

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

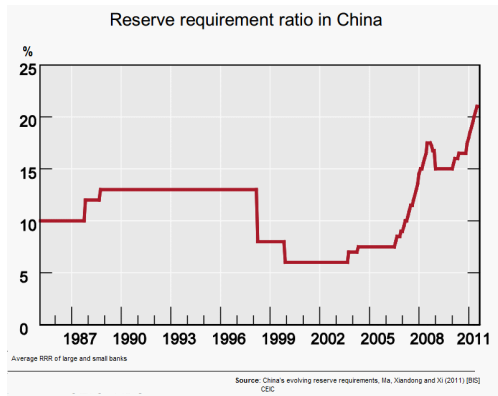
- ▶ Large population of **inexperienced retail investors**
 - ▶ retail investors hold 50% of tradable shares and contribute to 90% of trading volume
- ▶ Large price **volatility** in China's stock markets and heavy turnover
 - ▶ highest turnover rate among major stock markets
- ▶ Asset prices often **deviate 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

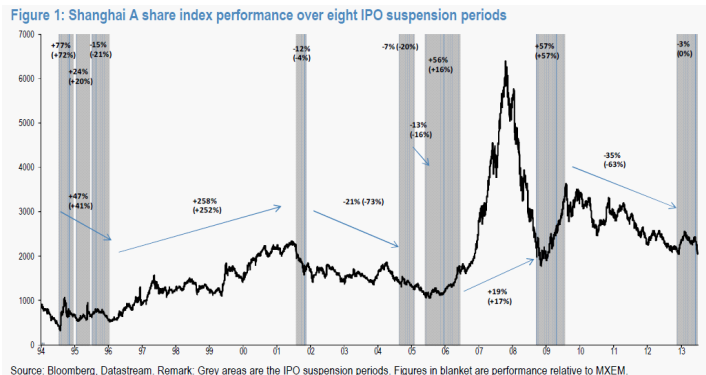
Required Reserve Ratio in China

- ▶ 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

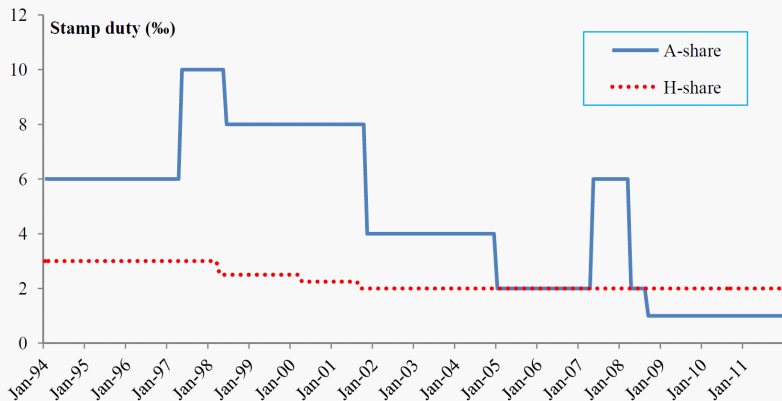
- ▶ The government (CSRC) directly **controls IPO issuance**
 - ▶ had suspended IPO issuance 8 times
 - ▶ quantity and allocation of quota



Stamp Tax in Stock Trading

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 ‰.



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?

Outline

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: $t = 0, 1, 2, \dots$

- ▶ A risky asset, which pays a stream of **dividends** over time:

$$D_t = \theta_t + \sigma_D \varepsilon_t^D, \quad \varepsilon_t^D \sim \mathcal{N}(0, 1)$$

- ▶ θ_t is an exogenous **asset fundamental**:

$$\theta_{t+1} = \rho_\theta \theta_t + \sigma_\theta \varepsilon_{t+1}^\theta, \quad \varepsilon_{t+1}^\theta \sim \mathcal{N}(0, 1)$$

- ▶ For now, θ_{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:

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

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

Rational short-term investors each maximize myopic trading profit:

$$U_t^i = \max_{X_t^i} E \left[-\exp \left(-\gamma W_{t+1}^i \right) \mid \theta_{t+1}, N_t \right]$$

with $W_{t+1}^i = R^f \bar{W} + X_t^i R_{t+1}$ and $R_{t+1} = D_{t+1} + P_{t+1} - R^f P_t$.

