N	Var_{τ^y}	Var_{τ^k}	Cov_{ψ,τ^y}	Cov_{τ^y,τ^k}
1995	5.34	0.13	4.36	0.71	-7.57	-2.13
2004	10.45	0.43	5.54	1.07	-11.88	-2.26
2008	6.15	0.24	5.27	1.28	-6.56	-3.46
1995-2004	5.14	0.28	4.46	1.23	-6.73	-2.62
2004-2008	2.39	0.03	4.24	0.90	-3.74	-2.62

Variance in K/Y and Wedges

$$Var\left[\ln \frac{K}{Y}\right] = Var[\ln(1-\tau^y)] + Var[\ln(1+\tau^k)(r+\delta)]$$
$$-2Cov[\ln(1-\tau^y), \ln(1-\tau^k)]$$

- compute the contribution of each term in $Var\left[\ln \frac{K}{Y}\right]$

	Var_{τ^y}	Var_{τ^k}	Cov_{τ^y,τ^k}
1995	1.14	1.28	-1.42
2004	0.81	1.08	-0.89
2008	1.05	1.75	-1.80
1995-2004	0.72	1.38	-1.10
2004-2008	1.18	1.72	-1.90

Changes in TFP and Wedges

$$\ln Z \quad = \quad Z(\alpha, \eta, \xi, \underline{z}, \nu; N, \tau^y, \tau^k, \psi)$$

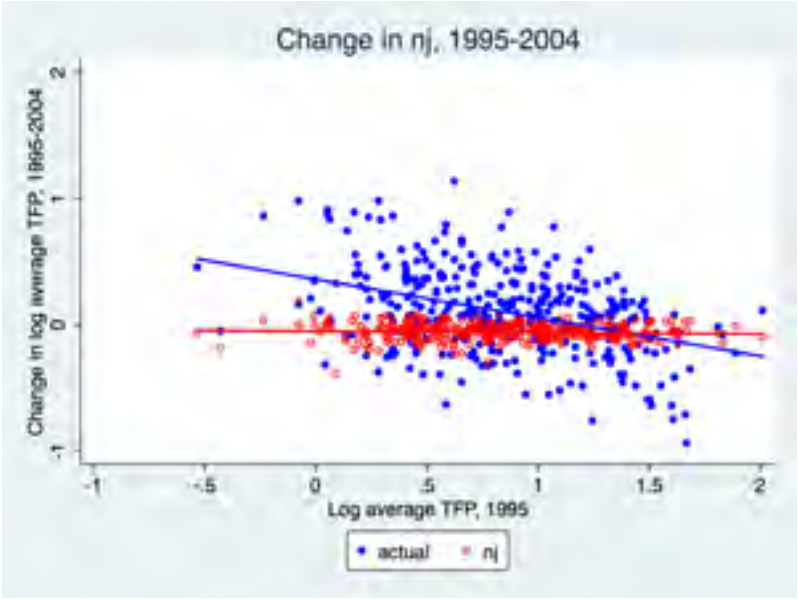
- Decompose the change in log TFP, $\Delta \ln Z = (\ln Z_{t+1} - \ln Z_t)$

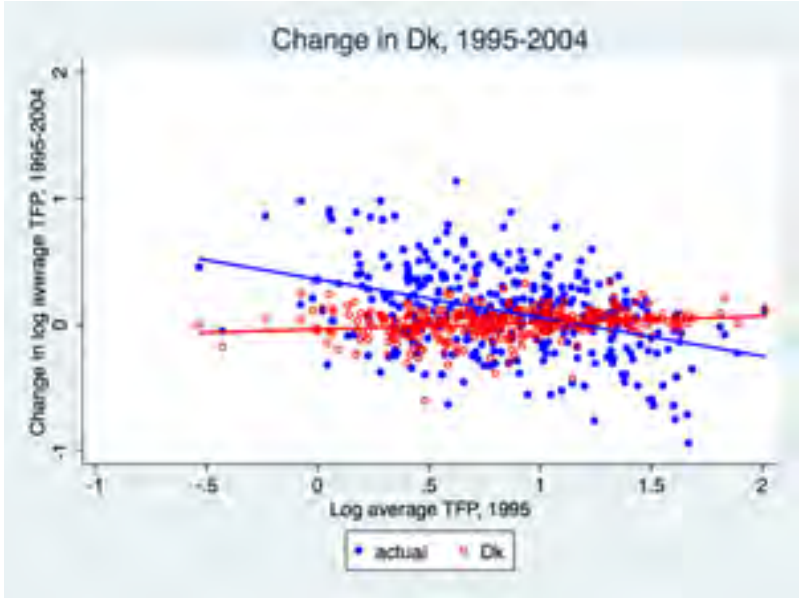
  (i) Change $(\alpha, \eta, \xi, \underline{z}, \nu)$ from t to $t+1$

  : subtract this from the change to be explained

  (ii) Change, one-by-one, $(N, \tau^k, \tau^y, \psi)$

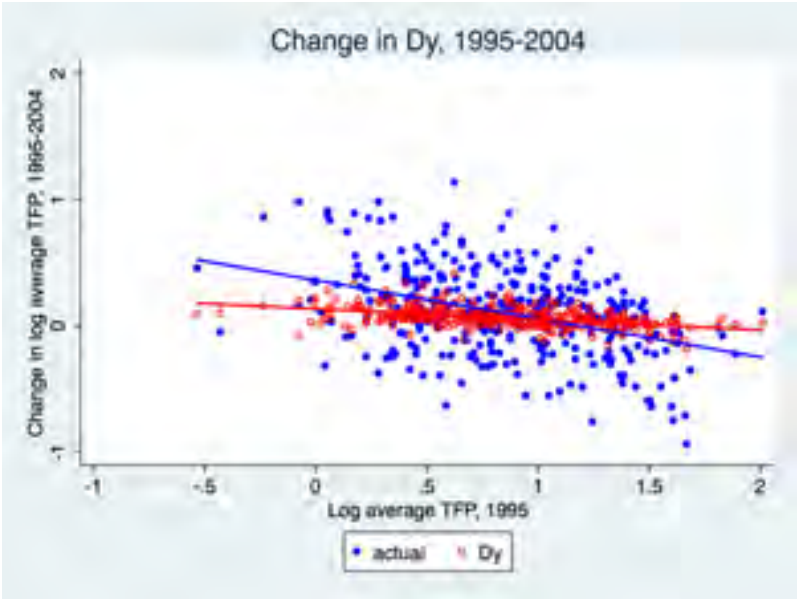
Changes in TFP and Wedges: 1995-2004

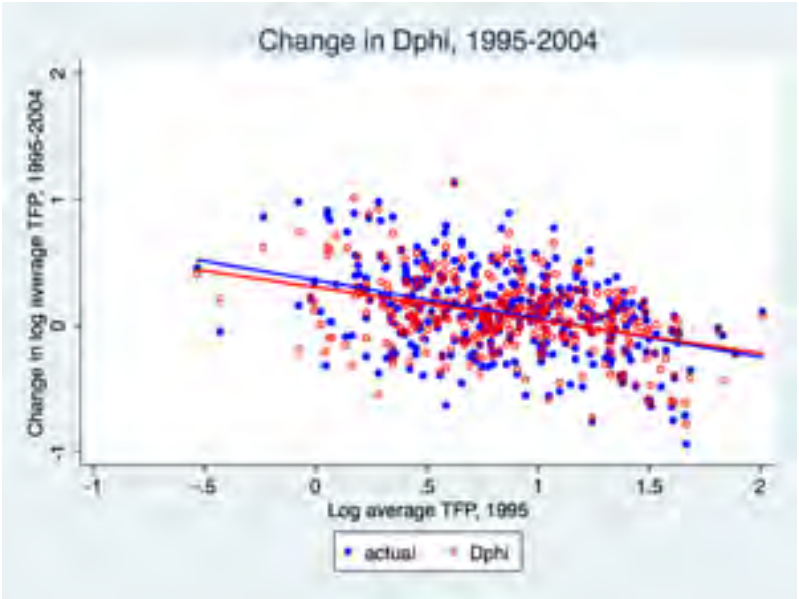




- Overall, there is a convergence in TFP in 1995-2004
- The change in N has a small effect on $\Delta \ln Z$
  - accounts for -18%
- The change in τ^k has a small effect on $\Delta \ln Z$
  - accounts for 12%

Changes in TFP and Wedges: 1995-2004





- The change in τ^y has a small effect on $\Delta \ln Z$
  - accounts for 12%
- The change in ψ has a large effect on $\Delta \ln Z$
  - accounts for 94%

Understanding the Entry Wedge

- 1995, the entry wedge is higher in prefectures where
  - : the share of employment (or output) in the SOE sector is higher
  - : fiscal revenues per government worker are lower
  - : the profitability of SOEs is lower
- 1995-2004, the decline in the entry wedge is larger in pref. where
  - : the decline in the SOE share of employment is larger
  - : the increase in fiscal revenues per government worker are larger

Note that data on

- : fiscal revenue per government worker available for 1995 and 2004
- : profitability of SOEs available for 1995

SOE and Fiscal Reforms

- SOE reforms after 1995
  - : smaller SOEs sold off or shutdown
  - : massive layoffs of workers in the SOE sector including in those firms not privatized
  - : concentration of SOEs in strategic and pillar sectors
- Fiscal reform after 1995
  - : recentralization of the fiscal system that increased the % of revenue going to the center
  - : new system of fiscal transfers and sharing rules between provinces and the center, and localities and provinces
  - : localities allowed to retain land conveyance fees; i.e., basically profits from the sale of farm land for non-agricultural uses

The Entry Wedge in 1995 and 2004

- Dependent variable
  - : 1995 (2004) log gross entry wedge
  - : $\ln(1-\psi)$
- $\ln FREV_t$
  - : 1995 (2004) log fiscal revenue per government worker
- $\ln PROF_t^{soe}$
  - : 1995 ratio of profits to total assets for SOEs
- $e_p^{soe} = \frac{E_p^{soe}}{E_p}$
  - : 1995 (2004) share of SOE employment in pref. p

Instruments for e_p^{soe}

- IV_{lag}: use $e_{p,t-1}^{soe}$, the lagged share of SOE employment in pref. p
- IV_{1978}
  - : use 1995 census and restrict to firms established in or before 1978
  - : construct SOE share in 1978, using this restricted sample
  - : results are similar if 1992, 2004, or 2008 census used
- IV_{prov}
  - : use 1978 GDP provincial data and construct province SOE share in 1978
  - : use as instrument for 1995, 2004, and 2008 SOE share constructed using
    - GDP province data (1995)
    - manufacturing census (2004 and 2008)

The Entry Wedge in 1995, 2004, and 2008

	$\ln(1-\psi)$	*OLS*	IV_{lag}	IV_{1978}	IV_{prov}
1995	e^{soe}	-11.64**	-14.13**	-12.96**	-11.72**
	$\ln FREV$	1.31**	0.93*	1.11**	1.69*
	$\ln PROF^{soe}$	0.31*	0.32*	0.32*	0.13
2004	e^{soe}	-9.61**	-13.39**	-16.06**	-17.47**
	$\ln FREV$	2.16**	1.89**	1.70**	0.40
2008	e^{soe}	-8.10**	-9.63**	-14.60**	-16.71**

Note: ** – statistically significant at 1%; * – statistically significant at 5%.

