Firm Entry and Regional Growth Disparities: the Effect of SOEs in China

Loren Brandt
University of Toronto

Gueorgui Kambourov
University of Toronto

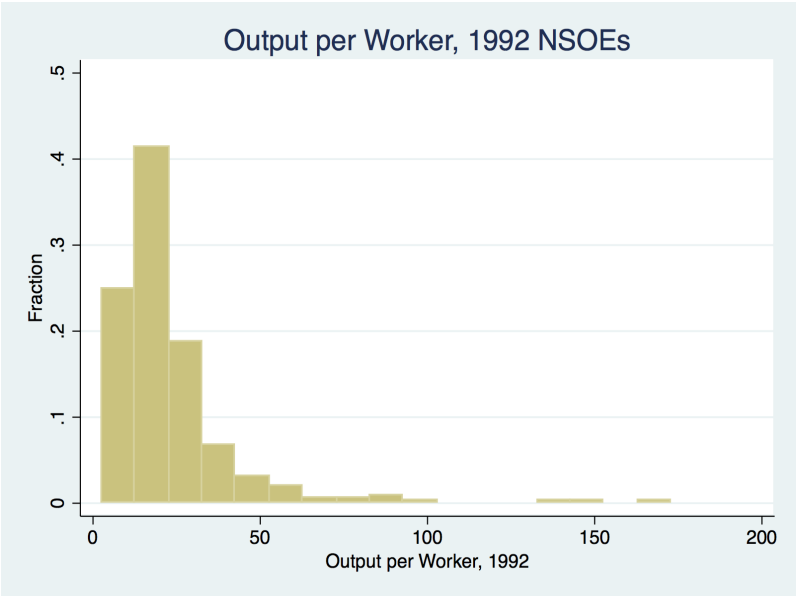
Kjetil Storesletten
University of Oslo

International Monetary Fund

Washington, D. C., April 28, 2016

Motivation

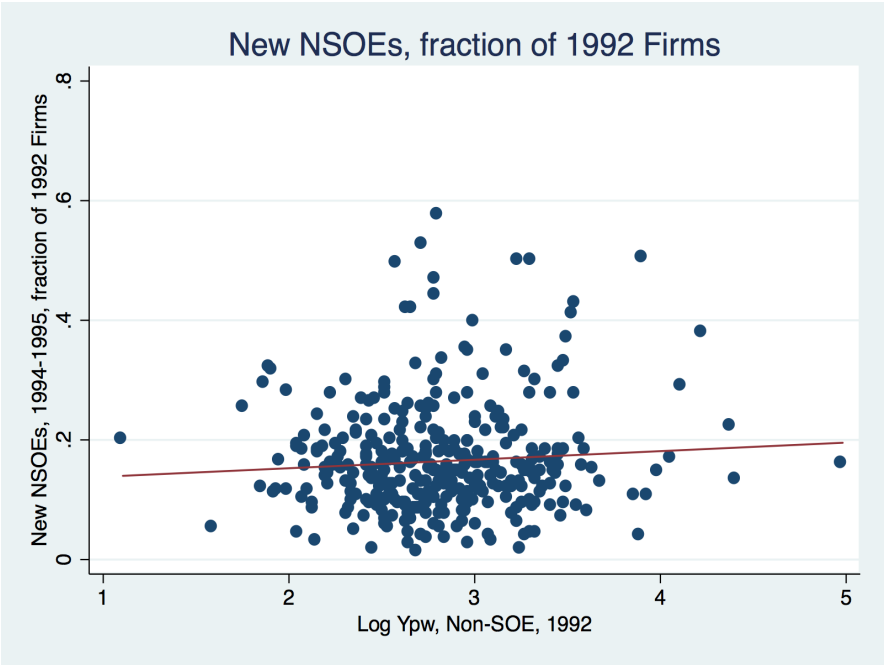
- 1992: Take-off for non-state firms in industry in China
- But huge initial dispersion in NSOE output per worker across localities
  - 334 prefectures (geographical administrative units)
  - Chinese Industrial Census Data
  - Output per worker in the Non-state sector, 1992
  - variance of logs is 0.35; 90/10 ratio is 4.2



Motivation

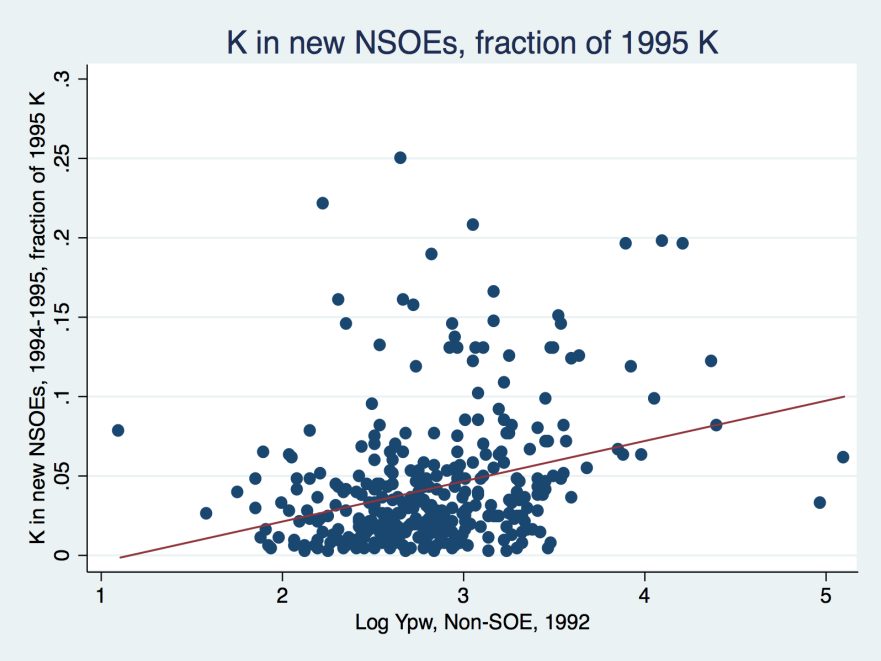
- Solow model: low Y/N could be driven by either low initial capital stock or low TFP
- Low initial capital yields clear prediction: Prefectures with low output per worker should experience
  - investment should increase (mechanism: capital inflow or high savings)
  - new firms should be created
  - inflow of workers (increased employment)

New Firm Creation



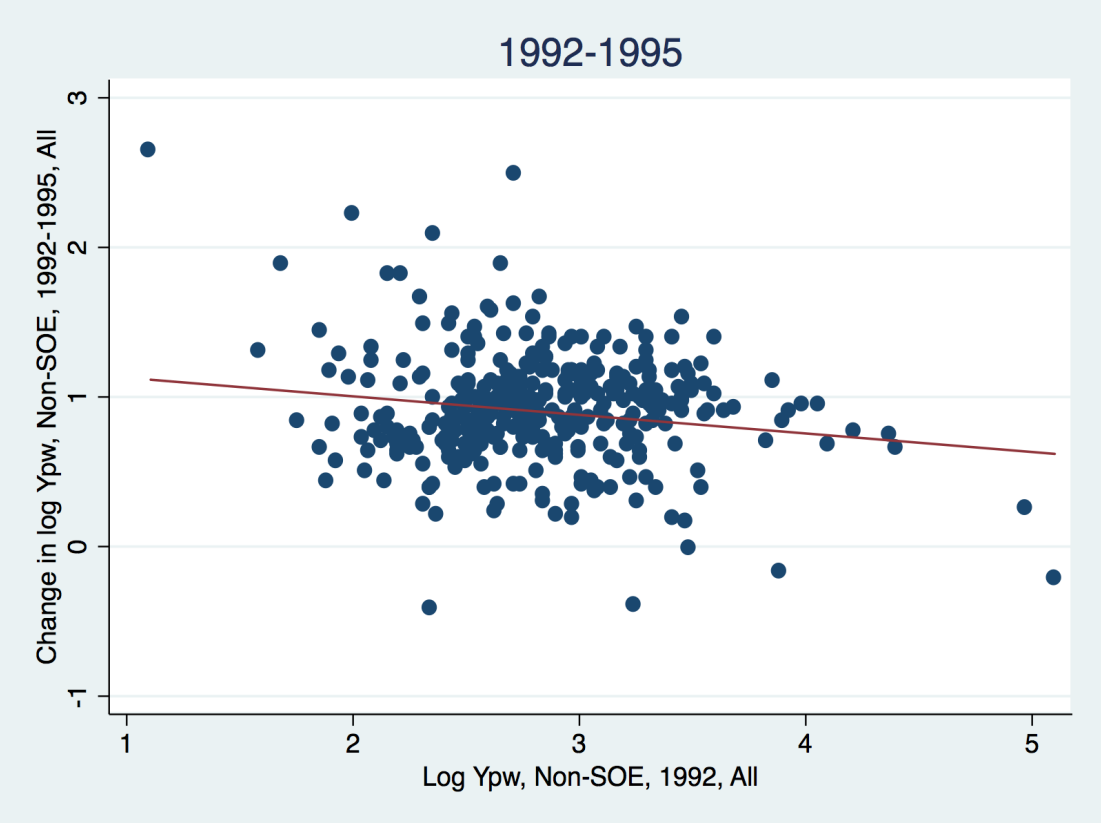
- There is no (negative) relationship between
  - creation of new NSOE firms (1994-1995), as a fraction of all 1992 firms
  - output per worker in 1992 for NSOEs

Flow of Capital (Investment)



- There is no (negative) relationship between
  - increased investment (flow of capital through new 1994-1995 NSOE firms), as a fraction of all capital in 1995
  - output per worker in 1992 for NSOEs

1992-1995: No Convergence in Output per Worker



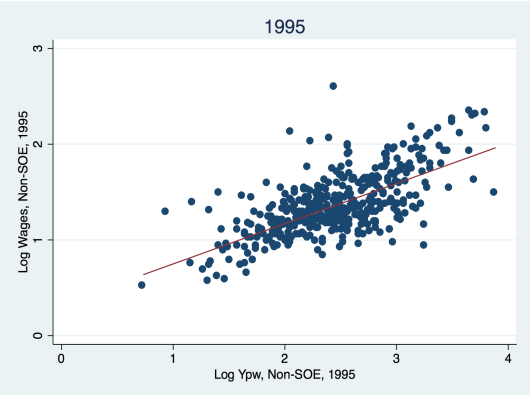
- There is little convergence in NSOE output per worker between 1992 and 1995
- slope: -0.12

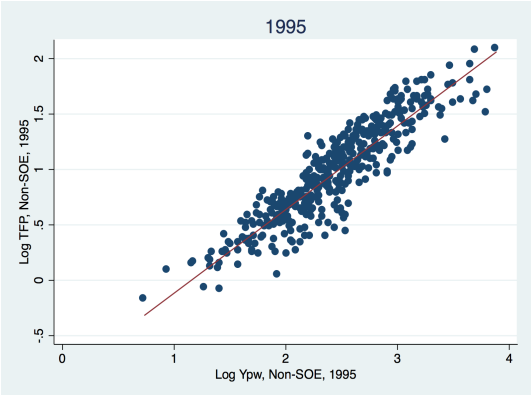
1995 Cross Section

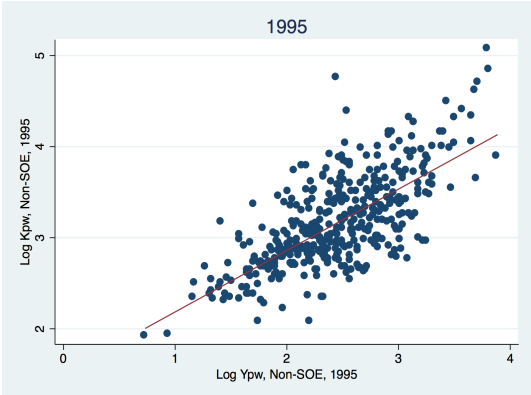
Chinese Industrial Census (CIC)