- ▶ Equilibrium without any government intervention:

$$\int_0^1 X_t^i dt = N_t$$

Market Breakdown

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:

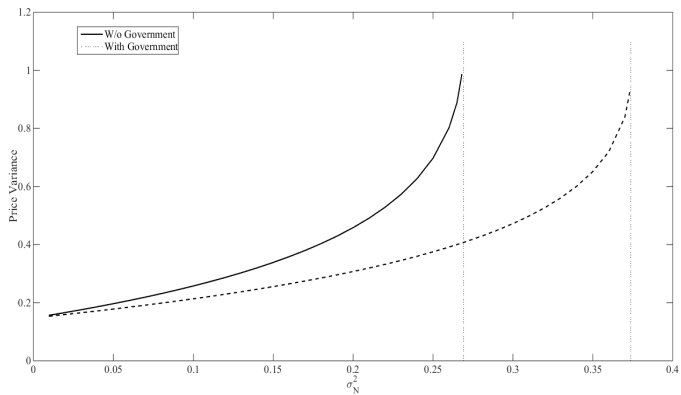
$$X_t^i = \frac{1}{\gamma} \frac{E_t [D_{t+1} + P_{t+1} - R^f P_t]}{\text{Var}_t [D_{t+1} + P_{t+1}]} = \frac{1}{\gamma} \frac{p_N (\rho_N - R^f)}{\sigma_D^2 + \left(\frac{R^f}{R^f - \rho_\theta}\right)^2 \sigma_\theta^2 + p_N^2 \sigma_N^2} N_t$$

- ▶ 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

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

- ▶ 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 ϑ_N to maximize

$$U_t^G = \min_{\vartheta_{N,t}} \gamma_\sigma \text{Var} [\Delta P_t (\vartheta_{N,t}) | \mathcal{F}_t] \\ + \gamma_\theta \text{Var} \left[P_t (\vartheta_{N,t}) - \frac{1}{R^f - \rho_\theta} \theta_{t+1} | \mathcal{F}_t \right]$$

- ▶ Penalty γ_σ for price volatility, penalty γ_θ 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 Sundarem (2016)
- ▶ The government internalizes the market failure by taking a sufficiently large $\vartheta_{N,t}$ to prevent market breakdown

Intervention Equilibrium

- ▶ Again, we conjecture a linear equilibrium:

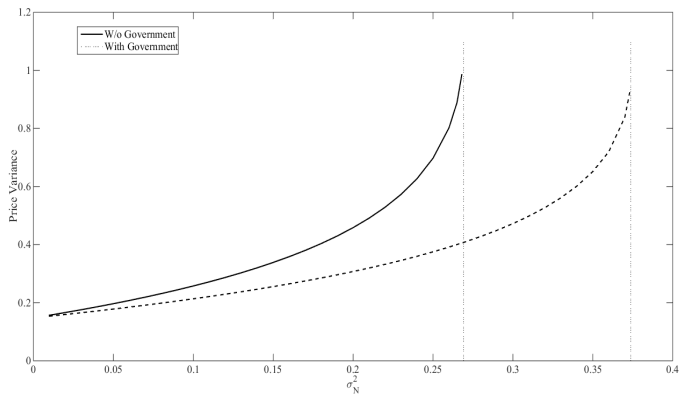
$$P_t = \frac{1}{R^f - \rho_\theta} \theta_t + p_N N_t + P_g G_t$$

- ▶ The market clearing $\int_0^1 X_t^i dt + X_t^G = N_t$ implies the market breaks down only when

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

- ▶ $\vartheta^N > 0$ **mitigates** the region of market failure and may prevent failure if sufficiently large

Volatility Explosion



An Extended Model with Information Frictions

- ▶ Suppose now θ_{t+1} is **unobservable**
- ▶ The public information set: $\mathcal{F}_t^M = \sigma(\{D_s, P_s\}_{s \leq t})$
 - ▶ $\hat{\theta}_{t+1}^M = E[\theta_{t+1} | \mathcal{F}_t^M]$ serves as the anchor of asset valuation
 - ▶ $\hat{N}_t^M = E[N_t | \mathcal{F}_t^M]$ is the market perceived noise trading
- ▶ The government has no private information and intervenes

$$X_t^G = \vartheta_{\hat{N}} \hat{N}_t^M + \sqrt{\text{Var}[\vartheta_{\hat{N}} \hat{N}_t^M | \mathcal{F}_{t-1}^M]} G_t$$

with an objective

$$\begin{aligned} \min_{\vartheta_N} \quad & \gamma_\sigma \text{Var} \left[\Delta P_t(\vartheta_{\hat{N}}) \mid \mathcal{F}_{t-1}^M \right] \\ & + \gamma_\theta \text{Var} \left[P_t(\vartheta_{\hat{N}}) - \frac{1}{R^f - \rho_\theta} \theta_{t+1} \mid \mathcal{F}_{t-1}^M \right] \end{aligned}$$

