Does External Monitoring Improve the Performance of State-Owned Enterprises?

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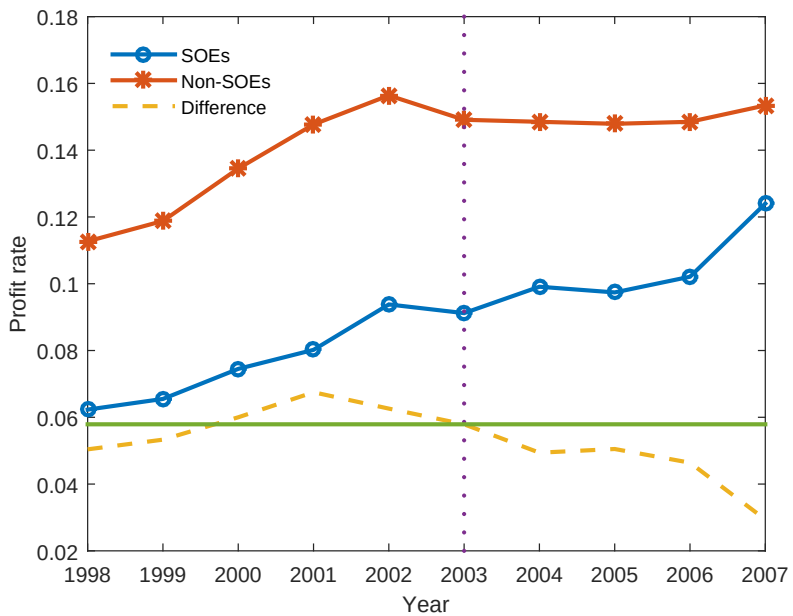
Motivation

Like in many countries, Chinese state-owned enterprises (SOEs), compared with private firms in manufacturing industries, are:

- larger – more capital stock and advantages in technology;
- underperforming – lower profitability and productivity (Jefferson and Rawski, 1994; Xu, 2011; Brandt, et al., 2012);

Nonetheless, the gap has narrowed down over time, especially after 2003 (Hsieh and Song, 2015; Berkowitz et al., 2018).



Motivation

Traditional focuses and explanations:

- internal incentivization/ effect of privatization:
  Groves, et al, 1994; Li, 1997; Estrin, et al, 2009; Chen, et al, 2017;
- Restructuring: Hsieh and Song (2015);
- Labor friction and capital market distortion: Berkowitz et al. (2017).

An important, but less explored perspective is external monitoring:

- SOEs face ineffective external monitoring on their management, due to:
  - unclear property rights ("owned by all the people");
  - weak legal enforcement arising from strong political connections.
- Consequence: corruption in procurement; shirking in production.
- Of first order importance (Becker, 1968; Allingham and Sandmo, 1972): internal incentives matter only when external monitoring strong enough.

Research Question

How does external monitoring from government influence SOE performance, by affecting managerial expropriation in procurement (material input prices) and shirking in production management (productivity)?

Weak monitoring $\Longrightarrow$ Procurement corruption $\Longrightarrow$ Higher input prices

$\Downarrow$ $\Downarrow$

Managerial shirking $\Longrightarrow$ Lower productivity $\Longrightarrow$ Weaker performance

- Managerial shirking
  - directly shirking in production management.
- Procurement corruption
  - corruption and kickbacks in material procurement;
  - conduct self-dealing and relational transactions;
  - shirk in bargaining for better material prices in the input market.

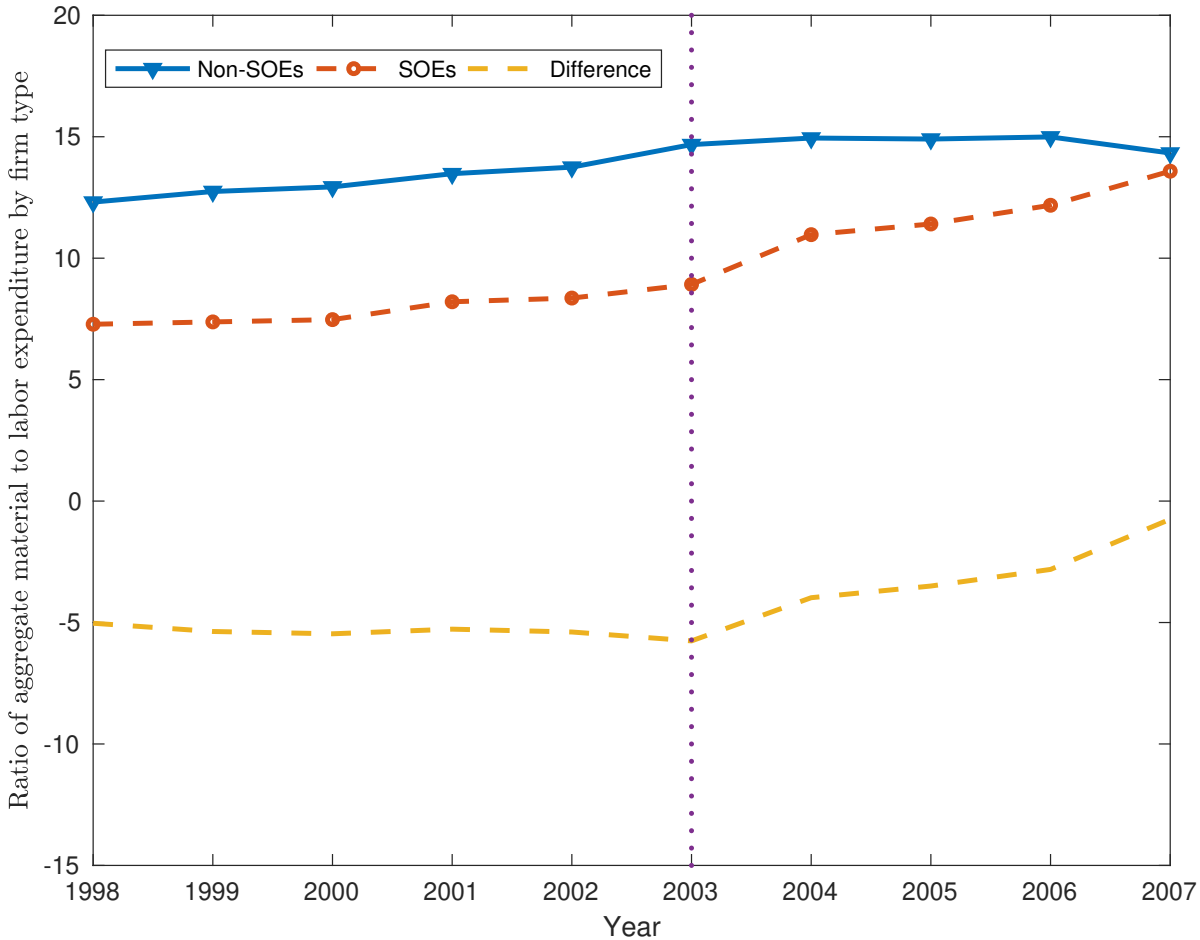
Why Care Material Input Prices?