- CIC: 1995, 2004, 2008
- Covers most of the manufacturing sector
- Large
- Data work (issues)
  - make prefectures consistent across years
  - define the SOE sector (especially in 2004 and 2008)
  - construct measures of real capital

1995 NSOE Ypw vs. TFP, Wages, and Kpw

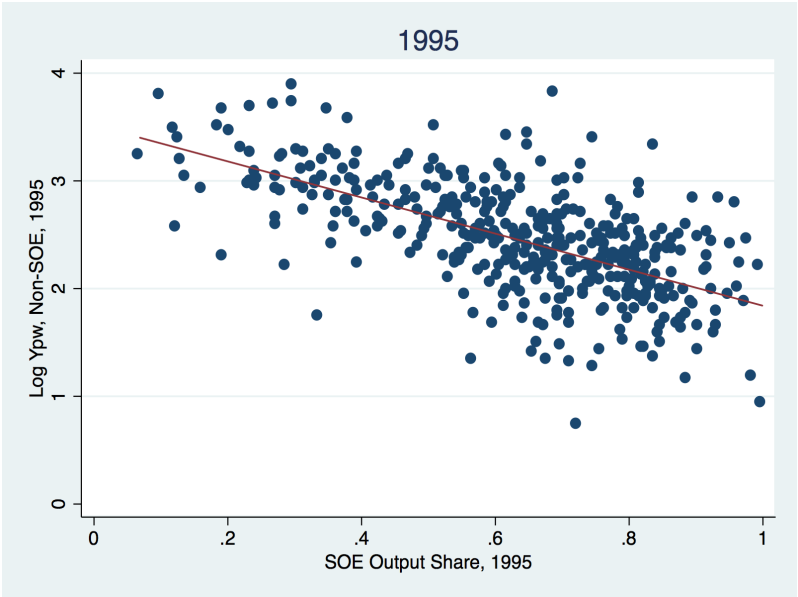


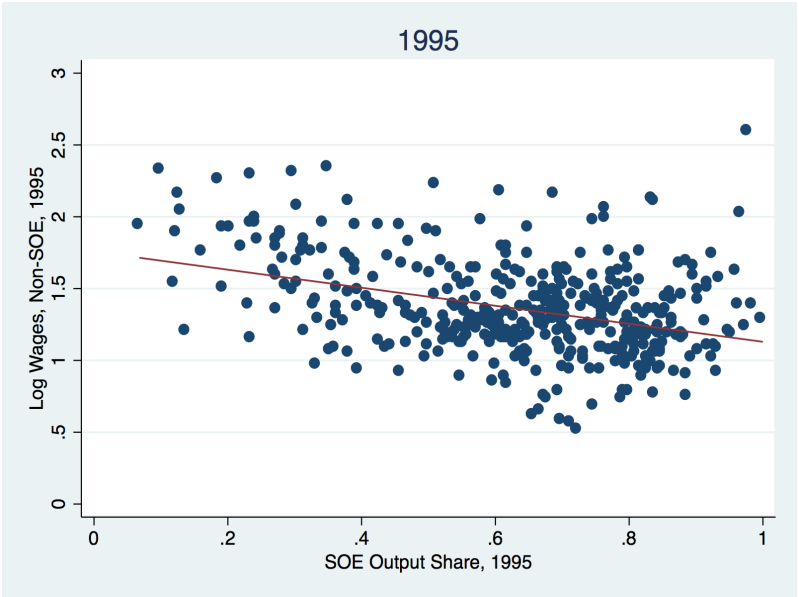




- 1995 NSOE output per worker is positively correlated with 1995 NSOE
  - wages
  - TFP
  - capital per worker

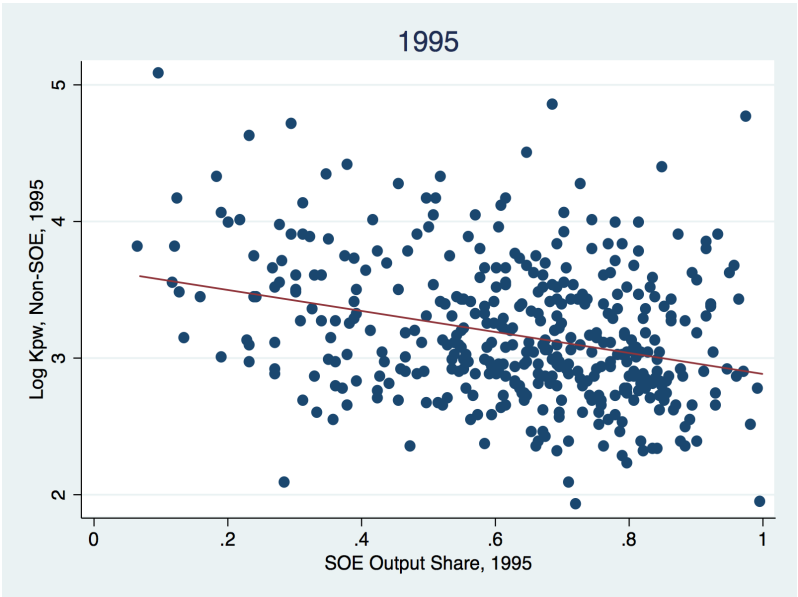
The Importance of the SOE Share of Output

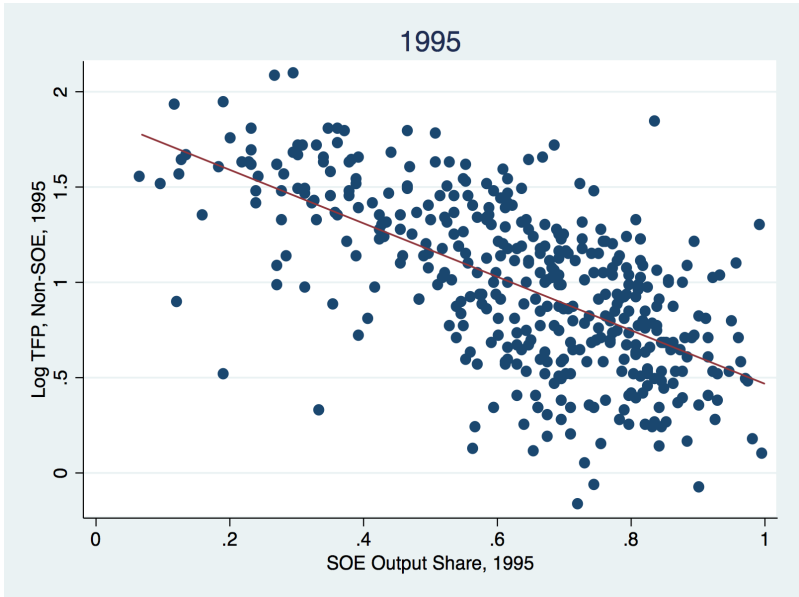




- The SOE share of output, *s*, is negatively correlated with NSOE
  - output per worker; *s* accounts for 39% of the variation
  - wages; *s* accounts for 12% of the variation

The Importance of the SOE Share of Output

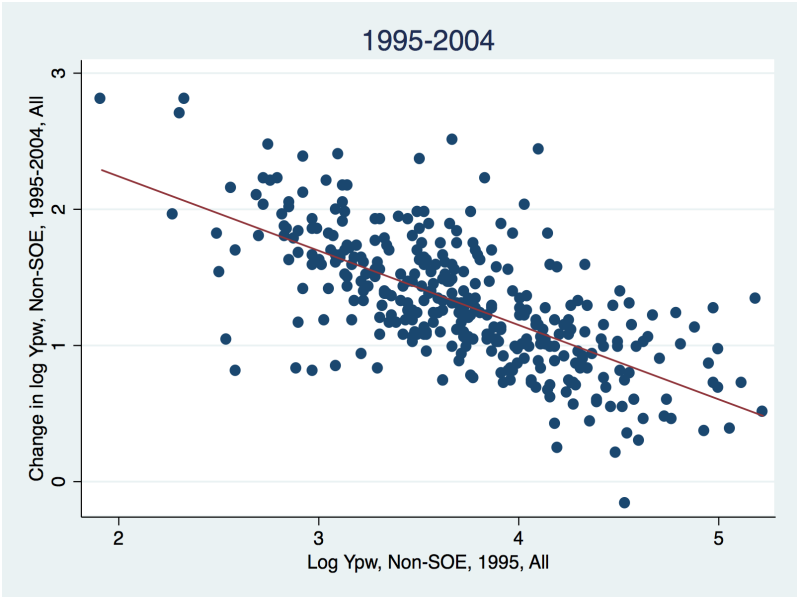




- The SOE share of output, *s*, is negatively correlated with NSOE
  - capital per worker; *s* accounts for 9% of the variation
  - TFP (defined as Solow residual); *s* accounts for 40% of the variation

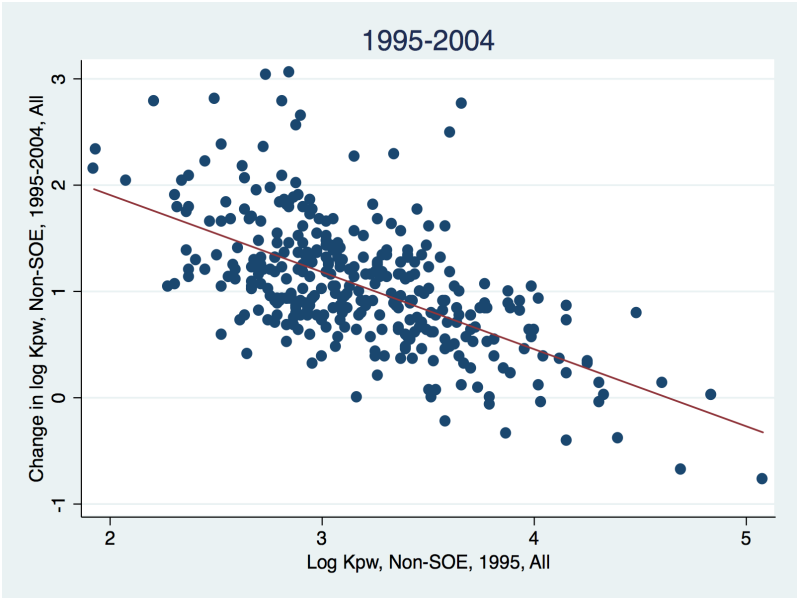
1995-2004 Convergence in the NSOE Sector

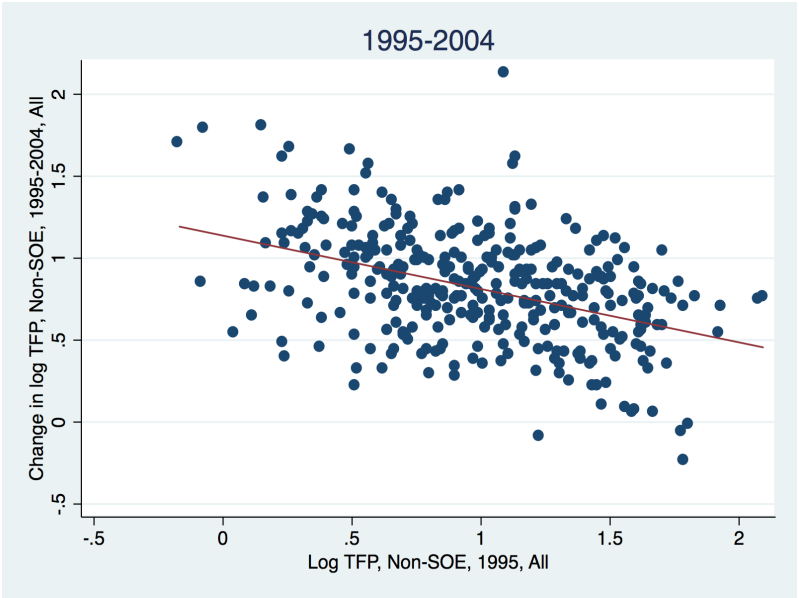
1995-2004 NSOE Convergence



- There is a 1995-2004 convergence in the NSOE sector in
  - output per worker; rate of convergence is 8.5%
  - wages; rate of convergence is 8.3%

