State vs Market Revisited: China’s Hybrid Economy

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State vs Market: The Long Debate

❖ One side: state controls and interventions are necessary for economic development
  ❖ Central planning championed by the Soviet and other socialist countries before 1990s

❖ The other side: free markets are superior
  ❖ Mises (1922): without markets, central planners would not know how to "calculate"
  ❖ Hayek (1945): Central planners cannot command all the knowledge initially dispersed among many different individuals

❖ The debate waned after 1990s
  ❖ The Soviet collapsed, many Eastern European countries adopted new systems, and China took successful market reforms

❖ Re-emerged in recent years
  ❖ The slowing down of China’s market reforms
  ❖ Strong state interventions in India, Brazil, Indonesia …
Outline

- A brief overview of China’s market reforms and hybrid economy
- A simple G-K framework to incorporate state and market
- Information discovery in the G-K framework
  - Brunnermeier, Sockin & Xiong (2022, RES) “China’s Model of Managing the Financial System”
- Incentives, investment and leverage in the mandarin system
  - Song & Xiong “The Mandarin Model of Growth”
China’s Market Reforms

♦ China didn’t adopt the shock therapy and instead took gradualist reforms to incorporate many free-market features in the past 40 years

♦ Deng Xiaoping: “crossing river by touching the stones”

♦ Reforms without a blueprint

♦ Lau, Qian & Roland (2000, JPE) “Economic Reforms without Losers”: a dual-track approach to avoid massive unemployment and social unrest

♦ Song, Storesletten & Zilibotti (2011, AER) “Growing Like China”: A transition economy with the state sector that will eventually vanish
Urban Employment

Urban Employment in China by Registration Type (Million)

Source: PRC National Bureau of Statistics, Annual Data
ROA of State and Non-State Firms

Return on Assets in Secondary Industry (excluding Construction Industry)

Source: PRC National Bureau of Statistics, Annual Data
Economic Growth

Real GDP Growth Rate of China (1979-2021)

GDP of Top 10 Countries in 2021 (2021 USD, Billion)

GDP per Capita in 2021 (2021 USD, K)

Source: World Bank Data, World Development Indicators
Chinese Firms in Fortune 500 in 2022

- **Central SOEs**
  - State Grid (3), Southern Power Grid (89)
  - Petro China (4), Sinopec (5), China National Offshore Oil (65)
  - ICBC (22), China Construction Bank (24), Agricultural Bank of China (28), Bank of China (42)
  - ...

- **Private firms**
  - JD.com (46), Alibaba (55), Tencent (121)
  - Huawei (96)
  - Pingan Insurance (25)
  - ...

8
China’s Hybrid Economy

- Despite the highly successful market reforms, the state maintains its dominant position in the economy
  - The state sets the development agenda through Intensive industrial policies
  - Local governments are key in driving local development
  - SOEs control the commanding heights
  - Private enterprises are at the peripheral
Open Issues

◊ How to characterize the relationship between state and market in China?
  ◊ Balancing the government’s visible hand and the market’s invisible hand is a recurring theme in China’s economic reforms
  ◊ Xi’s characterization: “enabling government and efficient markets” (有为政府、有效市场)
    ◊ 2022 CCP Constitution: “发挥市场在资源配置中的基础性决定性作用，更好发挥政府作用，建立完善的宏观调控体系。”

◊ Can the hybrid economy address the information and incentive challenges?
  ◊ An imbalanced economy
  ◊ The rising leverage
  ◊ The bubbly real estate
Investment-Driven Economy
High Leverage

Debt-to-GDP Ratio in China

- Government
- Households
- Non-Financial Corporations
Bubbly Real Estate

Property Prices of Main Cities
Price per Square Meter to Buy Apartment in City Centre in 2022 (K, USD by PPP)

Source: Numbeo; OECD Data
A Simple Framework

\[ Y = A \ G^{\alpha G} \ K^{\alpha K} \]

