

China's Model of Managing the Financial System

by

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Discussion by

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Elements of the Model

Discrete-time single-asset model on an infinite horizon

Asset is referred to as a “stock,” and discussion is of the Chinese context, but model can apply to any trading of risky assets (e.g., MBS, Greek sovereign bonds) and/or efforts to impact prices by a central bank

Normal (Gaussian), negative exponential “noisy rational expectations” model

- All r.v.’s are Normal, preferences are neg. exponential, “noise” traders
- Implications: agents care only about mean and variance, prices are not fully revealing, obtain linear r.e. equilibrium
- Complicated: 3 technical appendices with calculations and proofs*

Fundamentals: cash flow is an exogenous process θ_t :

$$\theta_t = \rho_\theta \theta_{t-1} + \sigma_\theta \varepsilon_t^\theta$$

Dividends:

$$D_t = \theta_t + \sigma_D \varepsilon_t^D$$

*Brunnermeier, Sockin and Xiong are smart guys, and we will assume that the model is solved correctly

Elements of the Model

Noise traders (interpreted as retail investors)

$$N_t = \rho_N N_{t-1} + \sigma_N \varepsilon_t^N$$

Noise traders don't optimize; they drive prices away from fundamentals and cause (non-fundamental) volatility; gov't trades in opposite direction to limit deviations of prices from fundamentals and/or limit volatility

Public information: All agents (investors and government) observe history of dividends, asset prices, government noise*

$$F_t^M = \{D_s, P_s, G_s\}_{s \leq t}$$

Model uses quantities such as the expectation of noise trading

$$\hat{N}_t^M = E[N_t^M | F_t^M]$$

*The "noise" induced by government trading, to be defined later.

Elements of the Model

Government trades against “noise” traders, and also introduces its own noise G_t :

$$X_t^G = \underbrace{\mathcal{G}_{\hat{N},t} \hat{N}_t^M}_{\substack{\text{gov't trades to} \\ \text{offset its estimate} \\ \text{of trading by noise} \\ \text{traders}}} + \underbrace{\sqrt{\text{var}[\mathcal{G}_{\hat{N},t} \hat{N}_t^M \mid F_{t-1}^M]}}_{\substack{\text{noise is scaled up by} \\ \text{magnitude of gov't trading}}} \underbrace{\times G_t}_{\substack{\text{noise because} \\ \text{gov't is not} \\ \text{perfect}}}$$

Government minimizes weighted sum of variance of prices and variance of deviations between price and fundamental value:

$$U_t^G = \min \gamma_\sigma \text{var}[P_t \mid F_{t-1}^M] + \gamma_\theta \text{var}\left[P_t - \underbrace{\theta_t / (R_t - \rho_\theta)}_{\text{fundamental value}} \mid F_{t-1}^M\right]$$

Elements of the Model

Continuum of investors have short horizons: each investor lives for only one period, dies, and is replaced by another

(Rational) investors acquire a signal about either next period's fundamental assets value θ_{t+1}

$$s_t^i = \theta_{t+1} + (\tau_s)^{-1/2} \varepsilon_t^{s,i}$$

or about the next-period gov't noise:

$$g_t^i = G_{t+1} + (\tau_g)^{-1/2} \varepsilon_t^{g,i}$$

Investors maximize

$$U_t^i = \max_{a_t^i \in \{0,1\}} E \left[\max_{X_t^i} E[-\exp(\gamma W_{t+1}^i) | F_t^i] | F_{t-1}^M \right]$$

Then choose demand X_t^i to maximize utility, based on investor's information

Investors choose which signal to acquire, based on public information

Elements of the model

Markets clear (sum of investor, government, and “noise trader” demands = 0)

There is a linear rational expectations equilibrium:

$$P_t = \frac{1}{R^f - \rho_\theta} \hat{\theta}_{t+1}^M + p_g G_t + p_{\hat{G}} \hat{G}_{t+1}^M + p_\theta (\theta_{t+1} - \hat{\theta}_{t+1}^M) + p_G (G_{t+1} - \hat{G}_{t+1}^M) + p_N N_t.$$

