

Financial Market Feedback:

New Perspective from Commodities Financialization

Itay Goldstein

Wharton School, University of Pennsylvania

Information in prices

- A basic premise in financial economics: **market prices are very informative** about assets fundamentals
- They gather information from many different participants, who trade on their own money
- Lots of **empirical evidence** supporting the idea, e.g., Roll (*AER*, 1984)
- **Models of how information gets reflected in the price:** Grossman and Stiglitz (*AER*, 1980), Kyle (*Econometrica*, 1985), Glosten and Milgrom (*JFE*, 1985)

The Feedback Effect

- The informativeness of prices is important, since it helps facilitate the **efficient allocation of resources**:

An efficient market “has a very desirable feature. In particular, at any point in time market prices of securities provide accurate signals for resource allocation. That is, firms can make production-investment decisions ...”

Fama & Miller (1972)

- **Who learns from the price?**
 - Managers, Creditors, Regulators, Customers, Employees, etc.
 - As long as there is *some* information in the price they don't know

Empirical Evidence

- Luo (*JF*, 2005) – Mergers are more likely to be canceled when prices react more negatively and managers are trying to learn
 - Chen, Goldstein, and Jiang (*RFS*, 2007) – Price informativeness affects investment sensitivity to price
 - Foucault and Fresard (*RFS*, 2012) – Cross listed firms exhibit stronger sensitivity of investment to price
 - Edmans, Goldstein, and Jiang (*JF*, 2012) – Exogenous shock to price affects takeovers
- Financial markets are not a **side show**

Implications for Theory

- A **feedback loop** emerges between market prices and firms' cash flows and fundamentals. Prices reflect *and* affect cash flows:

"In certain circumstances, financial markets can affect the so-called fundamentals which they are supposed to reflect." **George Soros**

- Traditional models on financial markets do not capture this feedback loop
 - They take firm cash flows as given and study price formation as a result
- The “Feedback Effect” papers break this paradigm and consider the feedback loop between prices and cash flows / fundamentals
 - Modelling can be challenging because of feedback loop

Early Literature Review: Bond, Edmans, and Goldstein (*ARFE*, 2012)

- Review theoretical and empirical literature on the real effect of **secondary financial markets**
- Two channels for real effect (both rely on information):
 - Decision makers on the real side **learn new information** from markets that guides their decisions
 - Compensation contracts for real decision makers are tied to market prices (due to their informativeness) and affect their **incentives**

- Highlight two implications for theoretical research:
 - Incorporating the feedback effect into models of trading in financial markets fundamentally **changes predictions on price formation** in financial markets (with implications for firm cash flows)
 - Giving rise to phenomena that otherwise look puzzling, e.g., manipulation, strategic complementarities
 - Different notions of efficiency
 - **Forecasting Price Efficiency vs. Revelatory Price Efficiency**
 - Former is often emphasized (Market Efficiency), but latter really matters (Real Efficiency)

Commodities Futures Financialization

- Commodity futures became popular among financial investors over the last two decades
 - Phenomenon known as **commodities financialization**: Cheng and Xiong (*ARFE*, 2014)
- Economists and regulators are concerned about whether and how financialization has affected the functioning of futures and spot markets
 - What happened to market quality (**spot and futures market**)?
 - What are the **real effects**?

Informational Role of Commodities Futures Markets

- Information incorporated in trading in futures markets may be key for **investment/production** decisions in commodities

“futures prices provide a wealth of valuable information for those who produce, store, and use commodities...The big benefit from futures markets is the side effect: the fact that participants in the futures markets can make production, storage, and processing decisions by looking at the pattern of futures prices, even if they don't take positions in that market.”

Black (1976)

- What would be the consequences of financialization analyzed through the lens of the **informational channel**?