Traditional literature on SOE performance: roles of labor and capital inputs:
—Firth et al., 2009; Song et al., 2011; Berkowitz et al., 2018.

Why material prices?

1. Large potential gains: material input accounts for a significant part of total variable costs (80-90%);
2. Large heterogeneity across firms (Ornaghi, 2006; Atalay, 2014);
3. Biased productivity estimate if material prices heterogeneity is ignored;
4. A direct channel through which external monitoring has an impact.

Ratio of Material Expenditure to Labor Expenditure



Challenges

- Our data—like most manufacturing survey datasets—does not include firm-level data on material input prices;
- Even if input prices are observed, they are usually not readily comparable, because firms choose input quality which vary by firm and is unobserved.
- Need to identify the mechanism from many firm performance drivers/policies involved.

What's New in This Paper

- Study the impacts of external monitoring on SOE performance, directly through two distinct channels: material input prices and productivity.
- Document the gaps between SOEs and non-SOEs in terms of both material input prices and productivity.
- Investigate the causality between external monitoring and SOE performance, using variations of monitoring strength in both time and spatial dimensions.
- We show that monitoring enhancement can be an effective policy tool to improve SOE performance.

Structure of the Talk

- Institutional background of SOE reform and external monitoring;
- Data and methodology to estimate productivity and material prices;
- Empirical investigation of the causality and results;
- Robustness checks of other driving forces;
- Conclusion.

SOE Reform and External Monitoring

Waves of SOE reform:

1. 1978-1984: management reform – greater autonomy and retaining profits.
2. 1985-1992: market-orientated reform – increased competition.
3. 1993-: ownership reform – privatization.

Fundamental problems of external monitoring remain:

- individuals do not have incentive to monitor.
- weak monitoring from government:
  - multiple departments jointly supervise, shirking responsibility.

A Nationwide Policy Shock: SASAC

To strengthen monitoring and management of SOEs, the State Council of China announced the establishment of State-owned Assets Supervision and Administration Commission (SASAC):

- established in March 2003;
- single powerful department with full responsibility for SOE performance; —many effective practice to strengthen monitoring.
- hierarchy: central, provincial, and prefecture-level SASAC offices;
- each SOE is supervised by one of the SASAC offices, depending on the level of its oversight/affiliated government.
- fruitful outcomes (2004-2008): initiated 77,081 monitoring projects regarding business operation and transactions, which saved over 28 billion RMB for SOEs and identified 3.69 billion RMB of corrupt money.

Main Purpose and Measures of SASAC

According to *"Policies, Laws & Regulations: Decree of the State Council of the People's Republic of China. No. 378"*, SASAC's main purpose is to :

- perform investors' responsibilities, supervise SOEs, and monitor state-owned assets.

Its main measures:

- adopts improved assessment and auditing criteria to enhance monitoring;
- is responsible to appoint, remove, and evaluate of top executives;
- designates board of supervisors to SOEs for further monitoring;
- participates in formulating the operational budgets and final accounts.

SASAC as a Quasi-experiment in Our Analysis

We use SASAC as a nationwide quasi-experiment policy change to identify the impact of strengthened monitoring on SOE performance, because

- SASAC was established and effective immediately in 2003;
- SASAC only directly affects SOEs, but not non-SOEs;
- SASAC enhanced external monitoring of SOEs:
  - sharp contrast to pre-2003: single- vs. multi-department supervision;
  - rigorous measures to strengthen monitoring of SOEs;
  - supervised by State Council and Central Discipline Inspection Commission.

Caveat: Any Other Concurrent Policies?

A map of SOE reform around and during the data period:

- Privatization started from 1992, and was reinforced in 1996 (*"grasp the large, let go of the small"*);
- *Ten Guidelines for SOE Reform* by the Fourth Plenary Sessions of 15th Central Committee of the Communist Party in 1999: use privatization, market competition, and modern enterprise system;
- China's accession to World Trade Organization (WTO) in 2001 with gradually reduced entry barriers for private firms.

Bottom line:

- SASAC was the biggest policy initiative directly regarding SOEs during 1998-2007.
- Results are robust after taking other forces into account.

Preview of Empirical Results

Findings:

- Gaps: SOEs' productivity is lower by 20% and they pay 6.4% higher input prices compared with non-SOEs;
- Evidence of causality:
  - Time dimension: SASAC narrowed down the gaps in input prices and productivity by one-half;
  - Spatial dimension: SOEs far away to their oversight governments have lower productivity and pay higher input prices.
- Catch-up: Strengthened external monitoring significantly contributed to the catch-up of SOEs to non-SOEs.

Implication:

- Monitoring enhancement as an effective tool to improve SOE performance.

Data: Chinese Manufacturing Industries

Firm-level survey from National Bureau of Statistics in China (1998-2007)

- all SOEs and non-SOEs with annual sales above 600,000 USD;
- 326,294 firms in total across 19 two-digit (SIC) manufacturing industries;
- 35,551 SOEs: state ownership over 30%, following Huang et al. (AER, 2018);
- firm-level total sales, number of workers, wage expenditure, material expenditure, capital stock, ownership, location, industry, etc.

