Barriers to Entry and Regional Economic Growth in China

Loren Brandt
University of Toronto

Gueorgui Kambourov
University of Toronto

Kjetil Storesletten
University of Oslo

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China's Economic Transformation and Major Reforms

- China has experienced major economic growth and transformation since 1978
  - : but growth has been uneven across locations
- Gradual increase in role of private sector – major engine of growth
  - 1980s: Household responsibility, Experimentation with SEZ
  - 1992: Private firms allowed to compete in many sectors
  - 1997-98: SOE reforms
    - : 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
  - 2001: WTO – increased competition

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
  - : 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

1. How much have SOEs influenced growth in the non-state sector through their effect on new firm behavior?

2. What is the precise channel through which SOEs matter?
    a. Capital constraints?
    b. Higher costs of labor?
    c. Taxes/subsidies?
    d. Entry costs?

3. 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

1. Draw on census data for 1995, 2004 and 2008 to examine links between state sector and new firm behavior at the prefecture level

2. Estimate standard capital and output wedges at the prefecture level

3. Build a Hopenhayn model of firm entry that incorporates output and capital wedges and allows for entry wedges

4. 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

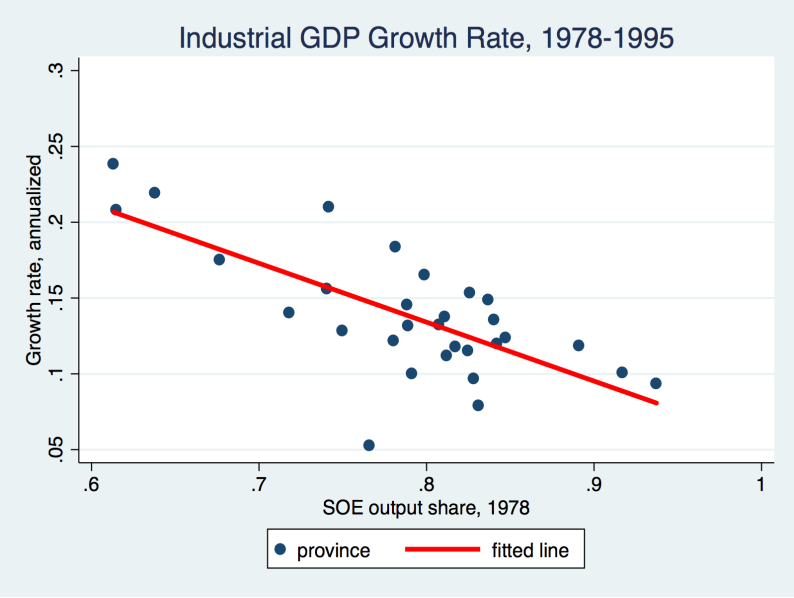
1. Entry wedges key to explaining differences in new firm behavior in the cross section and over time

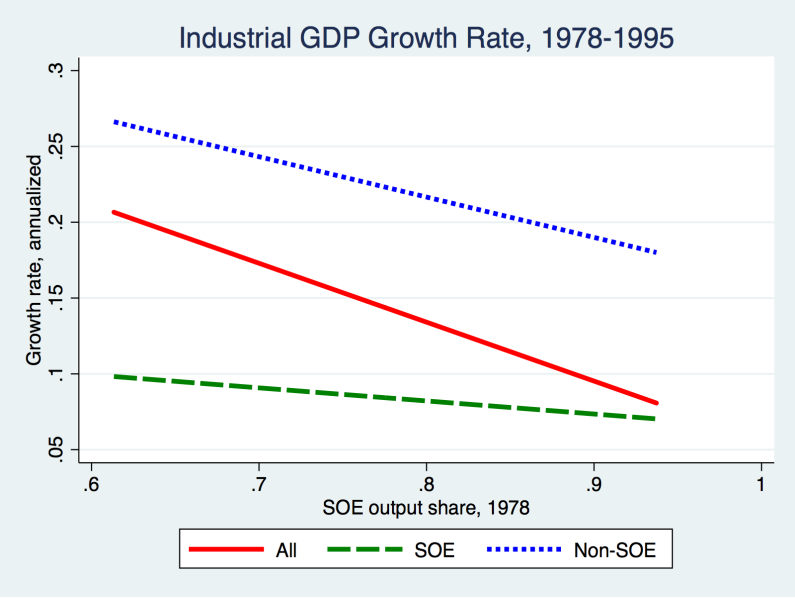
    : positively correlated with the “Cost of Doing Business in China Survey, 2008”

2. In levels and changes, highly correlated with the size of the state sector as well as state sector profitability and local fiscal capacity

3. Partial convergence after 1995 in growth in output, wages and TFP of new firms tied to downsizing of the state sector

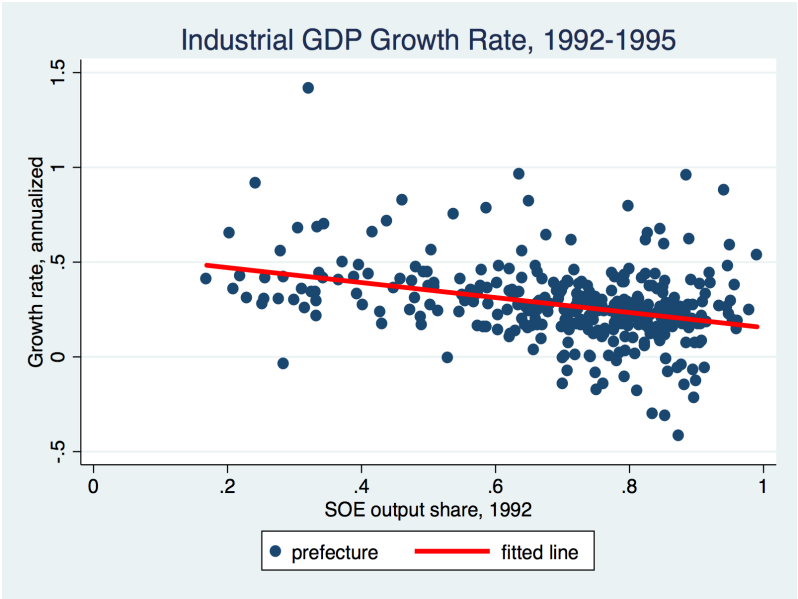
The Effect of the State Sector: 1978-1995

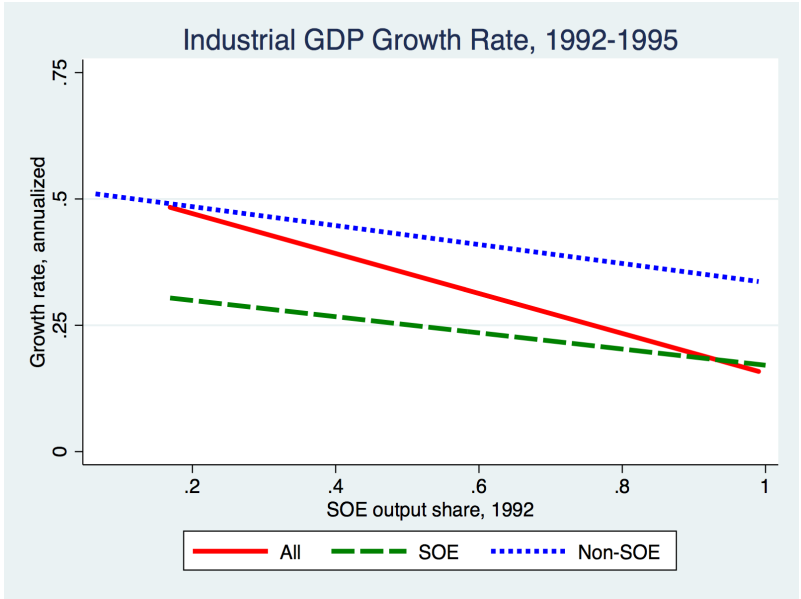




- At the province level, industrial output
- The SOE share of output, *s*, in 1978 is negatively correlated with the
  - 1978-1995 growth in provincial GDP (left panel); and
  - 1978-1995 growth in prov. overall, SOE, and NSOE GDP (right panel).

The Effect of the State Sector: 1992-1995





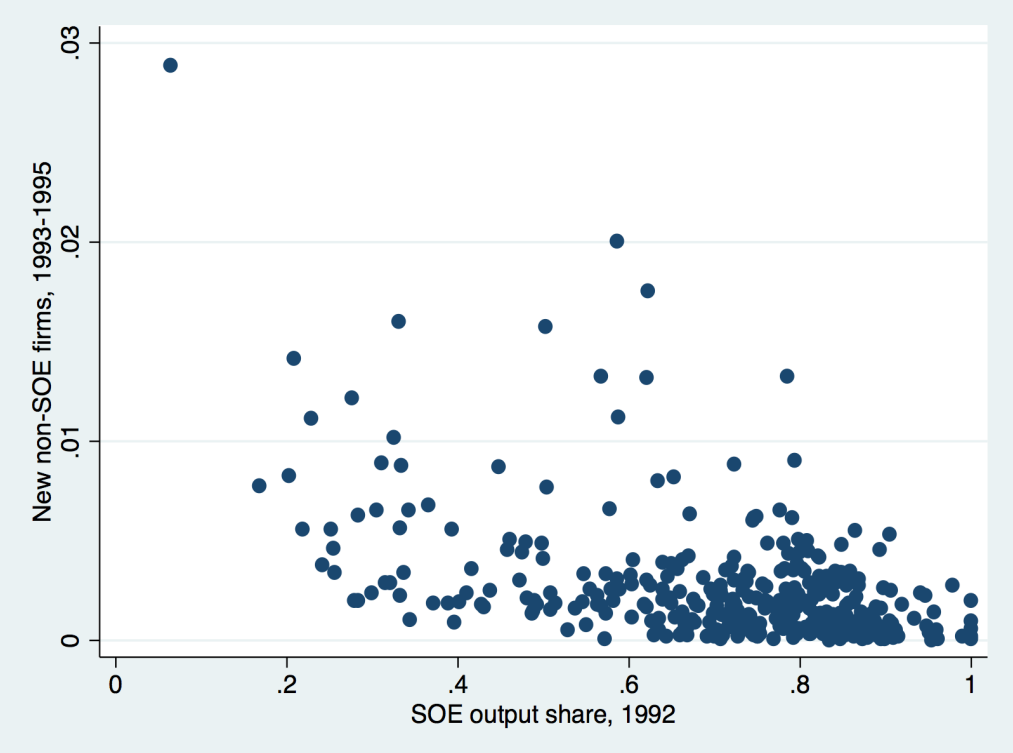
- At the prefecture level, industrial output
- The SOE share of output, *s*, in 1992 is negatively correlated with the
  - 1992-1995 growth in prefecture GDP (left panel); and
  - 1992-1995 growth in pref. overall, SOE, and NSOE GDP (right panel).

[Y/N]

TFP, Wages, Output, and Capital in Manufacturing

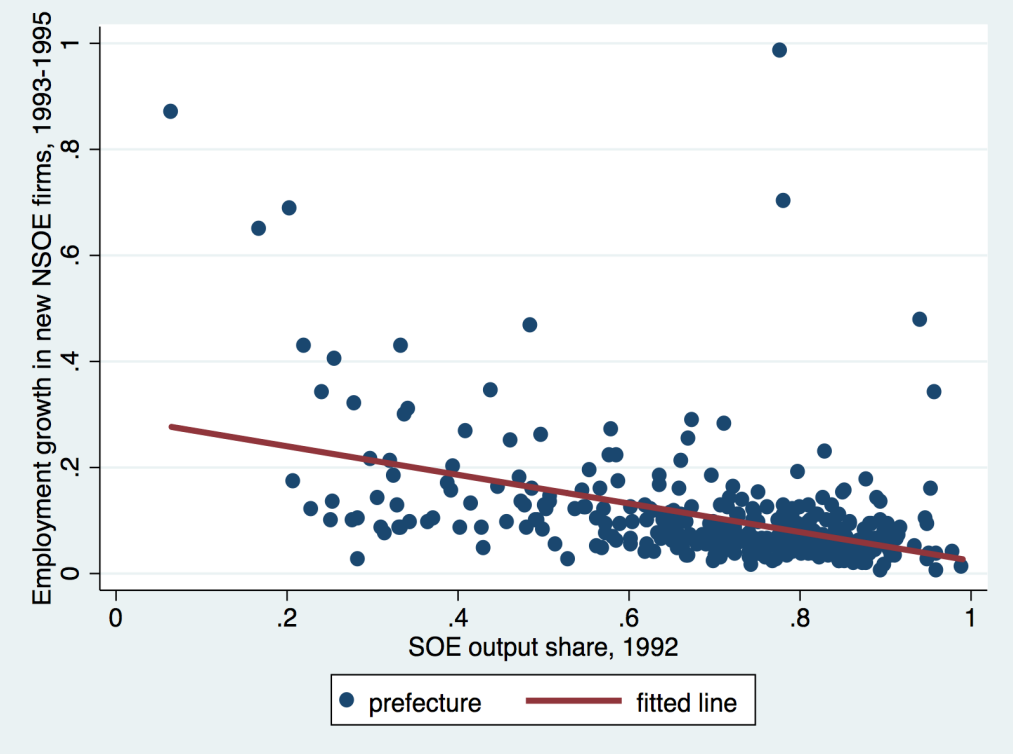
- Chinese Industrial Census (CIC)
- CIC: 1995, 2004, 2008
- Covers most of the manufacturing sector
- Large
- Data work (issues)
  - make prefectures consistent across years
  - define the SOE sector (especially in 2004 and 2008)
  - construct measures of real capital

