A Model of China's State Capitalism

Xi Li, Xuewen Liu, Yong Wang

HKUST

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State capitalism as alternative growth model

US Congress blame SOE subsidies to POEs for China CA surplus

U.S.-China Economic and Security Review Commission

October 26, 2011

An Analysis of State-owned Enterprises and State Capitalism in China

Further SOE Reforms Needed

China 2030

Building a Modern, Harmonious, and Creative High-Income Society

The World Bank

Development Research Center of the State Council, the People's Republic of China

SOEs Are Rich Now!!

Table 2. Chinese firms in 2011 Fortune Global 500

Company Name	Fortune Rank	Revenues ($millions)	Headquarter	Industry
Sinopec Group	5	273422	Beijing	Oil and Refinery
China National Petroleum	6	240192	Beijing	Oil and Refinery
State Grid	7	226294	Beijing	Electricity Power
Industrial & Commercial Bank of China	77	80501	Beijing	Banking
China Mobile Communications	87	76673	Beijing	Telecom
China Railway Group	95	69973	Beijing	Construction and Infrastructure
China Railway Construction	105	67414	Beijing	Construction and Infrastructure
China Construction Bank	108	67081	Beijing	Banking
China Life Insurance	113	64635	Beijing	Insurance
Agricultural Bank of China	127	60536	Beijing	Banking
Bank of China	132	59212	Beijing	Banking
Dongfeng Motor	145	55748	Wuhan	Automobile
China State Construction Engineering	147	54721	Beijing	Construction and Infrastructure
China Southern Power Grid	149	54449	Guangzhou	Electricity Power

Puzzling Fact 1: SOEs Outperformed POEs

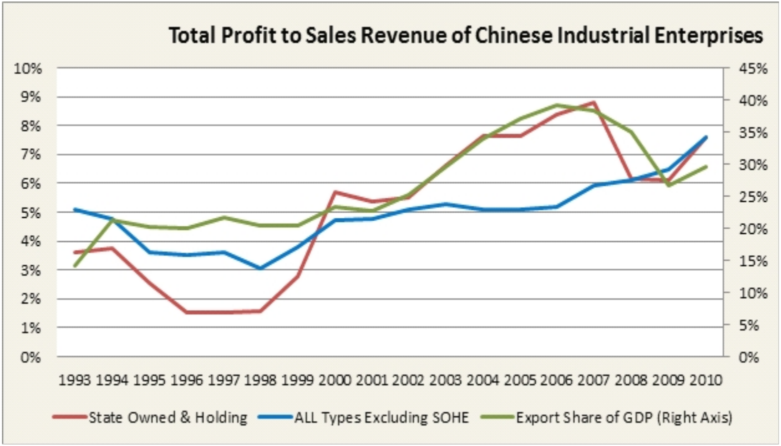

Figure 1: Total profit to sales revenues of Chinese enterprises in the industrial sector. We use CEIC (Table CN.BF: Industrial Financial Data: By Enterprise Type) to obtain Total profit to Sales Revenue. In this table, CEIC categorizes industrial enterprises into: state owned & holding,

% of Export from SOEs is Small

Table 1. Chinese Exports by Enterprise Ownership

Exports are in billions of US dollars. The data are from China Custom. Some missing.

Year	Total Exports	Exports by Ownership SOEs	non-SOEs	% of export from SOEs
1994	121.01	84.94	36.06	70.20
1995	148.78	99.25	49.53	66.71
1996	151.05	86.04	65.01	56.96
1997	182.79	102.74	80.05	56.21
1998	183.81	96.85	86.96	52.69
2000	249.20	116.45	132.76	46.73
2002	325.60	122.85	202.75	37.73
2004	593.33	153.58	439.75	25.88
2006	968.94	191.33	777.60	19.75
2008	1430.69	257.48	1173.21	18.00
2010	1577.75	234.30	1343.45	14.85