An Extended Model with Information Frictions

- ▶ **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 θ_{t+1} or future government noise G_{t+1} :

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

- ▶ 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 $\mathcal{F}_t^i = \mathcal{F}_t^M \vee \{a_t^i s_t^i + (1 - a_t^i) g_t^i\}$

Equilibria with Government Intervention

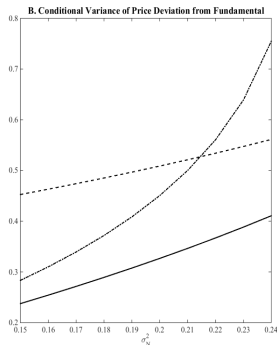
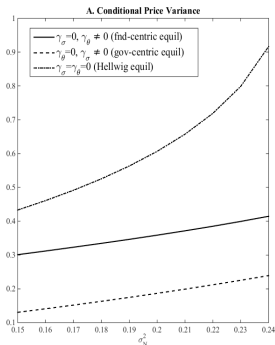
- ▶ A **fundamental-centric** equilibrium
all investors acquire signals about θ_{t+1}
 - ▶ investor trading makes price more informative about θ_{t+1}
 - ▶ investors may trade against government, depending on signals

- ▶ 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 θ_{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 θ_{t+1} some about G_{t+1}

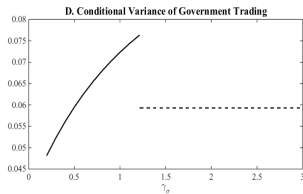
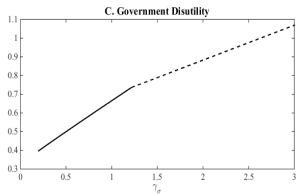
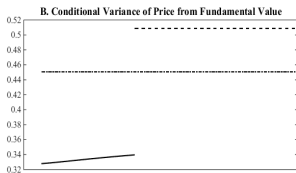
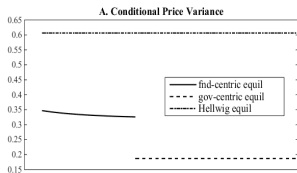
Market Equilibrium with a Single Government Objective

Three cases: 1) $\gamma_\sigma = 0, \gamma_\theta \neq 0$; 2) $\gamma_\theta = 0, \gamma_\sigma \neq 0$; 3) $\gamma_\theta = 0, \gamma_\sigma = 0$

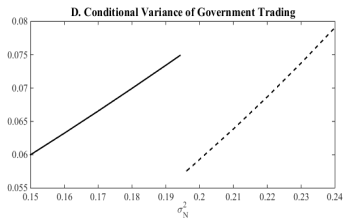
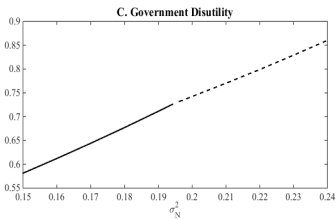
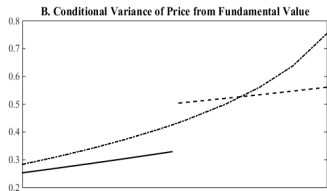
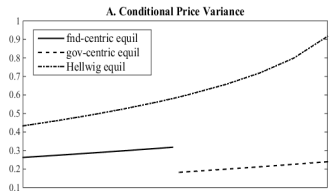


Market Equilibrium with a Mixed Government Objective

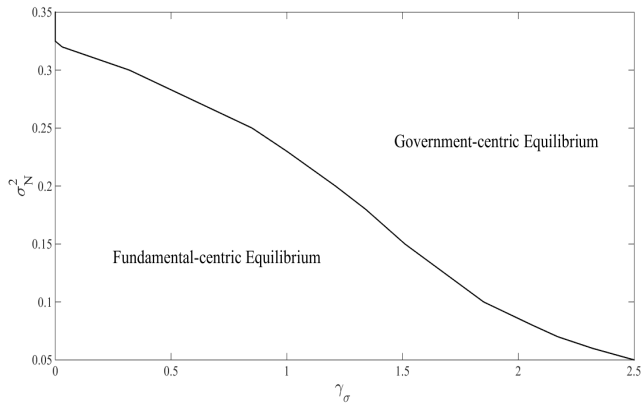
$\gamma_\theta = 1$ and varying γ_σ



$$\gamma_\theta = 1 \text{ and } \gamma_\sigma = 1.25$$



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