Non-SOE Entry in 1995



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

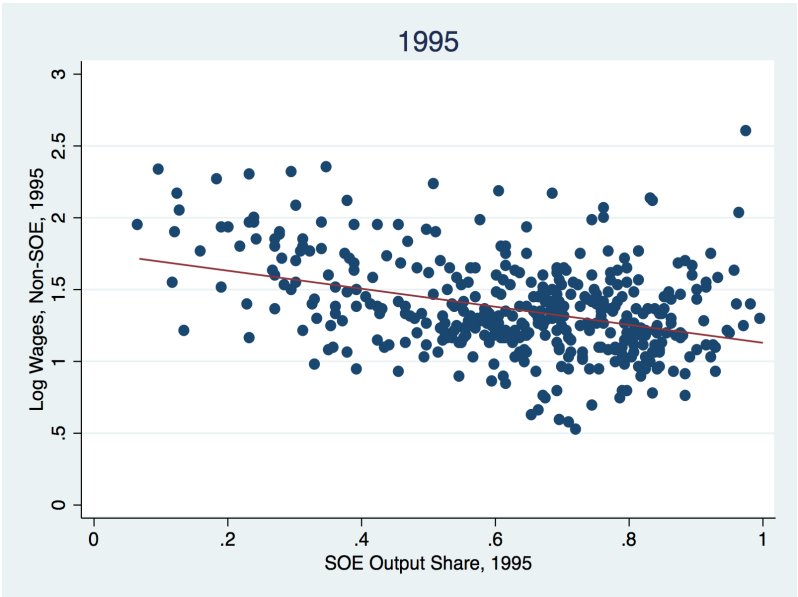
Non-SOE Entry in 1995

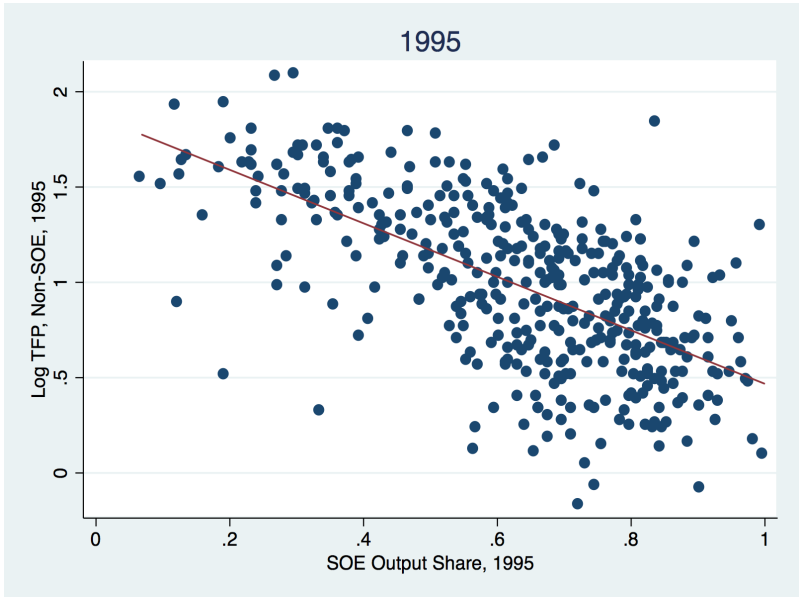


- Employment in new non-SOE entrants (1993-1995) relative to the employment in all firms in 1992
- Lower in high *s* prefectures

[Number of firms]

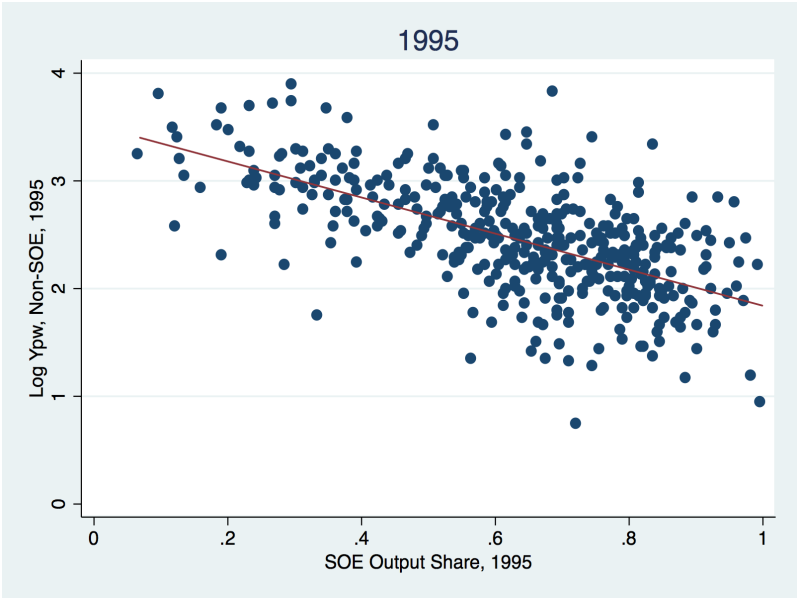
Non-State Sector, 1995

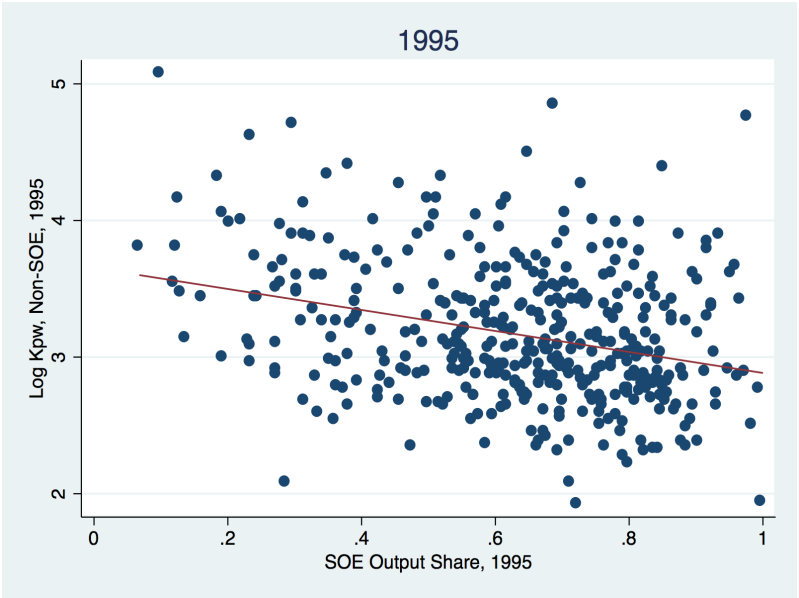




- The SOE share of output, *s*, is negatively correlated with NSOE
  - wages; *s* accounts for 12% of the variation
  - TFP (defined as Solow residual); *s* accounts for 40% of the variation

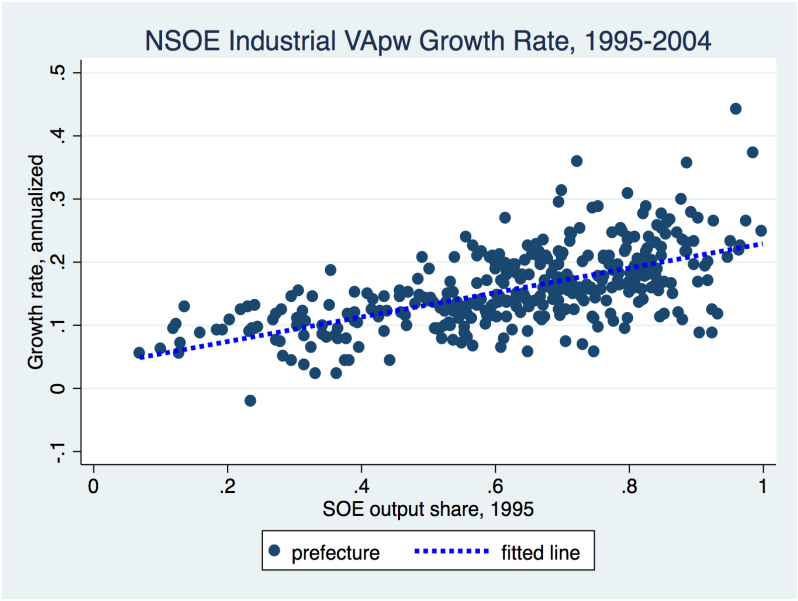
Non-State Sector, 1995

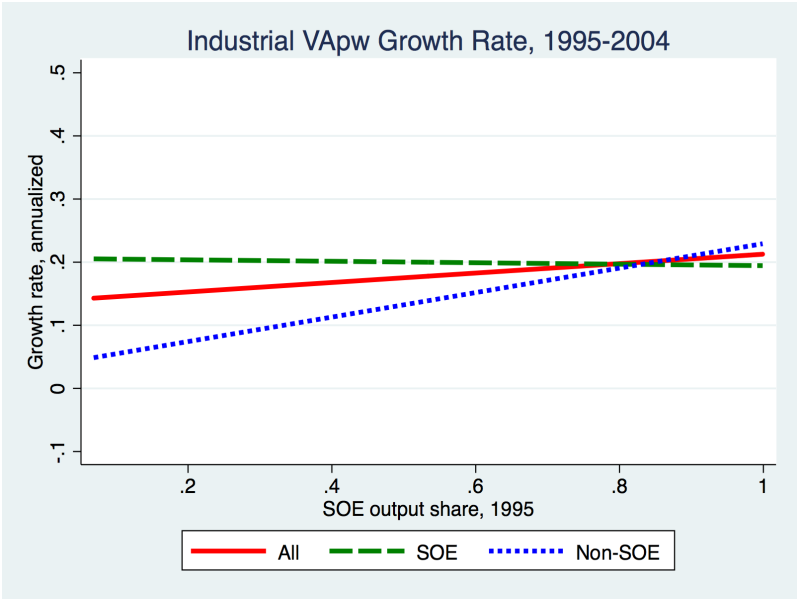




- The SOE share of output, *s*, is negatively correlated with NSOE
  - output per worker; *s* accounts for 39% of the variation
  - capital per worker; *s* accounts for 9% of the variation

Growth Rate in VApw, 1995-2004





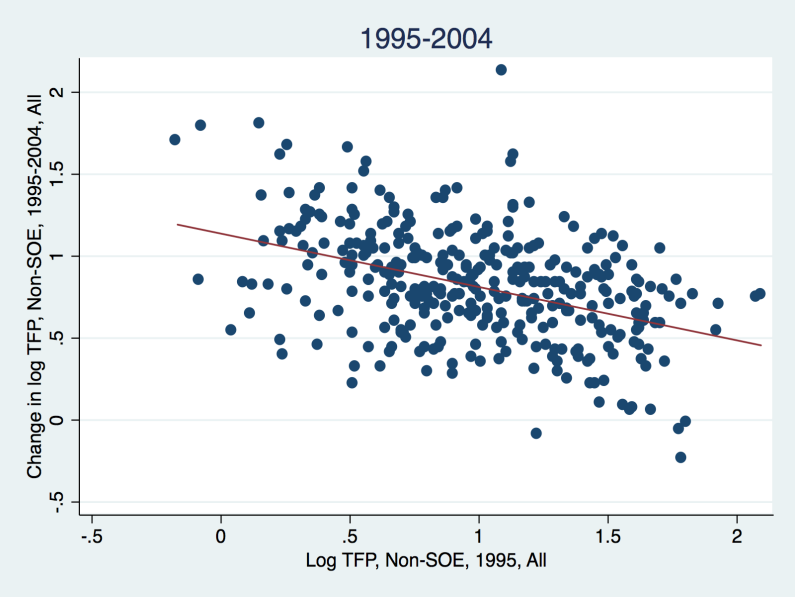
- The SOE share of output, *s*, in 1995 is positively correlated with the
  - 1995-2004 growth in prefecture NSOE VApw (left panel); and
  - 1995-2004 growth in pref. overall and NSOE VApw (right panel).

[Output per worker]

[Output]

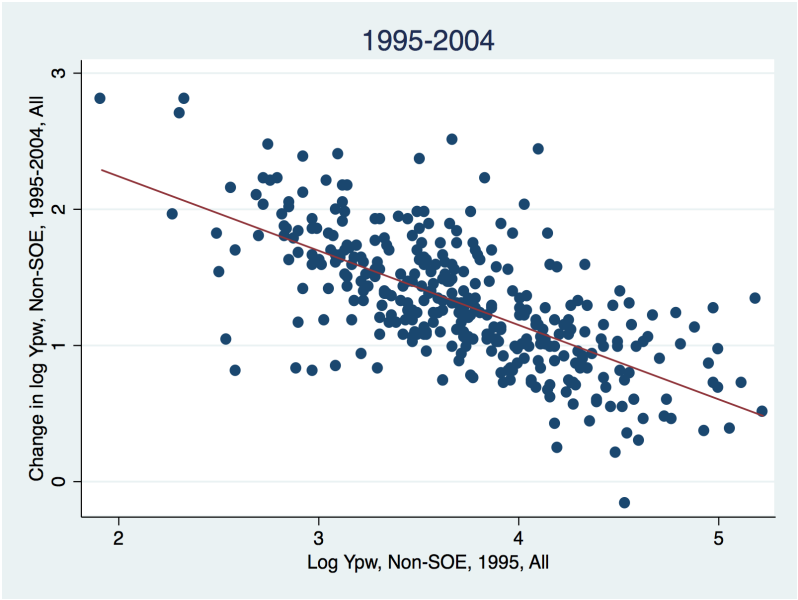
[2004-2008]