Puzzling Fact 1: SOEs Outperformed Non-SOEs

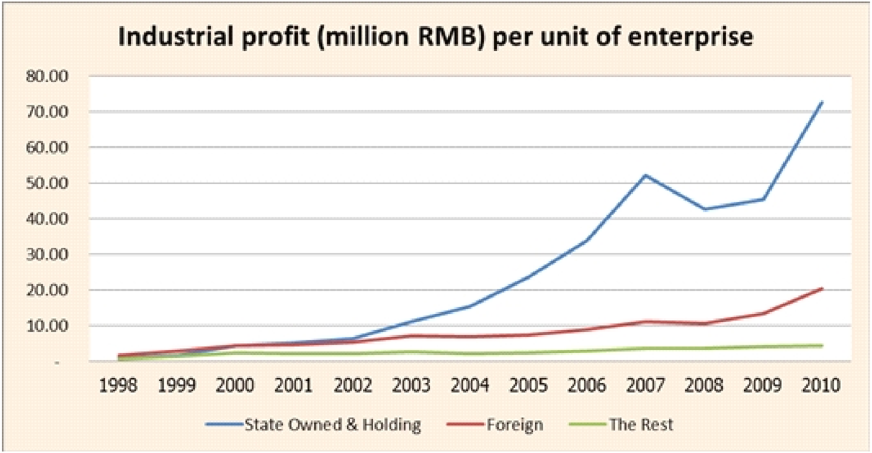

Figure 2a: Average Profit per Industrial Enterprise (by Different Ownership Structure): 1998-2010

Puzzling Fact 1: SOEs Outperformed Non-SOEs

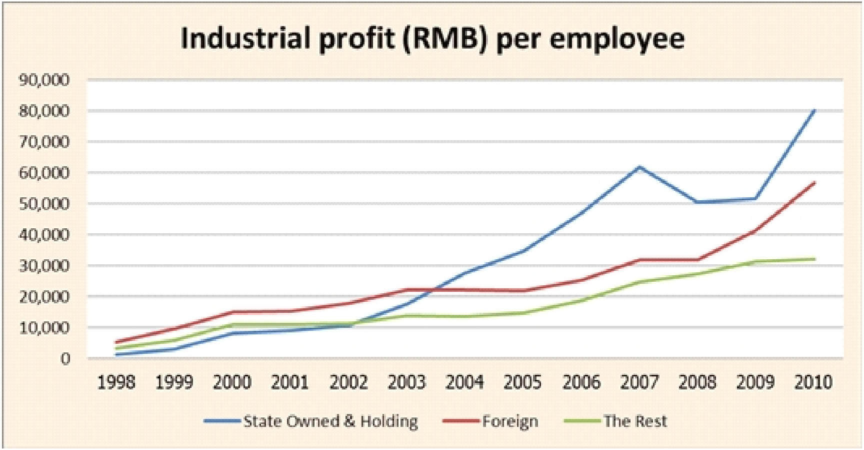

Figure 2b: Average Profit per Employee for Industrial Enterprise (by Different Ownership Structure): 1998-2010

Puzzling Fact 2: Low and Declining Labor Income Share

Figure 10: China's Labor Income Share (replicated from Bai and Qian, 2010)

Puzzling Facts about Fast-Growing China Economy

- SOEs have outperformed the private firms in the past decade while the opposite was true in the 1990s, although the GDP growth rates were stably high during the whole period. The recent experience seems contradictory to the common notion that fast growth is incompatible with persistly servere resource misallocation across heterogeneous firms (see Song, Storesletten, Zilibotti (2011); Hsieh and Klenow (2009)).
- The labor income share in total GDP is persistently declining in the past two decades, contradicting the Kaldor facts of neoclassical growth model and the predictions of HO trade model.

Key Characteristics of China's State Capitalism

- **Vertical Structure:** SOEs monopolize key upstream industries while the downstream industries are largely open for private competition
- **Dual Labor Market and Structural Change:** a huge labor supply in the process of industrialization
- **Trade Liberalization:** entering WTO in 2001, export-promoted strategies

Key Mechanisms

- **Key Story:** Upstream SOEs extract monopoly rents from expanding downstream private sectors in the process of industrialization and globalization
- **Declining Labor Income Share,** wage is sustained at a constantly low level during industrialization while GDP increases, especially after trade liberalization.
- **Without Vertical Structure,** SOEs would be victims, rather than beneficiary, of trade liberalization and expansion of non-SOEs.
- **Without Openness**, SOEs in the downstream industries could not exit so fast; Demand for downstream goods and services would be small, hence the profits of upstream SOEs would be small.
- **Without Labor Abundance**, wage will increase fast as export increases, which limits the room for the monopoly pricing charged by the upstream SOEs.

