China’s Model of Managing the Financial System

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China’s Distinct Economic Structure

- Central planning is still largely mixed with free markets
  - Dual tracks (market & planning tracks) are present in many sectors
  - The state sector, while much improved, is still less efficient than the private sector, and is large and will likely remain large

- The government still plays a central role in many aspects
  - Sets agenda for policy reforms
  - Has strong influence on allocation of key resources—fiscal spending, credit, land, ...
  - Provides soft budget constraints to state firms and implicit guarantees to various sectors

- The fluctuations in the financial system all revolve around government policy, intended or unintended
  - ongoing housing market boom
  - expansion of shadow banking system
  - stock market turmoil in 2015
  - breakdown of circuit breakers in 2016
Policy Risks in Financial Development

- Unavoidable policy risks
  - complex financial instruments and entangled financial structures
  - largely new to policy makers
- Intense speculation by market participants of government policy may reinforce, and even trigger, policy errors

Two related but separate issues

1. Front-running by market may cause the gradualistic approach of "crossing river by touching the stone" to fail in financial development
   - separately discussed in our other paper "China’s Gradualistic Economic Approach and Financial Markets"

2. Intensive government intervention
   - makes noise in policy making a pricing factor
   - government noise attracts market speculation and may get amplified
Government’s Paternalistic Philosophy

- Large population of **inexperienced retail investors**
  - retail investors hold 50% of tradable shares and contribute to 90% of trading volume
- Large price **volatility** in China’s stock markets and heavy turnover
  - highest turnover rate among major stock markets
- Asset prices often **deviate from fundamentals**
  - large price differentials between A-B and A-H stock pairs, e.g., Mei, Scheinkman and Xiong (2009)
  - dramatic warrant bubble in 2005-2008, e.g., Xiong and Yu (2011)
- CSRC’s **mission**: protect retail investors and stabilize markets
Government Interventions in China’s Financial System

- **Countercyclical policies and regulations**
  - interest rate and bank reserve ratio policy
  - suspension and quota control of IPO issuance
  - stamp tax on stock trading
  - mortgage rate and first payment requirement

- **Direct trading** in stock markets
  - “national team” directed to bail out stock market in summer 2015

- **Tremendous uncertainty** surrounding timing and scale of intervention
Active monetary policy: up 32 times, down 4 times from 2003-2011
- Powerful and direct impact on credit supply, money multiplier
IPO Issuance in A-Share Markets

- The government (CSRC) directly **controls IPO issuance**
  - had suspended IPO issuance 8 times
  - quantity and allocation of quota

*Figure 1: Shanghai A share index performance over eight IPO suspension periods*

Source: Bloomberg, Datastream. Remark: Grey areas are the IPO suspension periods. Figures in blanket are performance relative to MXEM.
Figure 1 Evolution of Stamp Duties in China and Hong Kong
The figure shows the evolution of trading stamp duty (sum over buyers and sellers) in A-share and H-share markets. Y-axis shows the absolute level of stamp duty in %.

Stamp duty (%)
Conceptual Questions

- How does government intervention impact market dynamics?
- How do market participants react to this intervention?
  - do they trade along with or against the government?
- What is the right objective of government intervention?
  - reduce price volatility or improve informational efficiency?
We develop a dynamic framework

1. to justify the need for government intervention
2. to show that intense intervention may alter market dynamics
   - Intensive government intervention makes **uncertainty about policy errors** a factor in asset prices
     - this factor gets **magnified by market speculation**
     - it attracts information acquisition by market participants and distracts them from analyzing economic fundamentals
   - Potential tension between **reducing price volatility** and **improving information efficiency**
A Model with Perfect Information

Discrete-time with infinitely many periods: $t = 0, 1, 2...$

- A risky asset, which pays a stream of dividends over time:
  \[ D_t = \theta_t + \sigma_D \varepsilon^D_t, \ varepsilon^D_t \sim \mathcal{N}(0, 1) \]

- $\theta_t$ is an exogenous asset fundamental:
  \[ \theta_{t+1} = \rho_\theta \theta_t + \sigma_\theta \varepsilon^\theta_{t+1}, \ varepsilon^\theta_{t+1} \sim \mathcal{N}(0, 1) \]