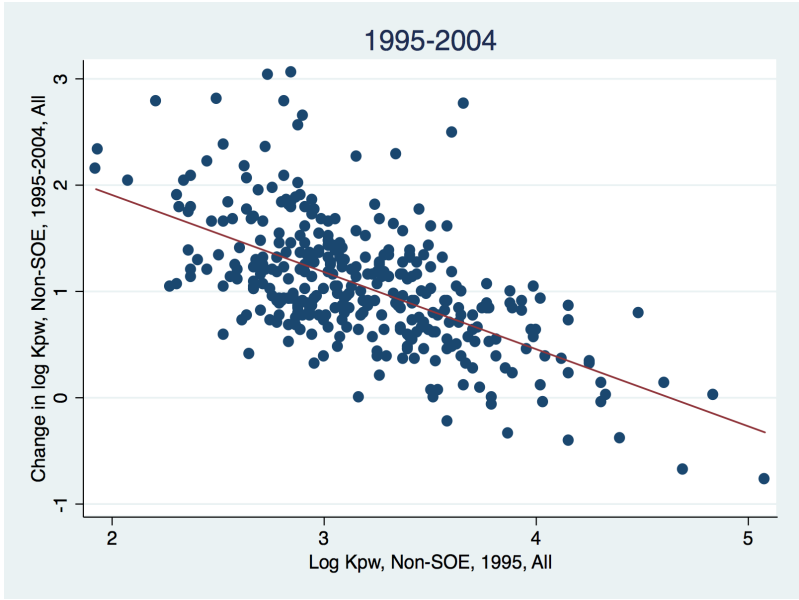
Non-State Sector Convergence, 1995-2004



- 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]

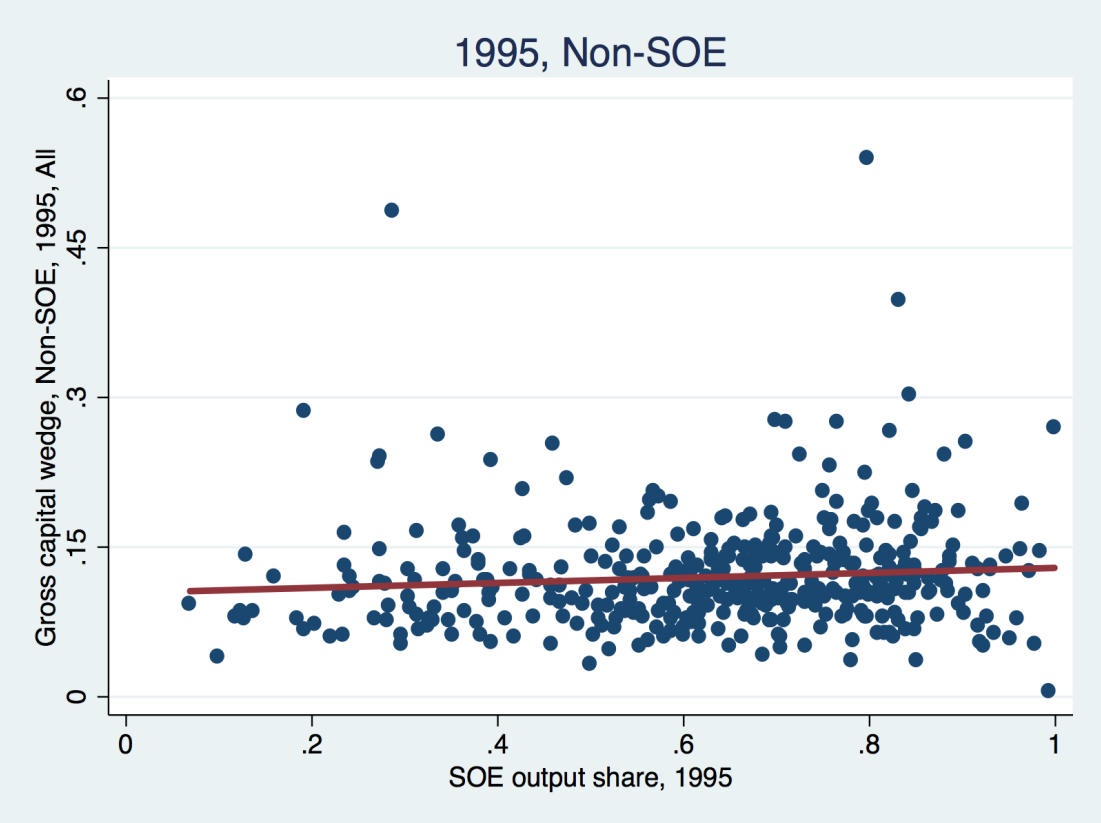
$$\Delta^y = (1 - \tau^y) = \sum_i \frac{1}{\alpha_j \eta} \frac{w_i n_i}{y_i} \frac{y_i}{\sum_i y_i}$$

- 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

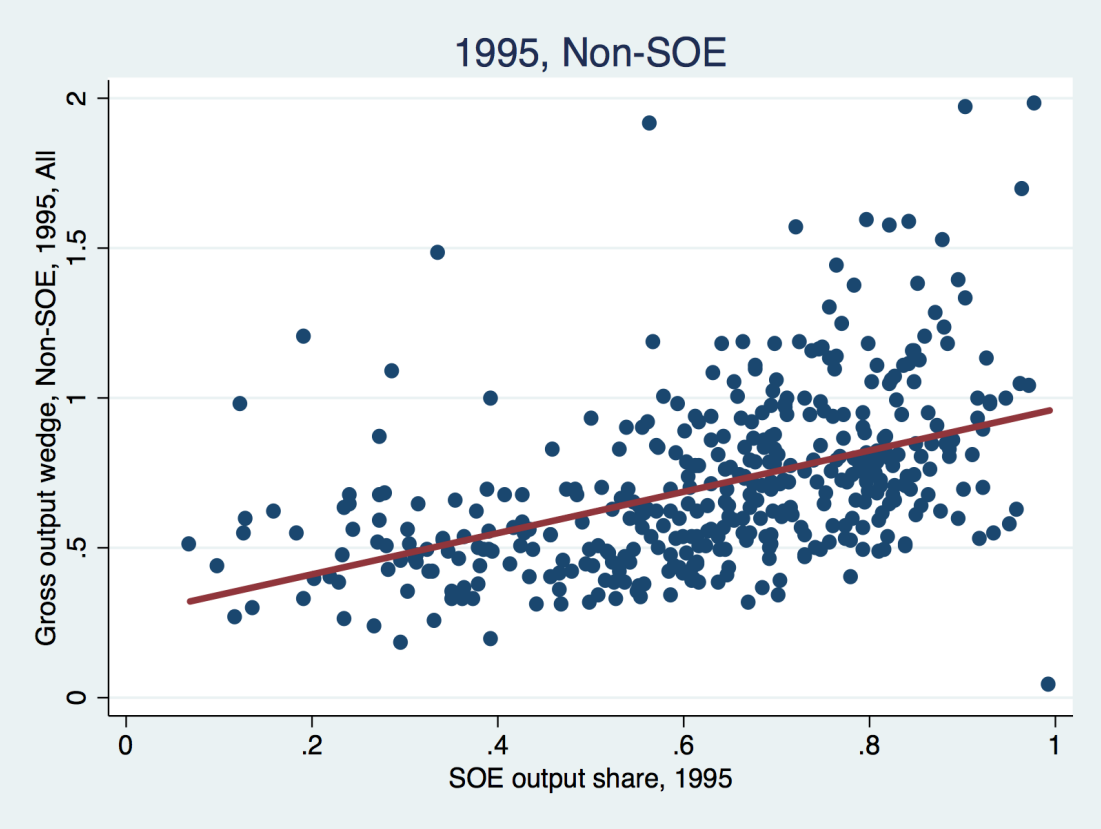


- Higher capital taxes in high s pref. for non-SOE firms

[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
  - $\uparrow$ 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
  - $\downarrow (1-\psi) \Rightarrow \downarrow$ 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 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

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

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

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

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

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

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

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

Equilibrium: TFP Z

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

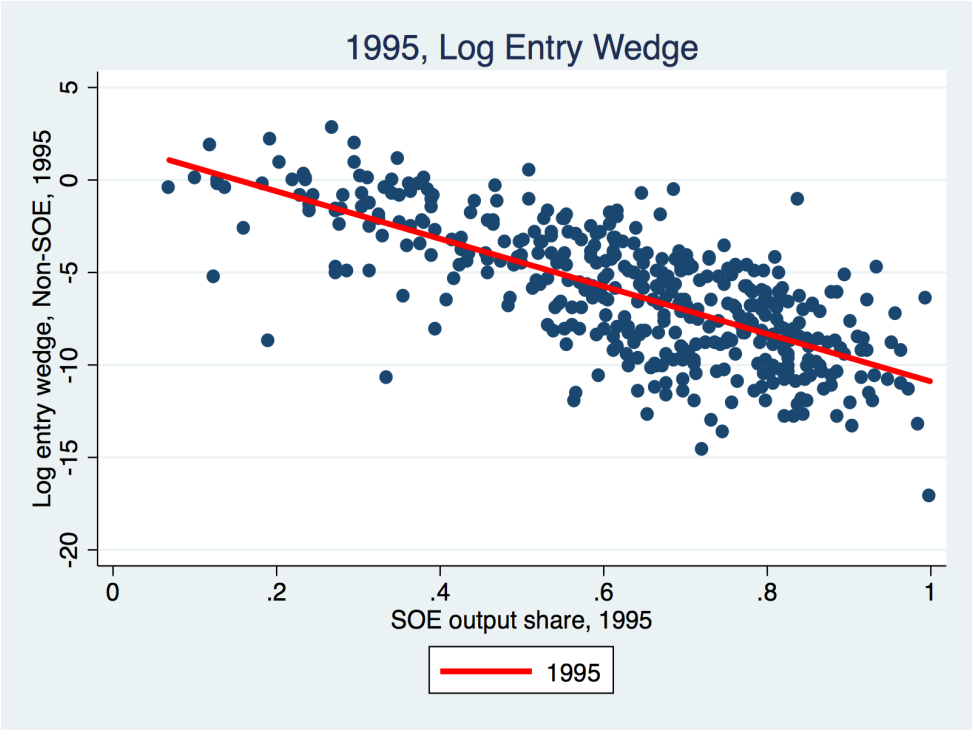
$$\begin{aligned}
\frac{\partial \ln Z}{\partial \ln\left(1+\tau^{k}\right)} \quad = \quad & \frac{\partial \ln Z}{\partial \ln(r+\delta)}=\frac{(1-\eta)\,(1+(\xi-1)\,\alpha\eta)}{1-\eta+\xi\,\alpha\eta}>0\\
\frac{\partial \ln Z}{\partial \ln\left(1-\tau^{y}\right)} \quad = \quad & -\frac{1-\eta}{1-\eta+\xi\,\alpha\eta}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

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

- Estimate ψ_j in prefecture j from the equilibrium condition

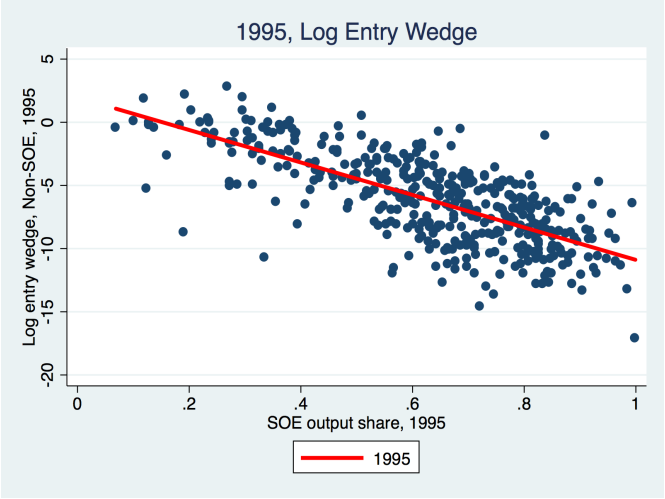
$$\begin{aligned}\ln(1-\psi_j) \quad = \quad & \ln N + \frac{1-\eta+\xi\alpha\eta}{1-\eta}\ln w_j \\ & -\frac{\xi}{1-\eta}\ln(1-\tau_j^y) \\ & +\frac{\xi\eta(1-\alpha)}{1-\eta}\ln\left[(1+\tau_j^k)(r+\delta)\right] \\ & +(\xi-1)\ln\nu+\Omega(\alpha,\eta,\xi,\underline{z})\end{aligned}$$

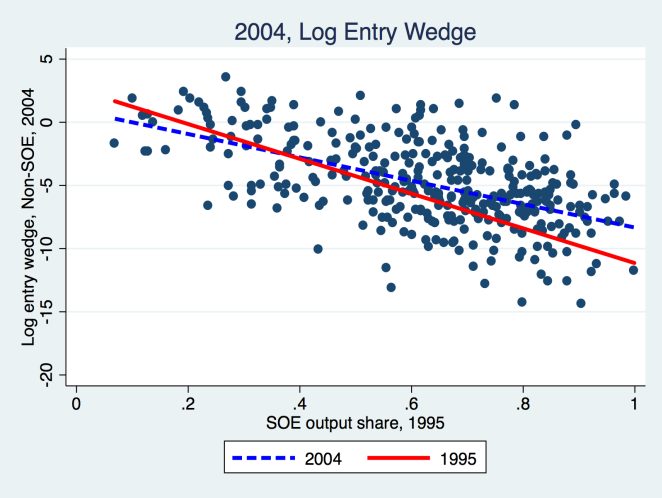
1995 Gross Entry Wedge in the NSOE Sector

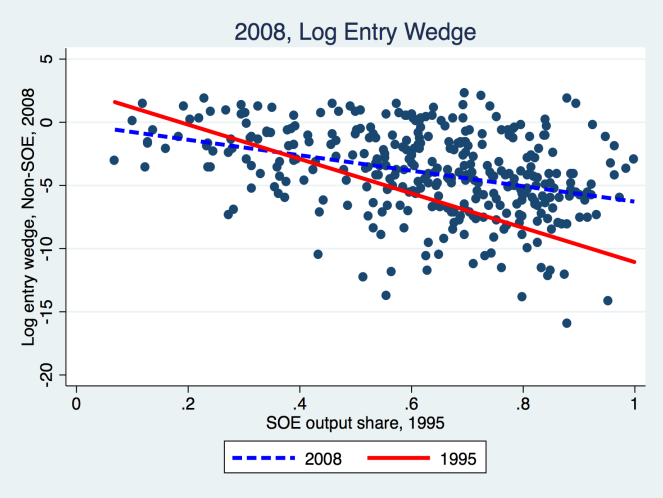


- Log gross entry wedge $\ln(1-\hat{\psi})$
- SOE share accounts for 52% of the variation in the entry wedge