Related Literature

- **Structural Change and Economic Growth:** Kongsmut, Rebelo, and Xie (2001), Ngai and Pissaridies (2007), Acemoglu and Guerrieri (2008), Matsuyama (2008, 2009); Buera and Kaboski (2011), Yi and Zhang (2011), Herrendorf, Rogerson and Valentinyi (2011); Restuccia, Yang, and Zhu (2008), Brandt, Hsieh and Zhu (2010).
- **Economic Transitions and Institutional Reforms:** Roland (2000), Lau, Qian, and Roland (2000), Murphy, Shleifer and Vishny (1992), Young (2000), Bruno (1972), Bai, Du, Tao and Sarah (2004)
- **Declining Labor Income Share, Trade, and Dual Labor Market:** Harrison (2002), Jaumotte and Tytell (2007), Karabarbounis and Neiman (2012); Ventura (1997), Acemoglu (2008), Feenstra (2004), Burnstein and Vogel (2011); Lewis (1954), Dooley, Folkerts-Landau, and Garber (2007), and Vollrath (2009)
- **SOE Reforms and Resource Misallocation:** Groves, Hong, McMillan, and Naughton (1994), Qian (1996), Li (1997), Lin, Cai and Li (1998); Hsieh and Klenow (2009), Song, Storetten, and Zilibotti (2011), Dollar and Wei (2007), Brandt, Tombe and Zhu (2010)

Road Map

- Documenting the vertical structure (downstream capitalism and upstream SOE monopoly)
- A Model of State Capitalism: Autarky, Trade (present)
- Sustainability of this State Capitalism (future)
- Emergence of State Capitalism (past)
- General Implications for Other Countries

Facts about Vertical Structure [1]

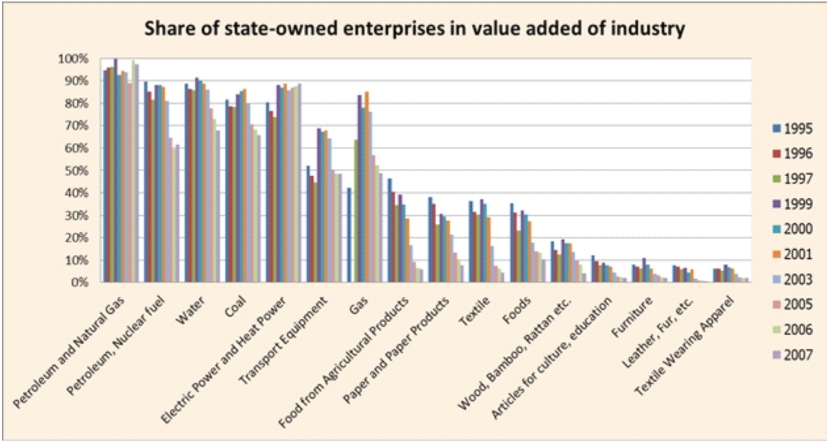

Figure 5a: Share of state enterprises in industrial value-added.

Facts about Vertical Structure [2]

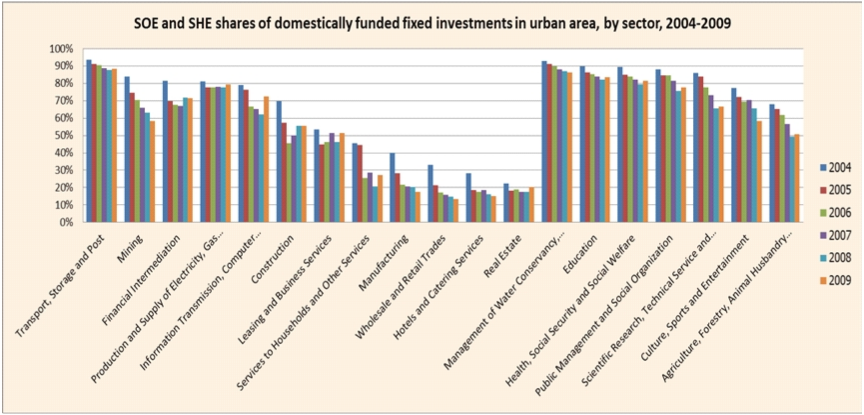

Figure 4: Investments in fixed assets in urban area by ownership for all sectors. The data are from the following tables of National Bureau of Statistics (NBS) of China: Investment in Urban Area by Sector, Source of Funds, Jurisdiction of Management and Registration Status. Note that NBS has changed the column title of state related ownership over time.