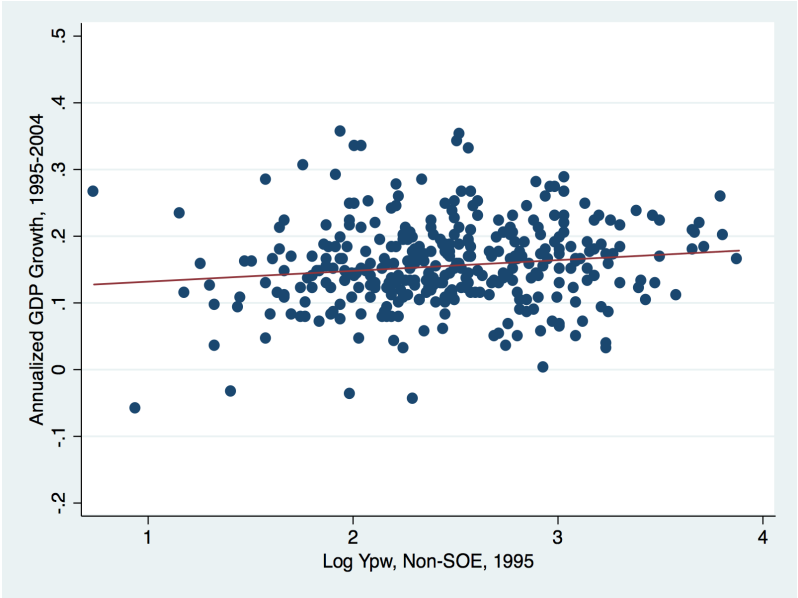
1995-2004 NSOE Convergence

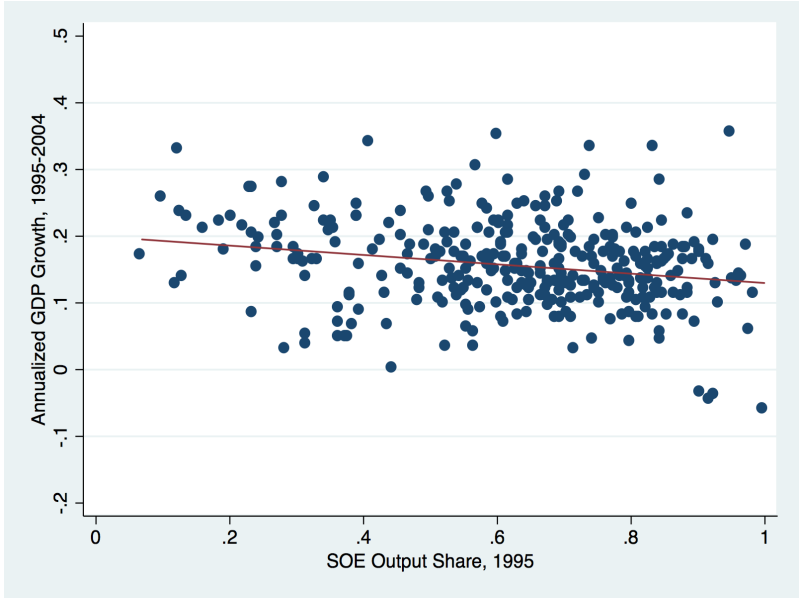




- There is a 1995-2004 convergence in the NSOE sector in
  - capital per worker; rate of convergence is 13.5%
  - TFP (calculated as Solow resid.); rate of convergence is 4.4%

1995-2004 Divergence in Total GDP





- There is a 1995-2004 divergence in total GDP
- 1995-2004 prefecture GDP growth is
  - higher in prefectures with high 1995 NSOE Y/N
  - higher in prefectures with lower SOE share of output

Paper in a Nutshell

Fact 1: 1995 – large initial dispersion across prefectures in Y/N for NSOEs

: Low Y/N prefectures have low TFP, low wages, little capital

: ... nevertheless, low investment and few firms established

Fact 2: Low TFP is highly associated with high share of SOE firms

Fact 3: Strong convergence in Y/N, TFP, and wages in 1995-2004

Paper in a Nutshell

Claim 1: Standard capital and output wedges cannot explain this pattern

Model: Build Hopenhayn firm entry model with heterogeneous “entry wedges”

Claim 2: Initial dispersion and eventual convergence is driven by the entry wedge

Claim 3: Implied entry wedges are highly correlated with SOE share

: Both in 1995 cross-section and in 1995-2004 changes

Framework for Wedges

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

- Firms have a common production function
- $0 < \eta < 1$: 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

Framework for 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

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

Framework for Wedges

- Gross output wedge, Δ_i^y [More]

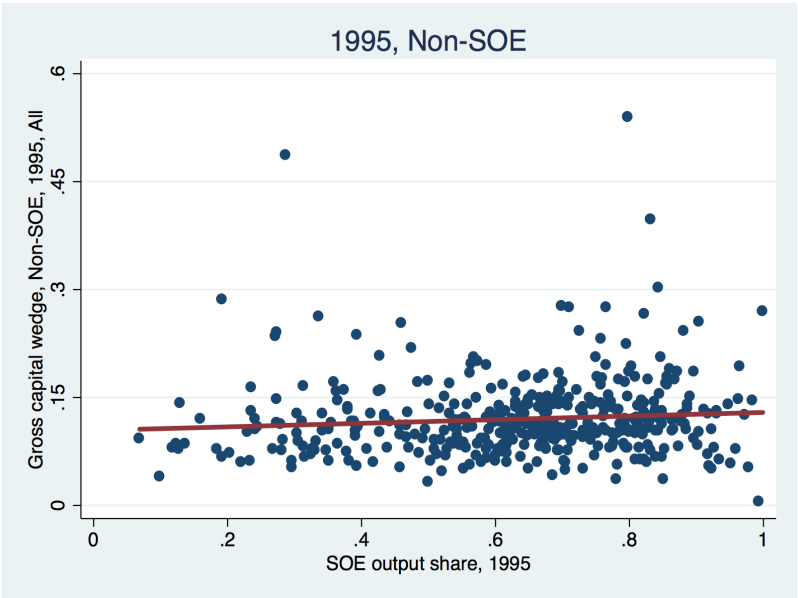
$$\Delta_i^y = (1 - \tau_i^y) = \frac{1}{\alpha\eta}\frac{w_i n_i}{y_i}$$

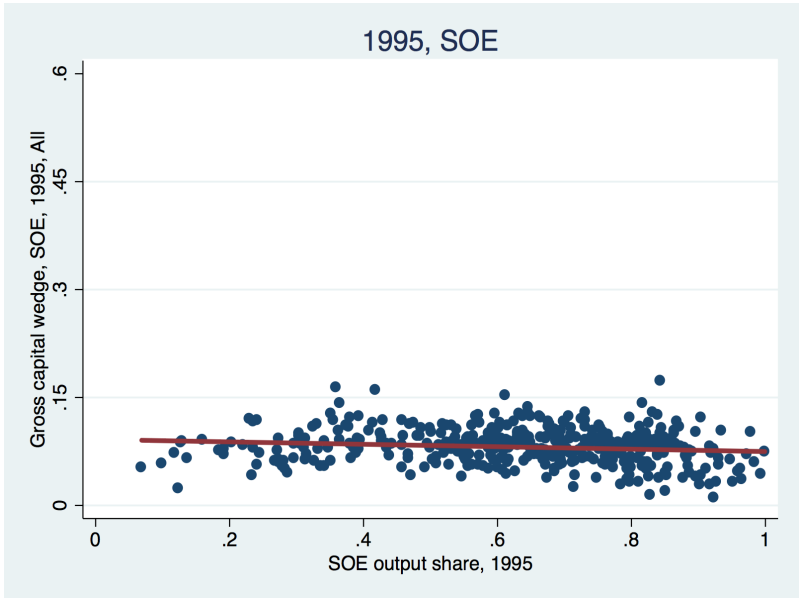
- Gross capital wedge, Δ_i^k

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

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

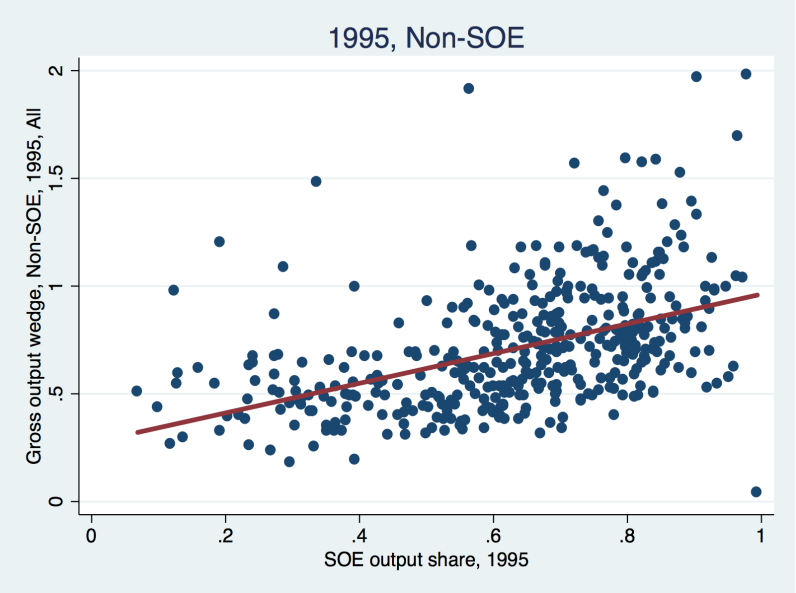
Gross Capital Wedge: Δ^k

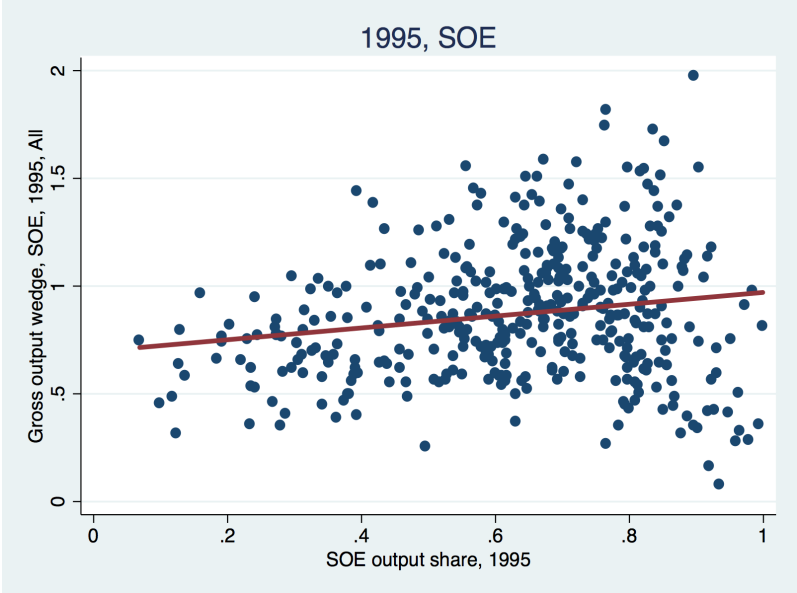




- Higher capital taxes in high s pref. for non-SOE firms [Entrants]
- No relationship between capital taxes and s for SOE firms

Gross Output Wedge: Δ^y





- Lower output taxes (higher subsidies) in high *s* prefectures [Entrants]
- For both non-SOE and SOE firms
- output wedges negatively correlated with TFP (large output taxes associated with large TFP)

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
  - $\uparrow$ output per worker $\frac{Y}{N}$ 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

A Model of Heterogeneous Entrepreneurs with an Entry Wedge

Model

- There are two sectors in a prefecture: SOE and NSOE
- large number of potential entrants in both sectors
- only a fraction $(1-\psi)$ of NSOE potential entrants do enter
- firms heterogeneous in productivity z
- capital freely mobile across prefectures
- prefecture-sector specific τ_i^y and τ_i^k
- same economy-wide wage rate $\hat{w}$ in the SOE sectors
- prefecture-specific wage rate w_i in NSOE sector
- per-period sector-specific operating fixed cost v