Commodity Financialization and Information Transmission: Goldstein and Yang (2017)

- We develop an asymmetric information model where financial traders, commodity producers, and noise traders trade futures contracts
 - Financial traders inject new **information** and **noise** into the futures market
 - **Price informativeness** can either increase or decrease with commodity financialization
- Commodity producers learn information from the futures price to guide commodity production
 - **Real effects** of commodity financialization; natural framework for feedback

Model Setup

- Two dates: $t = 0$ (futures market), $t = 1$ (spot market)
- **Date-1 spot market**
 - Symmetric information; endogenous spot price \tilde{v}
 - Exogenous linear commodity demand
 - Endogenous commodity supply from commodity producers
- **Date-0 futures market**
 - Asymmetric information; endogenous futures price \tilde{p}
 - Players: commodity producers (mass 1), financial traders (mass μ), and noise traders; μ parameterizes commodity financialization

Commodity Demand and Supply

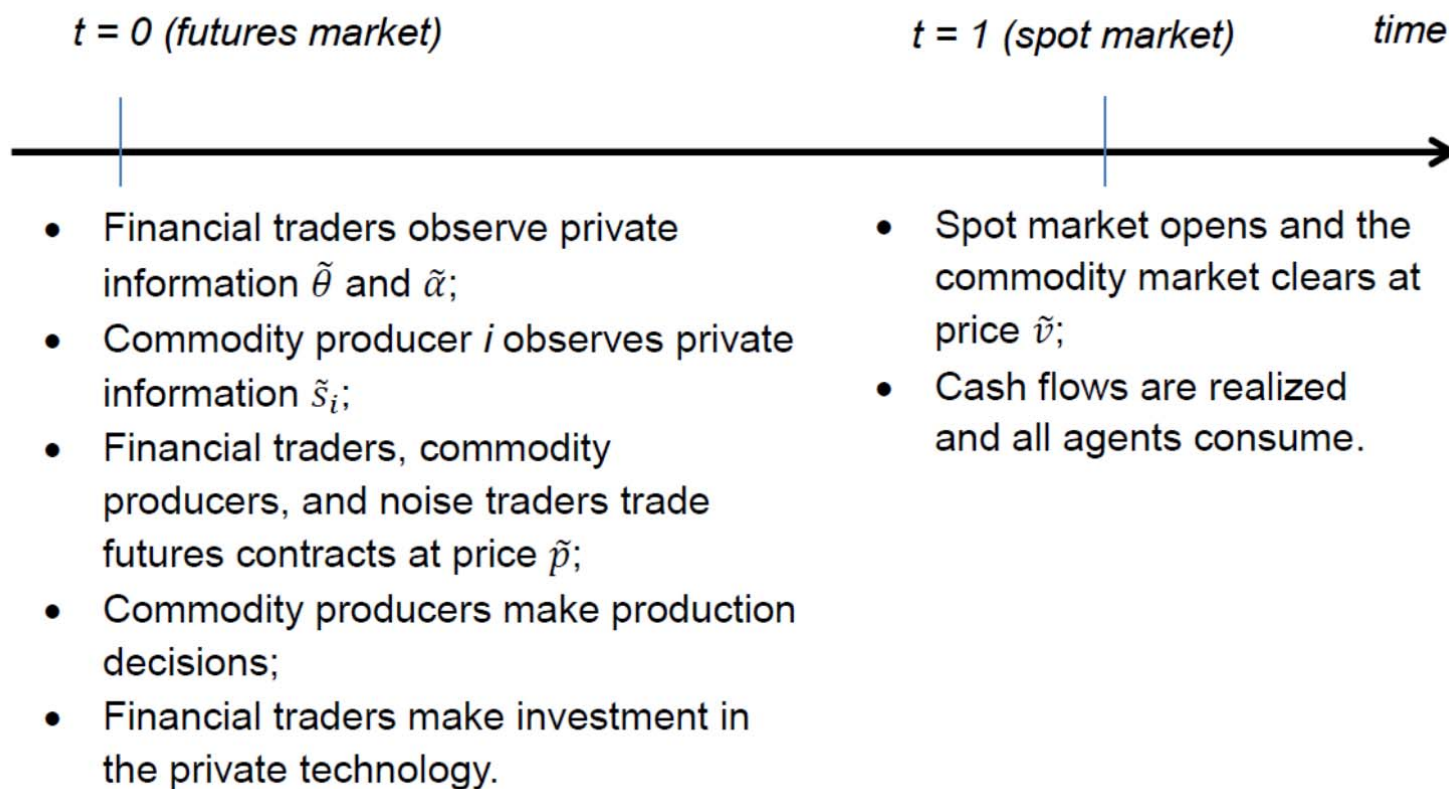
- At date 1, the commodity demand is $y = \tilde{\theta} + \tilde{\delta} - \tilde{v}$
 - $\tilde{\theta} + \tilde{\delta}$ captures demand shocks
 - $\tilde{\theta} \sim N(\bar{\theta}, \tau_{\theta}^{-1})$ is forecastable and $\tilde{\delta} \sim N(0, \tau_{\delta}^{-1})$ is unforecastable
- At date 0, a continuum $[0,1]$ of commodity producers choose production x_i and position in futures market d_i to maximize expected CARA utility
 - Their final wealth is: $W_i = \tilde{v}x_i - (cx_i + \frac{1}{2}x_i^2) + (\tilde{v} - \tilde{p})d_i$
 - Their information is the futures price \tilde{p} and a private signal $\tilde{s}_i = \tilde{\theta} + \tilde{\varepsilon}_i$, where $\tilde{\varepsilon}_i \sim N(0, \tau_{\varepsilon}^{-1})$