Change in the Entry Wedge, 1995-2004

- Dependent variable
  - : 1995-2004 change in the log gross entry wedge
  - : $\Delta \ln(1-\psi)$
- $\Delta \ln FREV$
  - : 1995-2004 change in the log fiscal revenue per government worker
- Δe^{soe}
  - : 1995-2004 change in SOE employment share
  - : $\Delta e^{soe} = \frac{E^{soe}_{2004}}{E_{2004}} - \frac{E^{soe}_{1995}}{E_{1995}}$

Change in the Entry Wedge, 1995-2004

- Instrument for the 1995-2004 change in prefecture SOE employment
- $\mu_j^{soe} = \frac{E_{j,2004}^{soe} - E_{j,1995}^{soe}}{E_{j,1995}^{soe}}$

  : 1995-2004 percentage change in SOE employment in industry j

- $e_{p,j}^{soe} = \frac{E_{p,j}^{soe}}{E_p}$

  : 1995 SOE employment in pref. p and industry j, as a fraction of total 1995 manufacturing employment in the pref. p

- Instrument IV_p^{ind}

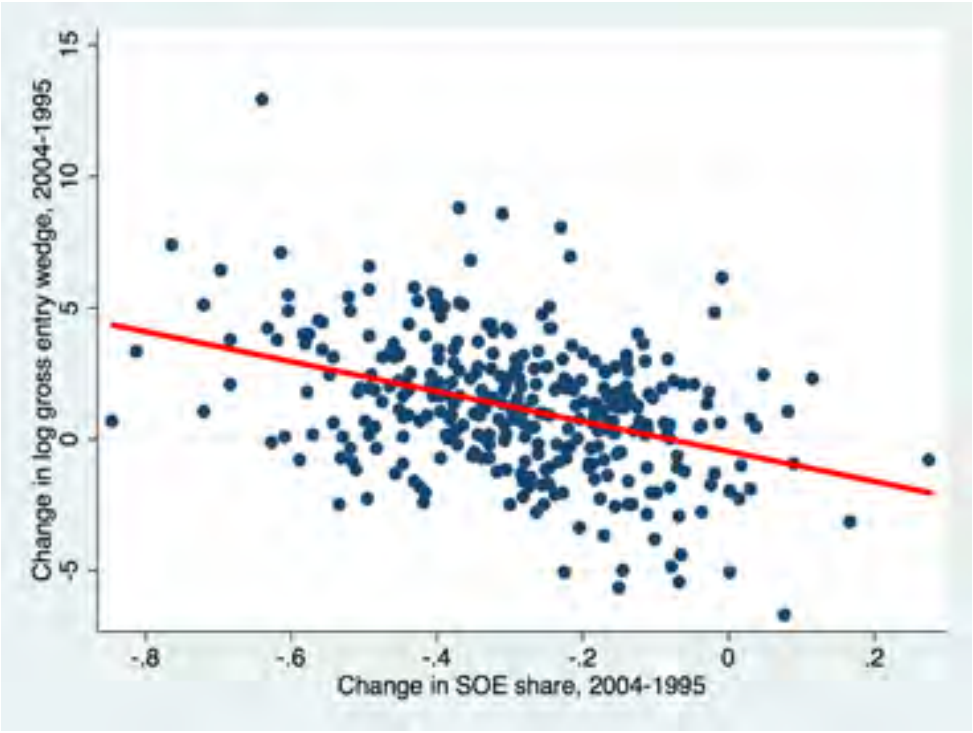
  : $IV_p^{ind} = \sum_j e_{p,j}^{soe} * \mu_j^{soe}$

Change in the Entry Wedge, 1995-2004

$\Delta \ln(1-\psi)$	*OLS*	*OLS*	IV_p^{ind}	IV_p^{ind}
Δe^{soe}	-3.13**	-2.54*	-5.38*	-6.14*
$\Delta \ln FREV$		1.13**		0.84*

Note: ** – statistically significant at 1%; * – statistically significant at 5%.

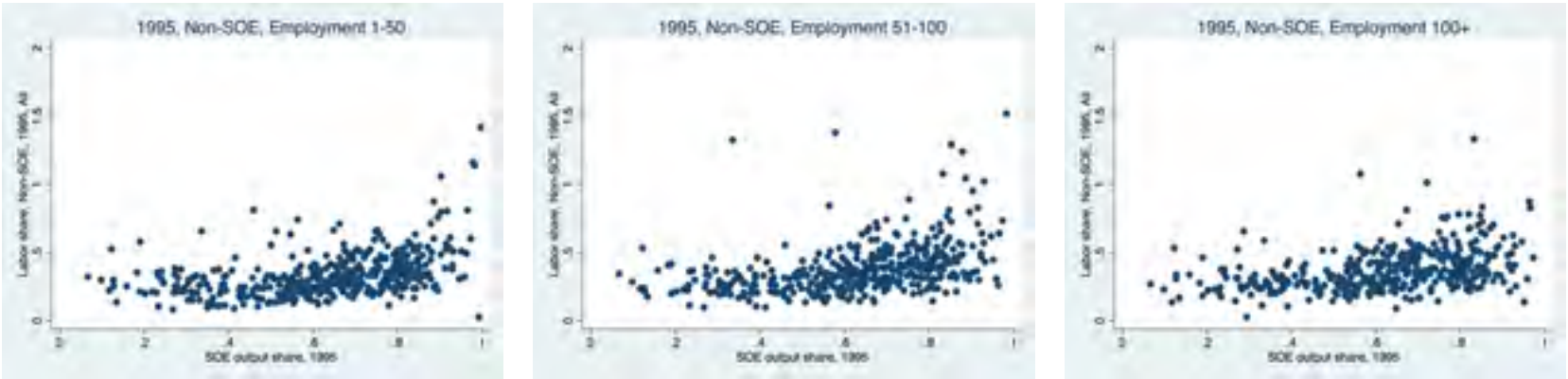
Entry Wedge and SOE Share, 1995-2004



Alternative Theory I

- NSOE firms in a prefecture have access to two technologies:
  1. inefficient low z technology with a high labor share (labor intensive)
  2. efficient high z technology with a low labor share
- A larger fraction of the NSOE firms in the high s prefectures will use technology 1 $\Rightarrow$ higher labor share
- Predictions of the alternative theory
  - within prefectures: smaller firms have higher labor share
  - across prefectures: conditional on size, firms have the same labor share

Alternative Theory I



- Predictions of the alternative theory are not consistent with the data
- Within prefectures
  - : firms with different sizes have the same labor share
- Across prefectures
  - : conditional on size, firms have increasing in *s* labor share

Alternative Theory II

- The pool of potential entrants is worse in the high s prefectures:
  - lower TFP of entrants
  - less heavy right Pareto tail (larger Pareto coefficient)
- Predictions of the alternative theory
  - consider a productivity cutoff z_0
  - consider the right tail of the Pareto distribution for firms with $z > z_0$
  - ξ should be higher in high s prefectures
- Predictions of the alternative theory are not consistent with the data
  - pick z_0 as the 90th or 95th percentile of the overall TFP distrib.
  - in each case, ξ is the same in high and low s prefectures
  - for the 90th perc: $\xi_{s,low} = 1.044$, $\xi_{s,high} = 1.048$

Alternative Theory III

- The cost of operation, v, is higher in high s prefectures
- Predictions of the alternative theory
  - less entry
  - lower wages
- Predictions of the alternative theory that are not consistent with the data
  - entrants are positively selected on productivity
  - high TFP

Conclusion

- Aim to understand the heterogeneous growth patterns across localities in China
- A snapshot of manufacturing in 1995 shows that
  - non-SOE firm entry is substantially smaller in high *s* prefectures
  - non-SOE firm entrants in high *s* prefectures pay lower wages and have lower *TFP*, value added per worker, and capital
- Output wedges are declining with *s* while the capital wedges are slightly increasing with *s*
- Output and capital wedges cannot account for 1995 NSOE patterns

Conclusion

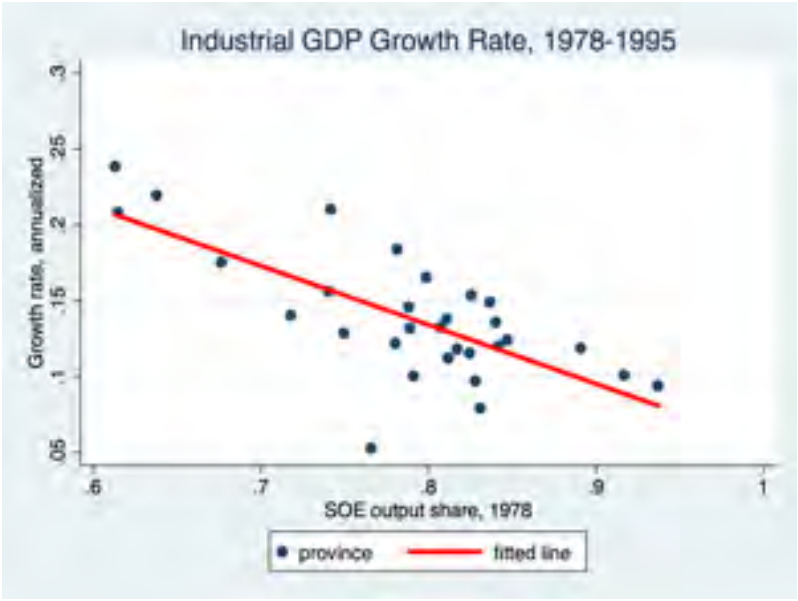
- Build a Hopenhayn model of firm entry
  - model entrants and incorporate entry wedges
  - infer the entry wedges in 1995
  - infer the entry wedges in 2004 and 2008
- Entry wedges account for most of the 1995, 2004, and 2008 cross-sectional variation in
  - wages and TFP
- Entry wedges account for most of the 1995-2004 and 2004-2008 changes in
  - wages and TFP

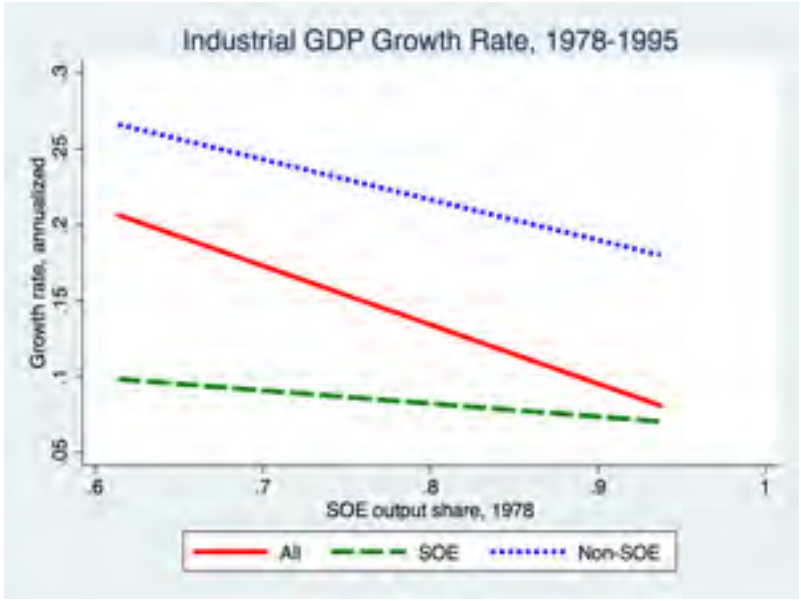
Conclusion

- Analyze the entry wedges
  - : 2008 entry wedges are positively correlated with the “Cost of Doing Business Estimates” for China in 2008 (for provinces)
  - : 1995, the entry wedge is higher in prefectures where
    - the share of employment (or output) in the SOE sector is higher
    - fiscal revenues per government worker are lower
    - the profitability of SOEs is lower
  - : 1995-2004, the decline in the entry wedge is larger in pref. where
    - the decline in the SOE share of employment is larger
    - the increase in fiscal revenues per government worker are larger

Additional Slides

The Effect of the State Sector: 1978-1995





- At the province level, industrial output
- The SOE share of output, *s*, in 1978 is negatively correlated with the
  - 1978-1995 growth in provincial GDP (left panel); and
  - 1978-1995 growth in prov. overall, SOE, and NSOE GDP (right panel).