There are two equilibria

In one (the fundamental-centric or “good” equilibrium), investors try to learn about fundamentals

In the other (the gov’t-centric or “bad” equilibrium), investors try to learn about the noise created by government trading

- The “bad” equilibrium only appears if the gov’t places at least some weight on minimizing price variance

Provided the gov’t places at least some weight on price variance, then

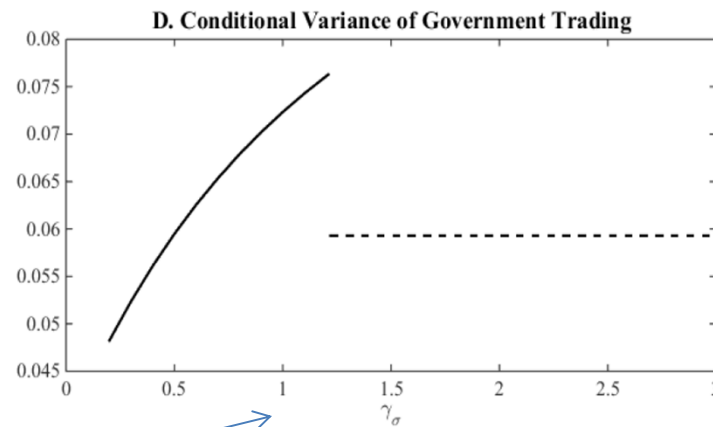
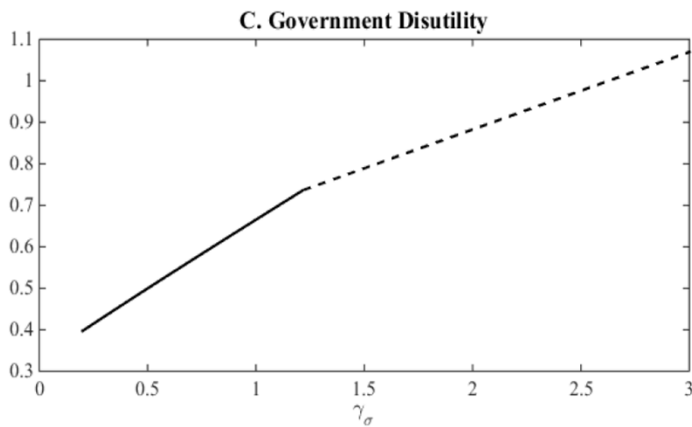
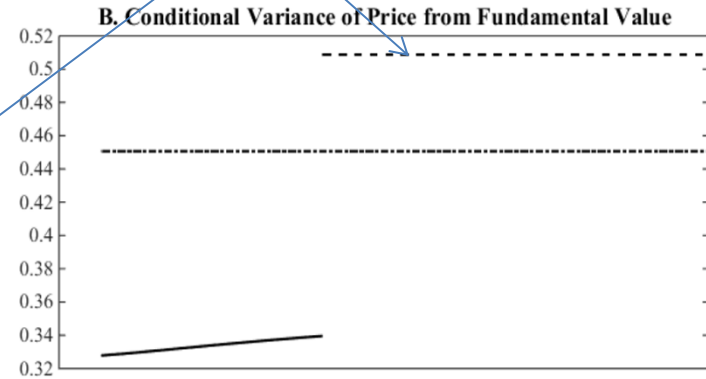
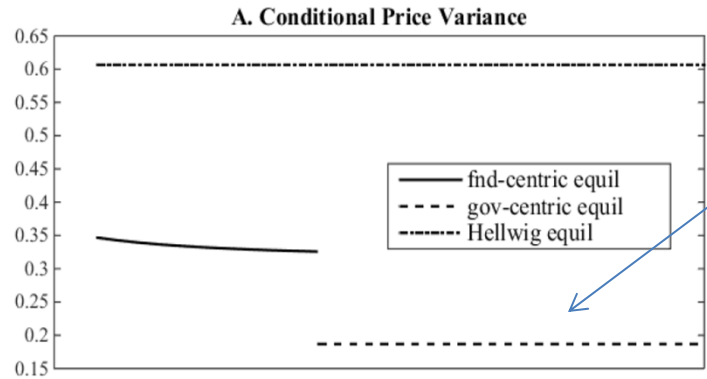
- “Bad” equilibrium appears if the weight on price variance is large enough
- If weight on price variance is non-zero, “bad” equilibrium appears if variance of noise trading is large enough

