A Model of China’s State Capitalism

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State capitalism as alternative growth model

The Economist

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STATE CAPITALISM
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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
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
### Table 2. Chinese firms in 2011 Fortune Global 500

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Fortune Rank</th>
<th>Revenues (Smillions)</th>
<th>Headquarter</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinopec Group</td>
<td>5</td>
<td>273422</td>
<td>Beijing</td>
<td>Oil and Refinery</td>
</tr>
<tr>
<td>China National Petroleum</td>
<td>6</td>
<td>240192</td>
<td>Beijing</td>
<td>Oil and Refinery</td>
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<tr>
<td>State Grid</td>
<td>7</td>
<td>226294</td>
<td>Beijing</td>
<td>Electricity Power</td>
</tr>
<tr>
<td>Industrial &amp; Commercial Bank of China</td>
<td>77</td>
<td>80501</td>
<td>Beijing</td>
<td>Banking</td>
</tr>
<tr>
<td>China Mobile Communications</td>
<td>87</td>
<td>76673</td>
<td>Beijing</td>
<td>Telecom</td>
</tr>
<tr>
<td>China Railway Group</td>
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<td>69973</td>
<td>Beijing</td>
<td>Construction and Infrastructure</td>
</tr>
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<td>China Railway Construction</td>
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<td>67414</td>
<td>Beijing</td>
<td>Construction and Infrastructure</td>
</tr>
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<td>China Construction Bank</td>
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<td>67081</td>
<td>Beijing</td>
<td>Banking</td>
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<tr>
<td>China Life Insurance</td>
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<td>64635</td>
<td>Beijing</td>
<td>Insurance</td>
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<td>Agricultural Bank of China</td>
<td>127</td>
<td>60536</td>
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<td>Banking</td>
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<td>Bank of China</td>
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<td>59212</td>
<td>Beijing</td>
<td>Banking</td>
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<tr>
<td>Dongfeng Motor</td>
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<td>55748</td>
<td>Wuhan</td>
<td>Automobile</td>
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<td>China State Construction Engineering</td>
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<td>54721</td>
<td>Beijing</td>
<td>Construction and Infrastructure</td>
</tr>
<tr>
<td>China Southern Power Grid</td>
<td>149</td>
<td>54449</td>
<td>Guangzhou</td>
<td>Electricity Power</td>
</tr>
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</table>
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, ALL Types Excluding SOHE, and Export Share of GDP (Right Axis).
% 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.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Exports</th>
<th>Exports by Ownership</th>
<th>% of export from SOEs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SOEs</td>
<td>non-SOEs</td>
</tr>
<tr>
<td>1994</td>
<td>121.01</td>
<td>84.94</td>
<td>36.06</td>
</tr>
<tr>
<td>1995</td>
<td>148.78</td>
<td>99.25</td>
<td>49.53</td>
</tr>
<tr>
<td>1996</td>
<td>151.05</td>
<td>86.04</td>
<td>65.01</td>
</tr>
<tr>
<td>1997</td>
<td>182.79</td>
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</tr>
<tr>
<td>1998</td>
<td>183.81</td>
<td>96.85</td>
<td>86.96</td>
</tr>
<tr>
<td>2000</td>
<td>249.20</td>
<td>116.45</td>
<td>132.76</td>
</tr>
<tr>
<td>2002</td>
<td>325.60</td>
<td>122.85</td>
<td>202.75</td>
</tr>
<tr>
<td>2004</td>
<td>593.33</td>
<td>153.58</td>
<td>439.75</td>
</tr>
<tr>
<td>2006</td>
<td>968.94</td>
<td>191.33</td>
<td>777.60</td>
</tr>
<tr>
<td>2008</td>
<td>1430.69</td>
<td>257.48</td>
<td>1173.21</td>
</tr>
<tr>
<td>2010</td>
<td>1577.75</td>
<td>234.30</td>
<td>1343.45</td>
</tr>
</tbody>
</table>

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-SOE

Figure 2b: Average Profit per Employee for Industrial Enterprise (by Different Ownership Structure): 1998-2010
Figure 10: China’s Labor Income Share (replicated from Bai and Qian, 2010)
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 severe 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


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
Figure 5a: Share of state enterprises in industrial value-added.
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: \( \theta \) elite group, \( 1 - \theta \) grassroot.
- Preference

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

\[
c_d = \left( \int_{0}^{1} c(i) \frac{\eta - 1}{\eta} \, di \right)^{\frac{\eta}{\eta - 1}}, \quad \eta > 1
\]

- Technology

1. one unit of labor produces one unit of numeraire good \( n \)
2. downstream good (consumption good \( d \)): \( F(k, l, m) = A k^\alpha l^\beta m^{1-\alpha-\beta} \)
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

**Household Wealth**: \( I_e = WL + RK + \frac{\Pi_m}{\theta} \); \( I_g = WL + RK \)

**BC**: \( WC_n + p_d c_d \leq I \), where \( I \in \{I_e, I_g\} \)

**Price**: \( p_d = \frac{R^\alpha W^\beta p_m^{1-\alpha-\beta}}{A^\alpha \beta (1 - \alpha - \beta)^{1-\alpha-\beta}} \)

**Upstream SOE**: \( \Pi_m = \max_{p_m} D_m(p_m) \cdot \left[ p_m - \frac{R^\gamma W^{1-\gamma}}{A_m \gamma^\gamma (1 - \gamma)^{1-\gamma}} \right] \)

\( p_m = \frac{R^\gamma W^{1-\gamma}}{A_m \gamma^\gamma (1 - \gamma)^{1-\gamma}} ; \mu \equiv \frac{(1 - \alpha - \beta)(\epsilon - 1) + 1}{(1 - \alpha - \beta)(\epsilon - 1)} \)
Autarky Equilibrium