Model

- a continuum of households with measure unity: θ elite group, $1-\theta$ grassroot.
- Preference

$$u(c) = c_n + \frac{\epsilon}{\epsilon - 1} c_d^{\frac{\epsilon-1}{\epsilon}}, \ \epsilon > 1,$$

- $c_d = \left(\int_0^1 c(i)^{\frac{\eta-1}{\eta}} di \right)^{\frac{\eta}{\eta-1}}, \eta > 1$
- Technology
  1. one unit of labor produces one unit of numeraire good n
  2. downstream good (consumption good d) : $F(k,l,m) = Ak^{\alpha} l^{\beta} m^{1-\alpha-\beta}$
  3. upstream good (intermediate input m): $F_m(k,l) = A_m k^{\gamma} l^{1-\gamma}$

- Endowment
  1. Each household, elite or grass root, is endowed with L units of time (labor) and K units of capital.
  2. The profits of all the state-owned enterprises are equally shared by the elite class.
  3. All the private firms are owned by the grassroot.
- Market Structure:
  1. Upstream (intermediate) good: monopoly
  2. All the other markets are perfectly competitive

Autarky Equilibrium Characterization

$$
\begin{aligned}
\textbf{Household Wealth} &: \quad I_e = WL + RK + \frac{\Pi_m}{\theta};\; I_g = WL + RK \\
\textbf{BC} &: \quad Wc_n + p_d c_d \leq I, \text{ where } I \in \{I_e, I_g\} \\
\textbf{Price} &: \quad p_d = \frac{R^\alpha W^\beta {p_m}^{1-\alpha-\beta}}{A\alpha^\alpha \beta^\beta (1-\alpha-\beta)^{1-\alpha-\beta}}; \\
\textbf{Upstream SOE} &: \quad \Pi_m = \max_{p_m} D_m(p_m) \cdot \left[p_m - \frac{R^\gamma W^{1-\gamma}}{A_m \gamma^\gamma (1-\gamma)^{1-\gamma}} \right] \\
p_m &= \mu \frac{R^\gamma W^{1-\gamma}}{A_m \gamma^\gamma (1-\gamma)^{1-\gamma}};\; \mu \equiv \frac{(1-\alpha-\beta)(\epsilon-1)+1}{(1-\alpha-\beta)(\epsilon-1)}.
\end{aligned}
$$

Autarky Equilibrium

Factor Markets Clear

$$
\begin{aligned}
L &= \underbrace{D_m \frac{\partial \frac{R^\gamma W^{1-\gamma}}{A_m \gamma^\gamma (1-\gamma)^{1-\gamma}}}{\partial W}}_{\text{by producer of intermediate good } m} + \underbrace{D_d \frac{\partial p_d}{\partial W}}_{\text{by producers of downstream good}} \\
&+ \underbrace{D_n}_{\text{by producers of good } n} \\
K &= \underbrace{D_m \frac{\partial \frac{R^\gamma W^{1-\gamma}}{A_m \gamma^\gamma (1-\gamma)^{1-\gamma}}}{\partial R}}_{\text{by producer of intermediate good } m} + \underbrace{D_d \frac{\partial p_d}{\partial R}}_{\text{by producers of downstream good}}
\end{aligned}
$$

Autarky Equilibrium

Lemma

Suppose $L > \frac{\mu-\gamma(1-\alpha-\beta)-\alpha\mu}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{L}(A, A_m, K)$*. In the autarky equilibrium,*

$$\begin{aligned}
\Pi_m &= \frac{(1-\alpha-\beta)(\mu-1)}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{L}(A, A_m, K), \\
Y &= L + \frac{\alpha\mu+(1-\alpha-\beta)(\gamma+\mu-1)}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{L}(A, A_m, K), \\
\theta_L &= \frac{L}{L + \frac{\alpha\mu+(1-\alpha-\beta)(\gamma+\mu-1)}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{L}(A, A_m, K)}, \\
\overline{L}(A, A_m, K) &\equiv M \cdot \left[A_m^{(1-\alpha-\beta)} A\right]^{\frac{\epsilon-1}{1+\alpha(\epsilon-1)+\gamma(1-\alpha-\beta)(\epsilon-1)}} K^{\frac{\alpha(\epsilon-1)+\gamma(1-\alpha-\beta)(\epsilon-1)}{1+\alpha(\epsilon-1)+\gamma(1-\alpha-\beta)(\epsilon-1)}}
\end{aligned}$$