Gov’t-centric equilibrium is bad:

- Investors do not gather information about fundamentals, so prices are less informative, i.e. variance of difference between prices and fundamentals is large
- Stepping outside the model, real resources are spent on an activity (learning about gov’t noise) that presumably does not improve allocation

Key results: Figure 4

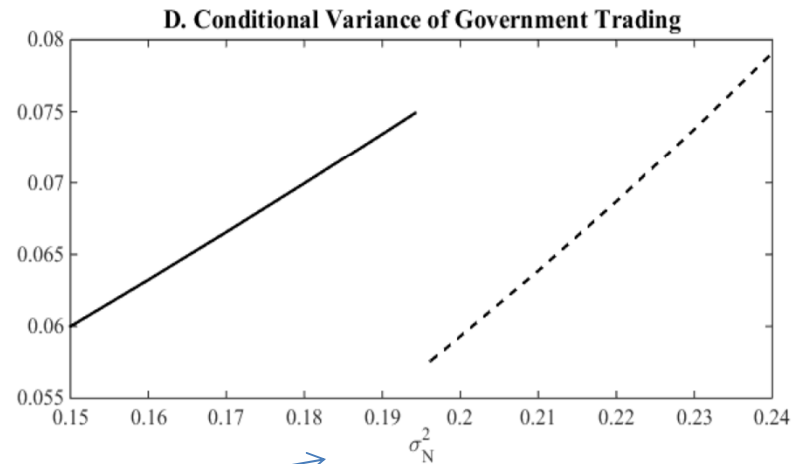
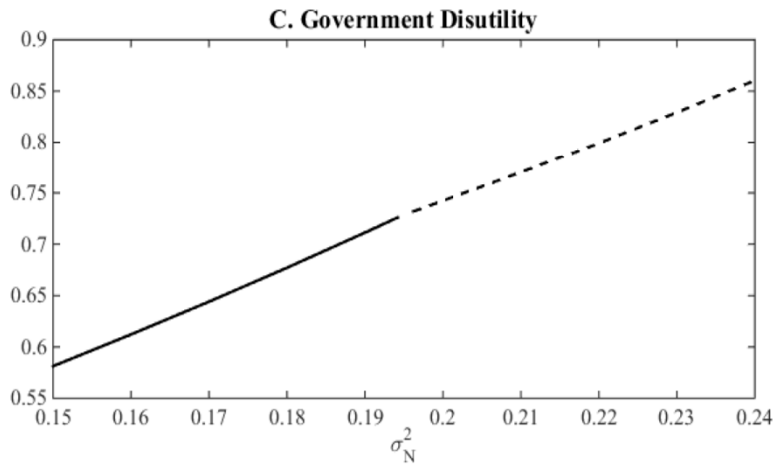
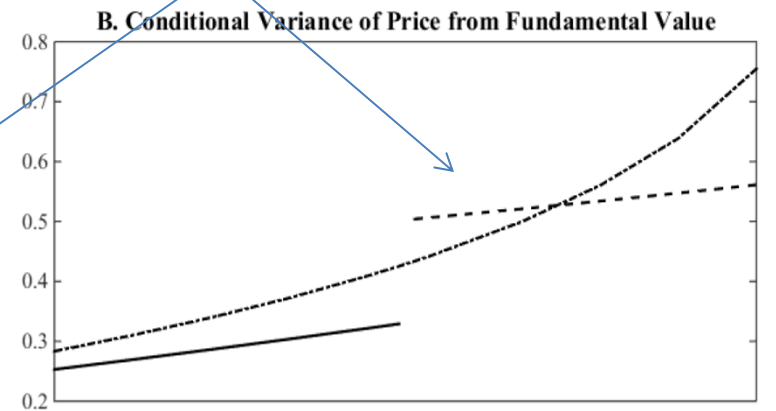
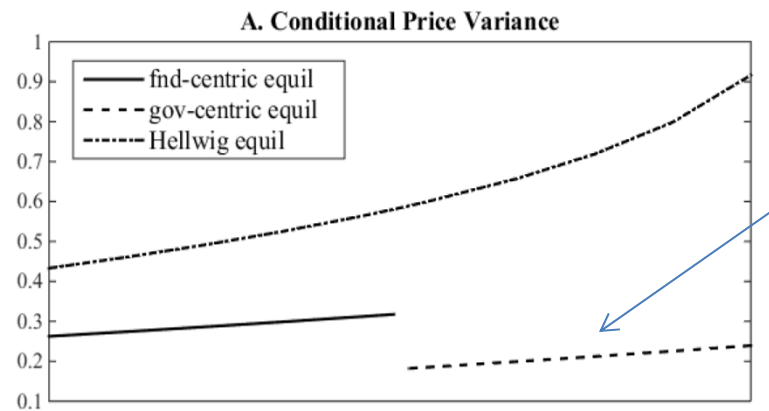
...then we switch to an equilibrium in which investors try to learn about government trading