Summary Statistics: SOEs v.s. Non-SOEs

Statistics	SOEs	Non-SOEs
Total Sales (Median)	1.648	2.143
Material Expenditure (Median)	1.221	1.665
Capital Stock (Median)	1.316	0.439
Wage Expenditure (Median)	0.212	0.146
Material Share over Total Variable Cost (Median)	0.795	0.903
Number of Firms	39,444	286,850

- SOEs possess significantly more capital stock $\rightarrow$ need to allow for capital mis-allocation across firms;
- material expenditure accounts for a substantial share of total variable costs $\rightarrow$ importance to focus on material prices.

Construction of Key Measures

Three key measures at the firm-level:

- input price and productivity using Grieco, Li, and Zhang (2016, 2018).
  - Grieco, Li, and Zhang (IER, 2016):
    - biased production estimation if input prices heterogeneity ignored;
    - estimate production functions with unobserved input prices heterogeneity.
  - Grieco, Li, and Zhang (2018):
    - take firms endogenous choices of material quality into account;
    - produce quality-adjusted measures of input prices and productivity.
- total factor productivity (TFP) using Levinsohn and Petrin (2003), without controlling for input price heterogeneity, a safeguard of our analysis.

Context of the Methodology

What we allow: non-optimal decisions, distortions, and resource mis-allocation in SOE and non-SOEs, at the firm level.

- input prices heterogeneity
  - managers' corruption in procurement;
  - market friction or market power (e.g., localized market, transportation costs, and firm size, SOEs' privilege).
- productivity heterogeneity
  - managers' shirking in exerting managerial effort;
  - vintage/quality of machinery.
- capital mis-allocation
  - SOEs' access to advanced equipment and technology;
  - SOEs' over-investment due to better access to financial resources.

Setup of the Empirical Model

Demand function:

$$P_{jt} = (Q_{jt})^{1/\eta}.$$

Production function:

$$Q_{jt} = \tilde{\Omega}_{jt}\left[\alpha_L L_{jt}^{\gamma} + \alpha_M M_{jt}^{\gamma} + \alpha_K K_{jt}^{\gamma}\right]^{\frac{1}{\gamma}}.$$

Firm capability following Kugler and Verhoogen (2009, 2012):

$$\tilde{\Omega}_{jt} = \left[\Omega_{jt}{}^{\theta} + H_{jt}^{\theta}\right]^{\frac{1}{\theta}}.$$

Input price menu:

$$\tilde{P}_{Mjt} = P_{Mjt} H_{jt}.$$

Material expenditure:

$$E_{Mjt} = \tilde{P}_{Mjt} M_{jt}.$$

Profit maximization:

$$\max_{Q_{jt}, L_{jt}, M_{jt}, H_{jt}} \quad P_{jt} Q_{jt} - \tilde{P}_{Mjt} M_{jt} - P_{L_{jt}} L_{jt}.$$

Setup of the Empirical Model

Denote $\omega_{jt} \equiv \ln \Omega_{jt}$, and assume it evolves according to an AR(1) process:

$$\omega_{jt+1} = f_0 + f_{soe} SOE_{jt} + f_{SASAC} SASAC_t + f_1 \omega_{jt} + \epsilon^{\omega}_{jt+1},$$

Denote $p_{Mjt} = \ln P_{Mjt}$, and assume it evolves according to an AR(1) process:

$$p_{Mjt+1} = g_0 + g_{soe} SOE_{jt} + g_{SASAC} SASAC_t + g_1 p_{Mjt} + \epsilon^{p}_{jt+1},$$

Note: no priori assumption on whether SOEs have lower or higher input prices or productivity, compared with non-SOEs.

Preferred Measures of Input Prices and Productivity

Two-stage estimation

Stage 1: quality-inclusive measures $(\tilde{\Omega}_{jt}, \tilde{P}_{Mjt})$, by Grieco, Li, and Zhang (2016)

- How: utilize the firm's static optimization of labor and material quantity;
- Data: revenue, expenditures on material and labor, wage rate, and capital;
- Feature: control for input price heterogeneity, but $(\tilde{\Omega}_{jt}, \tilde{P}_{Mjt})$ are quality-inclusive.

Stage 2: our preferred measures (Ω_{jt}, P_{Mjt}), by Grieco, Li, and Zhang (2018)

- How: utilize the optimality condition of input quality choice;
- Data: estimates from the first stage;
- Feature: (Ω_{jt}, P_{Mjt}) are quality-adjusted.

Preferred Measures of Input Prices and Productivity

Two-stage estimation

Stage 1: quality-inclusive measures ($\tilde{\Omega}_{jt}, \tilde{P}_{Mjt}$), by Grieco, Li, and Zhang (2016)

- Use first order conditions of labor and material to recover:

$$M_{jt} = \left[\frac{\alpha_L E_{Mjt}}{\alpha_M E_{Ljt}}\right]^{\frac{1}{\gamma}} L_{jt}$$

$$\tilde{\Omega}_{jt} = \frac{1}{\alpha_L}\frac{\eta}{1+\eta} L_{jt}^{-\gamma} E_{L_{jt}} \left[\alpha_L L_{jt}^{\gamma}\left(1+\frac{E_{M_{jt}}}{E_{L_{jt}}}\right) + \alpha_K K_{jt}^{\gamma}\right]^{1-\frac{1}{\gamma}(1+\frac{1}{\eta})}$$

- Substitute into revenue equation to estimate production and demand parameters.

$$R_{jt} = \frac{\eta}{1+\eta}\left[E_{M_{jt}} + E_{L_{jt}}\left(1+\frac{\alpha_K}{\alpha_L}\left(\frac{K_{jt}}{L_{jt}}\right)^{\gamma}\right)\right] e^{\epsilon_{jt}}.$$

Stage 1: Quality-Inclusive Firm Heterogeneity

- Stage 1 recovers two endogenous variables due to quality choice:
  - Quality-inclusive firm capability, $\tilde{\Omega}_{jt}$.
  - Quality-inclusive input price, $\tilde{P}_{Mjt}$.
- These variables turn out to be highly correlated.
- Consistent with high-productivity firms choosing high quality inputs (Kugler and Verhoogen 2012, De Loecker et al. 2016).