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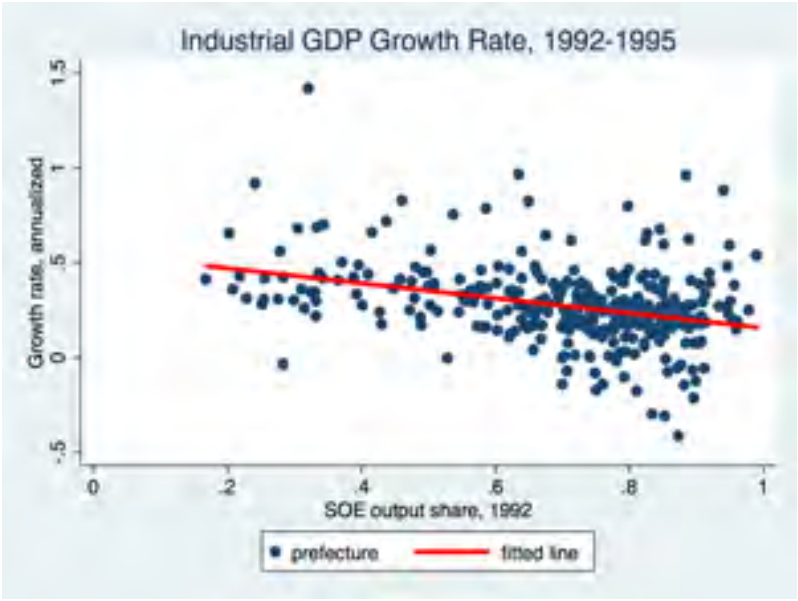
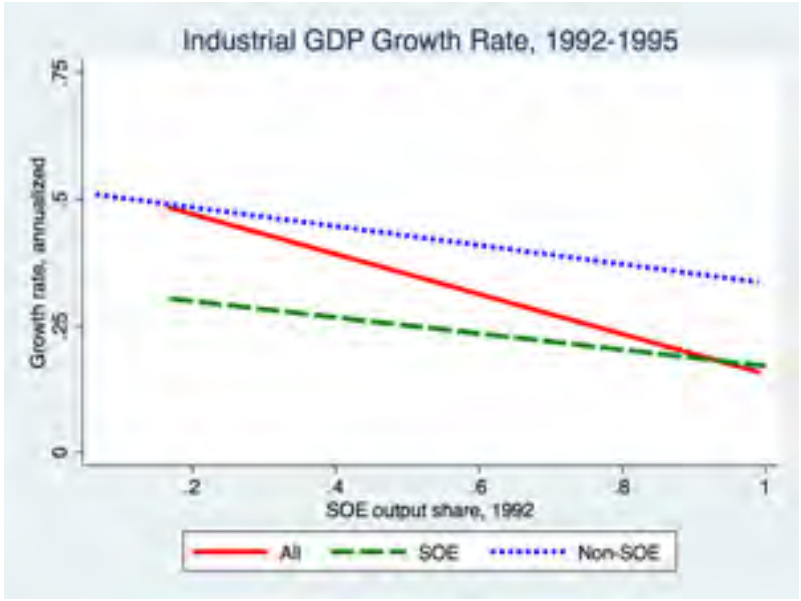
The Effect of the State Sector: 1992-1995





- At the prefecture level, industrial output
- The SOE share of output, *s*, in 1992 is negatively correlated with the
  - 1992-1995 growth in prefecture GDP (left panel); and
  - 1992-1995 growth in pref. overall, SOE, and NSOE GDP (right panel).

[Y/N]

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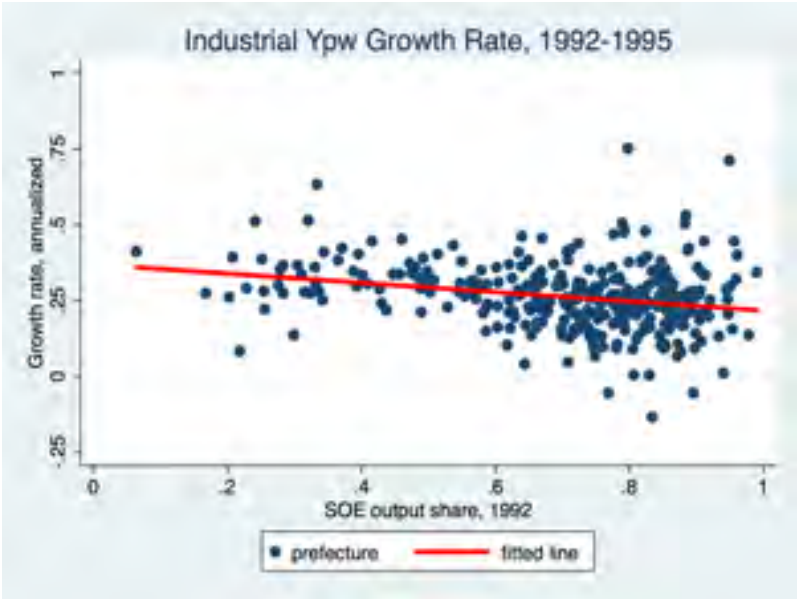
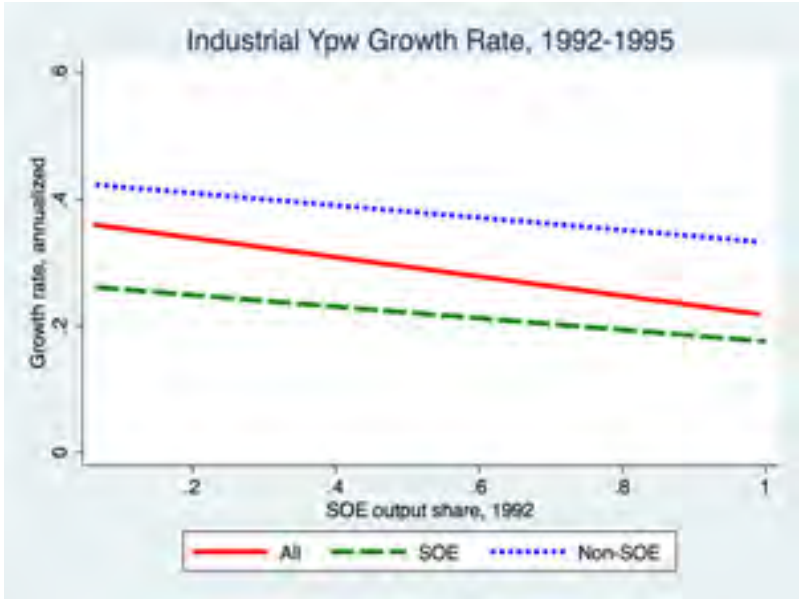
The Effect of the State Sector: 1992-1995, Y/N





- At the prefecture level, industrial output
- The SOE share of output, s, in 1992 is negatively correlated with the
  - 1992-1995 growth in prefecture Y/N (left panel); and
  - 1992-1995 growth in pref. overall, SOE, and NSOE Y/N (right panel).

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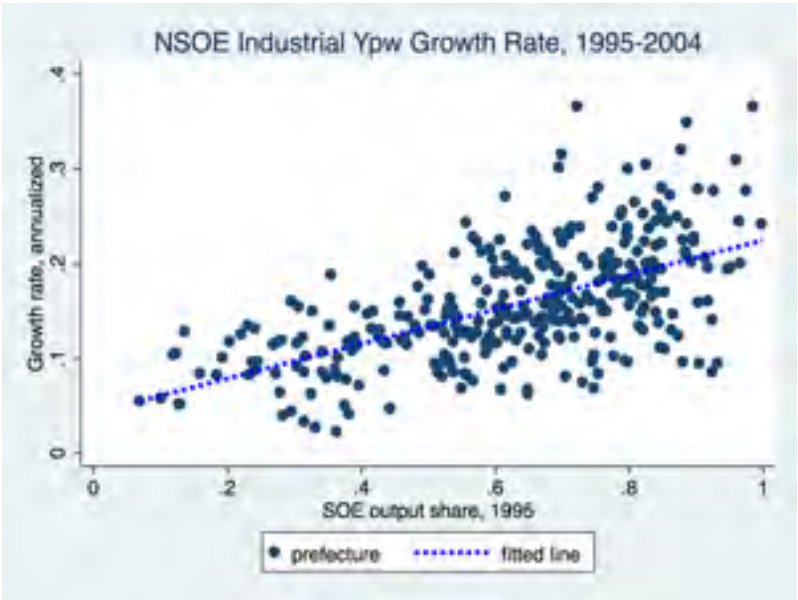
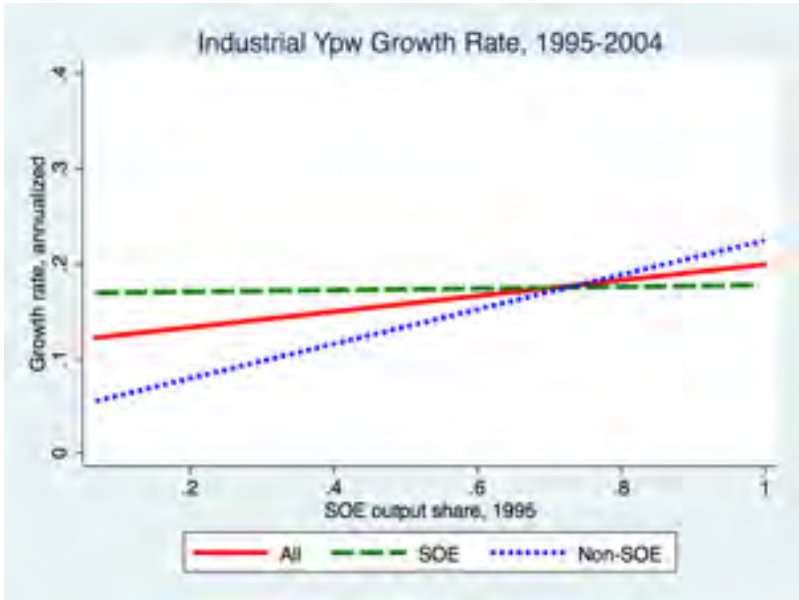
Growth Rate in Ypw, 1995-2004





- The SOE share of output, *s*, in 1995 is positively correlated with the
  - 1995-2004 growth in prefecture NSOE Ypw (left panel); and
  - 1995-2004 growth in pref. overall and NSOE Ypw (right panel).

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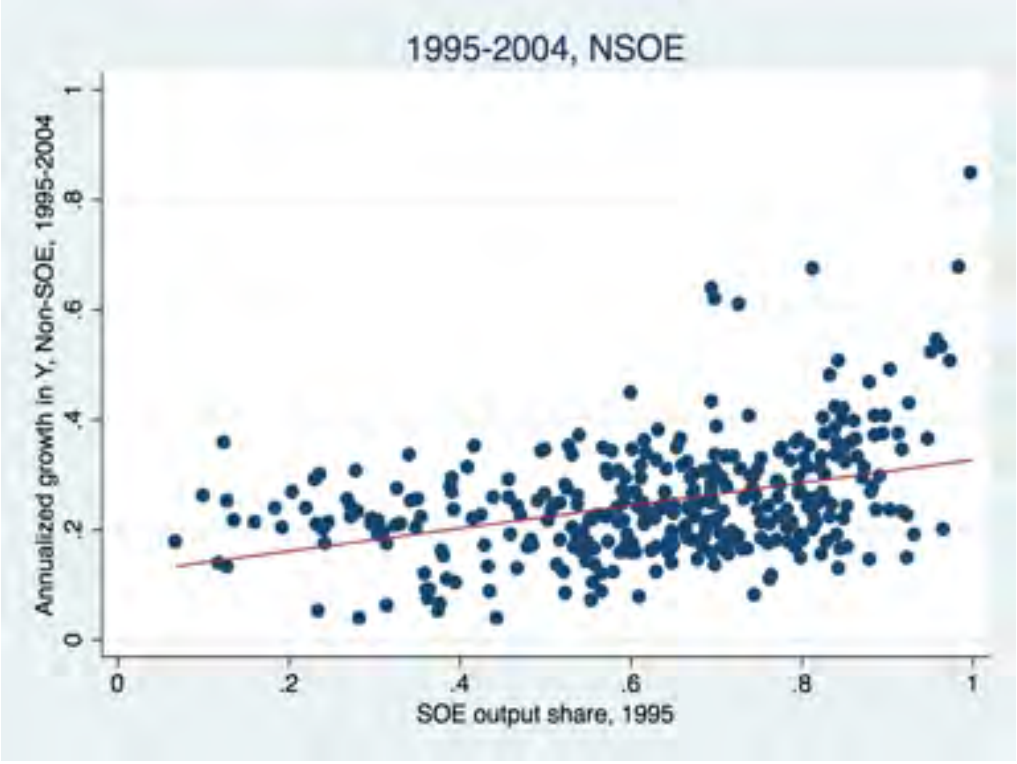
Growth Rate in Y, 1995-2004