- For now, $\theta_{t+1}$ is publicly observable
  - will be made unobservable later when we introduce information frictions and policy errors
A Model with Perfect Information

**Noise traders** submit random market orders:

\[ N_t = \rho_N N_{t-1} + \sigma_N \varepsilon^N_t, \quad \varepsilon^N_t \sim \mathcal{N}(0, 1) \]

- Price insensitive orders, capturing unstable market forces
- Meant to capture trading by inexperienced retail investors

**Rational short-term investors** each maximize myopic trading profit:

\[
U^i_t = \max_{X^i_t} E \left[ -\exp\left(-\gamma W^i_{t+1}\right) \mid \theta_{t+1}, N_t \right]
\]

with \( W^i_{t+1} = R^f \bar{W} + X^i_t R_{t+1} \) and \( R_{t+1} = D_{t+1} + P_{t+1} - R^f P_t \).

- Equilibrium without any government intervention:

\[
\int_0^1 X^i_t dt = N_t
\]
Conjecture a linear equilibrium: \( P_t = \frac{1}{R^f - \rho \theta} \theta_{t+1} + p_N N_t \)

- Optimal position of each myopic rational investor:

\[
X_t^i = \frac{1}{\gamma} \frac{E_t \left[ D_{t+1} + P_{t+1} - R^f P_t \right]}{\text{Var}_t [D_{t+1} + P_{t+1}]} = \frac{1}{\gamma} \frac{p_N \left( \rho_N - R^f \right)}{\sigma_D^2 + \left( \frac{R^f}{R^f - \rho \theta} \right)^2 \sigma_\theta^2 + p_N^2 \sigma_N^2} N_t
\]

- The market breaks down when

\[
\sigma_N > \sigma_N^* = \frac{R^f - \rho_N}{2 \gamma \sqrt{\sigma_D^2 + \left( \frac{R^f}{R^f - \rho \theta} \right)^2 \sigma_\theta^2}}.
\]

- Short-term investors ineffective in trading against noise trader risk, similar to DSSW (1990)
Volatility Explosion
Government Intervention

- Introduce a government that trades the asset and takes a position

\[ X_t^G = \underbrace{\vartheta_{N,t} N_t}_{\text{intended intervention}} + \sqrt{\underbrace{\text{Var}[\vartheta_{N,t} N_t | \mathcal{F}_{t-1}]}_{\text{unintended noise}}} G_t, \]

- the government chooses intervention intensity \( \vartheta_{N,t} \)
- the amount of unintended noise increases with \( \vartheta_{N,t} \)

- Government intervention affects discount rates not cash flows \( D_t \)
  - distinct from Pastor & Veronesi (2012) and Bond & Goldstein (2015), which focus on interventions that affect cash flow
Government Objective

- Define the government objective: choose $\vartheta_N$ to maximize

$$U_t^G = \min_{\vartheta_{N,t}} \gamma_\sigma \text{Var} [\Delta P_t (\vartheta_{N,t}) | F_t]$$

$$+ \gamma_\theta \text{Var} \left[ P_t (\vartheta_{N,t}) - \frac{1}{R^f - \rho_\theta} \theta_{t+1} | F_t \right]$$

- Penalty $\gamma_\sigma$ for price volatility, penalty $\gamma_\theta$ for price deviation from fundamental

- Two possible objectives: reducing conditional volatility and improving informational efficiency
  - often treated as equivalent in policy discussions
  - reducing price volatility is more convenient and widely adopted in practice, e.g., in US monetary policy - Stein and Sundaresan (2016)

- The government internalizes the market failure by taking a sufficiently large $\vartheta_{N,t}$ to prevent market breakdown
Again, we conjecture a linear equilibrium:

\[ P_t = \frac{1}{R^f - \rho \theta} \theta_t + p_N N_t + P_g G_t \]

The market clearing \( \int_0^1 X_t^i \, dt + X_t^G = N_t \) implies the market breaks down only when

\[ \sigma_N > \frac{1}{(1 - \vartheta_N) \sqrt{1 + \left( \frac{\rho_N - R^f}{R^f} \right)^2 \left( \frac{\vartheta_N}{1 - \vartheta_N} \right)^2 \sigma_G^2}} \]

\( \vartheta^N > 0 \) mitigates the region of market failure and may prevent failure if sufficiently large.
Volatility Explosion
Suppose now $\theta_{t+1}$ is unobservable