- \( G \) is infrastructure developed by the government
  - Particularly relevant for developing economies, which tend to lack infrastructure
  - Difficult for private firms to provide due to its public good nature
  - The government can recover the cost through taxation
  - Can also be broadly interpreted as both physical and soft infrastructure

- \( K \) is capital investment by private firms

- \( G \) and \( K \) are complementary
  - Free markets are more efficient in information discovery and incentive provision, but subject to externalities
  - The state system can internalize externalities but is subject to information and incentive issues
Information Discovery

- Can a hybrid economy overcome the information challenge faced by central planning, as highlighted by Mises (1922) and Hayek (1945)?

- Information among dispersed private firms can be aggregated through their investment decisions in the private sector
  - Feedback to other private firms
  - Feedback to policy makers and state firms
Information Discovery through G-K

◊ A continuum of firms with each firm’s output:

\[ Y_i = A G^{\alpha_G} K_i^{\alpha_K} \]

◊ A is unobservable to anyone

◊ **Dispersed information**

◊ The government observes a noisy signal: \( s_G = \log A + \epsilon_G \)

◊ Each firm also observes a noisy signal: \( s_i^A = \log A + \epsilon_i \)

◊ Each firms makes \( K_i \) based on \( I_i \):

\[
\max_{K_i} E\left[ AG^{\alpha_G} K_i^{\alpha_K} | I_i \right] - e^{\varphi_i K_i}
\]

◊ \( \varphi_i = \varphi + \epsilon_i^\varphi \)

◊ The government chooses \( G \) based on \( I_G \):

\[
\max_G E\left[ \int Y_i di | I_G \right] - R_G G
\]
Information Discovery through G-K

- $K = \sum_i K_i$ and $G$ serve to aggregate information
  - $I_i = \{s_i, \varphi_i, K, G\}$
  - $I_G = \{s_G, K\}$

- Investments in the equilibrium:
  \[
  \log K_i = a_0 + a_k \log K + a_g \log G + a_s s_i + a_\varphi \varphi_i
  \]
  \[
  \log G = b_0 + b_k \log K + b_s s_G
  \]
- Both $\log K$ and $\log G$ carry an information effect
- There are two equilibria

- Information transmission from $K$ is a clear advantage to central planning
  - Information distortions in China’s Great Leap Forward and the subsequent famine
Government-Centric Equilibrium

◊ Brunnermeier, Sockin & Xiong (2022, REStud) “China’s Model of Managing the Financial System”

◊ Suppose that each firm needs to choose a noisy signal

\[ s^i_A = \log A + \epsilon^i \]

or

\[ s^i_G = s^i_G + \epsilon^i \]

◊ A government-centric equilibrium may emerge with all firms acquiring information about \( s^i_G \), but not \( \log A \)

◊ The market does not provide any fundamental information discovery

◊ This occurs when \( G \) is sufficiently dominant
Incentives in the Mandarin System

- A politically centralized but fiscally decentralized system, e.g., Xu (2011), Qian (2017), Zhou (2018)
  - Local governors have autonomy in managing local fiscal budget and development
  - The central government evaluates local officials based on **unified** performance measures
  - A key channel for the state to exert controls of local officials and thus implement central government agenda

- The performance measure varies
  - Ideology and political loyalty before 1978
  - Economic development after 1978
Song & Xiong “The Mandarin Model of Growth”

- Consider an economy with $M$ regions and $t = 0, 1, 2, \ldots$

- In each region, the representative firm’s output is
  
  \[ Y_{it} = A_{it} G_{it}^{\alpha_G} K_{it}^{\alpha_K} \]

- The firm maximizes
  
  \[ \max_{K_{it}} (1 - \tau)Y_{it} - (r_{t} + \delta_{K})K_{it} \]