- The SOE share of output, *s*, in 1995 is positively correlated with the
  - 1995-2004 growth in prefecture NSOE Y

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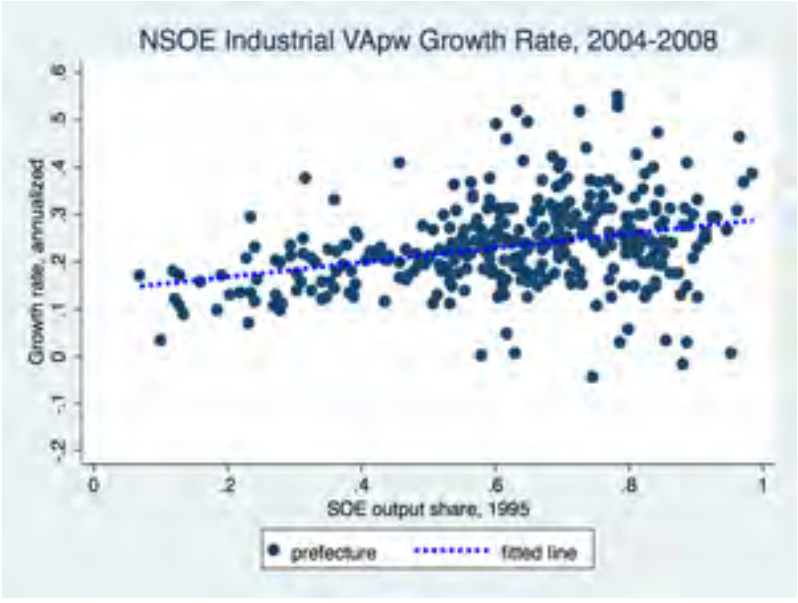
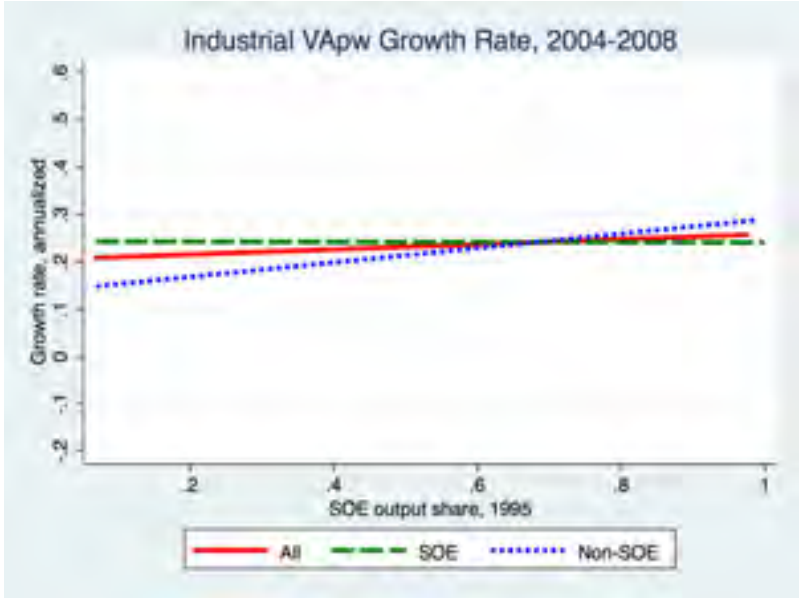
Growth Rate in VApw, 2004-2008





- The SOE share of output, *s*, in 1995 is positively correlated with the
  - 2004-2008 growth in prefecture NSOE VApw (left panel)

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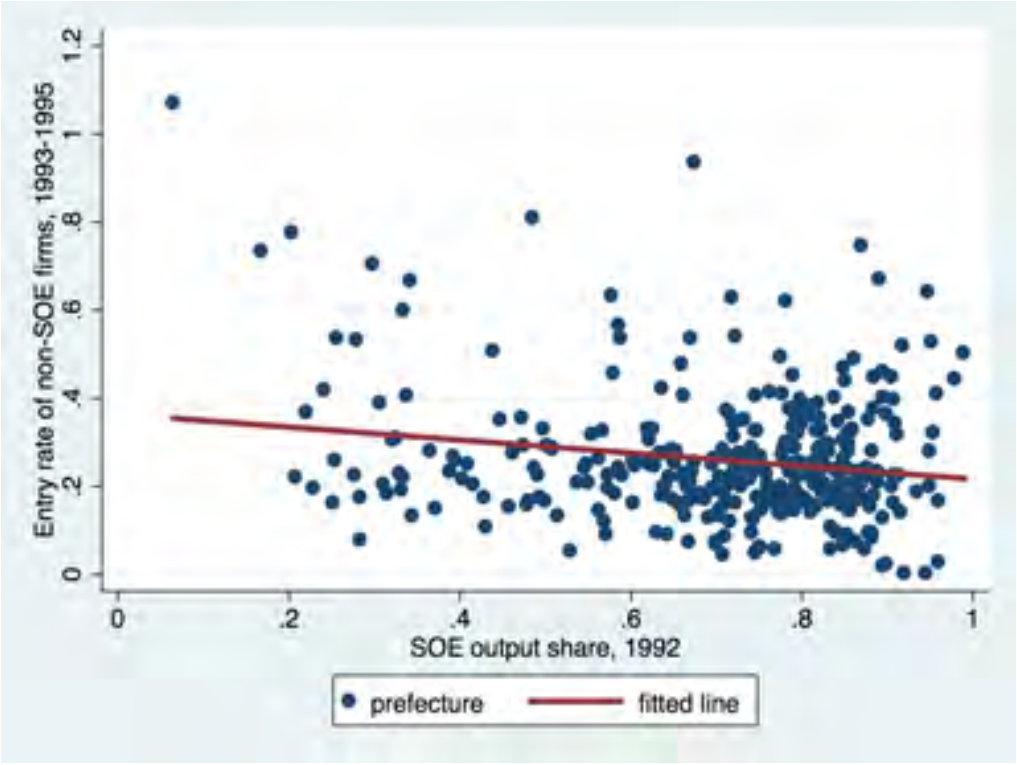
Non-SOE Entry in 1995



- New non-SOE entrants (1993-1995) relative to the stock of all firms in 1992
- Lower in high *s* prefectures

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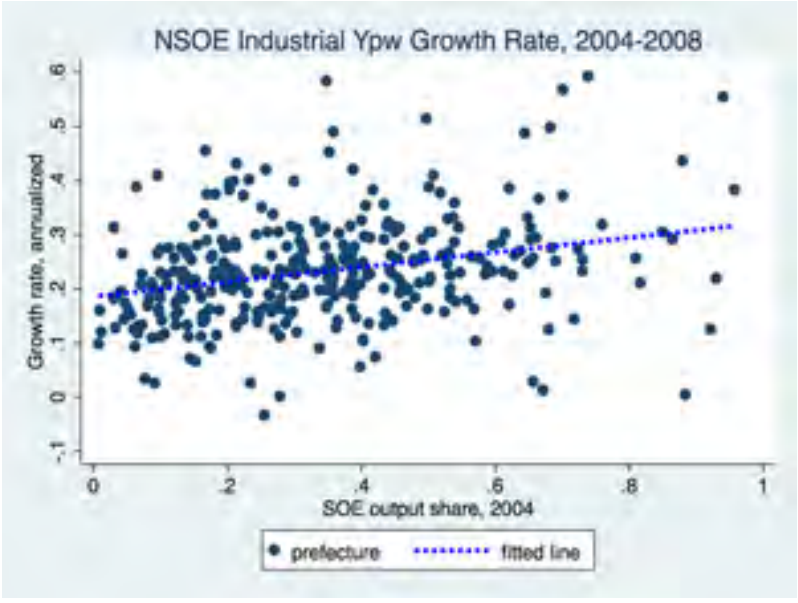
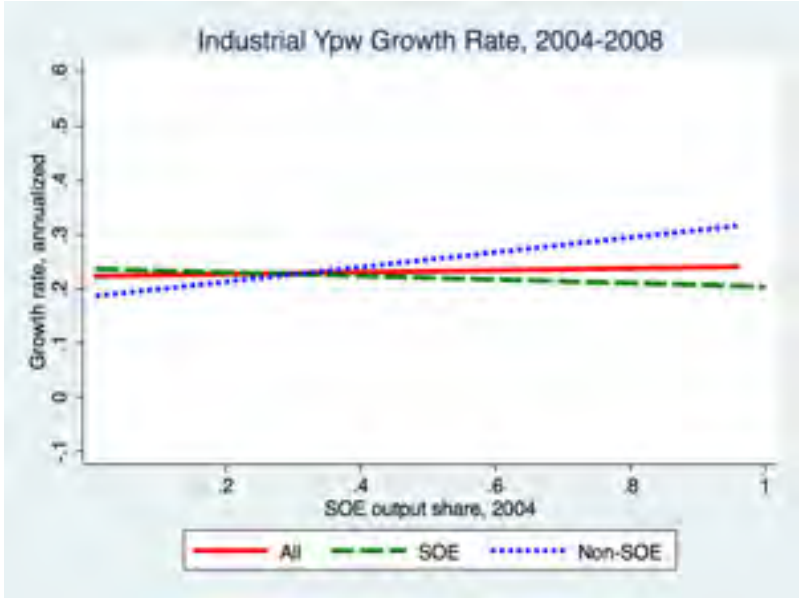
Growth Rate in Ypw, 2004-2008





- The SOE share of output, *s*, in 2004 is positively correlated with the
  - 2004-2008 growth in prefecture NSOE Ypw (left panel).