Autarky Equilibrium

Proposition

Suppose $L > \frac{\mu-\gamma(1-\alpha-\beta)-\alpha\mu}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{L}(A, A_m, K)$. *In the autarky equilibrium,* $\frac{\partial \Pi_m}{\partial A} > 0$, $\frac{\partial \Pi_m}{\partial A_m} > 0, \frac{\partial \Pi_m}{\partial K} > 0$; $\frac{\partial \theta_L}{\partial A} < 0$, $\frac{\partial \theta_L}{\partial A_m} < 0, \frac{\partial \theta_L}{\partial K} < 0$.

Socially Efficient Allocation

Proposition

In the social optimal equilibrium (eliminating the upstream monopoly), the wage is unchanged, the rental price of capital becomes larger, both the intermediate good and the downstream good become cheaper, the total industrial employment and the GDP both become larger, and the labor income share becomes smaller.

Open Economy

- Country H is same as the static autarky.
- Country F: L^* units of labor and same utility function
- All the firms are private in country F, and have exclusive technology: $F_d^*(l) = l$.
- One unit of foreign labor producing A^* units of numeraire good
- $p_n^* = \frac{W^*}{A^*}$, $p_d^* = W^*$.

Trade Equilibrium

Lemma

In the free trade equilibrium, H produces both d and n and F produces only n, and

$$\begin{aligned}
\Pi_m &= \frac{(1-\alpha-\beta)(\mu-1)}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{\overline{L}}(A, A_m, K)p_n.\\
Y &= \left[L + \frac{\alpha\mu+(1-\alpha-\beta)(\gamma+\mu-1)}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{\overline{L}}(A, A_m, K)\right]p_n\\
\theta_L &= \frac{L}{L+\frac{\alpha\mu+(1-\alpha-\beta)(\gamma+\mu-1)}{(1-\gamma)(1-\alpha-\beta)+\beta\mu}\overline{\overline{L}}(A, A_m, K)},\\
\overline{\overline{L}}(A, A_m, K) &\equiv 2^{\frac{1}{1+\alpha(\epsilon-1)+\gamma(1-\alpha-\beta)(\epsilon-1)}}\overline{L}(A, A_m, K).
\end{aligned}$$

Trade Equilibrium Properties

Proposition

The monopoly profit of the upstream SOE and the GDP in country H are larger in the free trade equilibrium than in the autarky, but the labor income share in total GDP is smaller in the trade equilibrium.

- Export Promotion Policies

Sustainability

Rise of Wage

Proposition

Suppose capital K in country H is moderately high. The two countries fully specialize and each consumes both goods. GDP in country H is

$$Y = B \cdot \left(A_m^{1-\alpha-\beta} A\right)^{\frac{\epsilon-1}{\epsilon}} K^{\frac{\alpha(\epsilon-1)+\gamma(1-\alpha-\beta)(\epsilon-1)}{\epsilon}} L^{\frac{(\epsilon-1)\{\gamma\beta+(1-\alpha)(1-\gamma)\}}{\epsilon}} p_n, \quad (1)$$

where B is a constant. Moreover,

$$\begin{aligned} \frac{WL}{Y} &= \frac{(1-\gamma)(1-\alpha-\beta)+\beta\mu}{\mu}, \\ \frac{RK}{Y} &= \frac{\gamma(1-\alpha-\beta)+\alpha\mu}{\mu}, \\ \frac{\Pi_m}{Y} &= \frac{(\mu-1)(1-\alpha-\beta)}{\mu}. \end{aligned} \quad (2)$$