Stage 2: Quality-adjusted Measures (Ω_{jt}, P_{Mjt})

- Our model accounts for this correlation through endogenous choice of input quality, which can be inverted to recover productivity and a quality-adjusted input price.
- Key assumptions:
  1. Lagged productivity affects input prices only though quality choice.
  2. Lagged quality adjusted input price does not affect current productivity.
  3. Shocks to quality adjusted input price and productivity may be correlated.

Preferred Measures of Input Prices and Productivity

Two-stage estimation

Stage 2: quality-adjusted measures (Ω_{jt}, P_{Mjt}), by Grieco, Li, and Zhang (2018)

- First order condition of input quality implies that input quality is a monotone function of productivity (in logs):

$$h_{jt} = \frac{1}{\theta} \ln \frac{\sigma_{Mjt}}{1 - \sigma_{Mjt}} + \omega_{jt}$$

- Use this in capability function and input price menu to recover (in logs),

$$\begin{aligned} \omega_{jt} &= \tilde{\omega}_{jt} + \frac{1}{\theta} \ln(1 - \sigma_{Mjt}), \\ p_{Mjt} &= \tilde{p}_{Mjt} - \tilde{\omega}_{jt} - \frac{1}{\theta} \ln(\sigma_{Mjt}), \end{aligned}$$

- Estimate θ, with σ_{Mjt}, $\tilde{\omega}_{jt}$, and $\tilde{p}_{jt}$ computed from data and stage 1, using Markov assumption *a la* Olley and Pakes (1996).

Empirical Objective and Strategy

Objective: how does external monitoring from government on firm management affect the performance of SOEs in China?

Strategy:

- compare SOEs to non-SOEs in terms of productivity and input prices;
- investigate the causal relationship using variations in monitoring strength
  - in the time dimension: establishment of SASAC in 2003;
  - in the spatial dimension: the role of monitoring costs.

SOEs v.s. Non-SOEs

Conjecture 1 (SOEs v.s. non-SOEs) SOEs pay higher input price and have lower productivity, compared with non-SOEs.

Regressions:

$$Y_{jt} = \beta_0 + \beta_{soe} SOE_{jt} + \beta_z Z_{jt} + \lambda_{ind} + \lambda_{prov} + \lambda_t + \varepsilon_{jt},$$

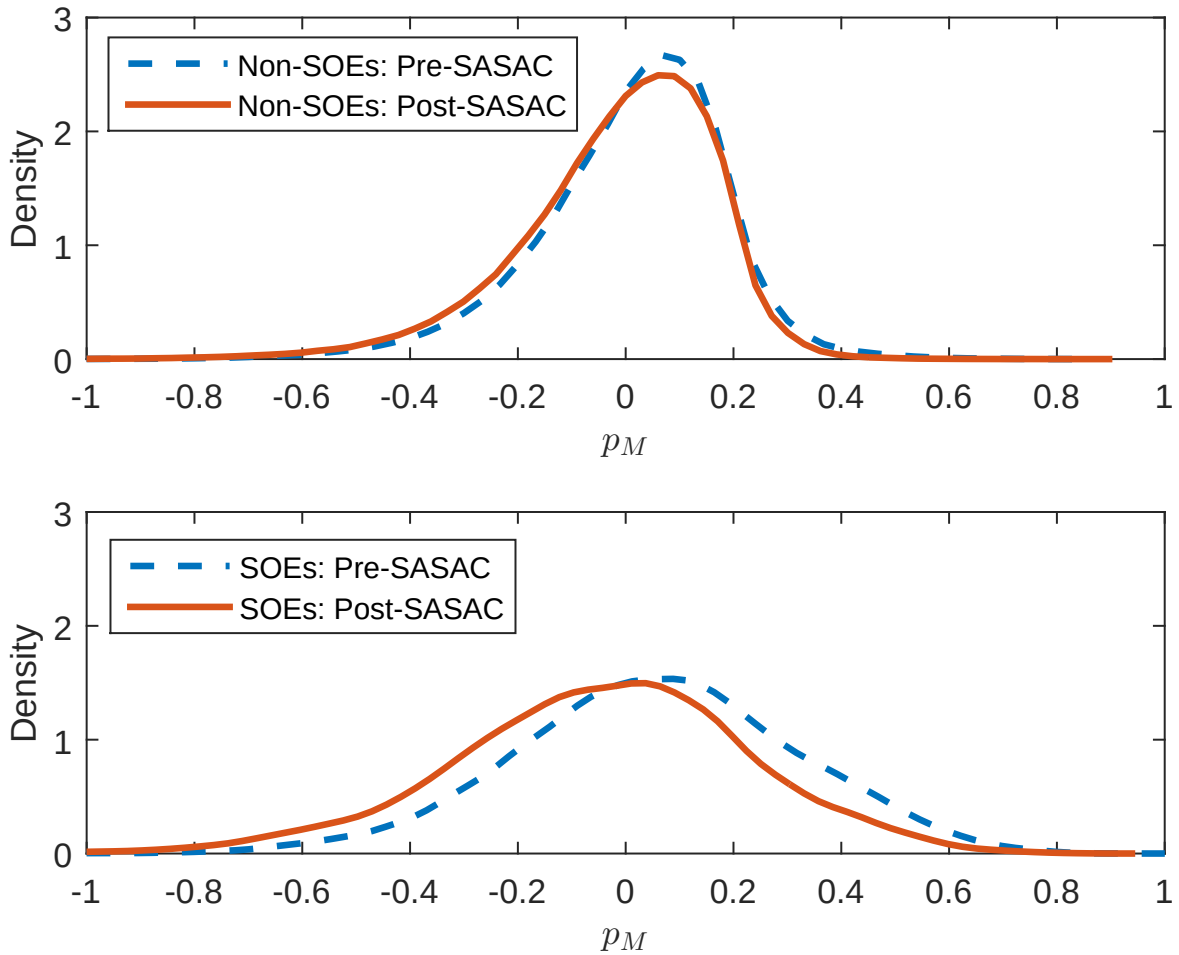
where Y_{jt} is input prices, productivity, or TFP (all in logarithm), and Z_{jt} includes firm characteristics (e.g., age, size).