The public information set: $\mathcal{F}_t^M = \sigma \left( \{ D_s, P_s \}_{s \leq t} \right)$

- $\hat{\theta}^M_{t+1} = E \left[ \theta_{t+1} \mid \mathcal{F}_t^M \right]$ serves as the anchor of asset valuation
- $\hat{N}^M_t = E \left[ N_t \mid \mathcal{F}_t^M \right]$ is the market perceived noise trading

The government has no private information and intervenes

$$X^G_t = \theta \hat{N} \hat{N}_t^M + \sqrt{\text{Var} \left[ \theta \hat{N} \hat{N}_t^M \mid \mathcal{F}_t^{M-1} \right]} G_t$$

with an objective

$$\min_{\theta, N} \gamma_{\sigma} \text{Var} \left[ \Delta P_t (\theta \hat{N}) \mid \mathcal{F}_{t-1}^M \right]$$

$$+ \gamma_{\theta} \text{Var} \left[ P_t (\theta \hat{N}) - \frac{1}{R^f - \rho_{\theta}} \theta_{t+1} \mid \mathcal{F}_{t-1}^M \right]$$
Rational short-term investors again trade in the risky asset. Each investor $i$ also chooses $a_t^i \in \{0, 1\}$ to acquire private information about either $\theta_{t+1}$ or future government noise $G_{t+1}$:

$$
\begin{align*}
  s_t^i &= \theta_{t+1} + \left[ a_t^i \tau \right]^{-1/2} \epsilon_t^{s,i} \quad \text{or} \quad g_t^i = G_{t+1} + \left[ (1 - a_t^i) \tau \right]^{-1/2} \epsilon_t^{g,i}
\end{align*}
$$

Once again, investors have a myopic objective:

$$
U_t^i = \max_{a_t^i \in \{0,1\}} E \left[ \max_{X_t^i} E \left[ - \exp \left( -\gamma W_{t+1}^i \right) \mid \mathcal{F}_t^i \right] \mid \mathcal{F}_{t-1}^M \right],
$$

where $\mathcal{F}_t^i = \mathcal{F}_t^M \lor \{ a_t^i s_t^i + (1 - a_t^i) g_t^i \}$.
Equilibria with Government Intervention

- **A fundamental-centric equilibrium**
  - all investors acquire signals about $\theta_{t+1}$
    - investor trading makes price more informative about $\theta_{t+1}$
    - investors may trade against government, depending on signals

- **A government-centric equilibrium**
  - all investors acquire signals about $G_{t+1}$
    - occurs when the government intervention is sufficiently intensive
    - price may be less informative about $\theta_{t+1}$
    - investors all trade along the government, making price volatility lower and allowing government to trade less

- **A mixed equilibrium**
  - some investors acquire signals about $\theta_{t+1}$ some about $G_{t+1}$
Market Equilibrium with a Single Government Objective

Three cases: 1) $\gamma_{\sigma} = 0, \gamma_{\theta} \neq 0$; 2) $\gamma_{\theta} = 0, \gamma_{\sigma} \neq 0$; 3) $\gamma_{\theta} = 0, \gamma_{\sigma} = 0$
Market Equilibrium with a Mixed Government Objective

\( \gamma_\theta = 1 \) and varying \( \gamma_\sigma \)
$\gamma_\theta = 1$ and $\gamma_\sigma = 1.25$
Boundary between Government- and Fundamental-Centric Equilibria
Key Insights

- Government intervention helps to stabilize financial markets
  - unregulated markets can be highly volatile and might break down when noise trader risk is sufficiently large

- Adverse effects:
  - active government intervention renders noise in government policy a pricing factor
  - intervention can cause investors to speculate on government noise rather than fundamentals, which amplifies effects of policy errors

- Tension between objectives of reducing price volatility and improving informational efficiency
  - while price volatility is lower with intervention, informational efficiency can be worse
Risks in China's Financial System

- Commonly concerned risks
  - Noise trader risk created by inexperienced retail investors
  - Rising leverage across the nation
  - Overheating housing markets
- Another risk: policy errors magnified by financial market speculation
  - the stock market turmoil in summer 2015
  - the breakdown of the circuit breaker in January 2016
  - the exchange rate crash in August 2015