If government places a large weight on price variance (γ_σ)...

Key results: Figure 5

...then we switch to an equilibrium in which investors try to learn about government trading



If government places any weight on price variance, and variance of noise trading (σ_N^2) is sufficiently high...

What should one take away from the paper?

It is possible to construct a sensible, internally consistent model in which intervention by a sophisticated* gov't (e.g., central bank), maximizing a reasonable objective function, makes things worse

- Here “worse” means that the difference between market prices and fundamental values is larger
- Mechanism is that agents stop gathering information about fundamentals and instead try to learn about the government’s actions

Note that the equilibrium is problematic in another way

- Paper abstracts away from the fact that real resources are used up in information acquisition—in the model agents can learn about either fundamentals or the regulator’s actions, without any resource cost
- In an actual economy, the “bad” equilibrium would involve tens or possibly hundreds of thousands of very smart people not thinking about fundamentals but instead thinking about what the government will do

The regulator has a reasonable objective function, optimizes given his/her information, uses Bayes Rule, (though is not perfect, i.e. there is gov't “noise”)

What should one take away from the paper? (continued)

You might have assumed that intervention by a sophisticated regulator (e.g., the Fed) who has a reasonable objective function, uses Bayes Rule, and optimizes given his/her (rational) beliefs would move prices closer to fundamentals

- If that was your assumption, you should rethink
- Even a good regulator can make things worse

Ok... so it is possible to construct a model in which central bank/regulatory intervention, even by a good regulator, makes things worse.

But does this model describe the financial markets?

- Does it describe the Chinese market?
- If, hypothetically, regulators in Western economies followed similar policies, would the model describe a western financial market?

Let's start by trying to take a "scientific" perspective: Is the model consistent with the data?

What are the implications of the model for the data?

- This is a difficult question

Model has

- a single asset \Rightarrow no cross-sectional implications
- A stationary equilibrium \Rightarrow no time-series implications

Does the model have any testable implications? If so, the paper does not address them.

One can imagine trying to exploit some of the comparative statics of the model.

For example, the next slide shows how the conditional price variance (left panel) and the variance of the difference between prices and fundamental value (right panel) vary with noise trader risk σ_N^2 .