Performance Comparison of SOE and non-SOEs

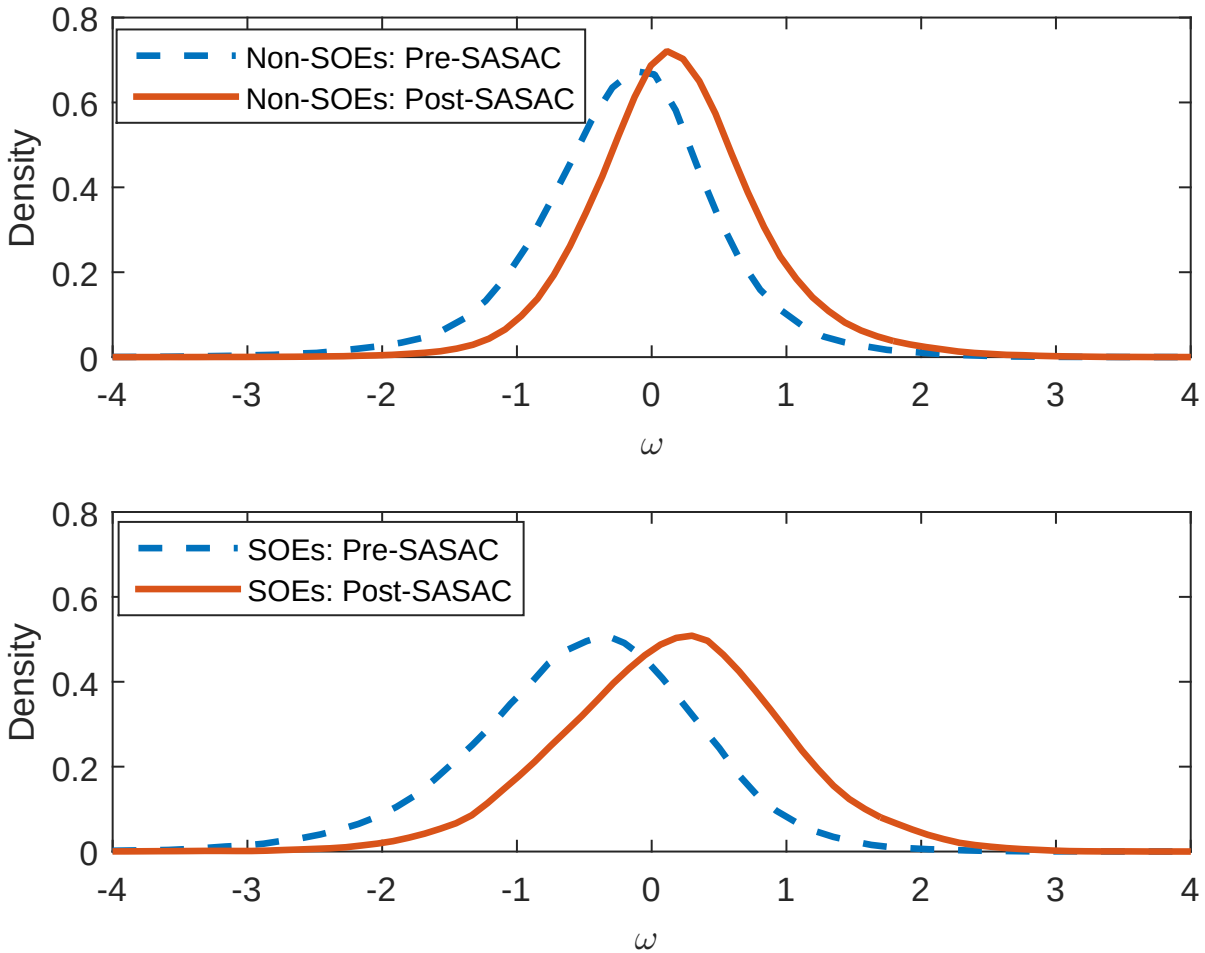
	(1) input price	(2) input price	(3) productivity	(4) productivity	(5) TFP	(6) TFP
SOE	0.067***	0.064***	-0.226***	-0.199***	-0.170***	-0.161***
	(0.001)	(0.001)	(0.004)	(0.003)	(0.002)	(0.002)
Age, Size	YES	YES	YES	YES	YES	YES
R&D, K-intensity		YES		YES		YES
Observations	1196053	873414	1196053	873414	1196053	873414
Adjusted R^2	0.943	0.967	0.928	0.966	0.685	0.725

Caveat: correlation, not causality.