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



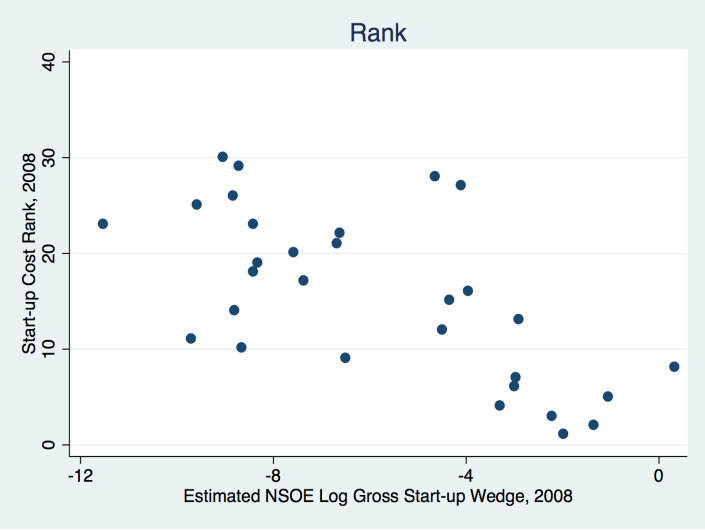


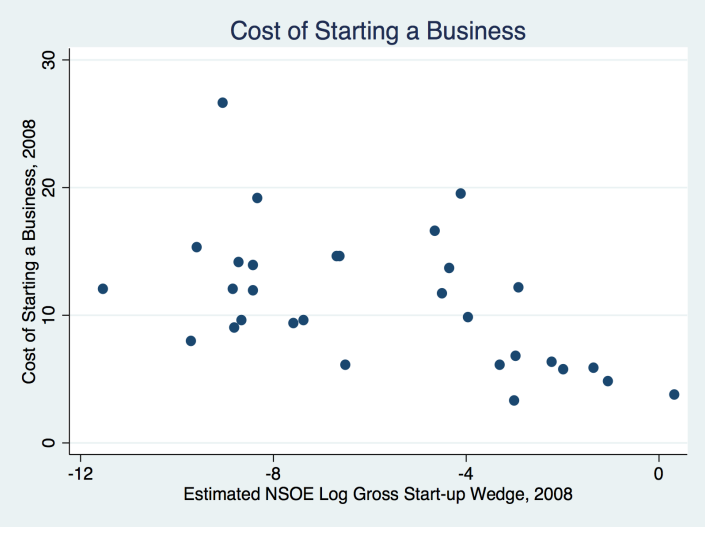


2008 Costs of Starting a Business in China

- "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

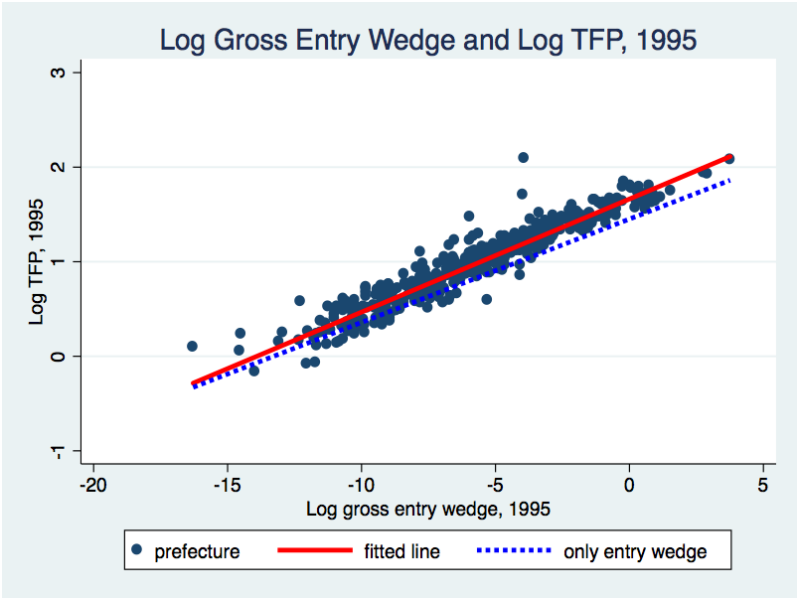
"Doing Business in China" and Entry Wedges, 2008

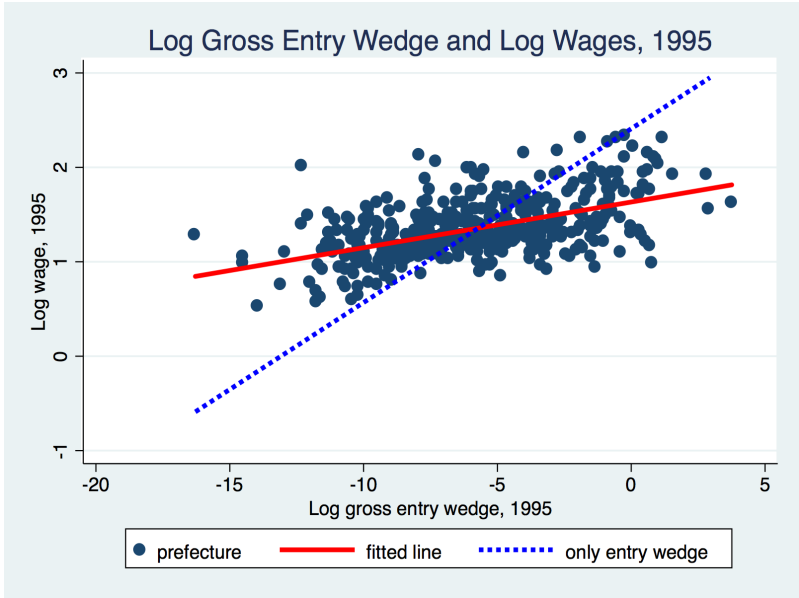




The Importance of Entry Wedges

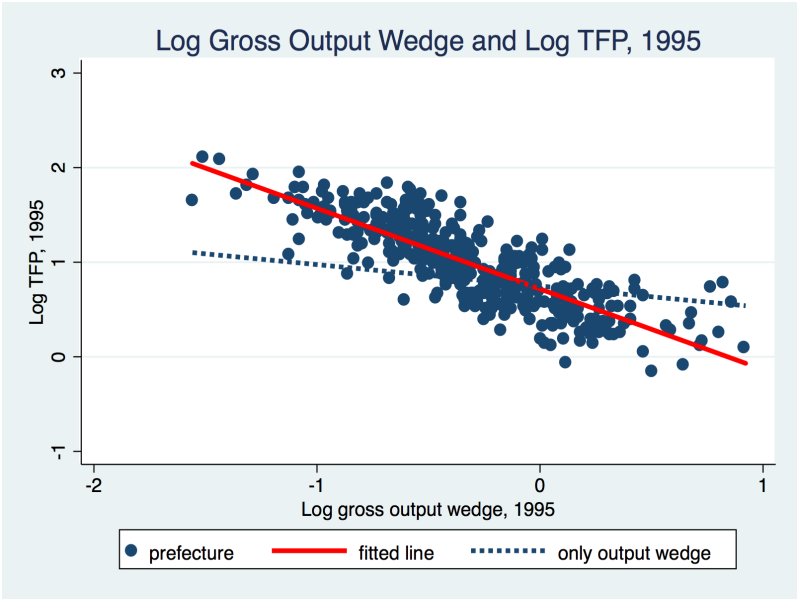
The Entry Wedge in the Cross-section, 1995

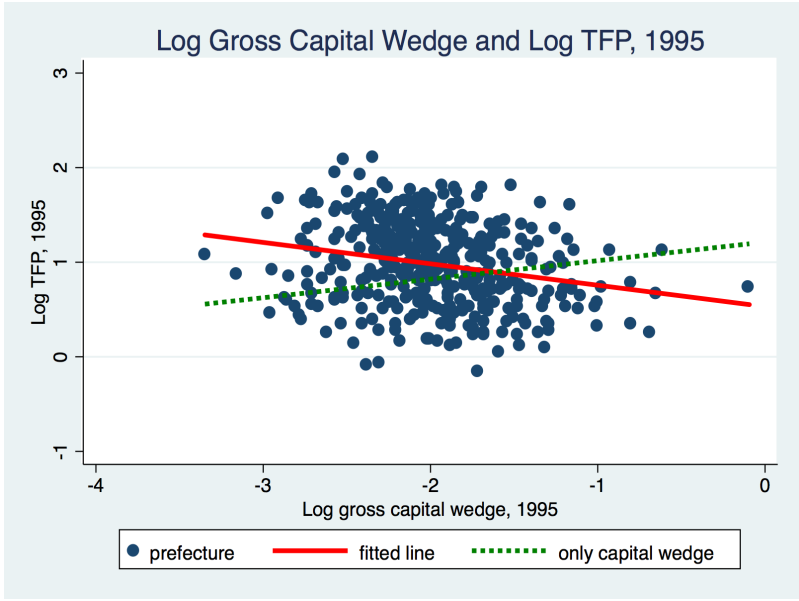




- TFP and wages are higher in prefectures where the entry wedge is lower
  - i.e., where the log gross entry wedge $\ln(1-\psi)$ is higher
- Only entry wedge $\Rightarrow$ even larger differences in wages (right panel)
  - the gross output and gross capital wedges are set to their average levels

The Output and Capital Wedge and TFP, 1995

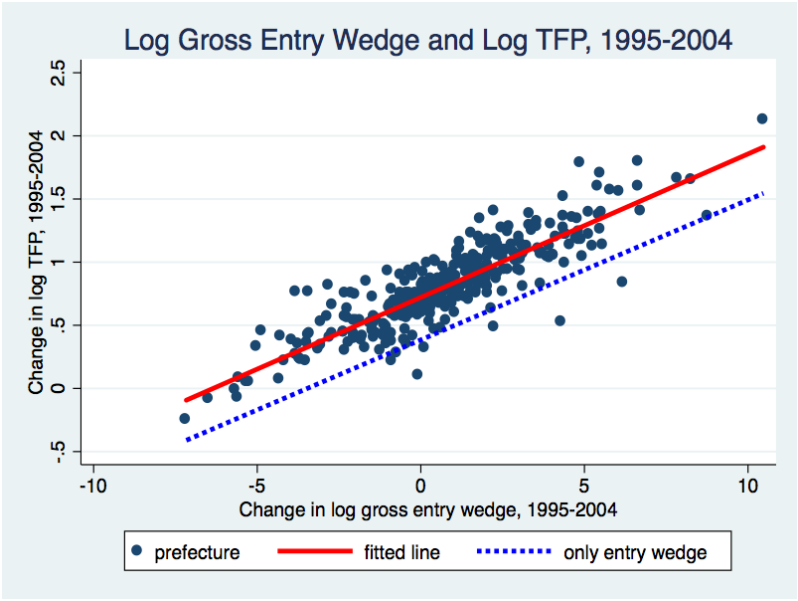


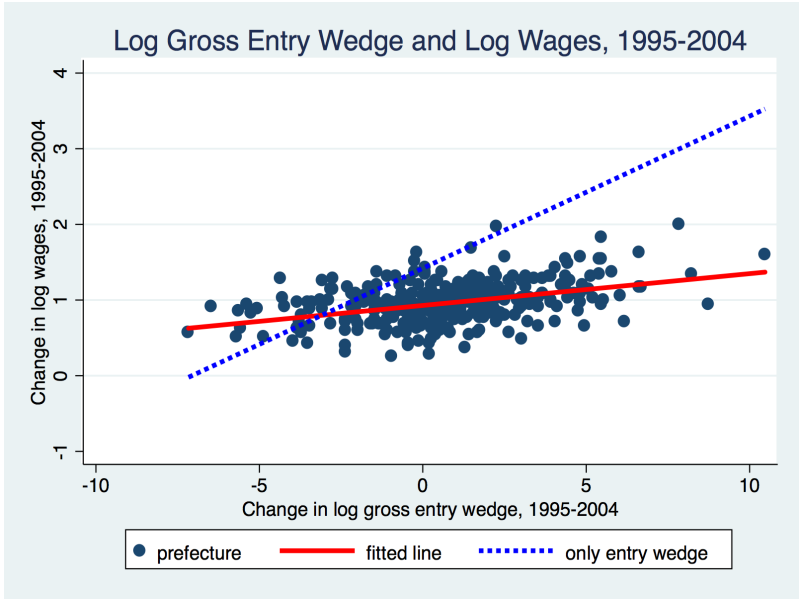


- Only output wedge $\Rightarrow$ quantitatively small effect on TFP (left panel)
  - the gross entry and gross capital wedges are set to their average levels
- Only capital wedge $\Rightarrow$ does not account for differences in TFP (right panel)
  - the gross entry and gross output wedges are set to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

[SOE share]