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Framework for Wedges: The Labor Wedge

- Incorporating the gross labor wedge: $(1+\tau^w)$
- Gross output wedge, Δ_i^y

$$\Delta_i^y = \frac{(1-\tau_i^y)}{(1+\tau^w)} = \frac{1}{\alpha\eta}\frac{w_i n_i}{y_i}$$

- Gross capital wedge, Δ_i^k

$$\Delta_i^k = \frac{(1+\tau_i^k)(r+\delta)}{(1+\tau^w)} \quad = \quad \frac{1-\alpha}{\alpha}\cdot\frac{w_i n_i}{k_i}$$

- If the labor wedge increases with s, then in the NSOE sectors
  - : the output subsidies have to be even higher in the high s prefectures, and
  - : the capital tax wedges have to be higher in the high s prefectures

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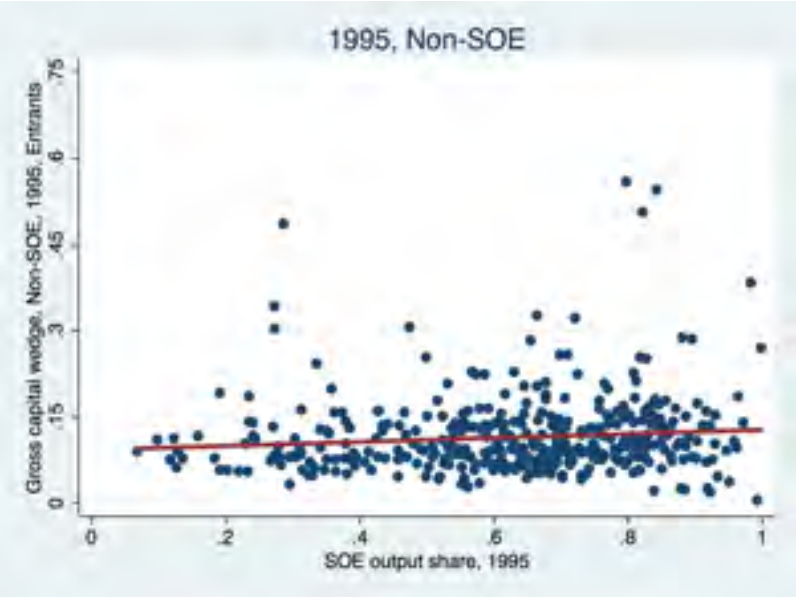
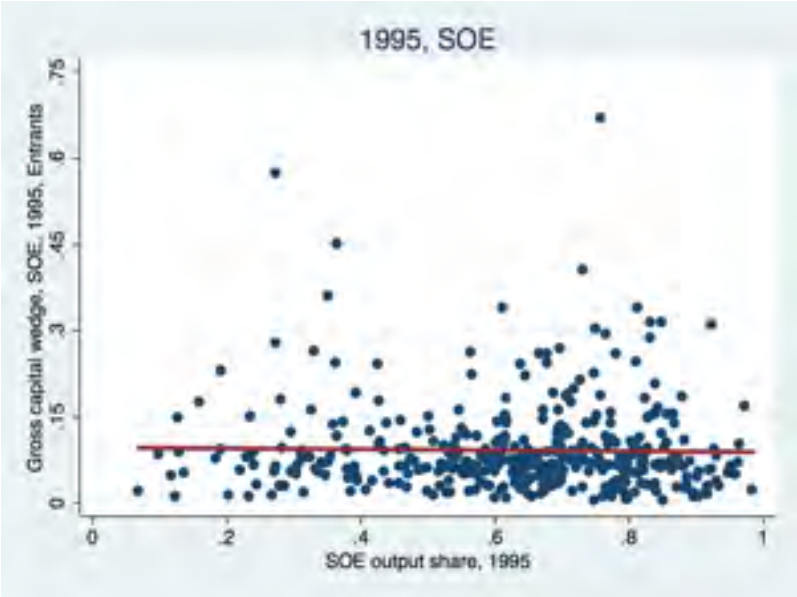
Gross Capital Wedge, Entrants: Δ^k





- Higher capital taxes in high *s* prefectures for non-SOE firms
- No relationship between capital taxes and *s* for SOE firms

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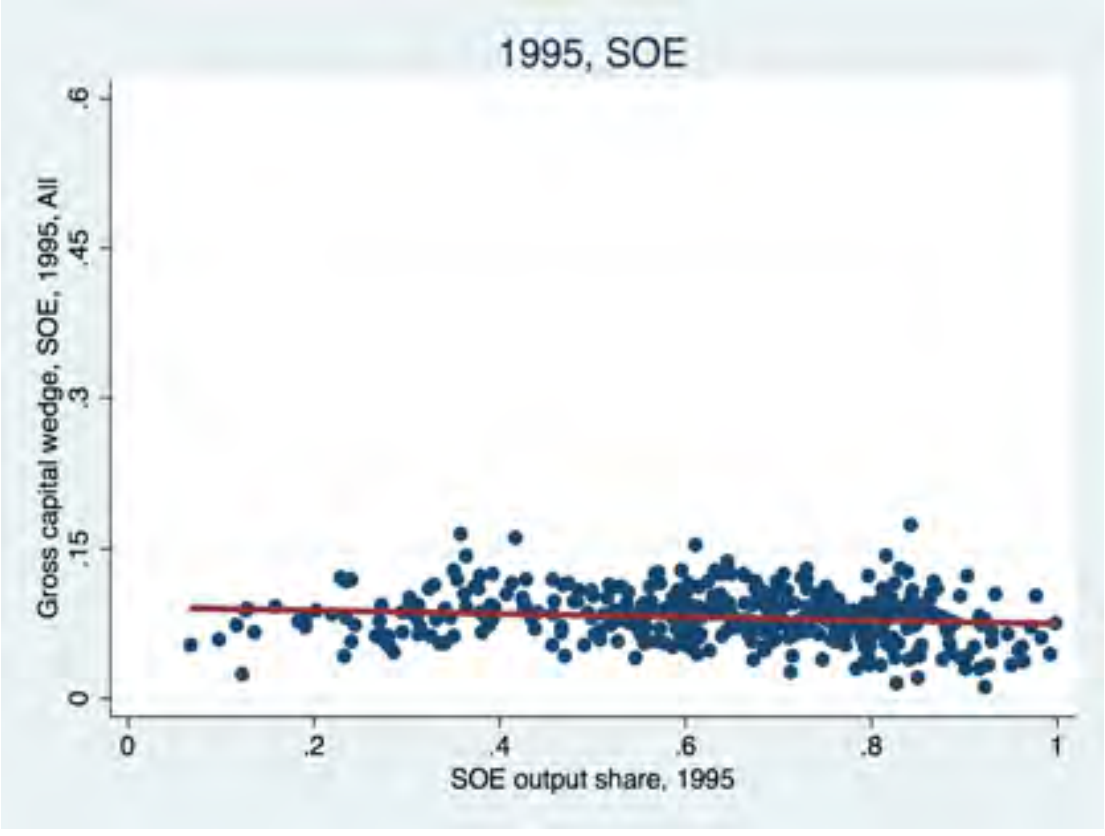
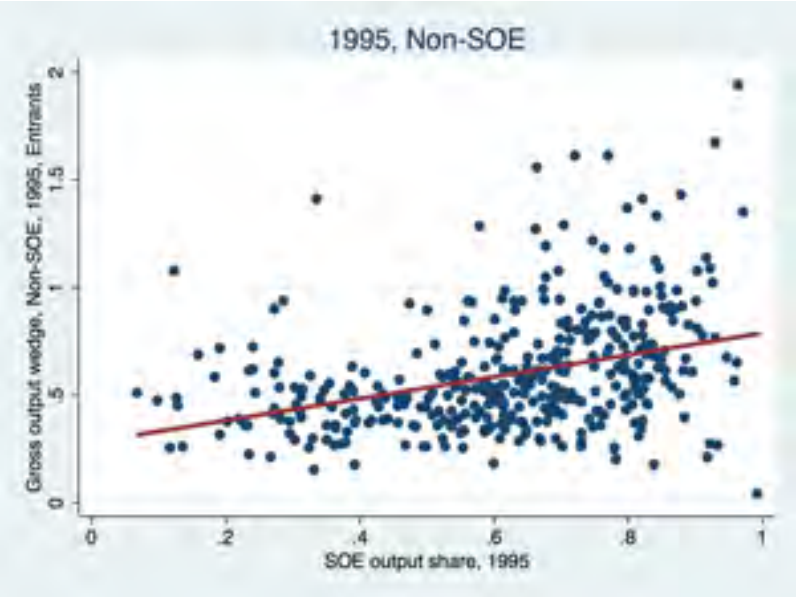
Gross Capital Wedge: Δ^k

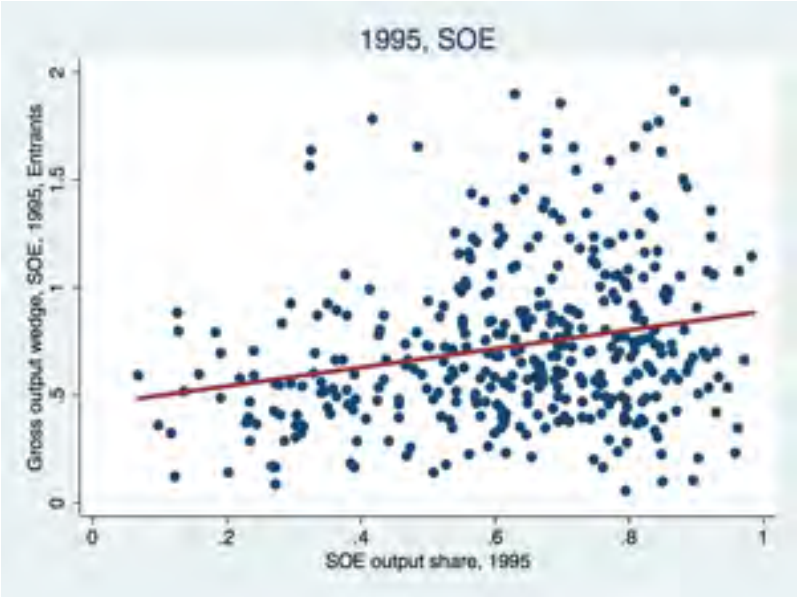


- No relationship between capital taxes and s for SOE firms

[Back]

Gross Output Wedge, Entrants: Δ^y





- Lower output taxes (higher subsidies) in high *s* prefectures
- For both non-SOE and SOE firms

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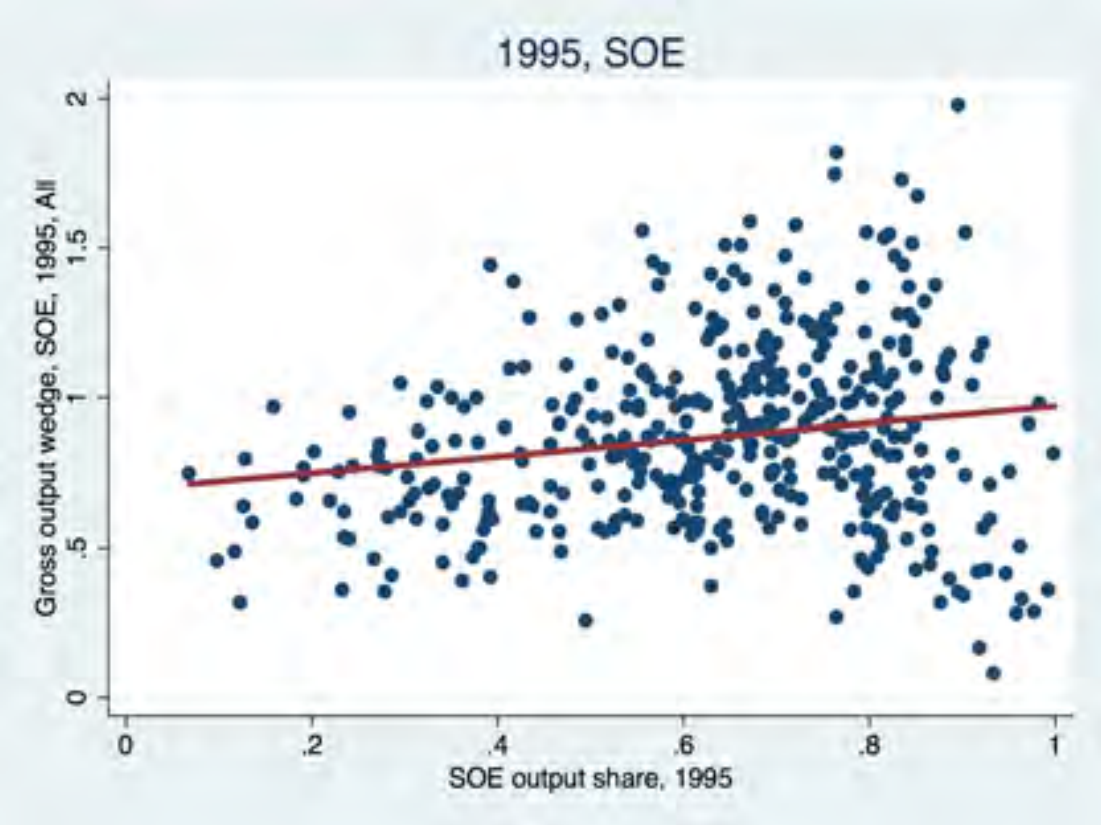
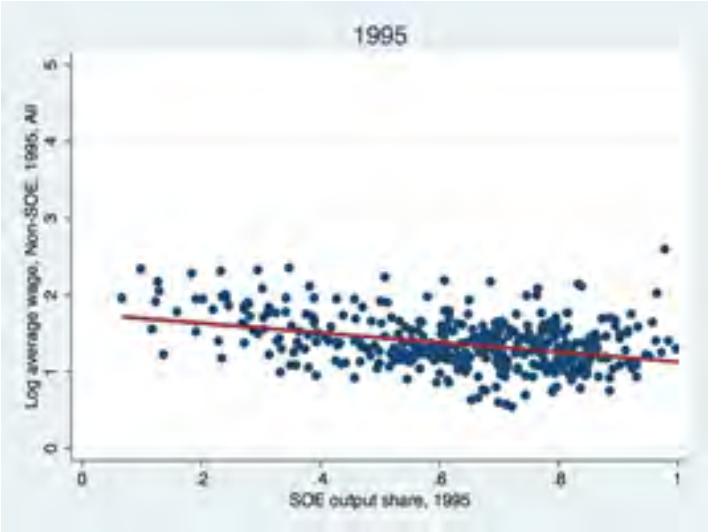
Gross Output Wedge: Δ^y