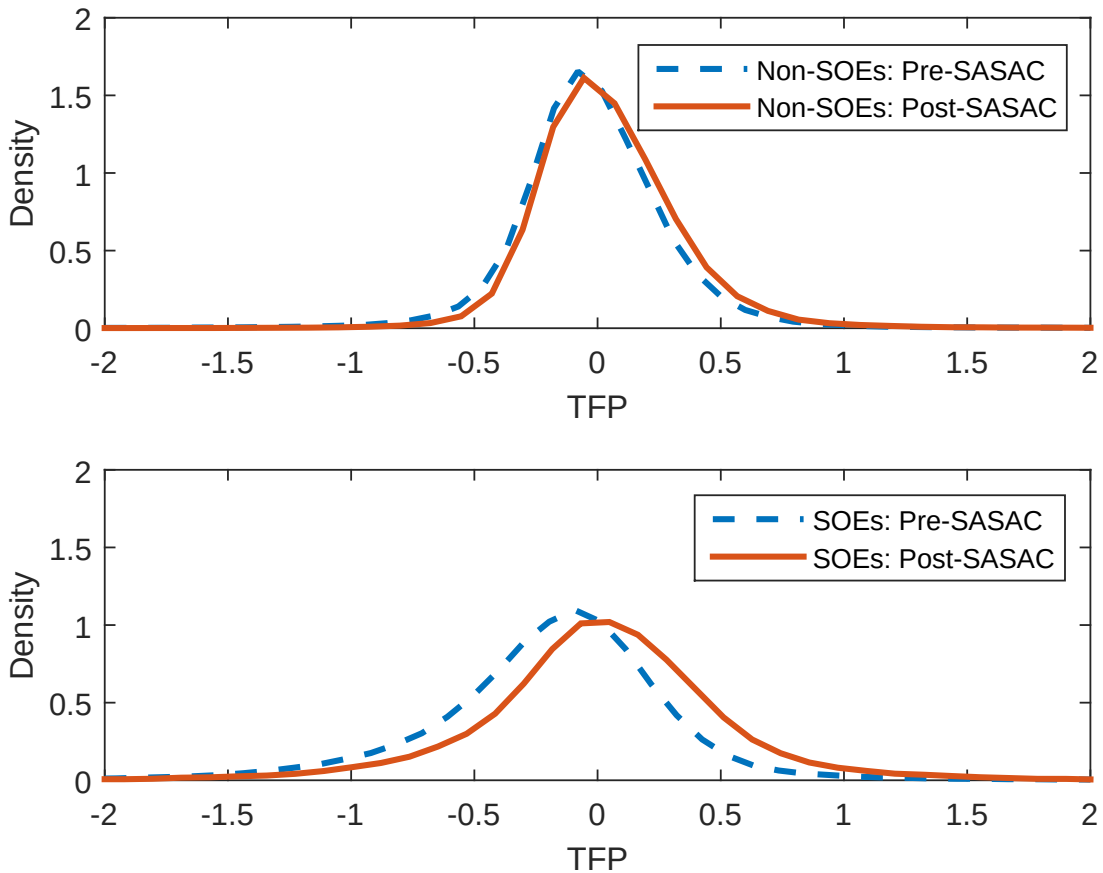
Input Prices: Before and After SASAC



Productivity: Before and After SASAC



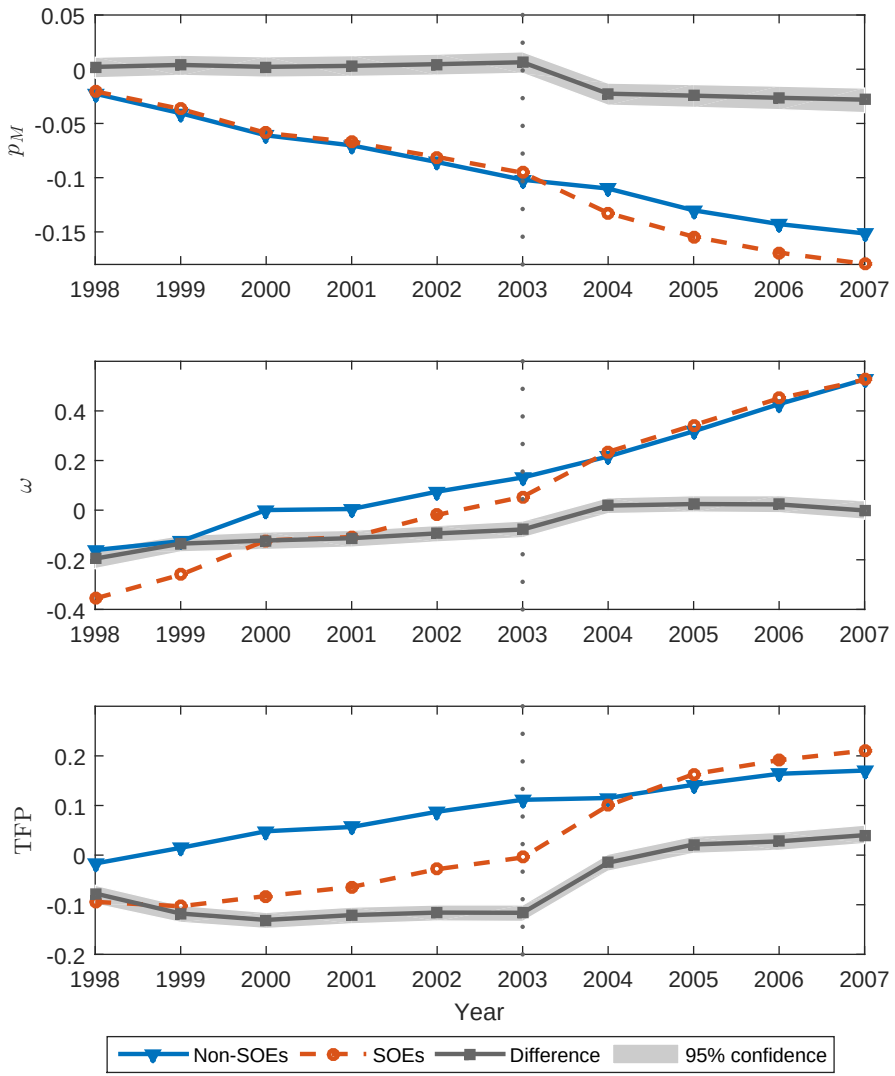
TFP: Before and After SASAC



Summary: Before and After SASAC

- A difference-in-difference comparision: the changes of input prices, productivity and TFP are siginificantly larger for SOEs after SASAC.
- Could also be driven by entry, exit or privatization.
- Now consider a balanced panel without entry, exit or privatization.

Evolution of Key Measures (Mean), SOE vs non-SOE



Summary: Evolution of Key Measures by Group

- Before and after SASAC, the gaps are almost stable;
- Immediately after SASAC, there is a significant jump in each of the measures $\rightarrow$ suggest the impact of SASAC;
- The jumps are mainly due to the improvement of SOEs, rather than the down-performance of non-SOEs $\rightarrow$ suggest the impact on SOEs only.
- Now let's control for other firm characteristics using regressions.