Factor Markets Clear

\[ L = D_m \frac{\partial}{\partial W} \frac{R^\gamma W^{1-\gamma}}{A_m^\gamma (1-\gamma)^{1-\gamma}} + D_d \frac{\partial p_d}{\partial W} \]

by producer of intermediate good \( m \)  
by producers of downstream good

\[ K = D_m \frac{\partial}{\partial R} \frac{R^\gamma W^{1-\gamma}}{A_m^\gamma (1-\gamma)^{1-\gamma}} + D_d \frac{\partial p_d}{\partial R} \]

by producer of intermediate good \( m \)  
by producers of downstream good
**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,

\[
\Pi_m = \frac{(1 - \alpha - \beta)(\mu - 1)}{(1 - \gamma)(1 - \alpha - \beta) + \beta \mu} \overline{L}(A, A_m, K),
\]

\[
Y = L + \frac{\alpha \mu + (1 - \alpha - \beta)(\gamma + \mu - 1)}{(1 - \gamma)(1 - \alpha - \beta) + \beta \mu} \overline{L}(A, A_m, K),
\]

\[
\theta_L = \frac{L}{L + \frac{\alpha \mu + (1 - \alpha - \beta)(\gamma + \mu - 1)}{(1 - \gamma)(1 - \alpha - \beta) + \beta \mu} \overline{L}(A, A_m, K)},
\]

\[
\overline{L}(A, A_m, K) \equiv M \cdot \left[ A_m^{(1 - \alpha - \beta)} A \right]^{\epsilon - 1}_{1 + \alpha(\epsilon - 1) + \gamma(1 - \alpha - \beta)(\epsilon - 1)} \cdot K^{\frac{\alpha(\epsilon - 1) + \gamma(1 - \alpha - \beta)(\epsilon - 1)}{1 + \alpha(\epsilon - 1) + \gamma(1 - \alpha - \beta)(\epsilon - 1)}}.
\]
Proposition

Suppose \( L > \frac{\mu - \gamma (1 - \alpha - \beta) - \alpha \mu}{(1 - \gamma)(1 - \alpha - \beta) + \beta \mu} \bar{L}(A, A_m, K) \). In the autarky equilibrium, \( \frac{\partial \Pi_m}{\partial A} > 0, \frac{\partial \Pi_m}{\partial A_m} > 0, \frac{\partial \Pi_m}{\partial K} > 0; \frac{\partial \theta_L}{\partial A} < 0, \frac{\partial \theta_L}{\partial A_m} < 0, \frac{\partial \theta_L}{\partial K} < 0. \)
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
- $p_n^* = \frac{W^*}{A^*}$, $p_d^* = W^*$. 
In the free trade equilibrium, $H$ produces both $d$ and $n$ and $F$ produces only $n$, and

\[
\Pi_m = \frac{(1 - \alpha - \beta) (\mu - 1)}{(1 - \gamma) (1 - \alpha - \beta) + \beta \mu} \overline{L}(A, A_m, K) p_n.
\]

\[
Y = \left[ L + \frac{\alpha \mu + (1 - \alpha - \beta) (\gamma + \mu - 1)}{(1 - \gamma) (1 - \alpha - \beta) + \beta \mu} \overline{L}(A, A_m, K) \right] p_n.
\]

\[
\theta_L = \frac{L}{L + \frac{\alpha \mu + (1 - \alpha - \beta) (\gamma + \mu - 1)}{(1 - \gamma) (1 - \alpha - \beta) + \beta \mu} \overline{L}(A, A_m, K)},
\]

\[
\overline{L}(A, A_m, K) \equiv 2^{\frac{1}{1 + \alpha (\epsilon - 1) + \gamma (1 - \alpha - \beta) (\epsilon - 1)}} \overline{L}(A, A_m, K).
\]
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
Suppose capital $K$ in country $H$ is moderately high. The two countries fully specialize and each consumes both goods. GDP in country $H$ is

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

where $B$ is a constant. Moreover,

$$\frac{WL}{Y} = \frac{(1-\gamma)(1-\alpha-\beta) + \beta \mu}{\mu}, \quad (2)$$

$$\frac{RK}{Y} = \frac{\gamma(1-\alpha-\beta) + \alpha \mu}{\mu},$$

$$\frac{\Pi_m}{Y} = \frac{(\mu-1)(1-\alpha-\beta)}{\mu}.$$
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

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

and the factor income shares:

$$\frac{WL}{Y} = \beta + (1 - \alpha - \beta) \frac{1 - \gamma}{\tilde{\mu}},$$

$$\frac{RK}{Y} = \alpha + (1 - \alpha - \beta) \frac{\gamma}{\tilde{\mu}},$$

$$\frac{\Pi_m}{Y} = (1 - \alpha - \beta) \frac{\tilde{\mu} - 1}{\tilde{\mu}},$$

where $\tilde{\mu}$, the markup, is uniquely determined.
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, private, HMT & foreign, collective owned, shareholding corporations, foreign funded, and Hong Kong, Macau & Taiwan funded. We divide all the industrial enterprises into state owned & holding and the rest. The right axis shows the ratio of export to GDP, also obtained from CEIC.
Emergence of China’s State Capitalism

- $\phi$: 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 ($\omega L < \bar{L}(A, A_m, K)$)
- Tax and Subsidies
- Causes of Monopoly and Industrial Distribution of SOEs
Implications for Other Countries

- Vietnam
- India
- Russia and other resource-abundant countries
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 sustainability of this development model of state capitalism.