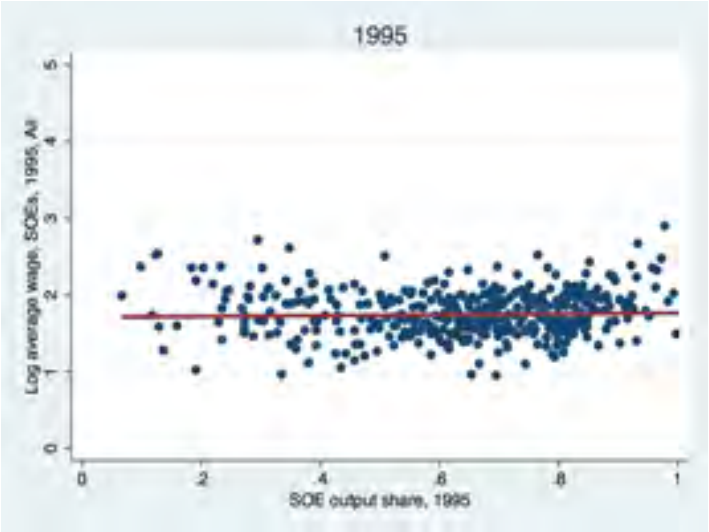


- Lower output taxes (higher subsidies) in high s pref. for SOE firms

[Back]

SOE and NSOE Wages in *s* Prefectures





- SOEs pay the same wage in all *s* prefectures
- SOE and NSOE wages are similar in low *s* prefectures
- SOE wages are higher than NSOE wages in high *s* prefectures

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SOE Sector

- Same production function as NSOE firms;

$$\hat{y}_i = \hat{z}_i^{1-\eta} \left(\hat{k}_i^{1-\alpha} \hat{n}_i^{\alpha} \right)^{\eta},$$

- measure one of potential SOE firms
- per-period operating fixed cost $\hat{v}$
- $\hat{z}$ is Pareto distributed with parameter $\hat{\xi}$ $(\hat{\xi} > \xi)$
- common (exogenous) wage rate $\hat{w}$ across prefectures

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SOE Sector in Equilibrium: Output per Worker

$$\ln \frac{\hat{Y}}{\hat{N}} = \ln \hat{w} - \ln\left(1 - \hat{\tau}^{y}\right) - \ln\left(\alpha\eta\right)$$

$$\begin{aligned} \frac{\partial \ln \frac{\hat{Y}}{\hat{N}}}{\partial \ln\left(1 + \hat{\tau}^{k}\right)} &= 0 \\ \frac{\partial \ln \frac{\hat{Y}}{\hat{N}}}{\partial \ln\left(1 - \hat{\tau}^{y}\right)} &= -1 \end{aligned}$$

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SOE Sector in Equilibrium: TFP $\hat{Z}$

$$\begin{aligned}
\ln \hat{Z} &= (1-\alpha\eta)\ln\left[\left(1+\hat{\tau}^k\right)(r+\delta)\right] \\
&\quad -\ln(1-\hat{\tau}^y) \\
&\quad +\alpha\eta \ln \hat{w} \\
&\quad +\Omega(\alpha,\eta)
\end{aligned}$$

$$\begin{aligned}
\frac{\partial \ln \hat{Z}}{\partial \ln\left(1+\hat{\tau}^k\right)} &= 1-\alpha\eta \\
\frac{\partial \ln \hat{Z}}{\partial \ln(1-\hat{\tau}^y)} &= -1
\end{aligned}$$

- Note that $\frac{\partial \ln Z}{\partial \ln(1-\tau^y)} = -\frac{1-\eta}{1-\eta+\xi\alpha\eta} \in (-1,0)$
- The effect is stronger in the SOE sectors because $\hat{w}$ does not change

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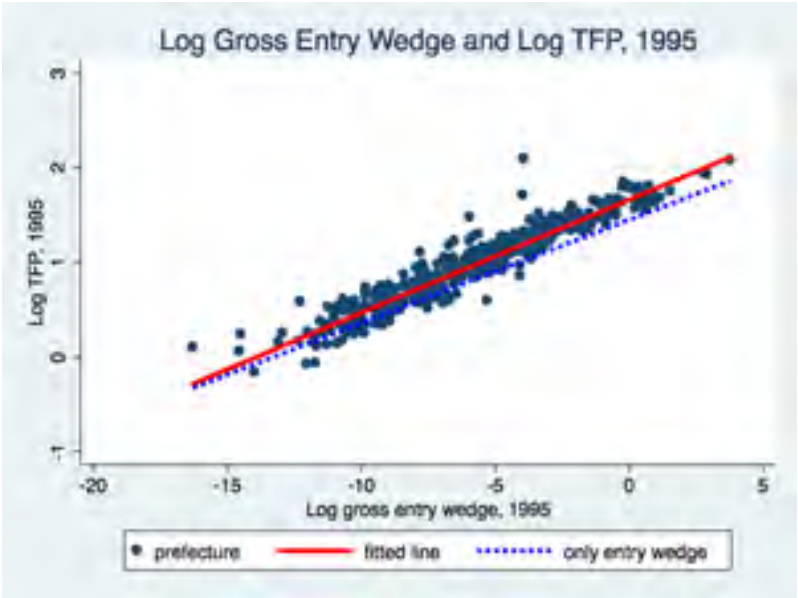
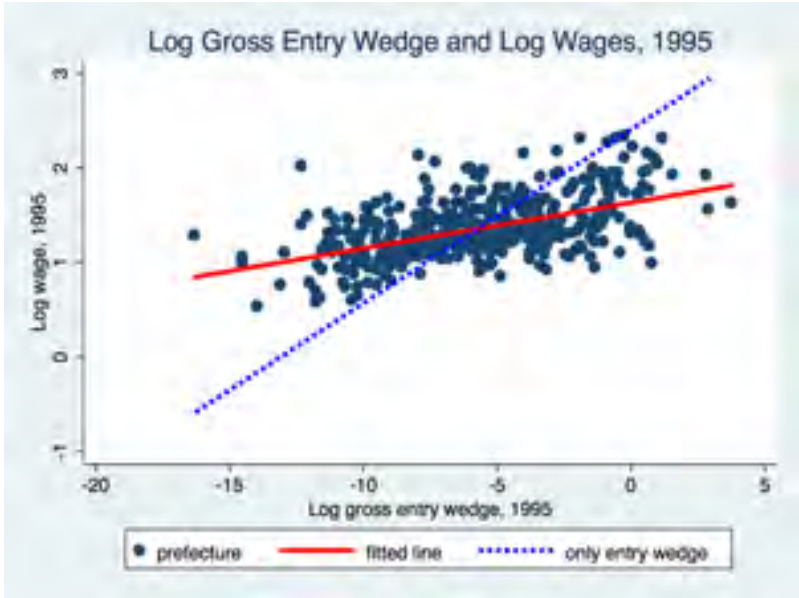
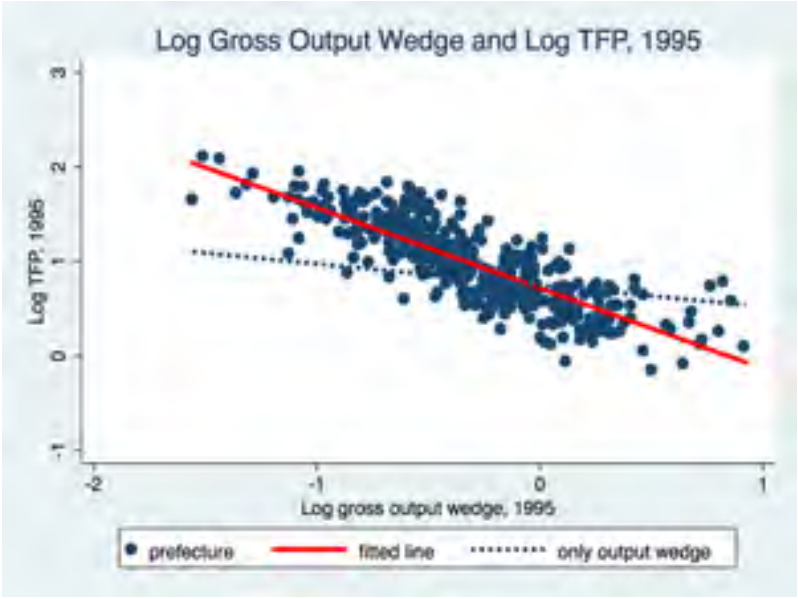
The Entry Wedge in the Cross-section, 1995

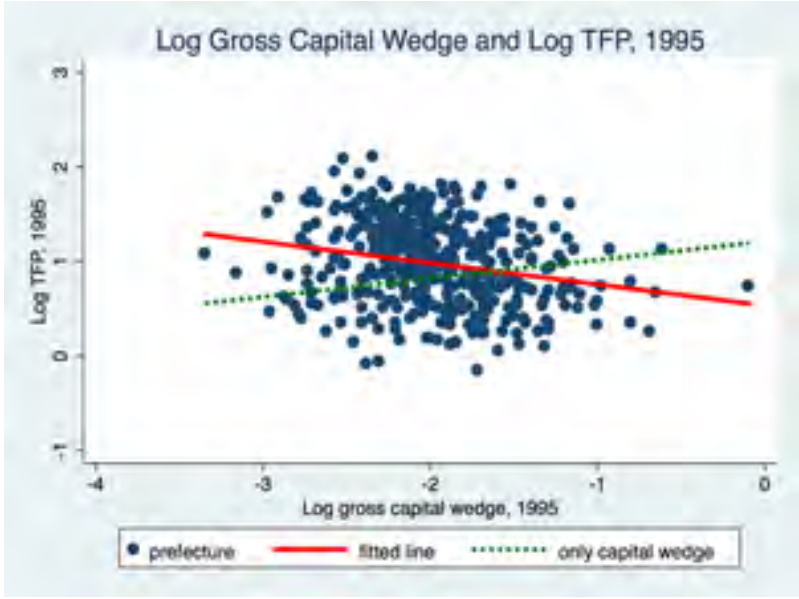




- TFP and wages are higher in prefectures where the entry wedge is lower
  - i.e., where the log gross entry wedge $\ln(1-\psi)$ is higher
- Only entry wedge $\Rightarrow$ even larger differences in wages (right panel)
  - the gross output and gross capital wedges are set to their average levels