SASAC and SOE Performance

Conjecture 2 (SASAC Effect) The establishment of SASAC reduces input prices and increases productivity of SOEs.

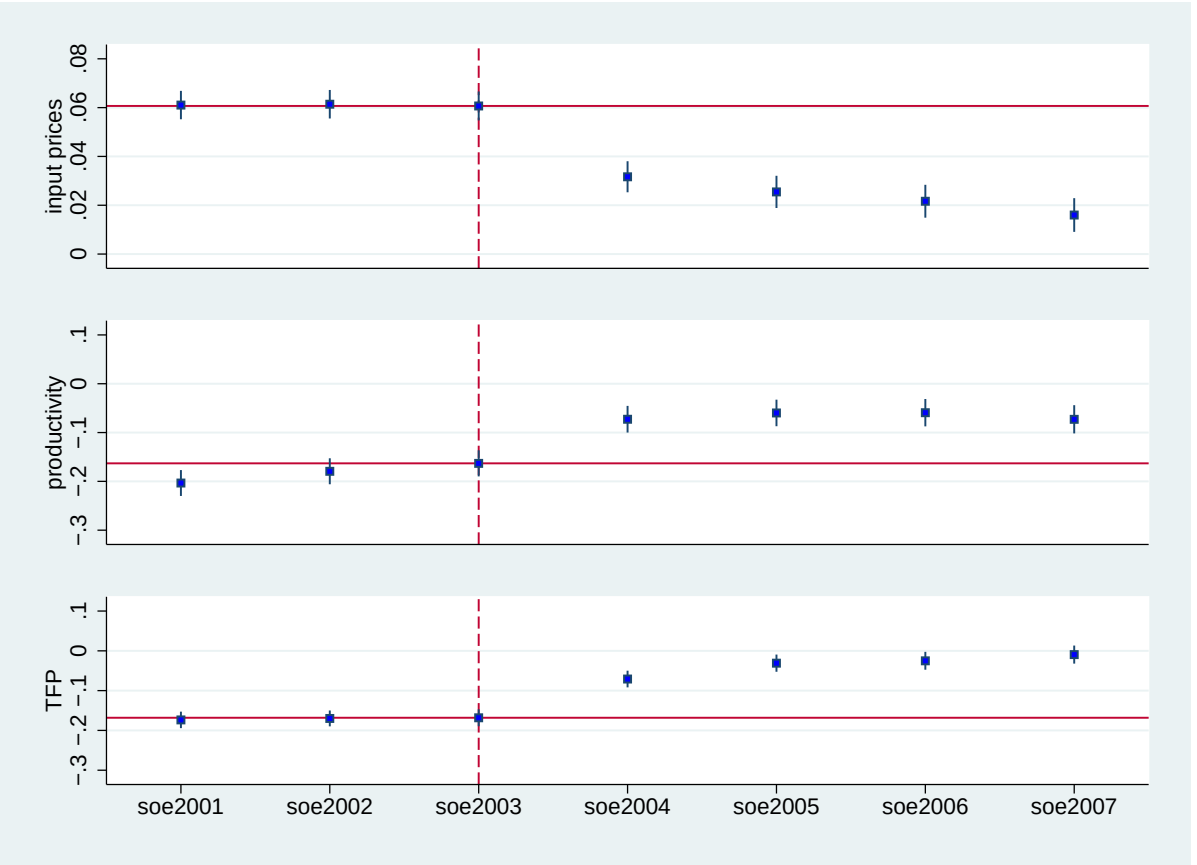
Regressions:

$$Y_{jt} = \beta_0 + \beta_{soe} SOE_{jt} + \beta_{soe*SASAC} (SOE_{jt} * SASAC_t) + \beta_z Z_{jt} + \lambda_{ind} + \lambda_{prov} + \lambda_t + \varepsilon_{jt}.$$

SASAC and SOE Performance

	(1) input price	(2) input price	(3) productivity	(4) productivity	(5) TFP	(6) TFP
SOE	0.082***	0.076***	-0.283***	-0.239***	-0.200***	-0.191***
	(0.001)	(0.001)	(0.005)	(0.003)	(0.002)	(0.003)
SASAC*SOE	-0.056***	-0.039***	0.213***	0.126***	0.113***	0.095***
	(0.001)	(0.001)	(0.006)	(0.004)	(0.004)	(0.004)
Age, Size	YES	YES	YES	YES	YES	YES
R&D, K-intensity		YES		YES		YES
Observations	1196053	873414	1196053	873414	1196053	873414
Adjusted R^2	0.943	0.967	0.929	0.966	0.686	0.726

Dynamic Effect of SASAC and Test for Pre-trend



$$Y_{jt} = \beta_0 + \beta_{soe} SOE_{jt} + \sum_{t=2001}^{2007} \beta_{soe*t} \left(SOE_{jt} * D_t\right) + \beta_z Z_{jt} + \lambda_{ind} + \lambda_{prov} + \lambda_t + \varepsilon_{jt}.$$

Monitoring Costs and SOE Performance

Larger monitoring costs → lower strength of monitoring → higher level of shirking/managerial expropriation → weaker performance.

Proxy monitoring costs as distance of an SOE to its oversight government:

- information asymmetry and monitoring difficulties, following Huang et al. (AER, 2018);
- each SOE has its own oversight government.

Potential concern: distance may contain effect of agglomeration and localization.

Solution:

- same affiliation system for non-SOEs;
- but, non-SOEs' affiliated government bears no responsibility for monitoring.

Monitoring Costs and SOE Performance

Conjecture 3 (Monitoring Costs and SOE Performance) Higher monitoring costs reduce SOE performance, through the input prices and productivity channels.