Model implications

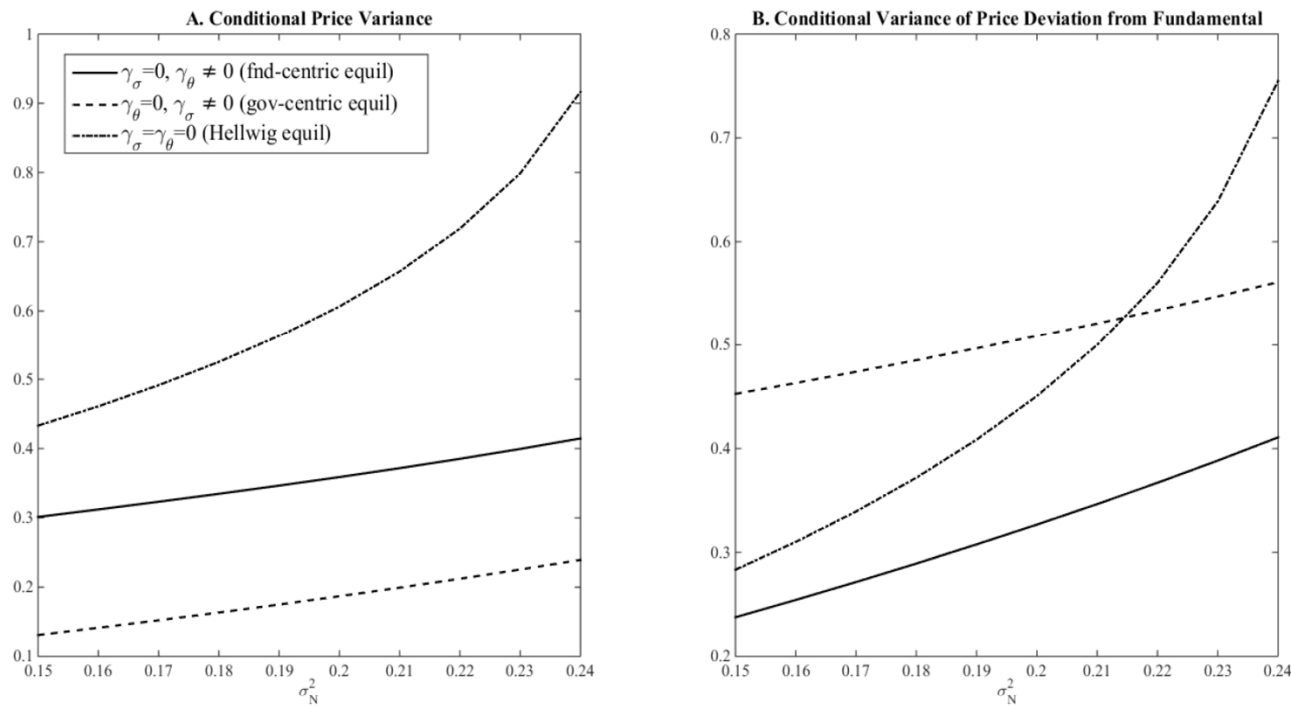


Figure 3: Equilibria across noise trader risk. Panel A depicts the conditional price variance $Var [P_t(\vartheta_{\hat{N}}) | \mathcal{F}_{t-1}^M]$, while Panel B the conditional variance of price deviation from the fundamental $Var [P_t(\vartheta_{\hat{N}}) - \frac{1}{R^f - \rho_\theta} \theta_{t+1} | \mathcal{F}_{t-1}^M]$. In both panels, the solid line is for the case when $\gamma_\sigma = 0$ and $\gamma_\theta \neq 0$, the dashed line for the case when $\gamma_\theta = 0$ and $\gamma_\sigma \neq 0$, and the short-dashed line for the Hellwig benchmark with $\gamma_\theta = \gamma_\sigma = 0$.

Testable implications of the model?

But it isn't clear that it makes sense to try to take these comparative statics to the data

- Figure 3 was created by considering a sequence of different models, indexed by σ_N^2
- You might try to convince yourself that this provides guidance about how the equilibrium will vary with time-series variation in σ_N^2 , but this is stepping outside the model (in the model σ_N^2 is constant)
- And if you do convince yourself of this, it is not clear how you will measure σ_N^2

I cannot figure out what (if any) are the testable implications of the model.