The Entry Wedge over Time, 1995-2004

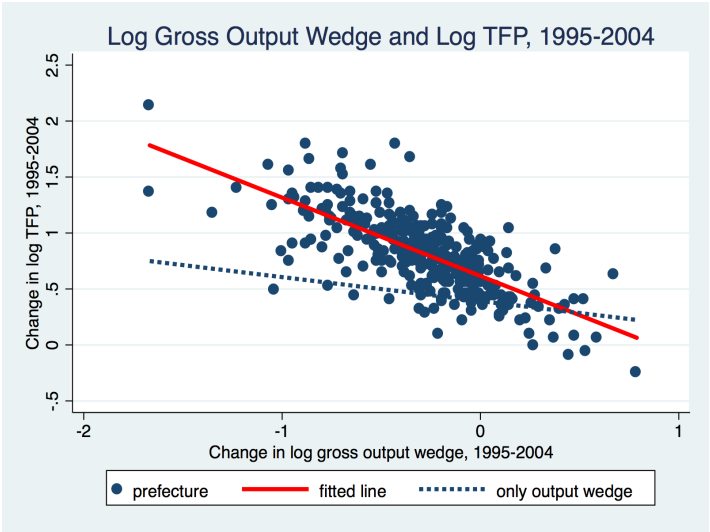


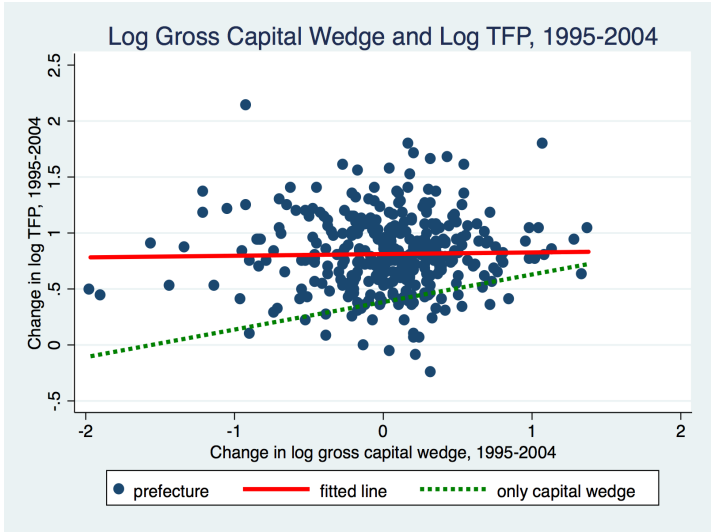


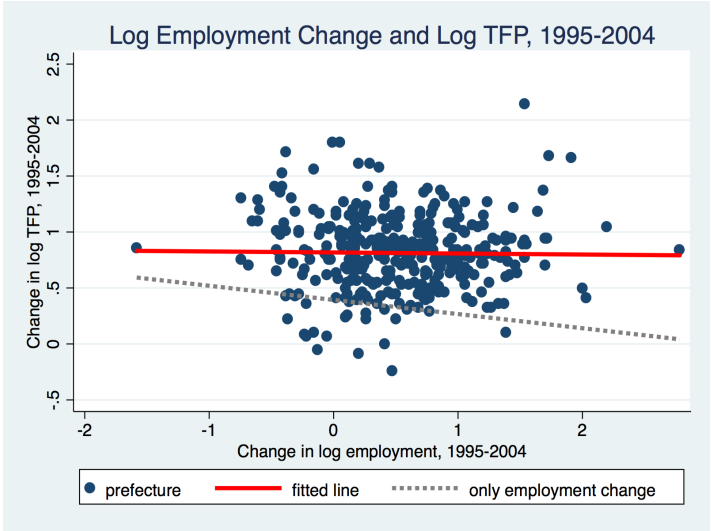
- The increase in TFP is larger in prefectures where the decline in the entry wedge is larger
  - i.e., where the increase in log gross entry wedge $\ln(1-\psi)$ is larger
- The entry wedge accounts for almost all of the increase in TFP

[2004-2008]

The Output and Capital Wedge and TFP, 1995-2004

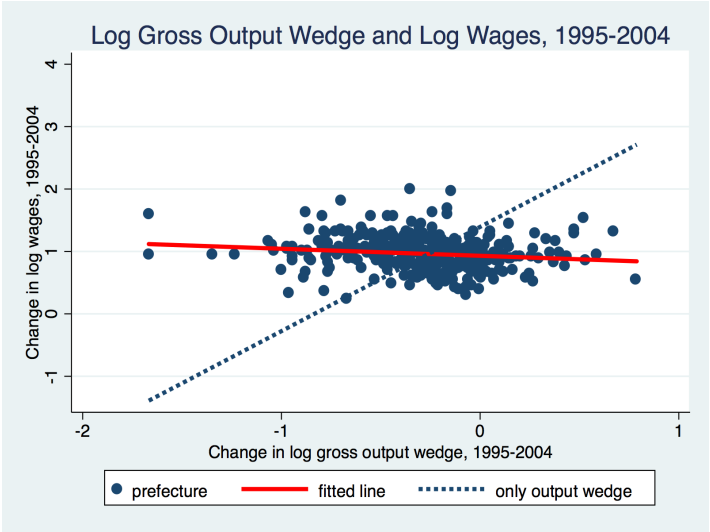


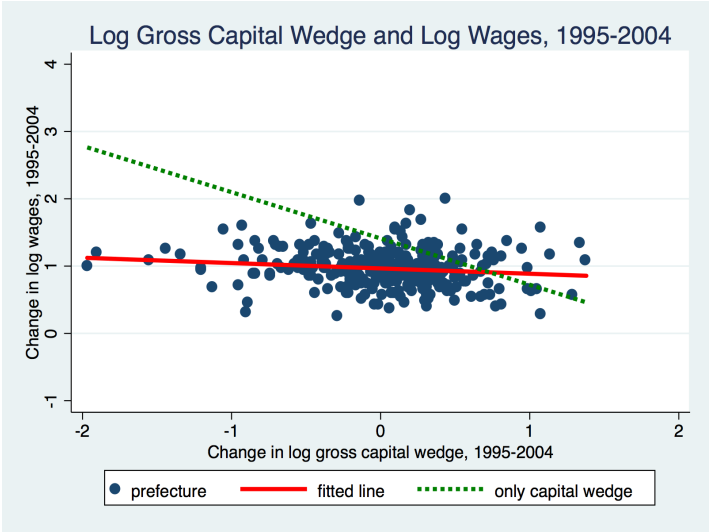


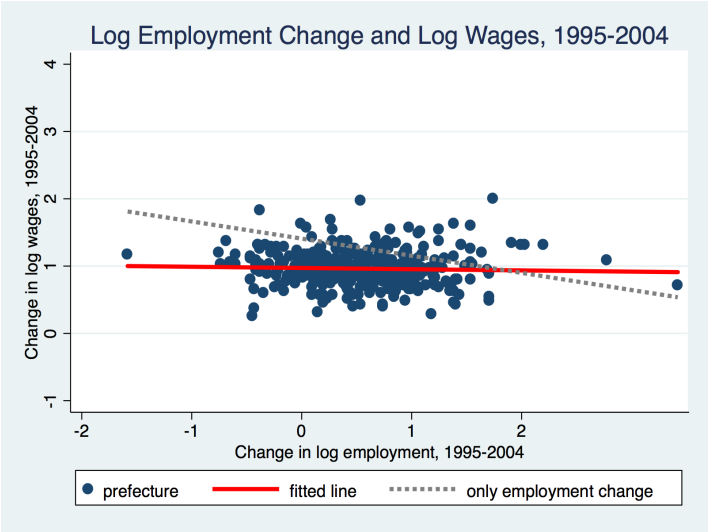


[SOE share]

The Output and Capital Wedge and Wages, 1995-2004







[SOE share]

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

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%.

- SOE reform after 1995
- Fiscal reform after 1995

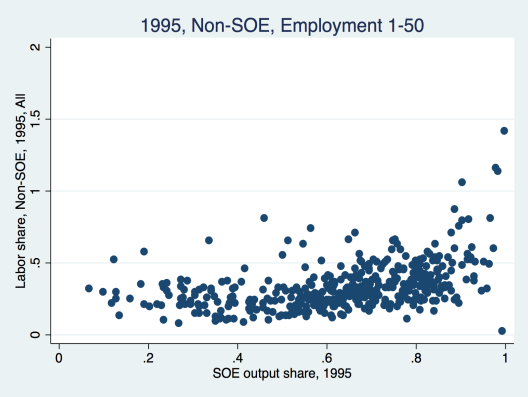
SOE and Fiscal Reforms after 1995

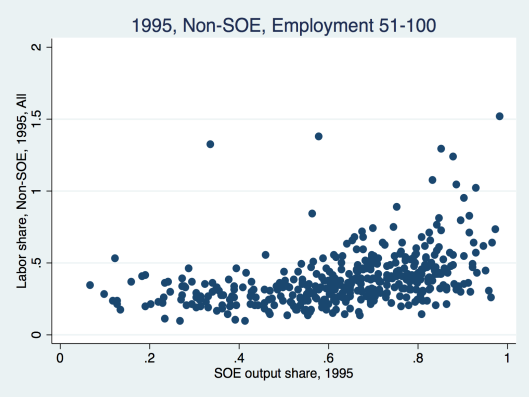
- SOE reforms after 1995
  - : smaller SOEs sold off or shutdown
  - : massive layoffs of workers in the SOE sector including in those firms not privatized
  - : concentration of SOEs in strategic and pillar sectors
- Fiscal reform after 1995
  - : recentralization of the fiscal system that increased 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

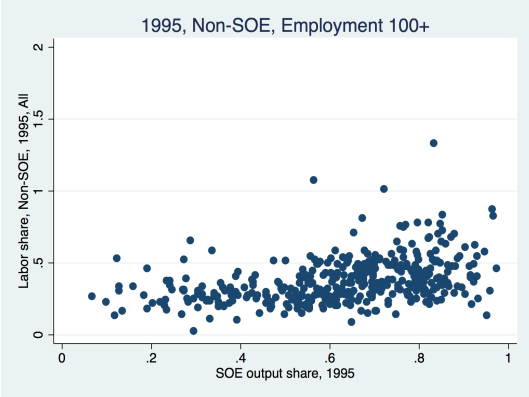
Alternative Theory I

- 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

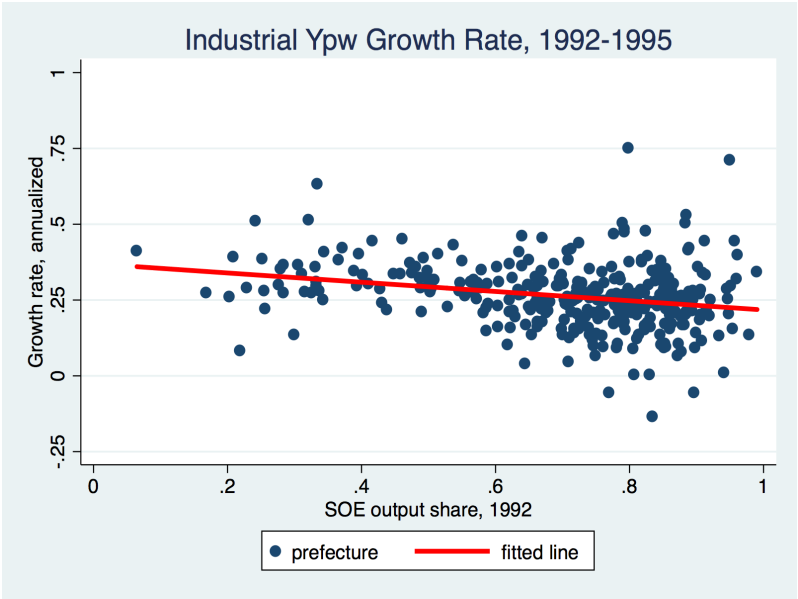
- Build a Hopenhayn model of firm entry
  - model entrants and incorporate entry wedges
  - infer the entry wedges in 1995
  - infer the entry wedges in 2004 and 2008
- Entry wedges account for most of the 1995, 2004, and 2008 cross-sectional variation in
  - wages and TFP
- Entry wedges account for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