Regressions:

$$\begin{aligned} Y_{jt} &= \beta_0 + \beta_{soe} SOE_{jt} + \beta_{soe*dist} \left(SOE_{jt} * Dist_{jt}\right) + \beta_{dist} Dist_{jt} + \beta_z Z_{jt} \\ &+ \lambda_{ind} + \lambda_{prov} + \lambda_t + \varepsilon_{jt}. \end{aligned}$$

Monitoring Costs and SOE Performance

	(1) input price	(2) input price	(3) productivity	(4) productivity	(5) TFP	(6) TFP
SOE	0.062***	0.060***	-0.189***	-0.169***	-0.165***	-0.157***
	(0.002)	(0.001)	(0.008)	(0.006)	(0.005)	(0.005)
SOE*Dist	0.002***	0.001***	-0.011***	-0.006***	0.001	0.002
	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)	(0.001)
Dist	YES	YES	YES	YES	YES	YES
Age, Size	YES	YES	YES	YES	YES	YES
R&D, K-intensity		YES		YES		YES
Observations	541117	392900	541117	392900	541117	392900
Adjusted R^2	0.946	0.970	0.928	0.966	0.669	0.707

Monitoring Costs, SASAC, and Performance

Combining both the time dimension and spatial dimension, we expect:

SASAC alleviates the negative effects of monitoring costs, because:

- larger potential gains;
- SASAC may spend more monitoring effort on distant firms.

Regressions:

$$\begin{aligned} Y_{jt} = & \beta_0 + \beta_{soe} SOE_{jt} + \beta_{soe*dist} (SOE_{jt} * Dist_{jt}) + \beta_{soe*sasac} (SOE_{jt} * SASAC_t) \\ & + \beta_{soe*dist*sasac} (SOE_{jt} * Dist_{jt} * SASAC_t) + \beta_{dist*sasac} (Dist_{jt} * SASAC_t) \\ & + \beta_{dist} Dist_{jt} + \beta_z Z_{jt} + \lambda_{ind} + \lambda_{prov} + \lambda_t + \varepsilon_{jt}. \end{aligned}$$

Monitoring Costs, SASAC, and Performance

	(1) input price	(2) input price	(3) productivity	(4) productivity	(5) TFP	(6) TFP
SOE	0.067***	0.064***	-0.222***	-0.196***	-0.175***	-0.165***
	(0.002)	(0.001)	(0.009)	(0.007)	(0.005)	(0.005)
SASAC*SOE	-0.026***	-0.019***	0.141***	0.096***	0.051***	0.035***
	(0.003)	(0.002)	(0.013)	(0.010)	(0.008)	(0.008)
SOE*Dist	0.005***	0.003***	-0.014***	-0.007***	-0.004**	-0.004**
	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)	(0.002)
SASAC*SOE*Dist	-0.007***	-0.005***	0.008**	0.003	0.015***	0.015***
	(0.001)	(0.001)	(0.004)	(0.003)	(0.002)	(0.002)
SASAC*Dist	YES	YES	YES	YES	YES	YES
Dist	YES	YES	YES	YES	YES	YES
Age, Size	YES	YES	YES	YES	YES	YES
R&D, K-intensity		YES		YES		YES
Observations	541117	392900	541117	392900	541117	392900
Adjusted R^2	0.946	0.970	0.928	0.966	0.669	0.708

What Makes Monitoring Distance Matter?

	input price	productivity	TFP	input price	productivity	TFP
SOE	0.060***	-0.188***	-0.152***	0.063***	-0.186***	-0.161***
	(0.002)	(0.011)	(0.009)	(0.002)	(0.008)	(0.006)
SASAC*SOE	-0.018***	0.087***	0.022*	-0.019***	0.087***	0.031***
	(0.003)	(0.015)	(0.013)	(0.002)	(0.011)	(0.010)
SOE*RoadDist	0.004***	-0.008***	-0.006***			
	(0.001)	(0.003)	(0.002)			
SASAC*SOE*RoadDist	-0.005***	0.005	0.015***			
	(0.001)	(0.003)	(0.003)			
SOE*Dist				0.004***	-0.008***	-0.003*
				(0.001)	(0.002)	(0.002)
SASAC*SOE*Dist				-0.006***	0.006**	0.017***
				(0.001)	(0.003)	(0.003)
SOE*Dist*TraDiff				0.003***	-0.014***	-0.007*
				(0.001)	(0.003)	(0.004)
SASAC*SOE*Dist*TraDiff				0.001	0.005	-0.006
				(0.001)	(0.004)	(0.004)
Other Dist-related Interactions	YES	YES	YES	YES	YES	YES
Age, Size	YES	YES	YES	YES	YES	YES
R&D, K-intensity	YES	YES	YES	YES	YES	YES
Observations	314665	314665	314665	314530	314530	314530
Adjusted R^2	0.969	0.965	0.705	0.969	0.965	0.705

Imply: physical interaction of government officials and SOEs is the major channel that makes distance matter.

A Brief Summary

We have shown:

- Ineffective monitoring is responsible for the weak SOE performance;
- Evidence of causality from both the time and spatial dimensions:
  - monitoring costs impair SOE performance;
  - SASAC improved SOE performance.

What is the impact at the aggregate level?

Aggregate Impacts

Table: *Impact on Aggregate Input Prices and Productivity (%)*

	Input Price	Productivity	TFP
Panel A: Impact of SASAC			
SOEs	-3.97	10.84	9.72
Manufacturing Sector	-0.51	1.39	1.24
Panel B: Impact of Monitoring Costs			
SOEs	1.15	-2.67	-1.53
Manufacturing Sector	0.20	-0.46	-0.26

Robustness Checks with Alternative Explanations

- Labor friction
- Market Power/Competition
- Restructuring of SOEs
- Privatization and Internal Monitoring/Incentive
- Pre-trend
- Balanced panel
- World Trade Organization
- Alternative Definition of SOEs
- Firm-level Import and Export Engagement
- Firm Fixed Effects

Conclusion

- We empirically investigate how external monitoring affects SOE performance through both channels of material input prices and productivity in the context of Chinese manufacturing industries.
- We apply a structural method to separately estimate material input prices and productivity from observable data.
- Time and spatial evidence shows that ineffective external monitoring contributed to the weak SOE performance.
- Results imply that external monitoring enhancement could be an effective policy to improve firm performance.