Private firms, NSOE Sector

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

- common production function: $0 < \alpha < 1$
- heterogeneous productivity: z
- $0 < \eta < 1$: decreasing returns to scale
- common rental rate of capital $(r + \delta)$
- prefecture-specific wage rate w_i, output tax τ_i^y, capital tax τ_i^k

NSOE Sector

- $f(z)$ 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:

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

NSOE Sector

- 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

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

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

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

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

Equilibrium: Entrants

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

$$\frac{\partial \ln \Gamma}{\partial \ln\left(1+\tau^k\right)} < 0$$

$$\frac{\partial \ln \Gamma}{\partial \ln\left(1-\tau^y\right)} > 0$$

$$\frac{\partial \ln \Gamma}{\partial \ln(1-\psi)} > 0$$

Equilibrium: TFP Z

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

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

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 [More]

SOE Sector in Equilibrium: Output per Worker

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

$$\frac{\partial \ln \frac{\hat{Y}}{\hat{N}}}{\partial \ln\left(1 + \hat{\tau}^{k}\right)} = 0$$

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

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

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):
  - : $\xi = 1.05$, use 30% of the most productive firms

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

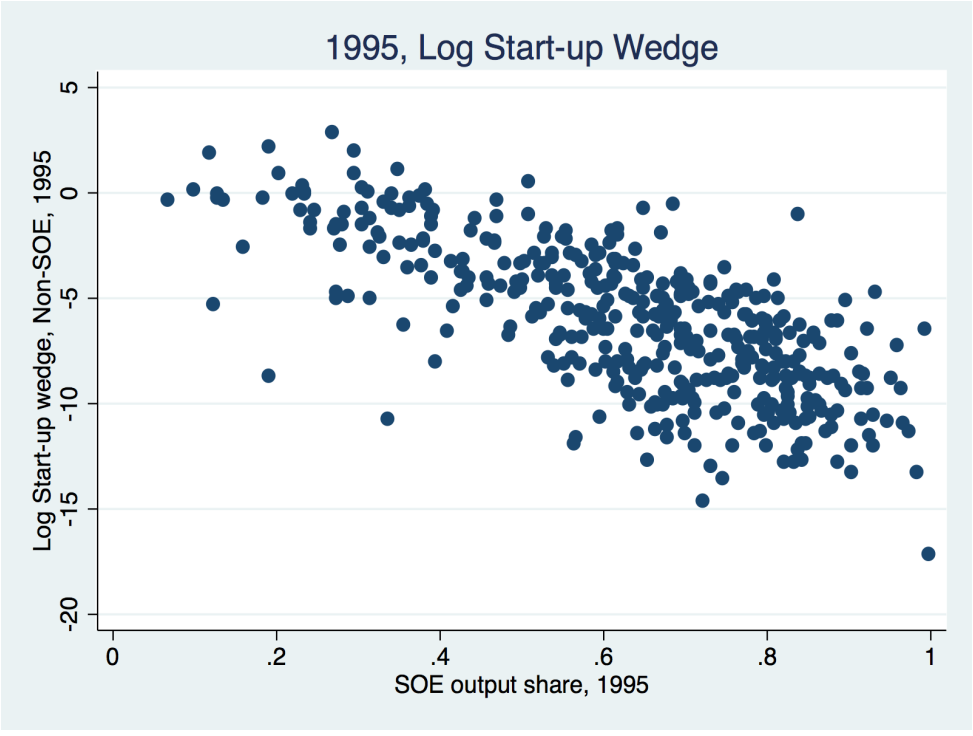
- calibrate v such that $n^*(z^*) = 1$ in the lowest s prefectures
- calibrate $\underline{z}$ such that $\psi = 0$ in the lowest s prefectures

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

- Estimate ψ_j in prefecture j from the equilibrium condition

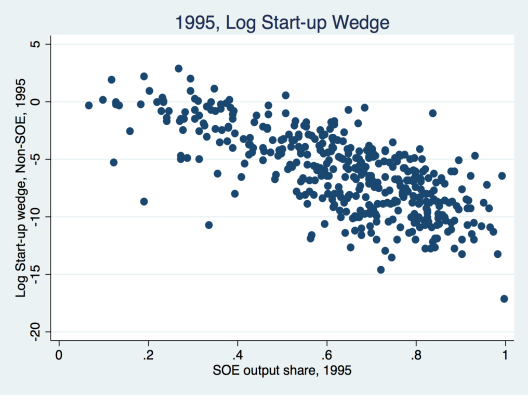
$$\begin{aligned}\ln(1-\psi_j) \quad = \quad & \ln N + \frac{1-\eta+\xi\alpha\eta}{1-\eta}\ln w_j \\ & -\frac{\xi}{1-\eta}\ln(1-\tau_j^y) \\ & +\frac{\xi\eta(1-\alpha)}{1-\eta}\ln\left[(1+\tau_j^k)(r+\delta)\right] \\ & +(\xi-1)\ln v + \Omega(\alpha,\eta,\xi,\underline{z})\end{aligned}$$

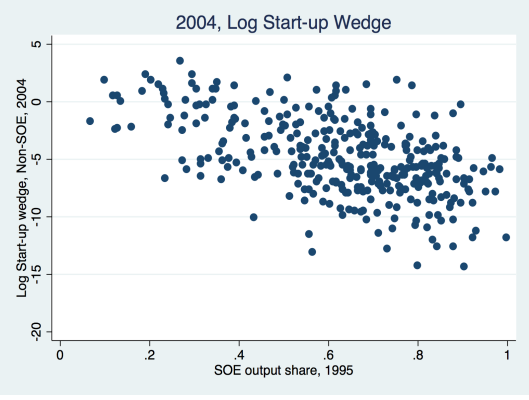
1995 Gross Entry Wedge in the NSOE Sector

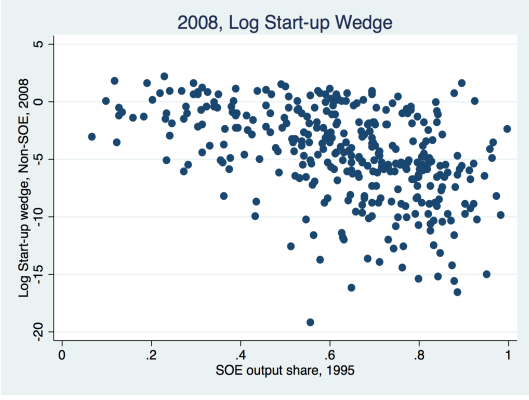


- log gross entry wedge $\ln(1-\hat{\psi})$
- SOE share accounts for 52% of the variation in the entry wedge

Entry Wedges in the NSOE Sector





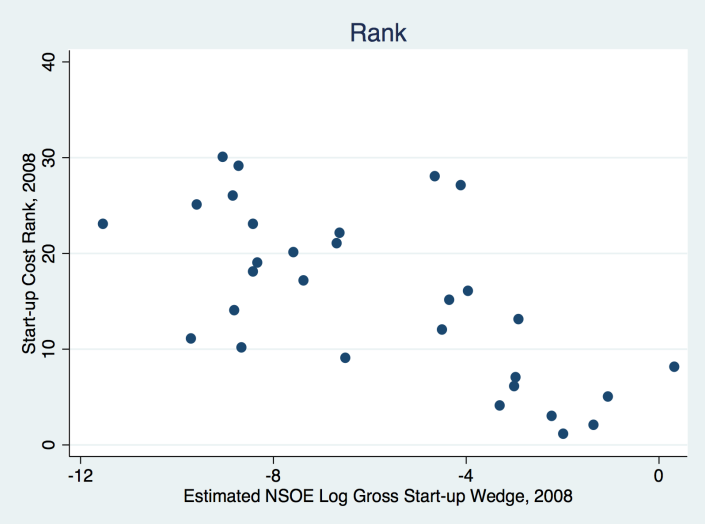


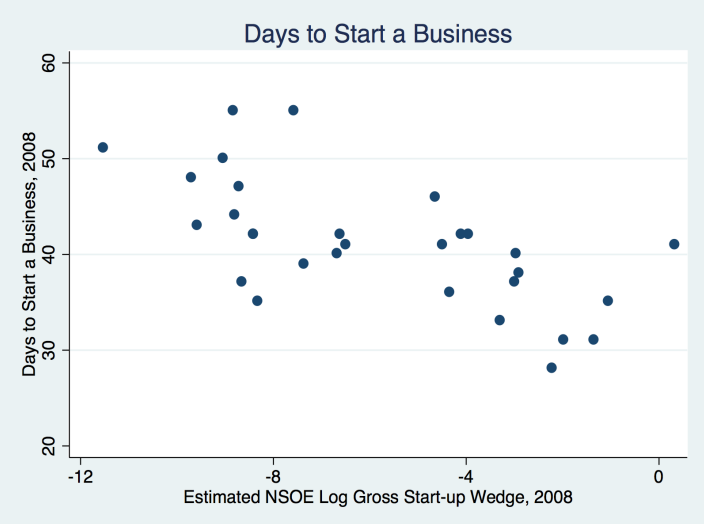
- Log gross entry wedge $\ln(1-\psi)$

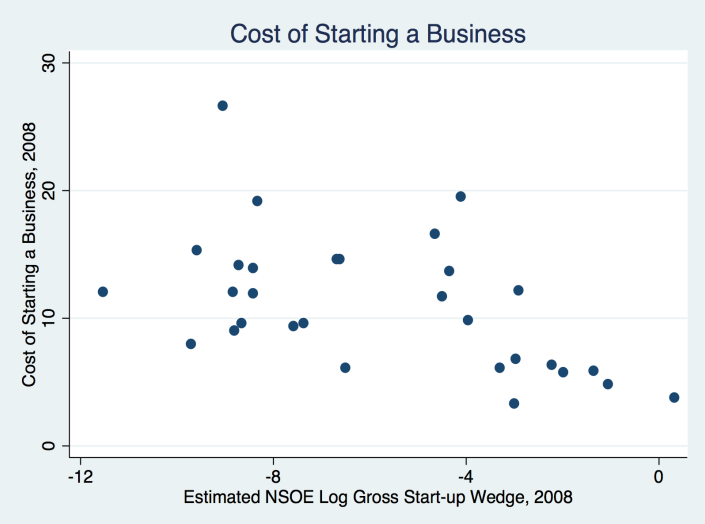
2008 Costs of Starting a Business in China

- "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



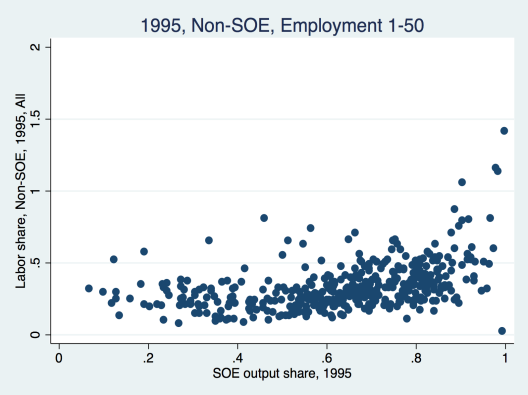


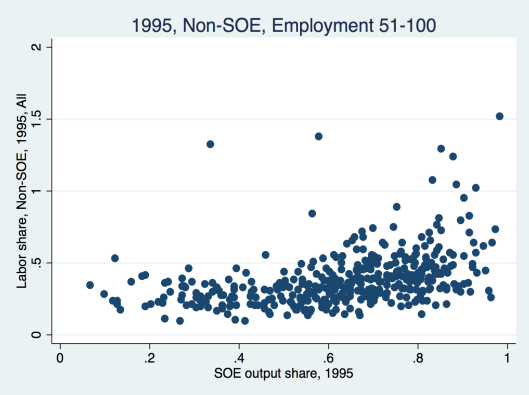


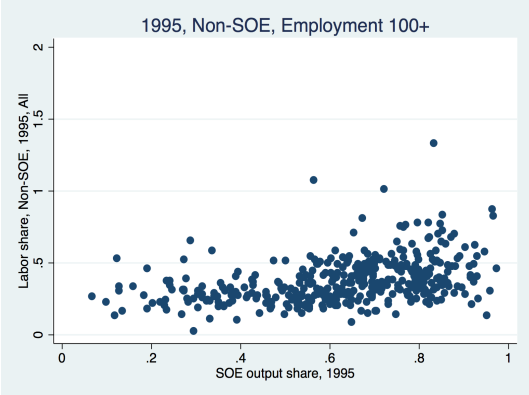
Alternative Theory I

- 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 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 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