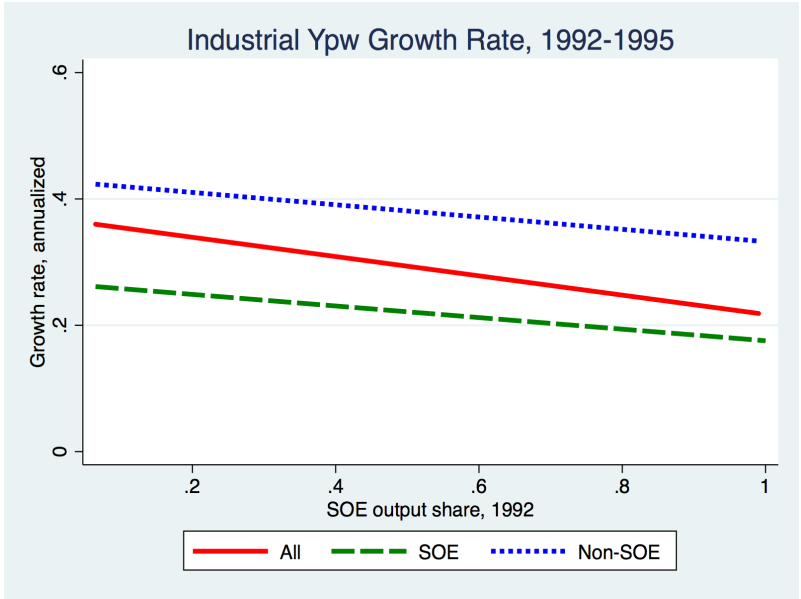
Conclusion

- 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: 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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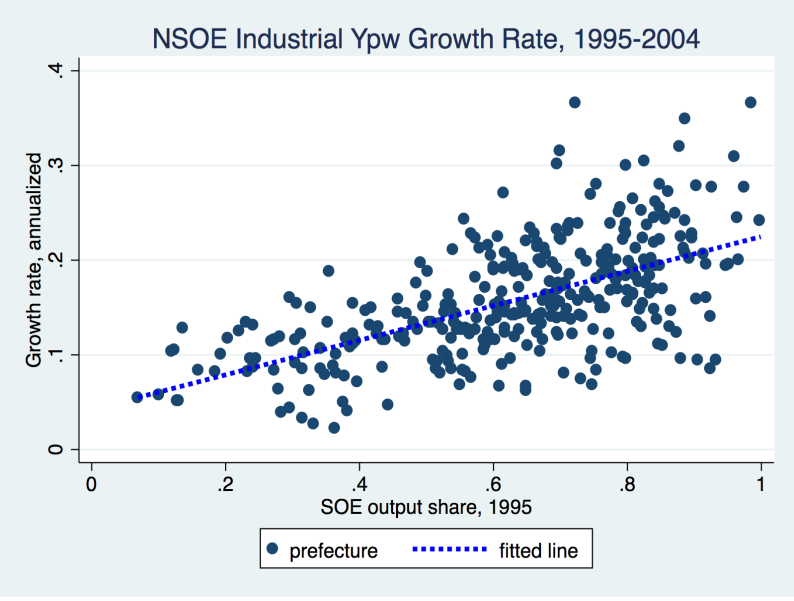
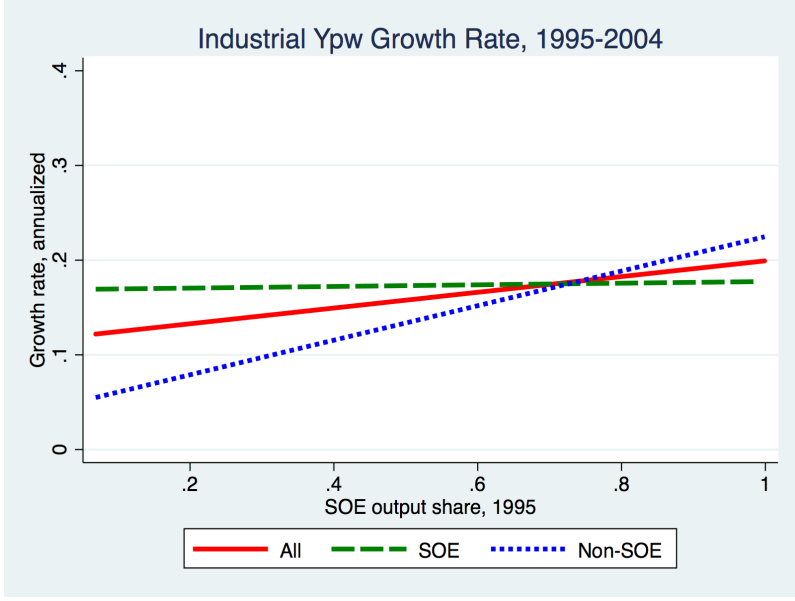
Growth Rate in Ypw, 1995-2004





- 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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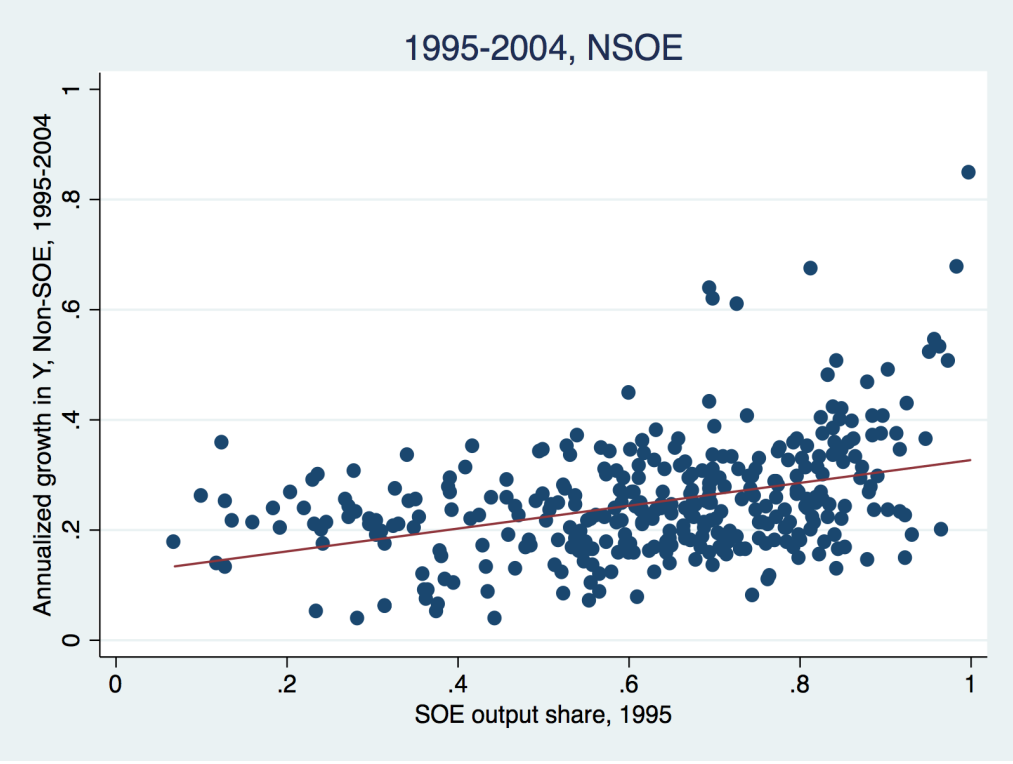
Growth Rate in Y, 1995-2004



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

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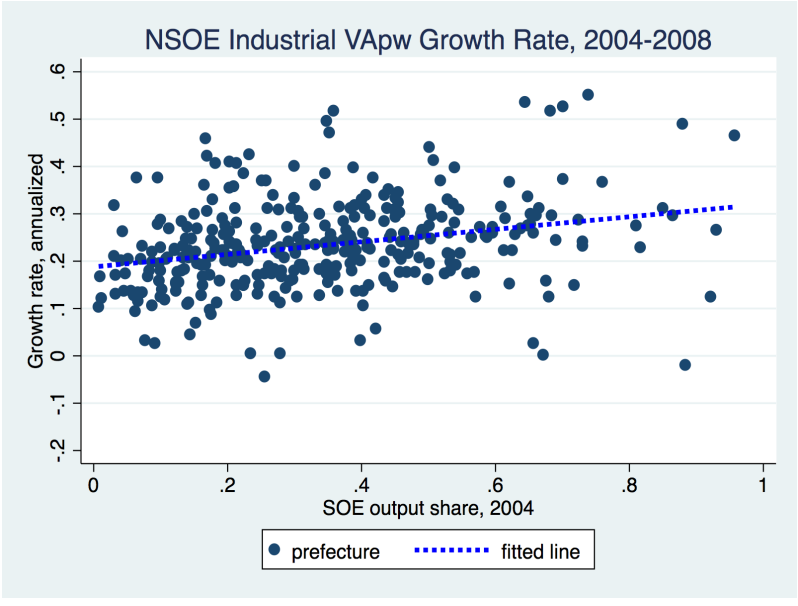
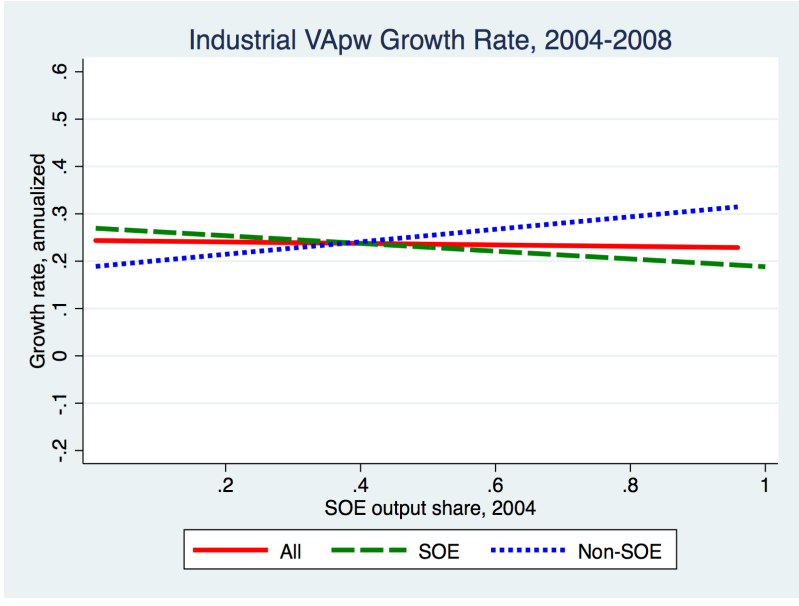
Growth Rate in VApw, 2004-2008





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

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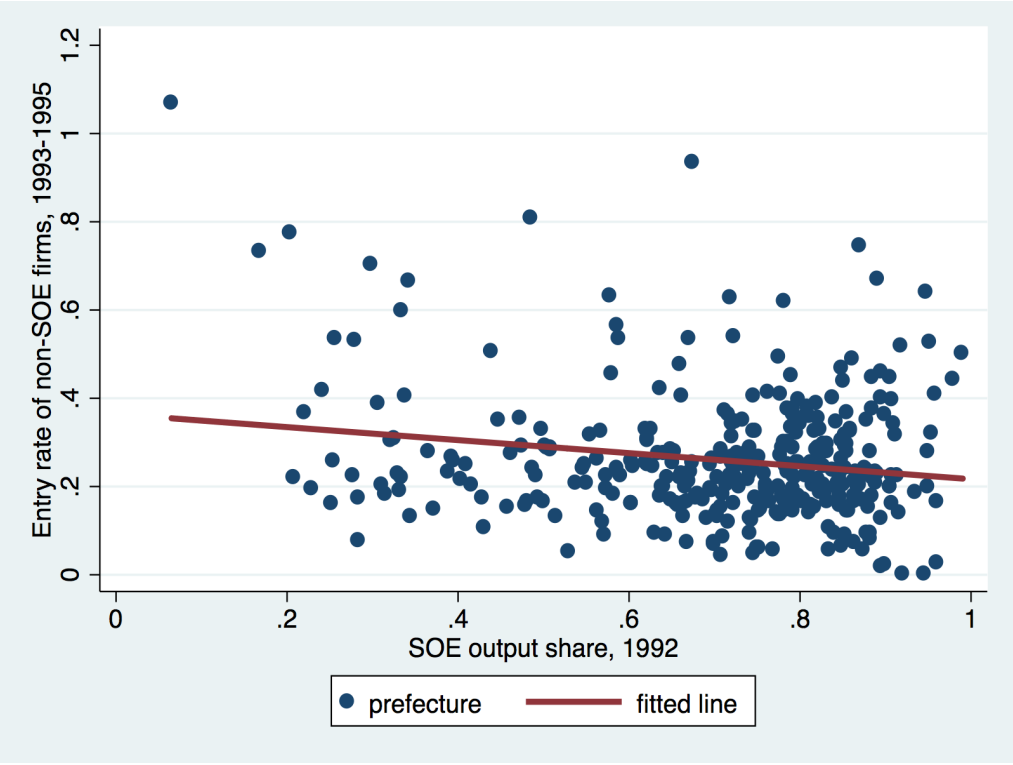
Non-SOE Entry in 1995



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

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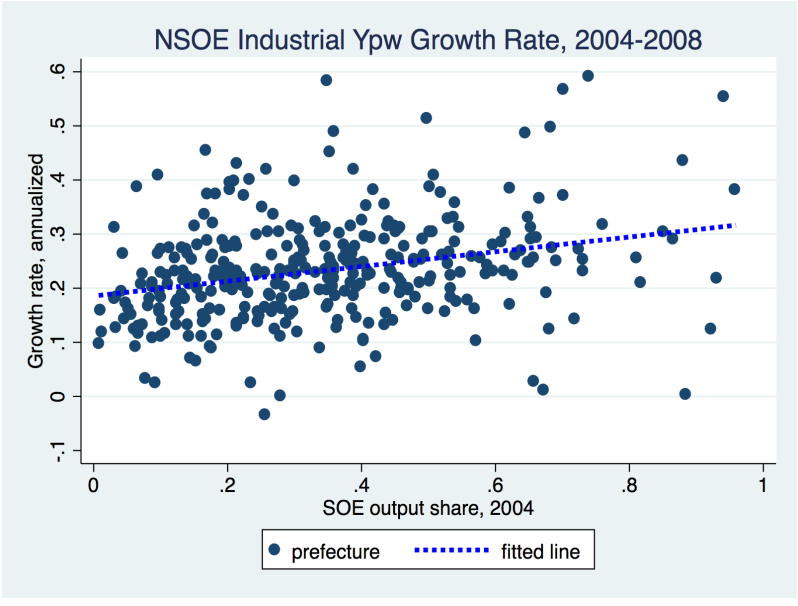
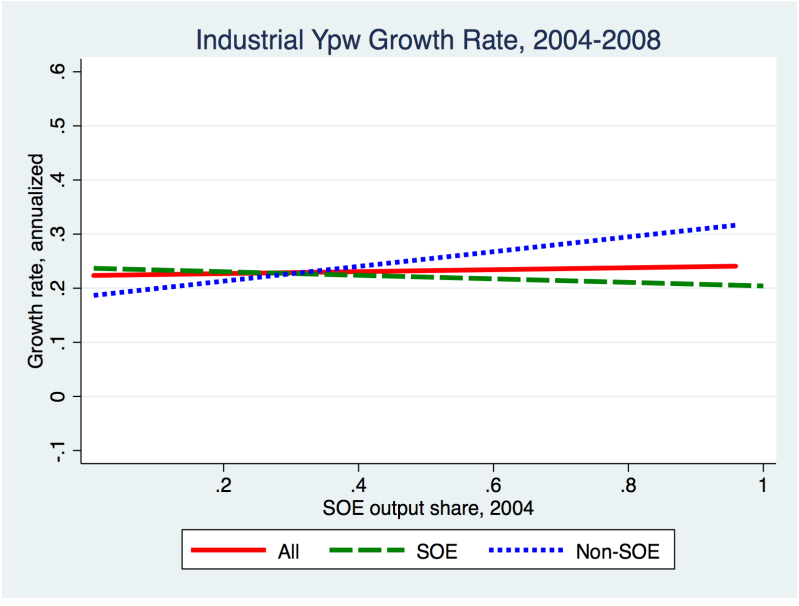
Growth Rate in Ypw, 2004-2008