The Output and Capital Wedge and TFP, 1995

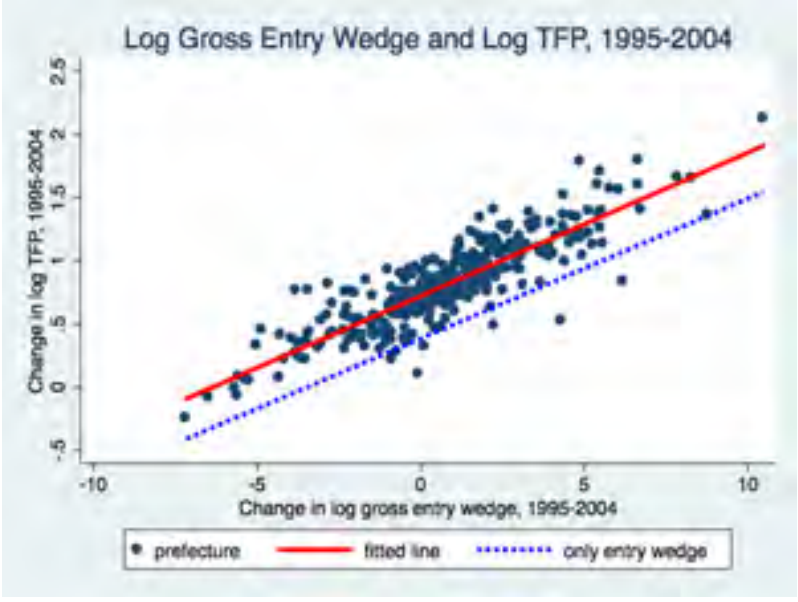


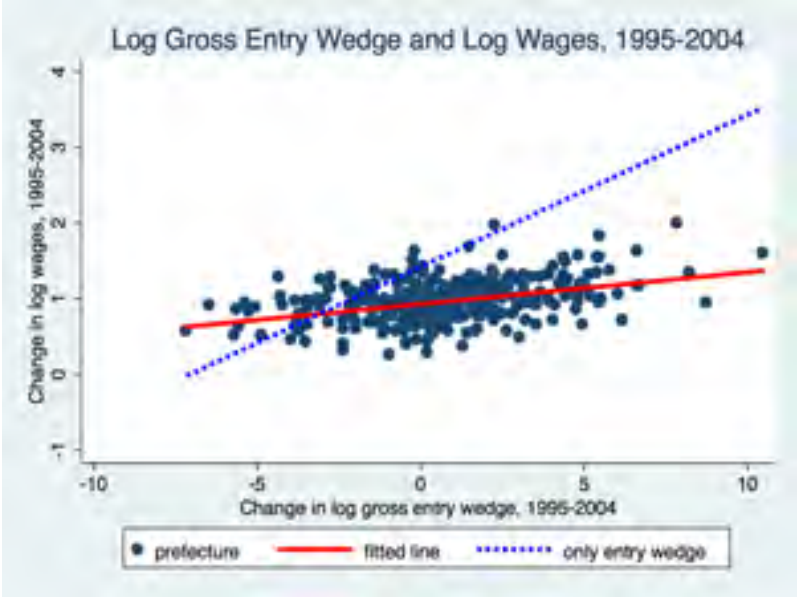


- Only output wedge $\Rightarrow$ quantitatively small effect on TFP (left panel)
  - the gross entry and gross capital wedges are set to their average levels
- Only capital wedge $\Rightarrow$ does not account for differences in TFP (right panel)
  - the gross entry and gross output wedges are set to their average levels
- Similar pattern for wages

[SOE share]

The Entry Wedge over Time, 1995-2004

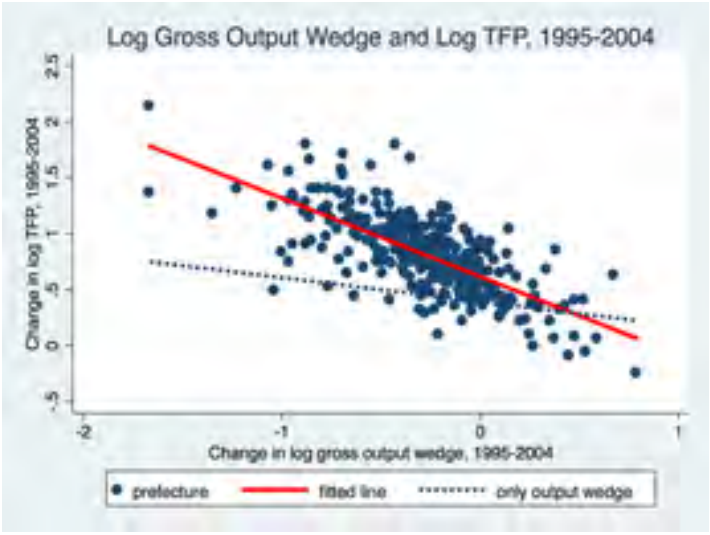


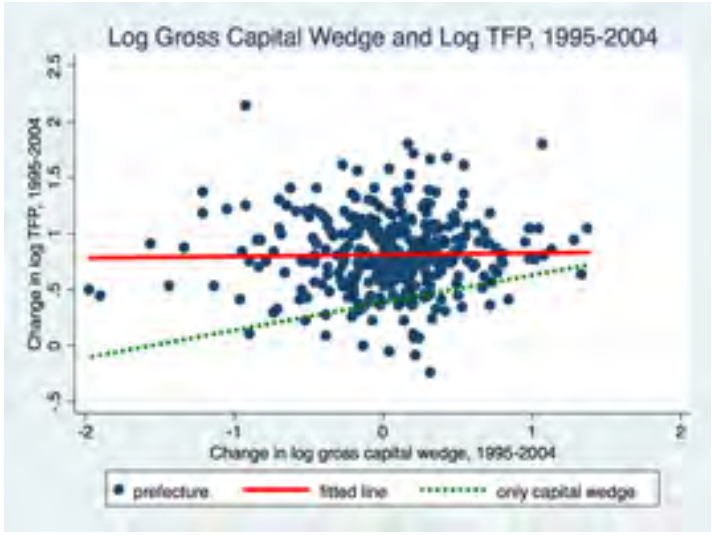


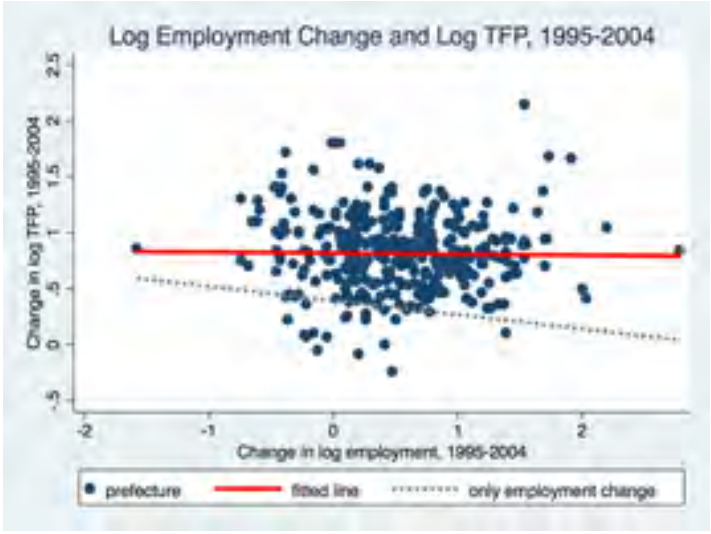
- The increase in TFP is larger in prefectures where the decline in the entry wedge is larger
  - i.e., where the increase in log gross entry wedge $\ln(1-\psi)$ is larger
- The entry wedge accounts for almost all of the increase in TFP

[2004-2008]

The Output and Capital Wedge and TFP, 1995-2004

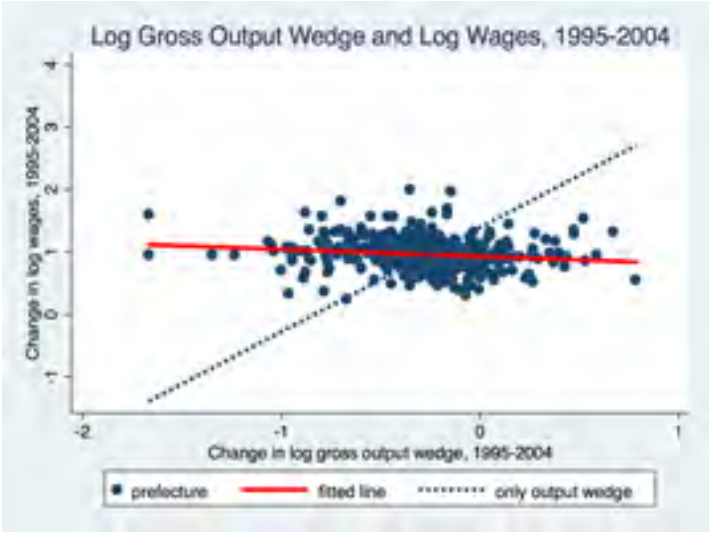


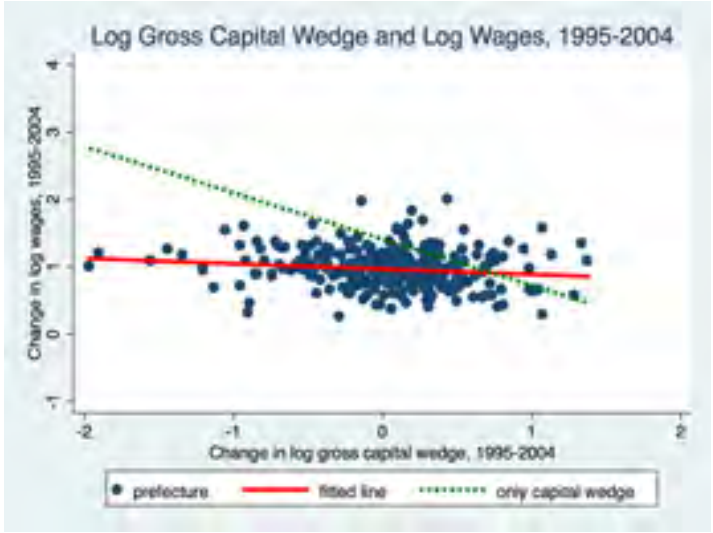


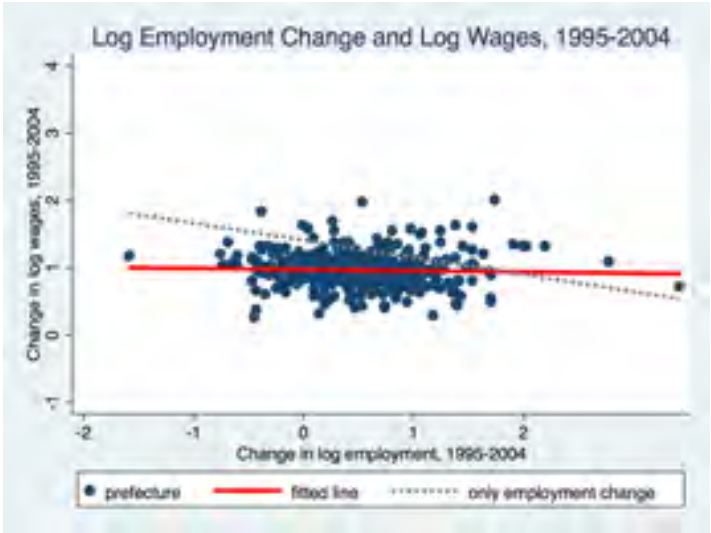


[SOE share]