- The representative household maximizes
  
  \[ J(W_{it}^H) = \max_{c_{it}^H, s_{it}^H} \log c_{it}^H + \log c_{it}^P + \beta E_t [J(W_{it+1}^H)] \]

  with

  \[ W_{it}^H = (1 - \tau)Y_{it-1} - (r_{t} + \delta_{K})K_{it-1} + (1 + r_{it-1})S_{it-1}^H \]
The market provides the performance measure

\[ A_{it} = e^{ft + a_{it} + \epsilon_{it}} \]

The central government uses the local output to evaluate performance:

\[ \hat{a}_{it} = E[a_{it} | Y_{it}] \quad \text{where} \quad Y_{it} = A_{it} G_{it}^{\alpha_G} K_{it}^{\alpha_K} \]

and

\[ \log Y_{it} = \frac{\alpha_G}{1 - \alpha_K} \log G_{it} + f_t + a_{it} + \epsilon_{it} \]

The signal jamming mechanism of Holmstrom (1982):

\[ \hat{a}_{it} \propto \kappa \left( (f_t - \bar{f}) + (a_{it} - \bar{a}_{it}) + \epsilon_{it} + \alpha_K \left( \log G_{it} - \log G_{it}^* \right) \right) \]

The governor chooses \( G_{it} \):

\[ J^G(W_{it}^G) = \max_{C_{it}^G, C_{it}^P, G_{it}} \log C_{it}^G + \rho \log C_{it}^P + \kappa \log G_{it} + \beta_G E_t [J^G(W_{it+1}^G)] \]

subject to

\[ C_{it}^P + C_{it}^G + G_{it} = \tau Y_{it-1} + (1 - \delta_G) G_{it-1} \]
The Career-Driven Equilibrium

- If $\delta_K = \delta_G = 1$, the governor chooses
  
  $G_{it} = \left[1 - (1 + \rho) \frac{1 - \beta G_{1 - \alpha_K}}{1 + \rho + \kappa}\right] \tau Y_{it-1}$

- $C^p_{it} = \frac{1 - \beta G_{1 - \alpha_K}}{1 + \rho + \kappa} \rho \tau Y_{it-1}$

- $C^G_{it} = \frac{1 - \beta G_{1 - \alpha_K}}{1 + \rho + \kappa} \tau Y_{it-1}$

- In the absence of career incentives $\kappa = 0$, $G_{it}$ is lower than the first best level if $\frac{\beta G \tau}{1 - \alpha_K} < \beta$.

- If the career incentives, i.e., $\kappa$, are sufficiently large, $G_{it}$ is higher than the first best level.
  - Short-termist behavior
Debt Financing

- Local governments were not allowed to raise debt before 2008
- This changed in 2008-2010 during China’s massive post-crisis stimulus, e.g., Bai, Hsieh & Song (2016) and Chen, He & Liu (2021)

- Suppose that the local governor can use debt $D_{it}$:

$$C_{it}^p + C_{it}^G + G_{it} + (1 + r_{it-1})D_{it-1} + \frac{\psi}{2}\left(\frac{r_tD_{it}}{E_t(\tau_{it}Y_{it})}\right)D_{it} = \tau Y_{it-1} + (1 - \delta_G)G_{it-1} + (1 + r_{it})D_{it}$$

- In the steady state equilibrium, $D_\ast$ increases with $\kappa$
  - Without sufficient $\kappa_{it}$, debt is used to boost $C_{it}^G$
Quantitative Analysis: Heterogeneous Local Economy

- Estimate city-level career incentives through observed $G_{it}$ in 2013-2017
- Each region is represented by $(W^H_{it}, W^G_{it}, \kappa_{it}, a_{it}, S_i)$
  - $\kappa_{it}$ iid, $r_{it} = r_t + \phi_i$, no aggregate shock in $f_t$
  - $S_i = \{\bar{a}_i, \phi_i, \tau_i, T_i\}$
- Idiosyncratic shocks to households, causing each household to lose its labor income
- Let $\Gamma_t$ be the cross-region distribution of $(W^H_{it}, W^G_{it}, \kappa_{it}, a_{it}, S_i)$
- A recursive equilibrium $\Gamma_{t+1} = H(\Gamma_t)$
  - Local governor optimization: $W^G_{it+1} = W^G(\Gamma_t)$
  - Household optimization: $W^H_{it+1} = W^H(\Gamma_t)$
  - $r_t$ determined by capital market clearing: $S^H(\Gamma) = K(\Gamma) + D(\Gamma)$
Quantitative Analysis