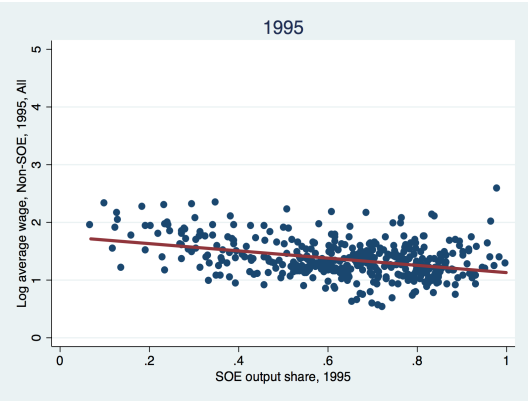
- The pool of potential entrants is worse in the high s prefectures:
  - lower TFP of entrants
  - less heavy right Pareto tail
- Predictions of the theory
  - consider a productivity cutoff z_0
  - consider the right tail of the Pareto distribution for firms with $z > z_0$
  - ξ should be higher in high s prefectures
- Predictions of the 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: $\xi_{s,low} = 1.044$, $\xi_{s,high} = 1.048$

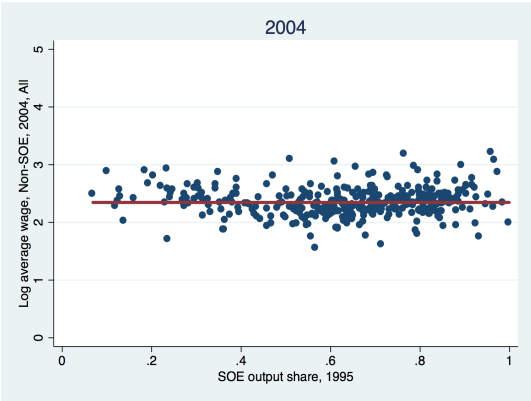
Alternative Theory III

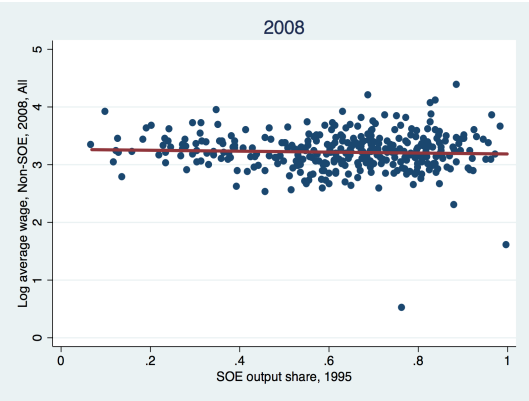
- The cost of operation, v, is higher in high s prefectures
- Predictions of the theory
  - less entry
  - lower wages
- Predictions of the theory that are not consistent with the data
  - entrants are positively selected on productivity
  - high TFP

Understanding Changes over Time

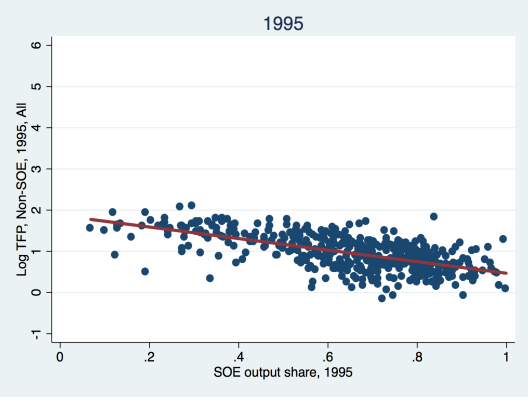
NSOE Wages: 1995, 2004, and 2008

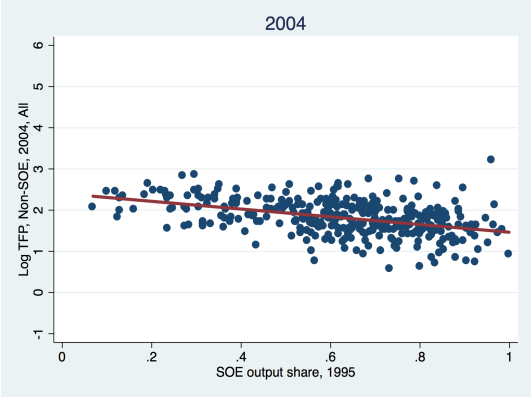


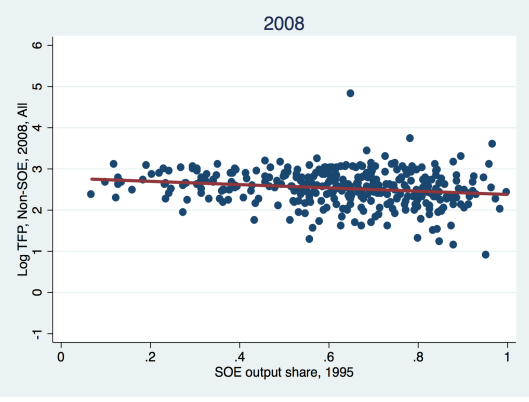




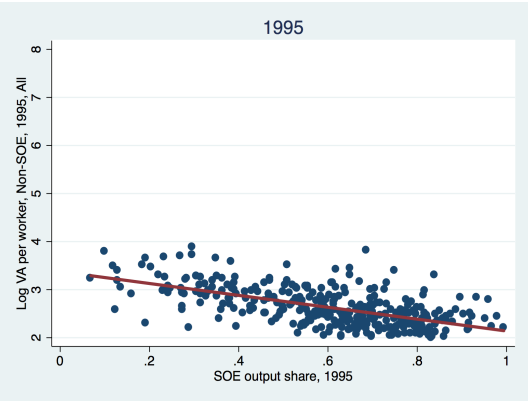
NSOE TFP: 1995, 2004, and 2008

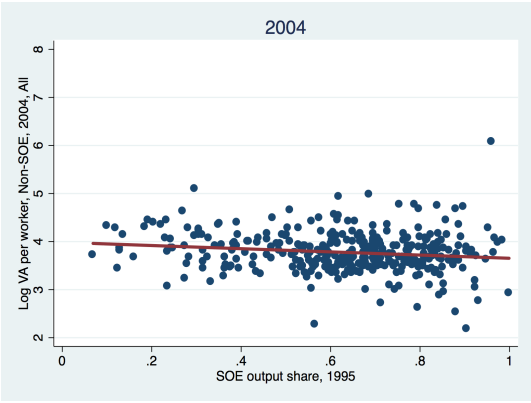


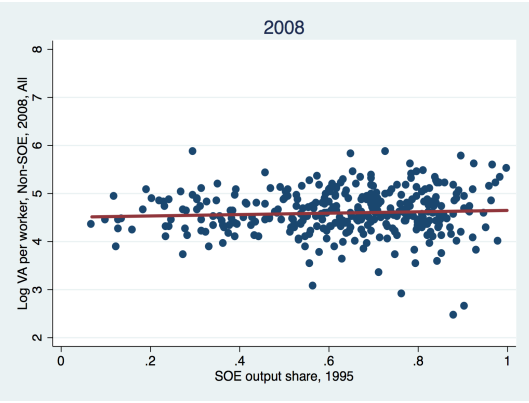




NSOE $\frac{VA}{N}$: 1995, 2004, and 2008



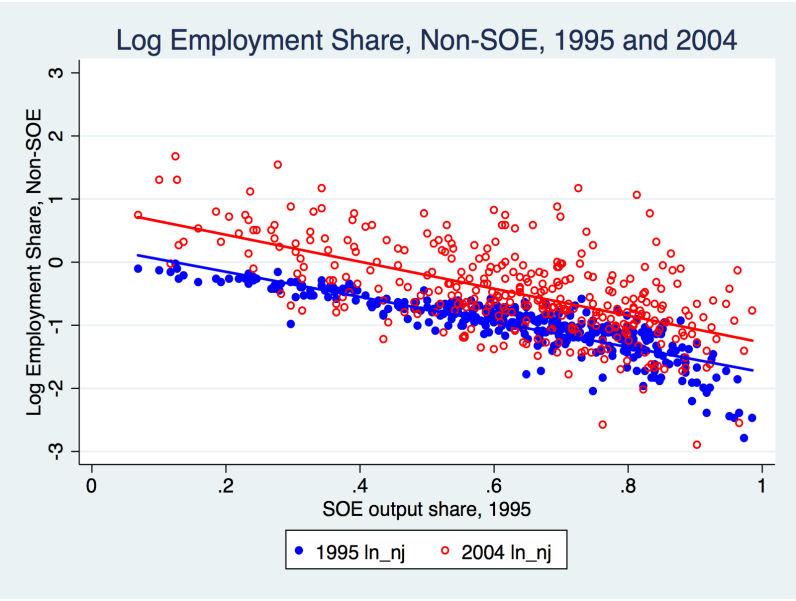


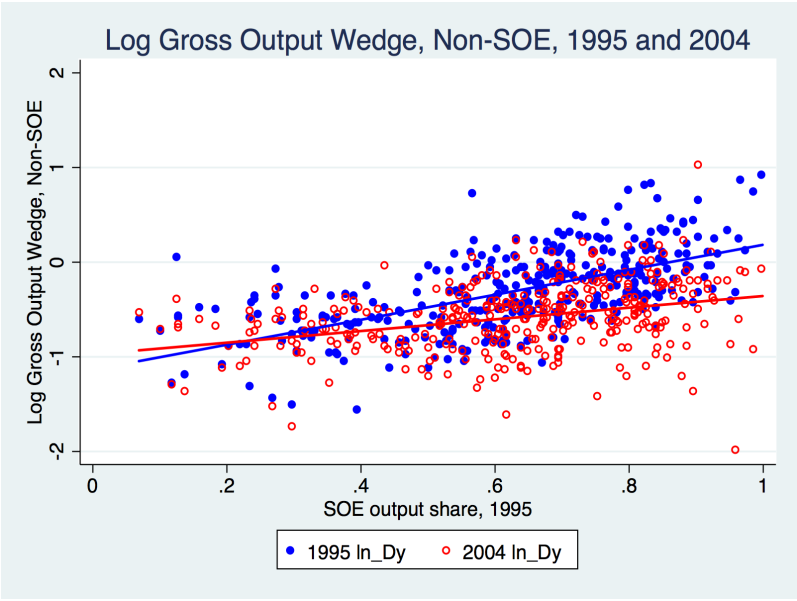


Decomposition, 1995-2004: NSOE *w*

- Wages in the NSOE sector have equalized by 2004.
- Study the importance of the change in four margins in the NSOE sector:
  - the employment share: n
  - the gross output wedge: $(1-\tau^y)$
  - the gross capital wedge: $(1+\tau^k)$
  - the gross entry wedge: $(1-\psi)$