- 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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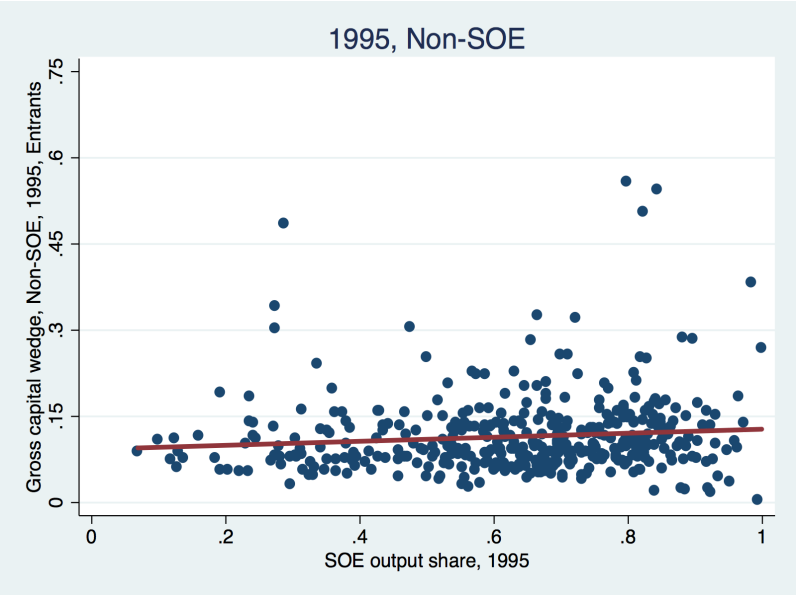
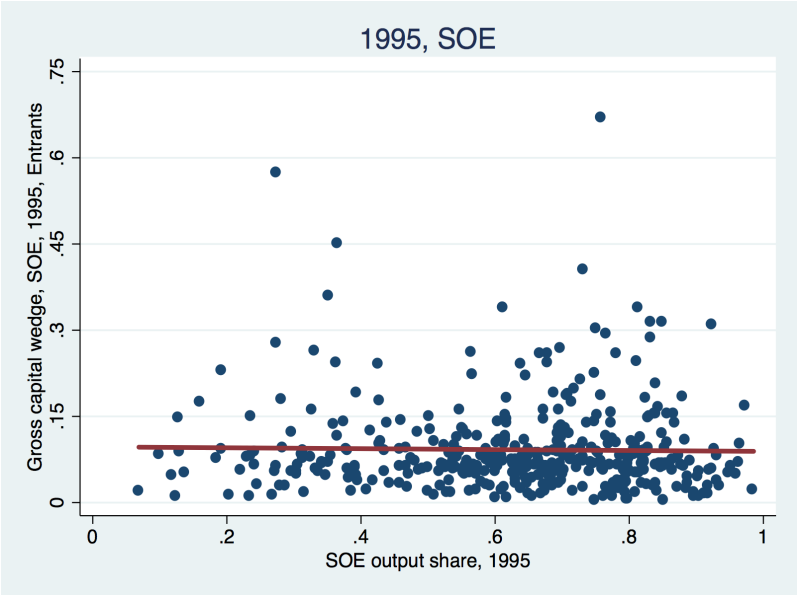
Gross Capital Wedge, Entrants: Δ^k





- 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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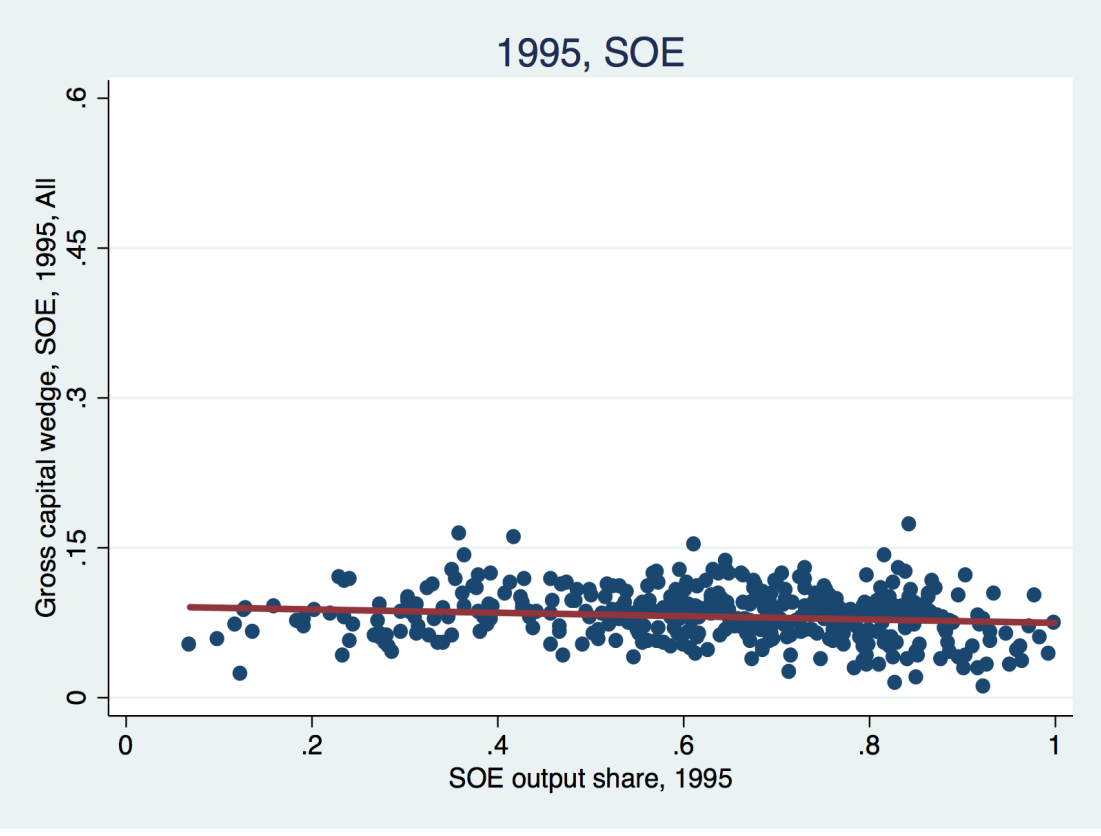
Gross Capital Wedge: Δ^k



- No relationship between capital taxes and s for SOE firms

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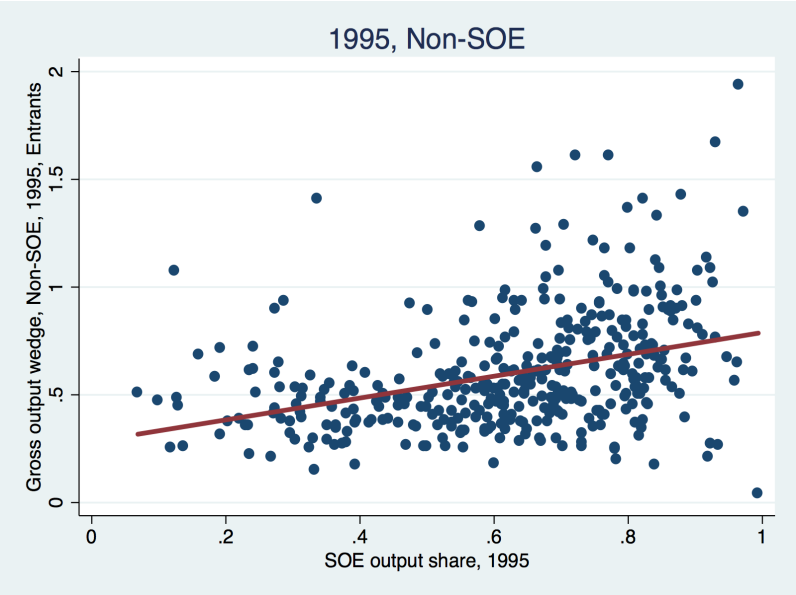
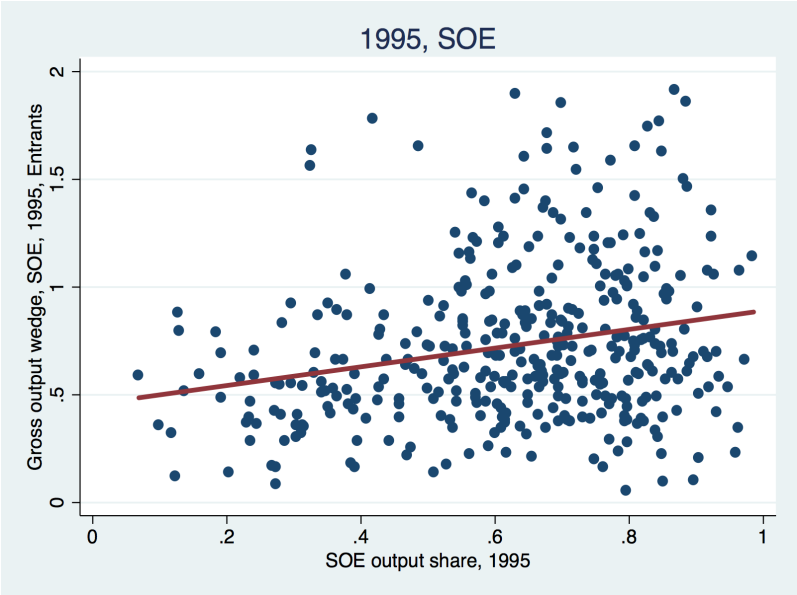
Gross Output Wedge, Entrants: Δ^y





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

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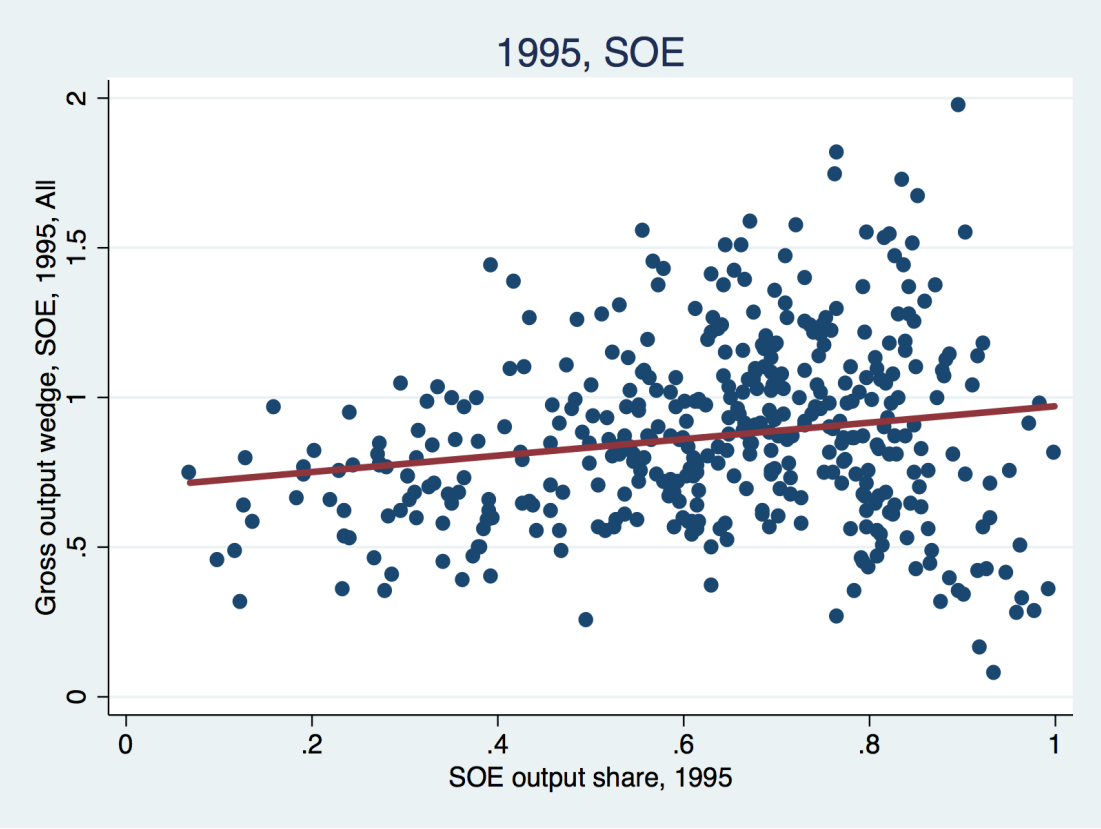
Gross Output Wedge: Δ^y



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

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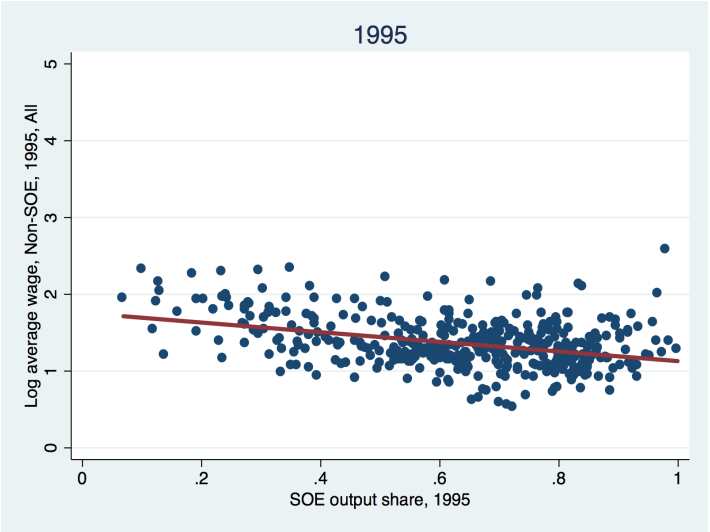
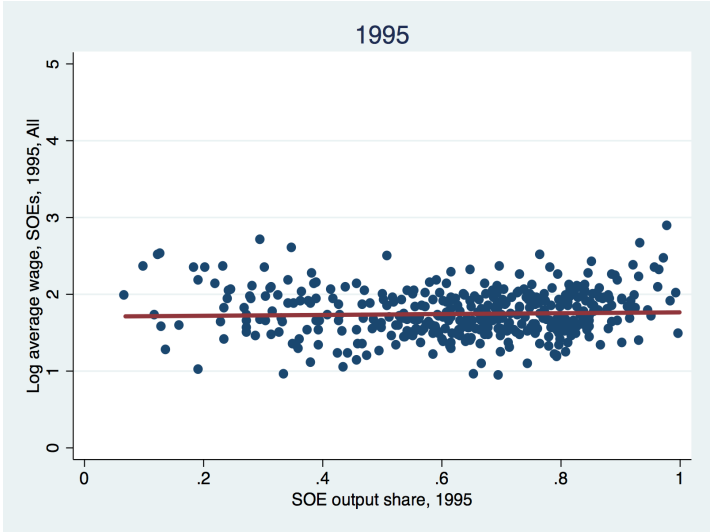
SOE and NSOE Wages in *s* Prefectures