The Output and Capital Wedge and Wages, 1995-2004

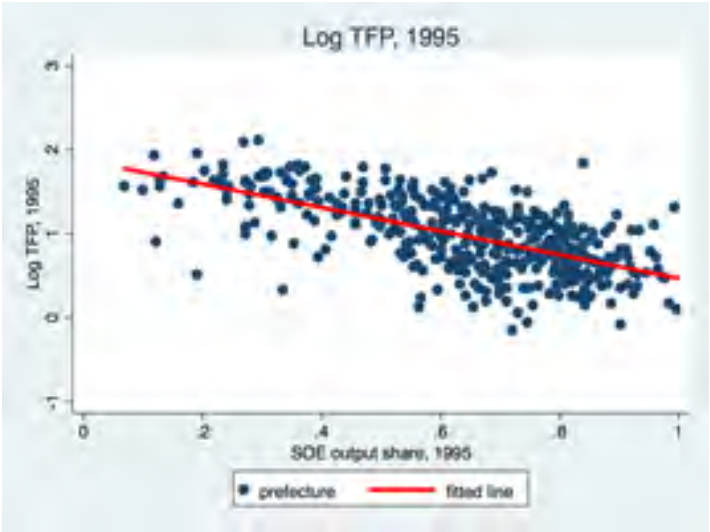


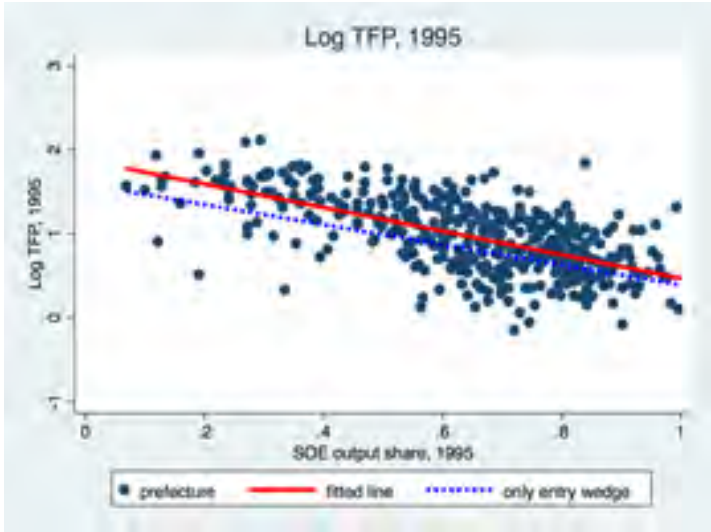


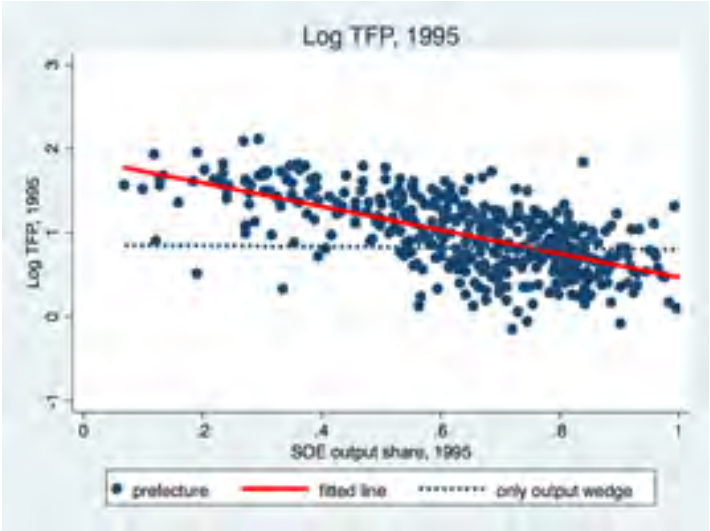


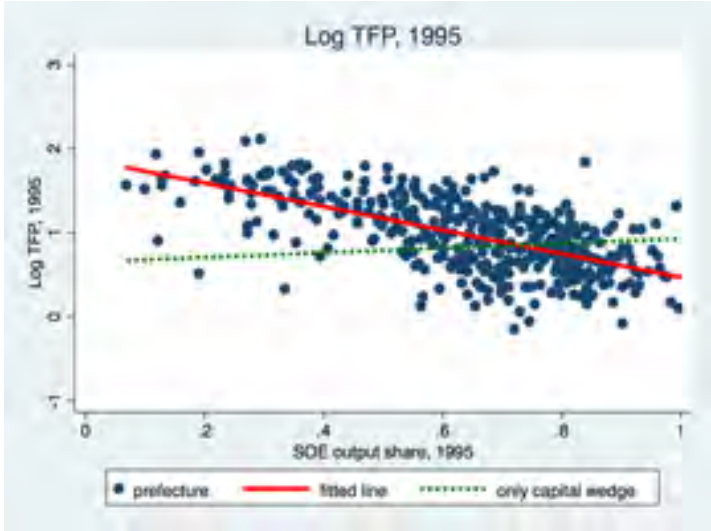
[SOE share]

Wedges, SOE Share, and Log TFP: 1995









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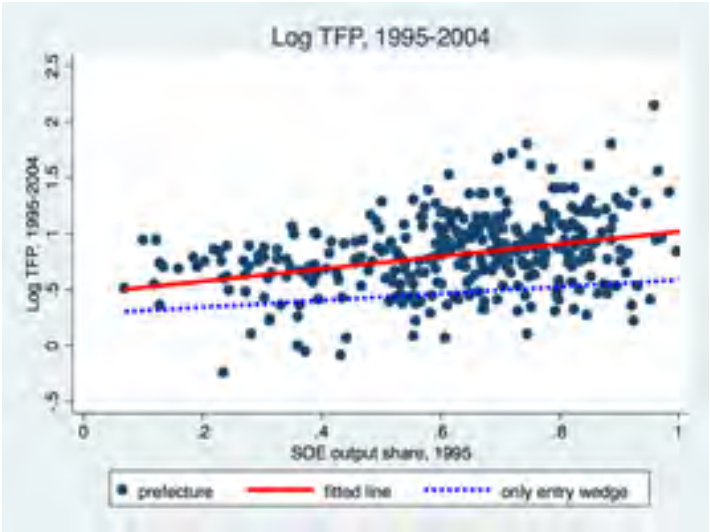
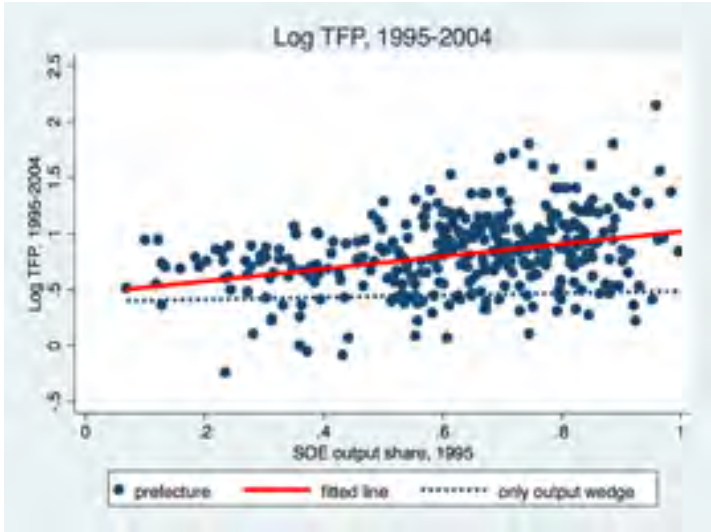
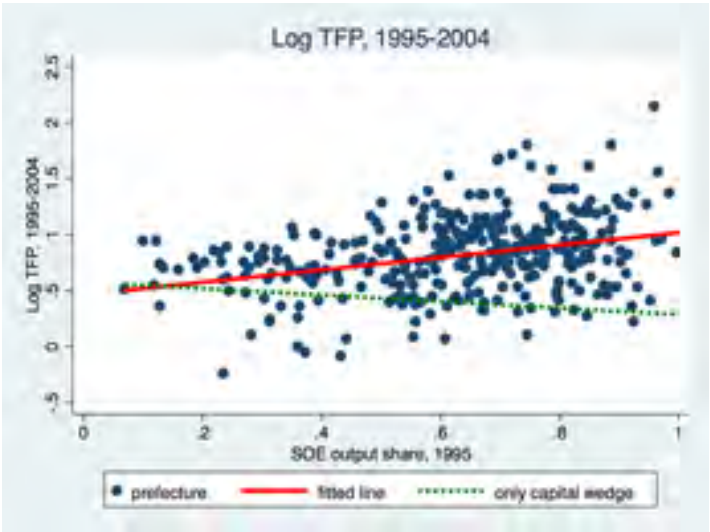
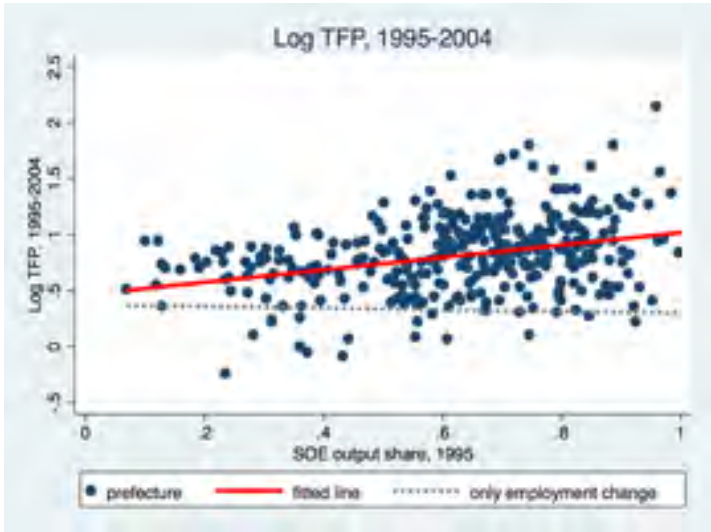
Wedges, SOE Share, and Log TFP: 1995-2004









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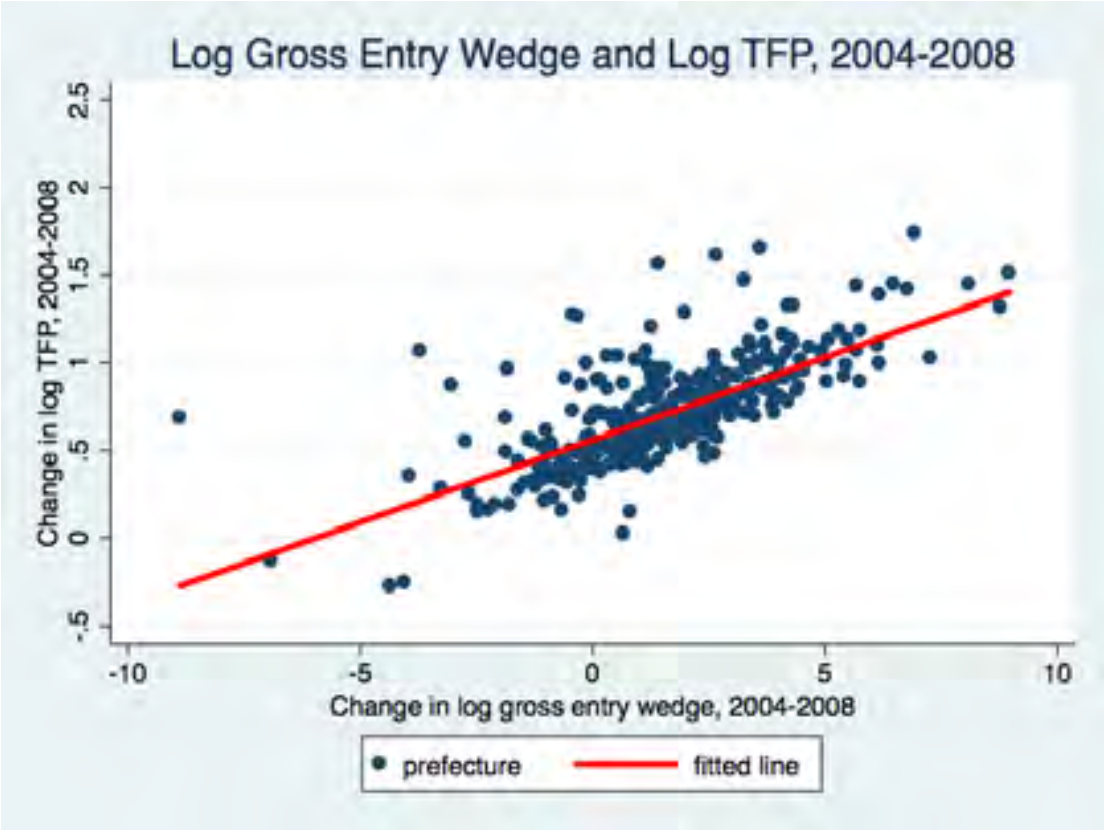
The Entry Wedge over Time, 2004-2008



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