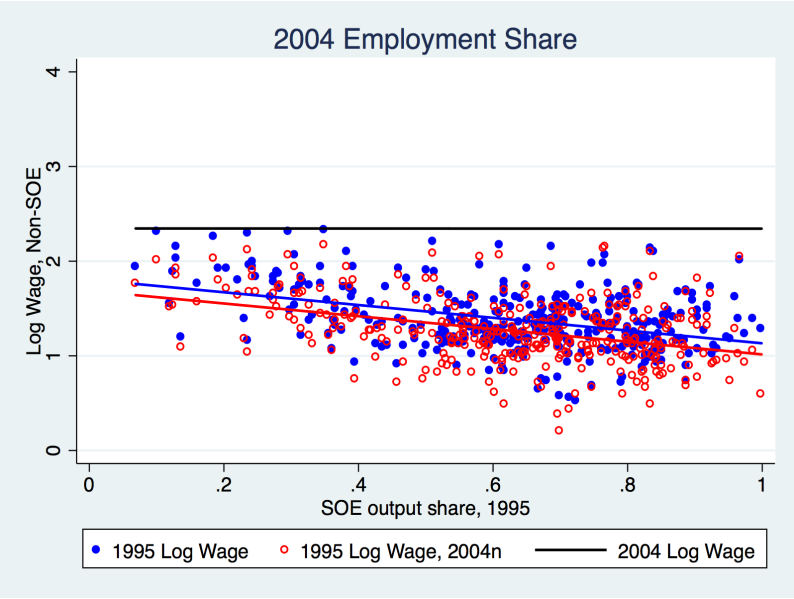
Decomposition, 1995-2004: *w*

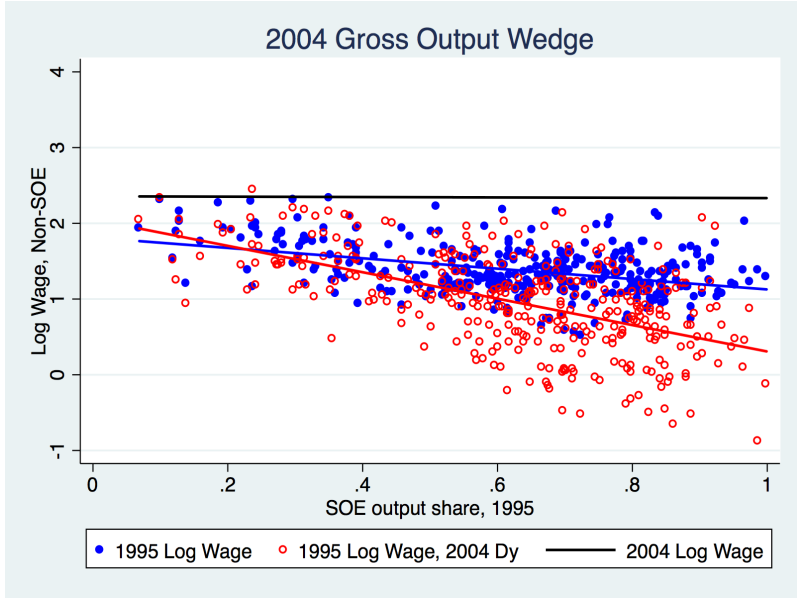




- Employment in the NSOE sector increased at approx. same rate
  - : no effect on *w* (no convergence in *w*)
- The gross output wedge declined for the high *s* prefectures
  - : decline in *w* in the high *s* prefectures (divergence in *w*)

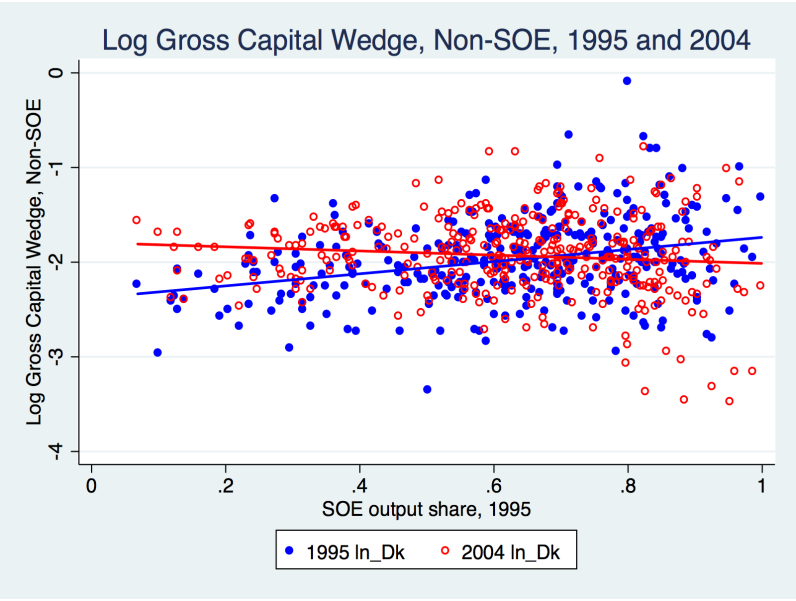
Decomposition, 1995-2004: *w*

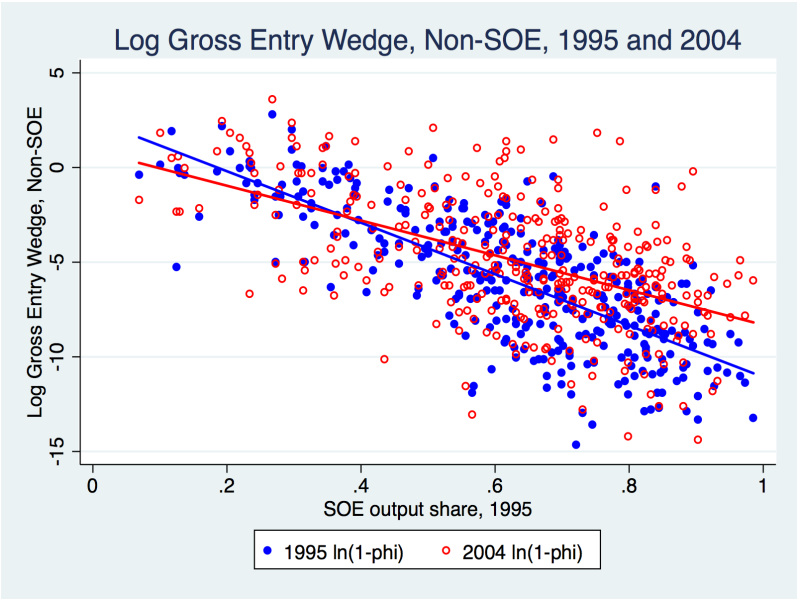




- Blue line (dots): 1995 log wages – slope -0.67
- Red line (dots): log wages with 1995 parameters
  - : 2004 employment shares (left panel) – slope -0.67
  - : 2004 gross output wedge (right panel) – slope -1.78
- Black line: 2004 log wages – slope 0.00

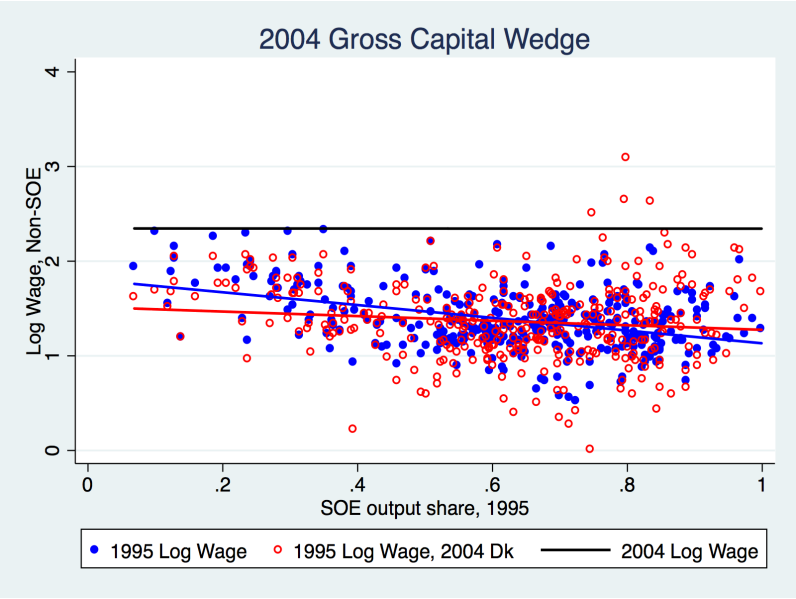
Decomposition, 1995-2004: *w*

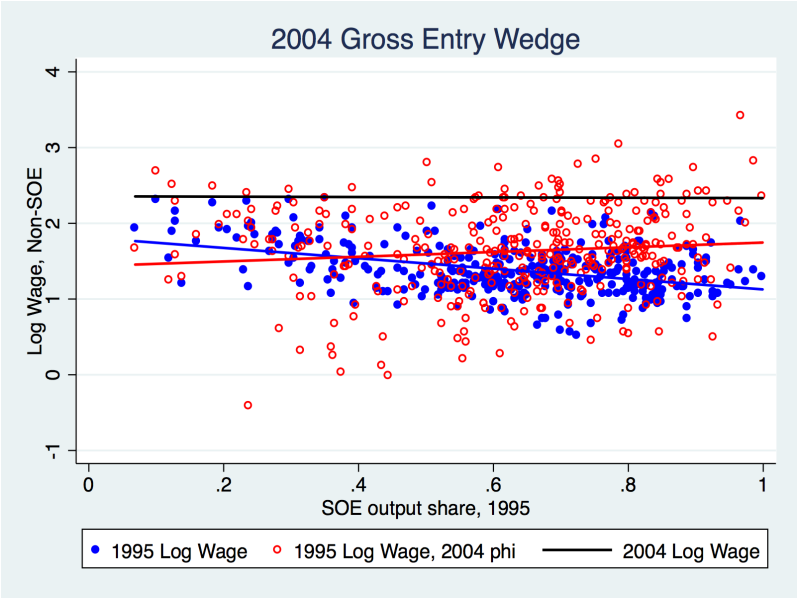




- The gross capital wedge was equalized in the NSOE sectors
  - : decline (increase) in *w* in the low (high) *s* pref. (converg. in *w*)
- The gross entry wedge declined for the high *s* prefectures
  - : increase in *w* in the high *s* prefectures (convergence in *w*)

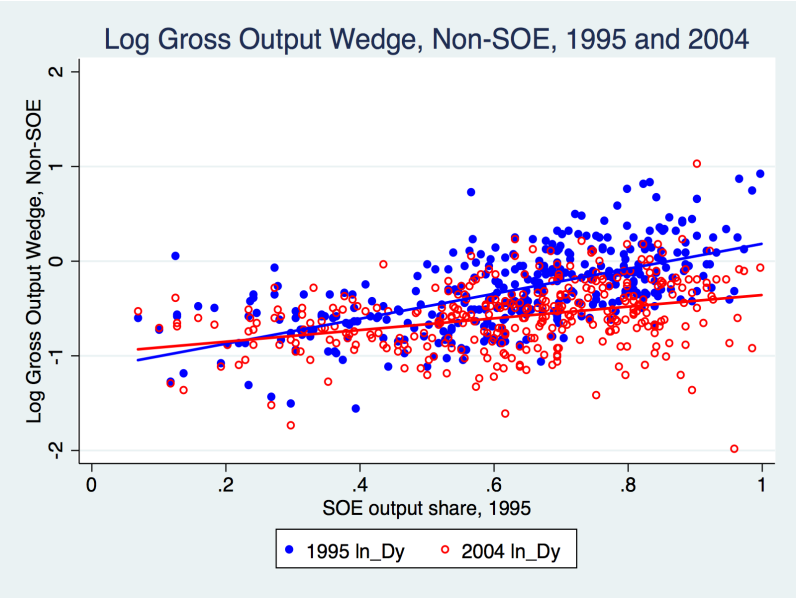
Decomposition, 1995-2004: *w*

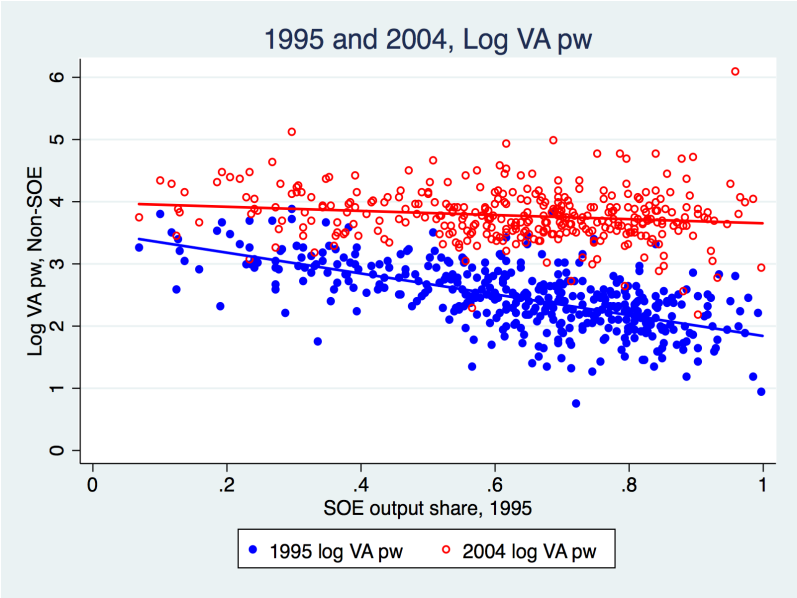




- Blue line (dots): 1995 log wages – slope -0.67
- Red line (dots): log wages with 1995 parameters
  - : 2004 gross capital wedge (left panel) – slope -0.24
  - : 2004 gross entry wedge (right panel) – slope 0.38
- Black line: 2004 log wages – slope 0.00