- 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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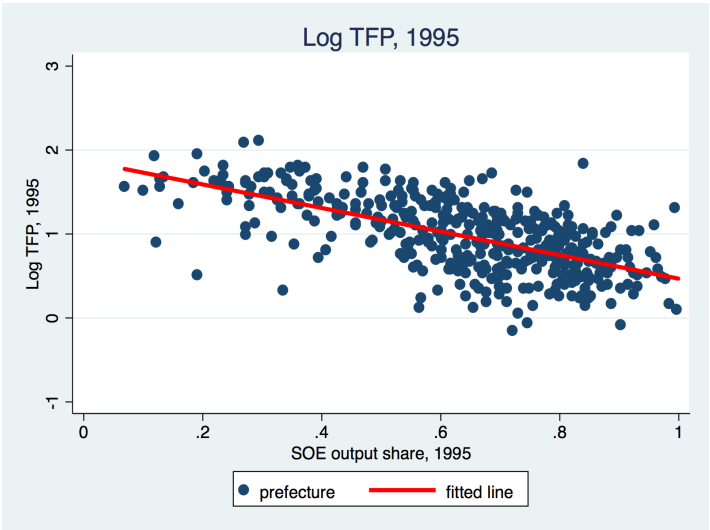
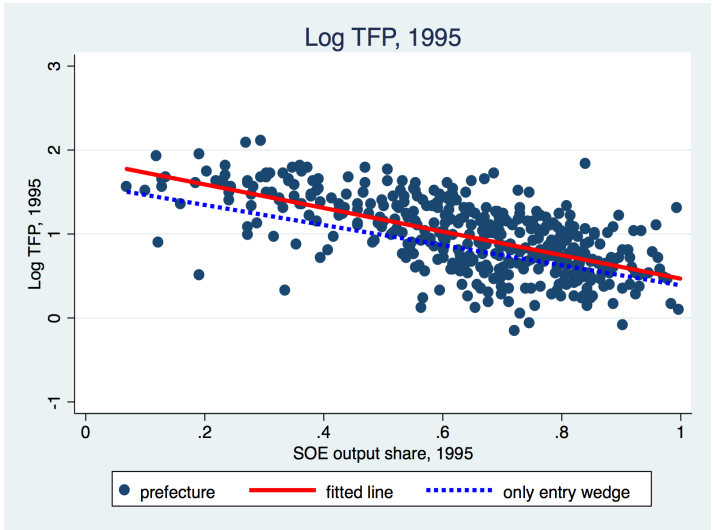
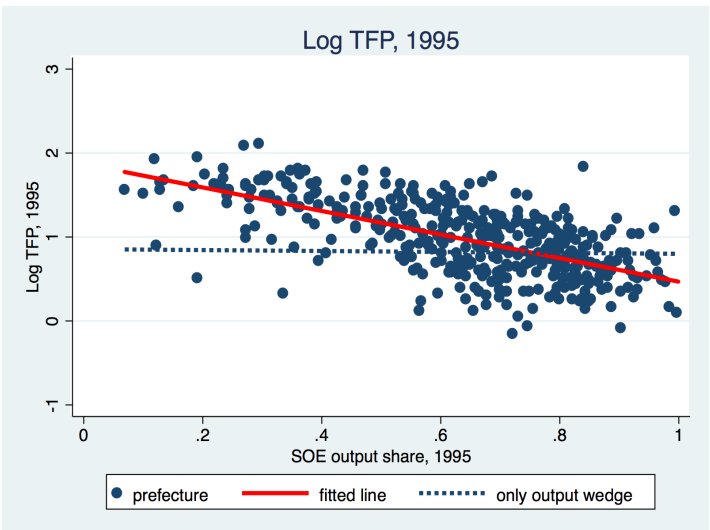
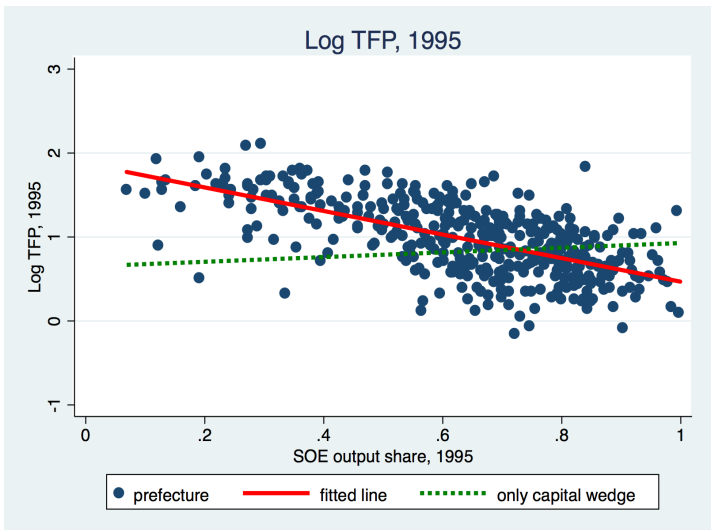
Wedges, SOE Share, and Log TFP: 1995









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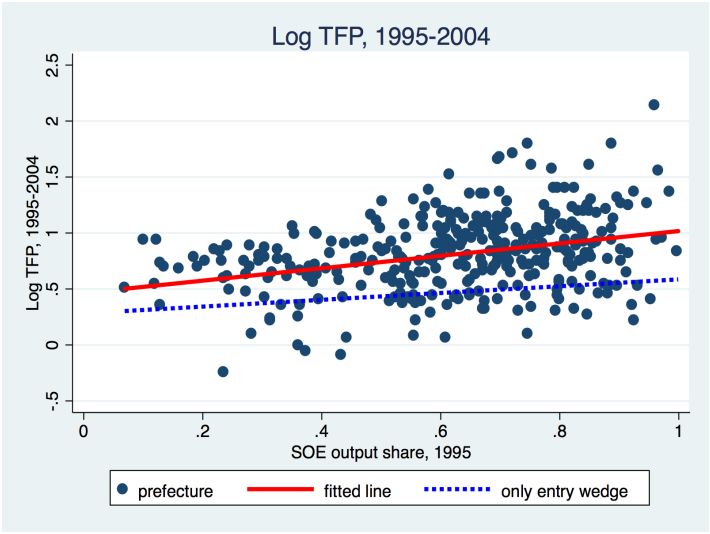
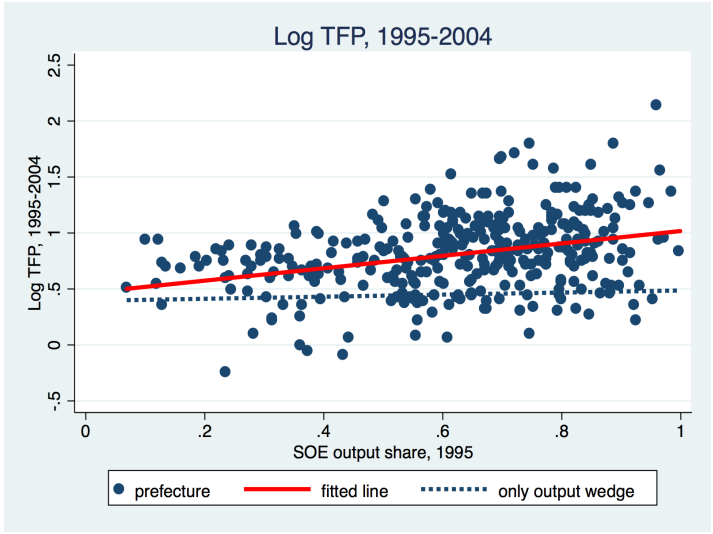
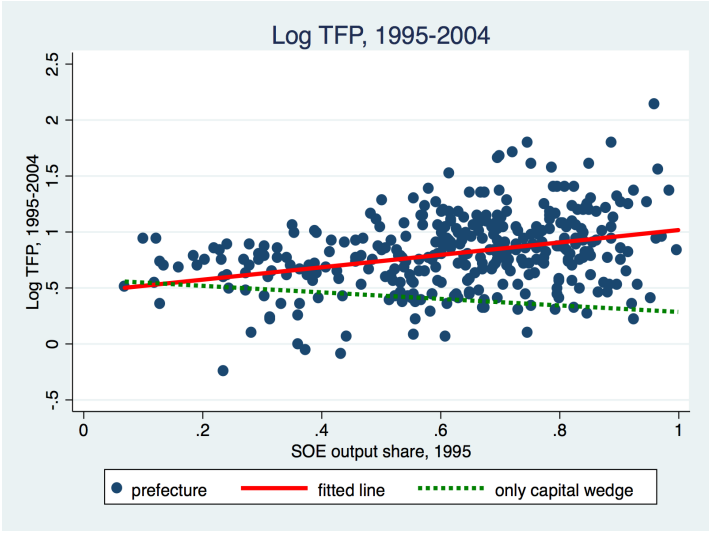
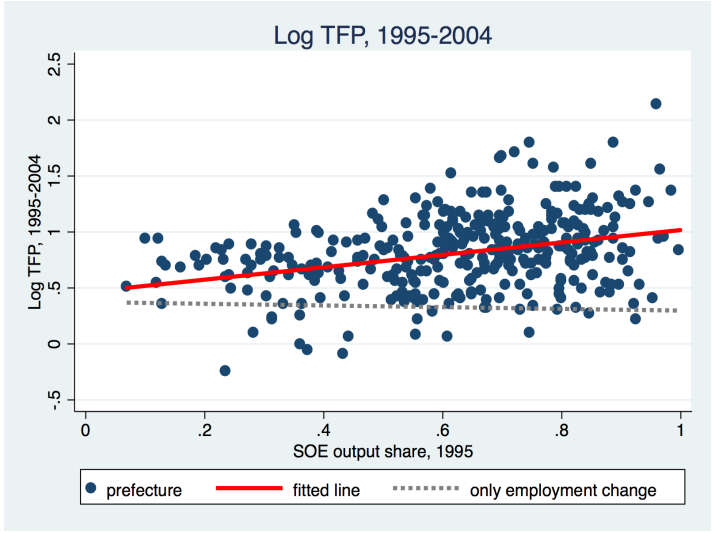
Wedges, SOE Share, and Log TFP: 1995-2004









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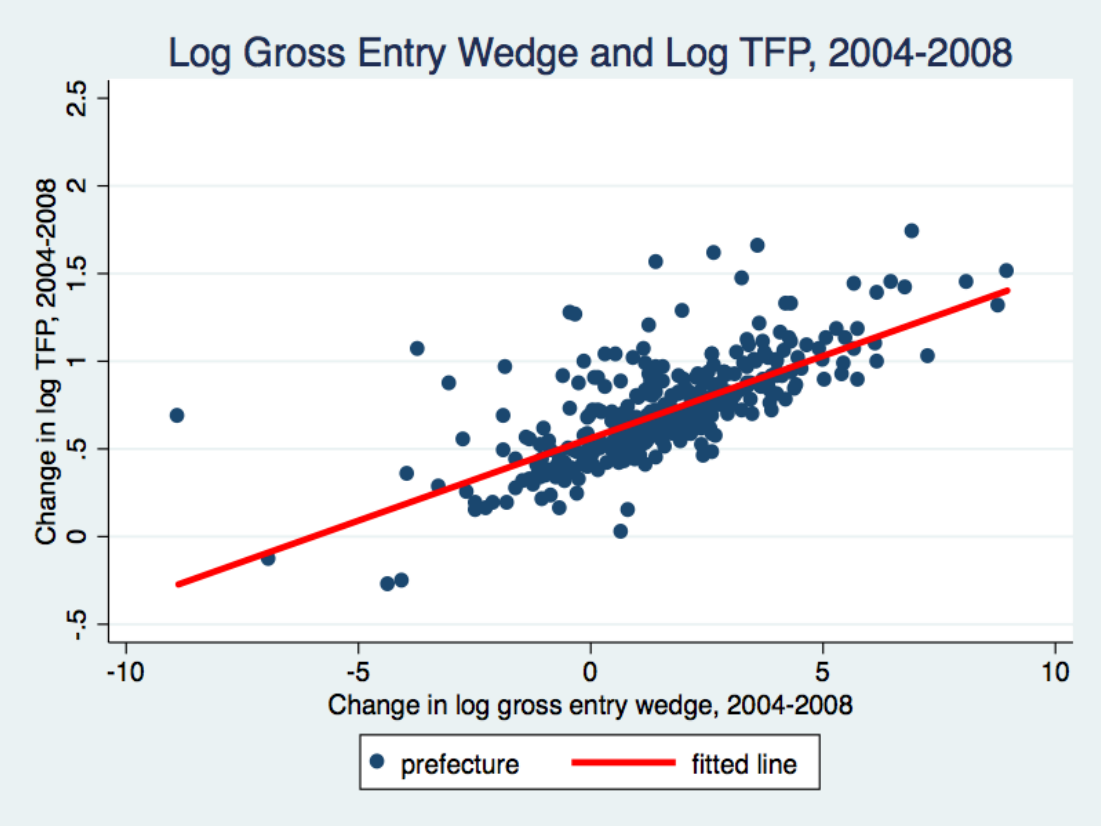
The Entry Wedge over Time, 2004-2008



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