- Equilibrium-free calibration
  - $\alpha_K = 0.402$
  - $\alpha_G = 0.075$
  - $\delta_G = 1 - (1 - 0.10)^5 = 0.41$, $\delta_K = 1 - (1 - 0.14)^5 = 0.53$
  - $\tau_i$ varies across regions from 10.3% to 40.6%

- In a sample of 270 prefecture cities, we calibrate $\kappa_i$ to $G_i$ in 2013-2017
Estimates of Career Incentives

- Career incentives are inversely related to age
Career Incentives and Leverage

Slope 0.12, STD 0.065.

Slope 0.18, STD 0.088.
## Counterfactuals

<table>
<thead>
<tr>
<th></th>
<th>$E(\kappa_i) = 0.09, \psi = 6.0$</th>
<th>$\kappa_i = 0$</th>
<th>$\psi = 4.5$</th>
<th>$\kappa_i = 0, \psi = 4.5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$G(\Gamma)$</td>
<td>58.31</td>
<td>36.70</td>
<td>58.62</td>
<td>38.25</td>
</tr>
<tr>
<td>$D(\Gamma)$</td>
<td>120.33</td>
<td>112.20</td>
<td>160.93</td>
<td>142.75</td>
</tr>
<tr>
<td>$K(\Gamma)$</td>
<td>208.48</td>
<td>197.66</td>
<td>208.71</td>
<td>198.73</td>
</tr>
<tr>
<td>$Y(\Gamma)$</td>
<td>870.79</td>
<td>825.00</td>
<td>871.47</td>
<td>829.62</td>
</tr>
<tr>
<td>$\frac{D}{Y}$</td>
<td>0.69</td>
<td>0.68</td>
<td>0.92</td>
<td>0.86</td>
</tr>
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</table>
Calibration of National Aggregate
Transitional Dynamics in Aggregate

Table 4: Transitional Dynamics

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<thead>
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</thead>
<tbody>
<tr>
<td>$\kappa_t$</td>
<td>-0.0057</td>
<td>0.2851</td>
<td>0.3853</td>
<td>0.4064</td>
<td>0.1911</td>
<td>0.1331</td>
</tr>
<tr>
<td>$\psi_t$</td>
<td>$\infty$</td>
<td>$\infty$</td>
<td>$\infty$</td>
<td>$\infty$</td>
<td>13</td>
<td>5</td>
</tr>
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</table>

Calibrated to match $G_t$ and $D_t$

Table 5: Counterfactual

<table>
<thead>
<tr>
<th></th>
<th>benchmark</th>
<th>no career incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\kappa_{t \geq 5}$</td>
<td>0.13</td>
<td>0</td>
</tr>
<tr>
<td>$Y_6/Y_5 - 1$</td>
<td>4.3%</td>
<td>2.4%</td>
</tr>
<tr>
<td>$Y_\infty$</td>
<td>1 (normalized)</td>
<td>0.94</td>
</tr>
</tbody>
</table>

30
Summary

◊ China’s rapid growth is rooted to the complementarity between $G$ and $K$
  ◊ $G$ provides public good to boost productivity of $K$
  ◊ $K$ provides information discovery and performance measure for $G$

◊ In light of the waning of China’s market reforms, potential concerns going forward
  ◊ Reduced incentives for $G$, further amplified by reduced $K$
  ◊ The dominance of $G$ may distort information discovery of $K$

◊ Many other issues to explore
  ◊ The land-based fiscal policy for local governments
  ◊ State capital in venture capital and private equity sector
  ◊ …
Thank You!