Decomposition, 1995-2004: NSOE $\frac{Y}{N}$

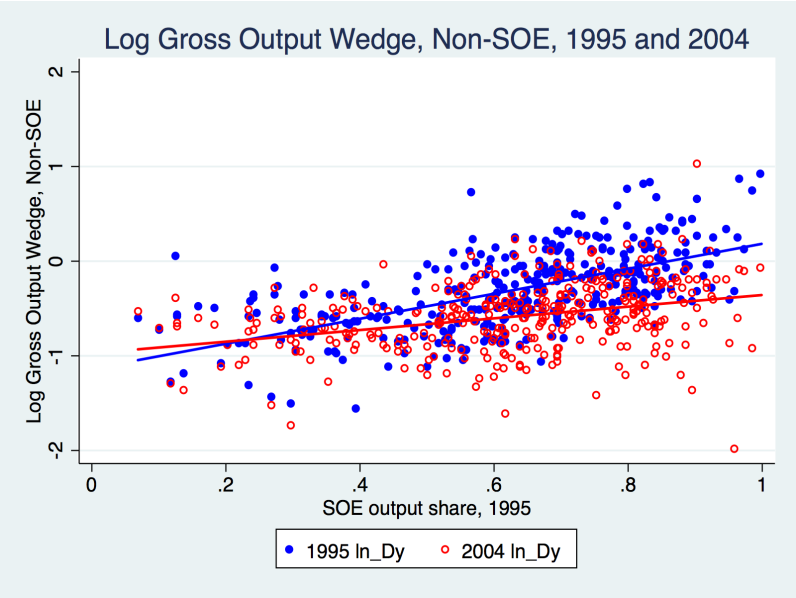


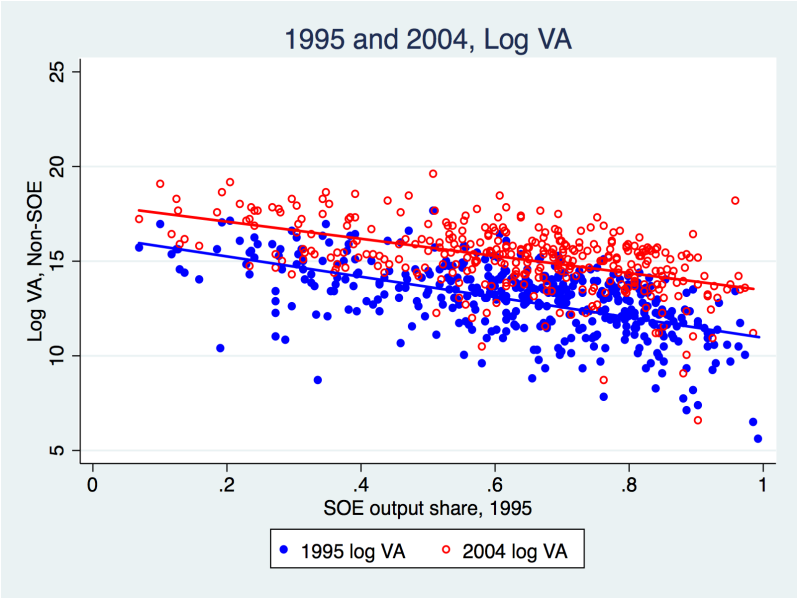


$$\ln \frac{Y}{N} = \ln w - \ln(1-\tau^y) + \Omega(\alpha,\eta)$$

- Margins affecting converg. in w: same effect on $\frac{Y}{N}$
- $\ln(1-\tau^y)$ still different by $s \Rightarrow$ no full converg. in $\frac{Y}{N}$

Decomposition, 1995-2004: NSOE *Y*

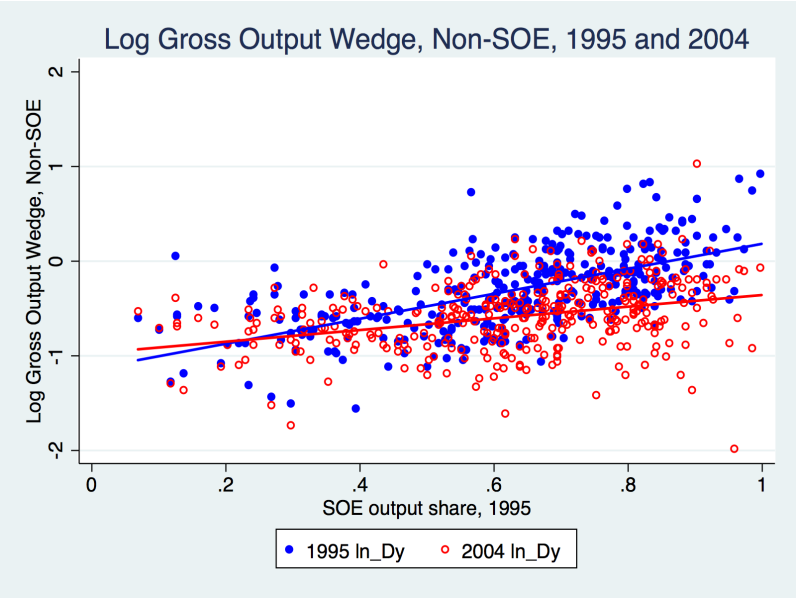


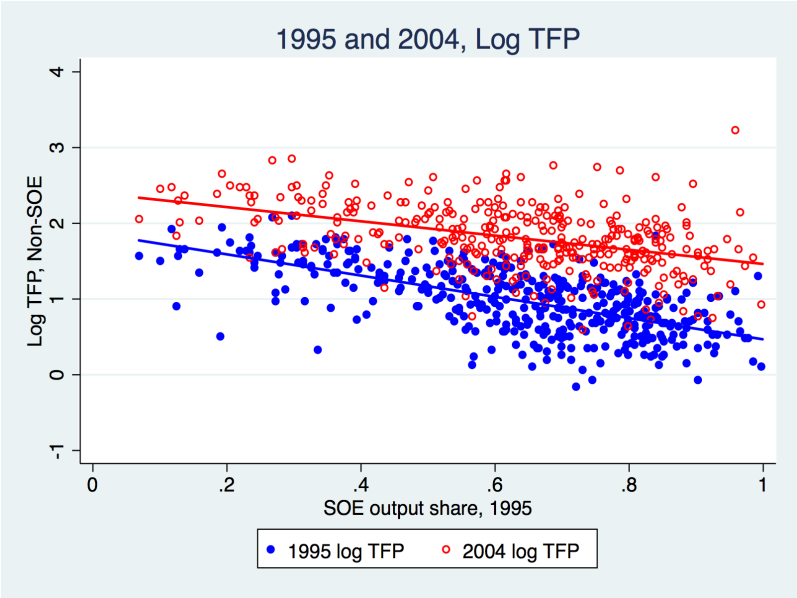


$$\ln Y = \ln w - \ln(\alpha\eta) - \ln(1-\tau^y) - \ln N$$

- Margins affecting converg. in w: same effect on Y
- $\ln(1-\tau^y)$ still different by $s \Rightarrow$ no full converg. in Y

Decomposition, 1995-2004: NSOE Z





$$\ln Z = \alpha\eta \ln w + (1-\alpha\eta)\ln[(1+\tau^k)(r+\delta)] - \ln(1-\tau^y) + \Omega(\alpha,\eta)$$

- Margins affecting converg. in w: same effect on Z
- $\ln[(1+\tau^k)(r+\delta)]$ equalized by s
- $\ln(1-\tau^y)$ still different by $s \Rightarrow$ no full converg. in Z

Experiment: SOE Reform

- The SOE sector
  - : $\uparrow \hat{v}$: the worst SOEs exit
  - : $\frac{\partial \ln \hat{Y}}{\partial \ln \hat{v}} = \frac{\partial \ln \hat{K}}{\partial \ln \hat{v}} = \frac{\partial \ln \hat{N}}{\partial \ln \hat{v}} = 1 - \hat{\xi} < 0$
  - : $\frac{\partial \ln\left(\frac{\hat{Y}}{\hat{N}}\right)}{\partial \ln \hat{v}} = \frac{\partial \ln \hat{Z}}{\partial \ln \hat{v}} = 0$, but $\uparrow \bar{\hat{z}}$
- NSOE sector
  - : suppose the change in s does not directly affect $(1-\psi)$
  - : $\uparrow N \Rightarrow \downarrow w, \downarrow z^*, \uparrow M, \uparrow Y, \downarrow (Y/N), \downarrow Z$
    - $(1-\psi)$ remains a key wedge
    - policy advice: eliminate the entry wedge

Conclusion

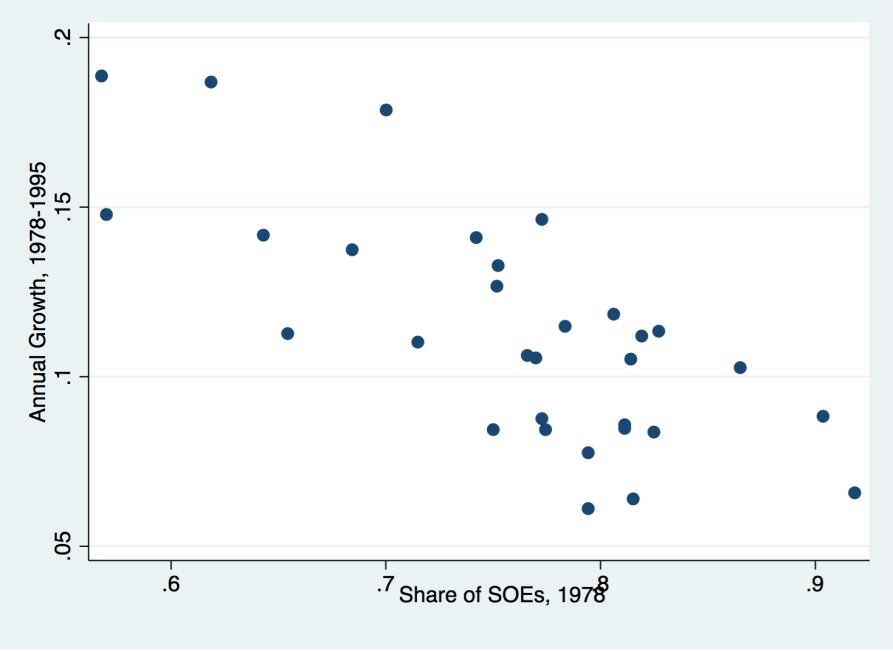
- Aim to understand the heterogeneous growth patterns across localities in China
- A snapshot of manufacturing in 1995 shows that
  - non-SOE firm entry is substantially smaller in high *s* prefectures
  - non-SOE firm entrants in high *s* prefectures pay lower wages and have lower *TFP*, value added 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 two-sector model of heterogeneous firms
  - SOE and NSOE sectors
  - model entrants and incorporate entry wedges
  - infer the entry wedges in 1995
  - infer the entry wedges in 2004 and 2008
  - study the effect of capital, output, and entry wedges and labor mobility on changes at the prefecture level from 1995 to 2004
- Work in progress
  - study the effect of SOE reforms on changes at the prefecture level from 1995 to 2004
  - analyze the partial reversal observed in the 2004-2008 period
  - calibrate full dynamic model