Further Rise of Wage

Proposition

Suppose capital K is sufficiently high. H and F completely specializes. H consumes both while F only consumes good d. GDP of H is given by

$$Y = \left[\frac{1}{(\widetilde{\mu} - \mu)(1 - \alpha - \beta)(\epsilon - 1)} + 1 \right] A^* L^* p_n, \tag{3}$$

and the factor income shares:

$$\begin{aligned} \frac{WL}{Y} &= \beta + (1 - \alpha - \beta) \frac{1 - \gamma}{\widetilde{\mu}}, \\ \frac{RK}{Y} &= \alpha + (1 - \alpha - \beta) \frac{\gamma}{\widetilde{\mu}}, \\ \frac{\Pi_m}{Y} &= (1 - \alpha - \beta) \frac{\widetilde{\mu} - 1}{\widetilde{\mu}}, \end{aligned}$$

where $\widetilde{\mu}$, the markup, is uniquely determined.

Change in External Demand

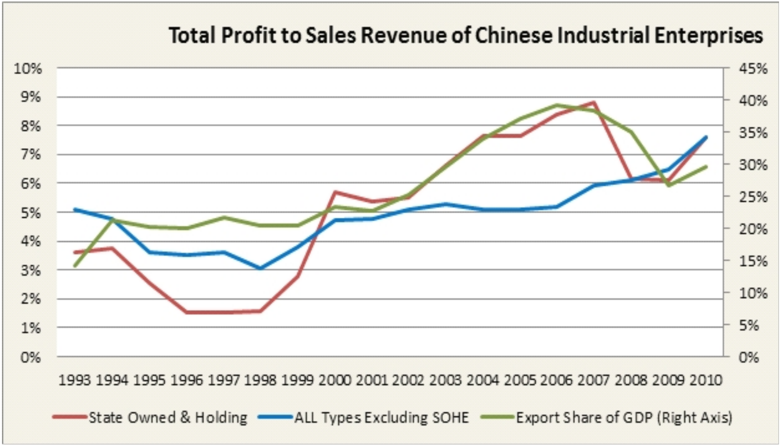

Figure 1: Total profit to sales revenues of Chinese enterprises in the industrial sector. We use CEIC (Table CN.BF: Industrial Financial Data: By Enterprise Type) to obtain Total profit to Sales Revenue. In this table, CEIC categorizes industrial enterprises into: state owned & holding,

- ϕ : the fraction of downstream industries that are liberalized ($\phi = 0$ at the beginning); $c_d = \left(\int_0^1 c(i)^{\frac{\eta-1}{\eta}} di \right)^{\frac{\eta}{\eta-1}}, \eta > 1$
- SOEs and non-SOEs are engaged in perfect competition in each liberalized industry in the downstream.
- Each of the rest $1 - \phi$ fraction of the industries is monopolized by one state firm.
- $A = A_p$ if private, and $A = A_s$ if state. $A_s < A_p$.
- **Key Result: When $\frac{A_p}{A_s}$ is sufficiently large, the total profit of SOEs is maximized when $\phi = 1$.**
- To compete with private firms in the liberalized industries, a downstream SOE needs a subsidy equal to $\frac{R^\alpha W^\beta {p_m}^{1-\alpha-\beta}}{\alpha^\alpha \beta^\beta (1-\alpha-\beta)^{1-\alpha-\beta}} \left(\frac{1}{A_s} - \frac{1}{A_p} \right)$ per unit of output.

More Discussions

- Vertical Structure and Imperfect Competitions in Downstream
- Income Distribution and Domestic Demand
- Domestic Labor Market Integration ($\omega L < \overline{\overline{L}}(A, A_m, K)$)
- Tax and Subsidies
- Causes of Monopoly and Industrial Distribution of SOEs

Implications for Other Countries

- Vietnam
- India
- Russia and other resouce-abundant countries

Summary

- We provide a simple model of China's state capitalism that highlights a **vertical structure, international trade, and industrialization**.
- We explain why SOEs outperformed POEs in the last decade while the opposite was true in the 1990s.
- Our framework also explains the persistently low and declining labor income share in China's GDP in the past two decades
- Our theory points to the **incompleteness of the market-oriented reforms** as a plausible fundamental cause for the recent unusual prosperity of China's SOEs.
- We discuss the emergence and substainability of this development model of state capitalism.