This is my question for the authors (which I don't expect them to answer right now): What are the testable implications of the model? Is it possible to confront the model with the data? Is it possible to falsify the model? If so, what empirical finding would falsify the model?

Pending the answers to these questions, let's try to think about the reasonableness of the model

Main message is that it is possible to construct a sensible model in which intervention by a sophisticated gov't, maximizing a reasonable objective function, makes things worse

This does not happen if the regulator's objective function is to minimize the variance of the difference between prices and fundamentals

Agents only stop gathering information about fundamentals if the regulator's minimization problem places at least some weight on minimizing price volatility (and some other conditions are satisfied)

Let's think about China: Are Chinese regulators likely to put any weight on minimizing price volatility?



Investors outside the 中国证券监督管理委员会 (China Securities Regulatory Commission) request a friendly dialogue with regulators following the Chinese stock market collapse in summer 2015

Do Chinese regulators care about the difference between prices and fundamentals and efficient allocation of capital?

Short sales are restricted (only a limited list of large cap. stocks may be sold short), and historically have been prohibited

- Allowing short sales would be an easy way to move prices toward fundamentals

Other regulatory practices suggest a lack of concern with fundamentals

- IPOs are rationed, and there are limits on the P/E ratio at which shares may be offered ($P/E \leq 23$)
- This creates various side effects

Only once has party moved to reduce stock prices (the May 30, 2007 tripling of the stamp tax)

- I think of this as being driven by a concern about volatility, not the difference between prices and fundamentals

Does the model in the paper describe the China market?

I suggest that the Chinese regulatory objective is maintaining social and political stability, which will involve placing some weight on minimizing price variance (and little or no weight on fundamentals)

Provided the regulator places some weight on fundamentals, then the bad equilibrium only occurs if “noise” trader volatility is sufficiently high

- Is it high enough to put us in the bad equilibrium?
- I will remind you of my previous comments about how I wish I knew how to confront the model with the data

Casual empiricism suggests that Chinese investors are very focused on what the government (= party) will do

If the Fed intervene in US (risky) asset markets, would the US fall into the bad equilibrium?

Well, of course the Fed is competent, and will focus on fundamentals, and will never introduce any “noise.”

- I imagine that most of you think the US regulators will not have the same focus on volatility as Chinese regulators focused on political stability

But I feel that I should point out that Chinese think that Chinese regulators do a much better job than US regulators

Are you really confident that US regulators will be less subject to social/political pressure a communist dictatorship?

Would the US fall into the bad equilibrium?

For one and half days I have been listening to people at this conference, and I hear a lot of discussion about when the Fed will reduce its balance sheet...

- ...when it will be unwound, whether it will be fully unwound, and how aggressively it will be unwound
- Fed impacts fundamentals, so some of this concern is probably about fundamentals
- But I suspect that some would be concerned about when the Fed would reduce its balance sheet even if this did not impact fundamentals
- Tens, possibly hundreds, of thousands of the most highly educated and (potentially) productive people in the US are not thinking about fundamentals but instead are thinking about what the Fed will do

Perhaps we are already in the bad equilibrium

- If we are, it is an enormous waste of scarce and valuable resources, the time and energy of very smart (and potentially productive)

But we are at a Fed conference...

You might reply by pointing out that we are at a Fed conference—of course people at a Fed conference talk about the Fed

But perhaps the fact that we are at a Fed conference is possibly a symptom of the problem—we are not at a conference about productivity and growth

Even if we are in the bad equilibrium, I do not blame people for focusing on the Fed's balance sheet

If we are in the bad equilibrium then it is optimal for people to try to figure out what the Fed will do.

If, hypothetically, the Fed started intervening in US equity markets, would the US fall into the bad equilibrium?

Currently (at least some) equity investors think about fundamentals

If, hypothetically, the Fed had a large position in US equities, I hypothesize that tens, possibly hundreds, of thousands of the smartest, most highly educated, and productive people in the US would stop thinking about fundamentals and start thinking about what the Fed will do

It is difficult to see this as anything other than a significant cost