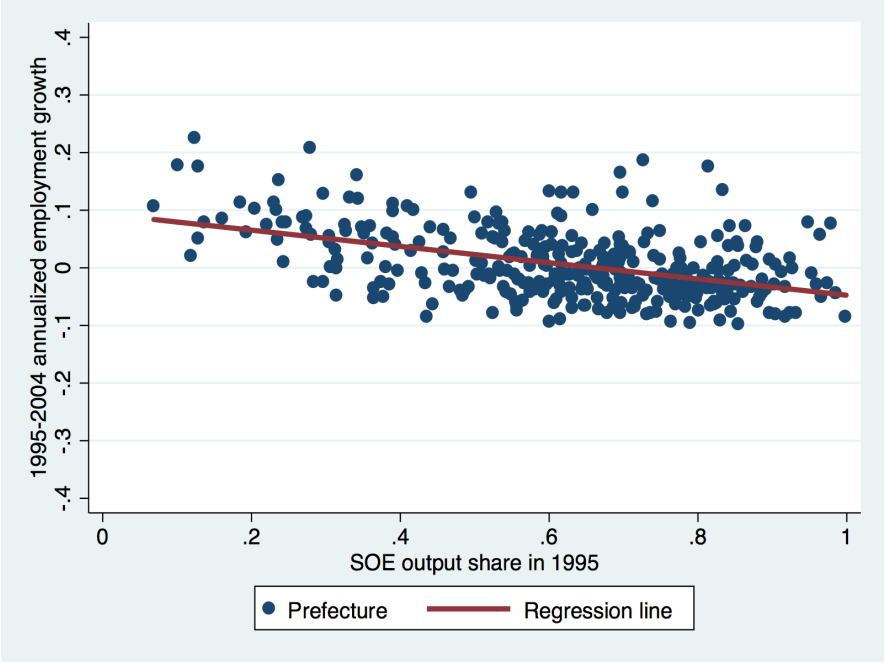
Additional Slides

Provincial Economic Growth and SOE Share



- Negative relationship at the provincial level between
  - 1978-1995 output (annual) growth rate
  - 1978 output share of SOEs [Back]

Employment Growth: 1995-2004



- Negative relationship between
  - 1995-2004 employment growth rate
  - 1995 output share of SOEs

Framework for Wedges: The Labor Wedge

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

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

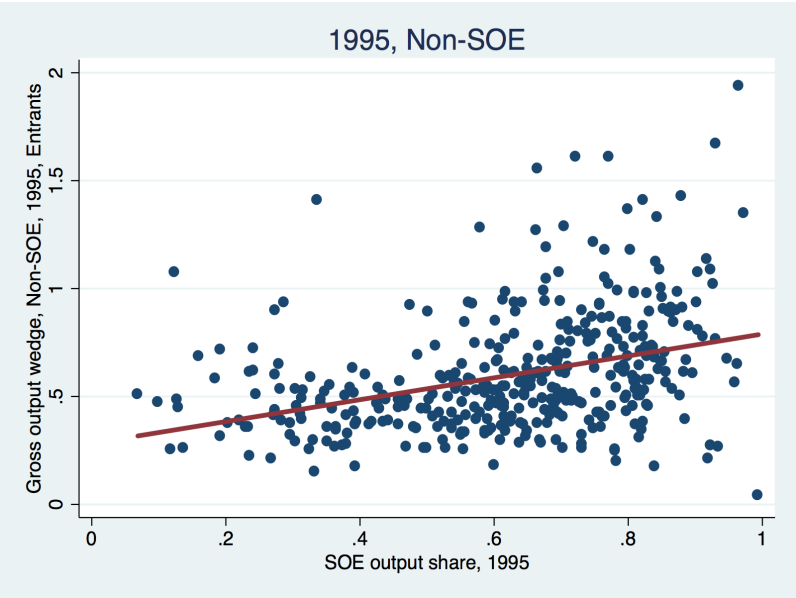
- Gross capital wedge, Δ_i^k

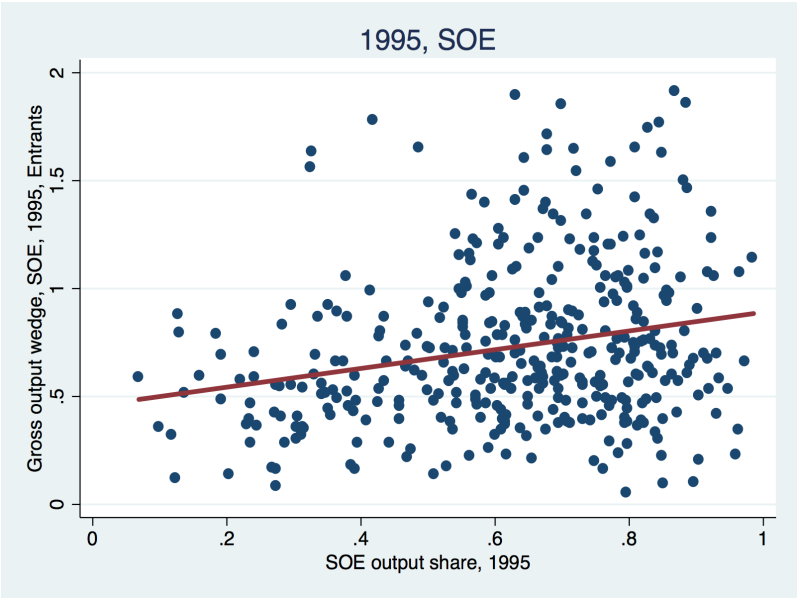
$$\Delta_i^k = \frac{(1+\tau_i^k)(r+\delta)}{(1+\tau^w)} \quad = \quad \frac{1-\alpha}{\alpha}\cdot\frac{w_i n_i}{k_i}$$

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

[Back]

Gross Output Wedge, Entrants: Δ^y

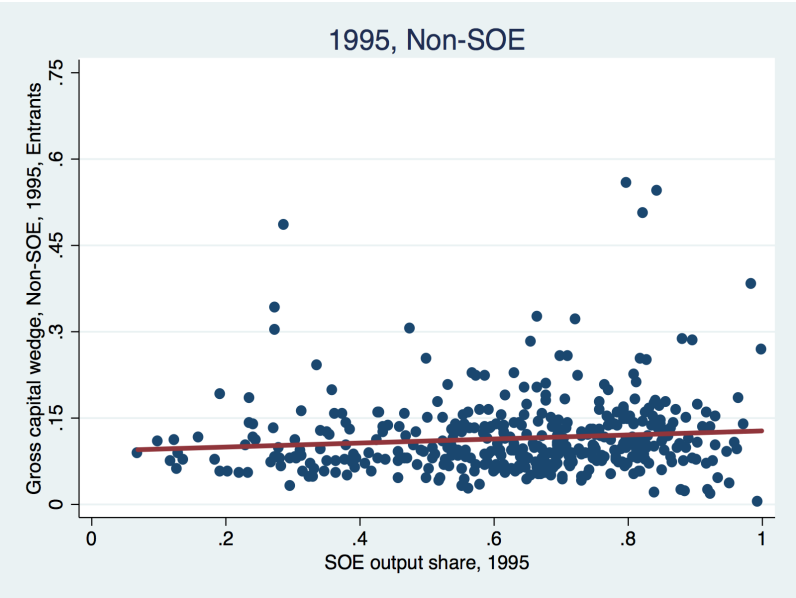


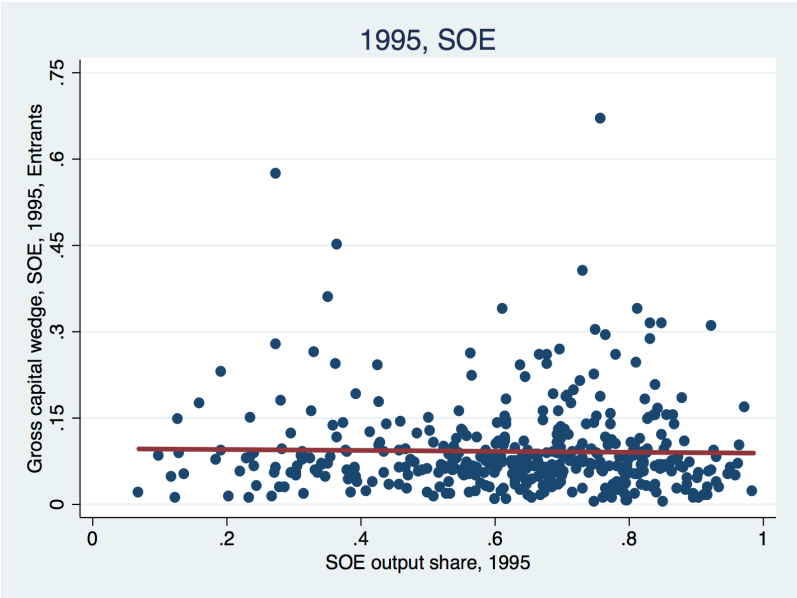


- Lower output taxes (higher subsidies) in high *s* prefectures
- For both non-SOE and SOE firms

[Back]

Gross Capital Wedge, Entrants: Δ^k

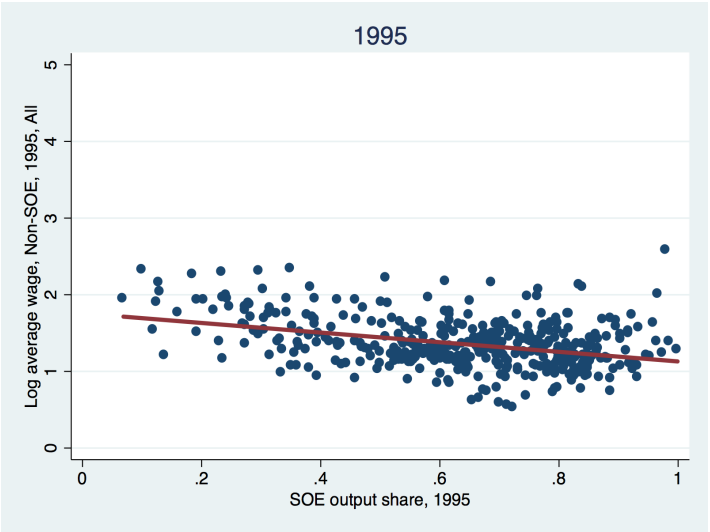


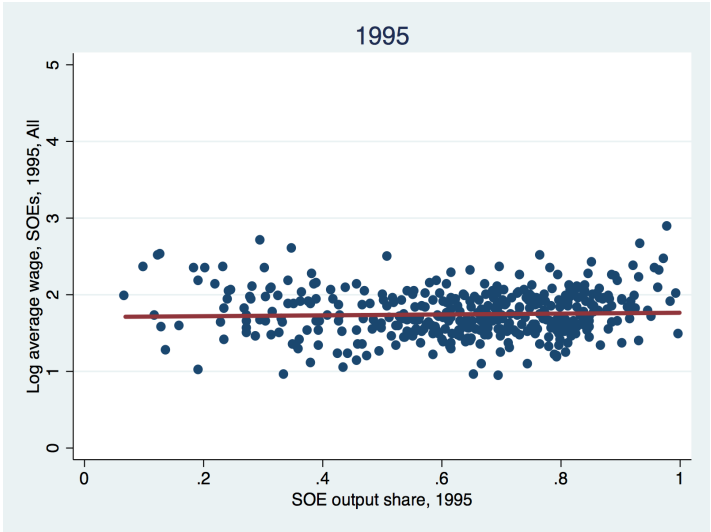


- Higher capital taxes in high s prefectures for non-SOE firms
- No relationship between capital taxes and s for SOE firms

[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

[Back]