- Their choices are:
 - **Production:** $x_i = \tilde{p} - c$
 - **Futures exposure:** $d_i = \frac{E(\tilde{v}) - \tilde{p}}{\kappa \text{Var}(\tilde{v})} - (\tilde{p} - c)$
 - First component is **speculation** and second component is **hedging**
- Equilibrium in spot market:
 - Supply $(\tilde{p} - c)$ equals demand $(\tilde{\theta} + \tilde{\delta} - \tilde{v})$
 - Spot price $\tilde{v} = \tilde{\theta} + \tilde{\delta} + c - \tilde{p}$
- Clear **supply channel** by which futures price affects spot price and the real economy

Financial Traders

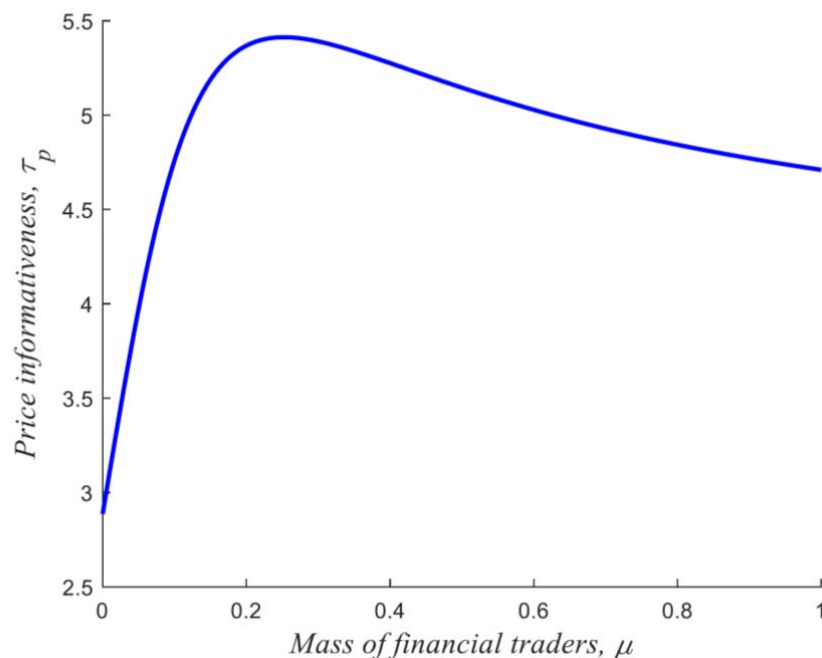
- A mass μ of identical financial traders who trade futures both for **speculation** and for **hedging** to maximize expected CARA utility
- They know the demand shock $\tilde{\theta} \rightarrow$ speculation
- They invest in another market with net return of $\tilde{\alpha} + \tilde{\eta}$
 - $\tilde{\alpha} \sim N(0, \tau_{\alpha}^{-1})$ is forecastable and $\tilde{\eta} \sim N(0, \tau_{\eta}^{-1})$ is unforecastable
 - $Corr(\tilde{\delta}, \tilde{\eta}) = \rho \in (-1, 1) \rightarrow$ hedging
- In the financial market, there are also noise traders: $\tilde{\xi} \sim N(\bar{\xi}, \tau_{\xi}^{-1})$
- Price is obtained by market clearing; linear function of $\tilde{\theta}, \tilde{\alpha}, \tilde{\xi}$

Timeline



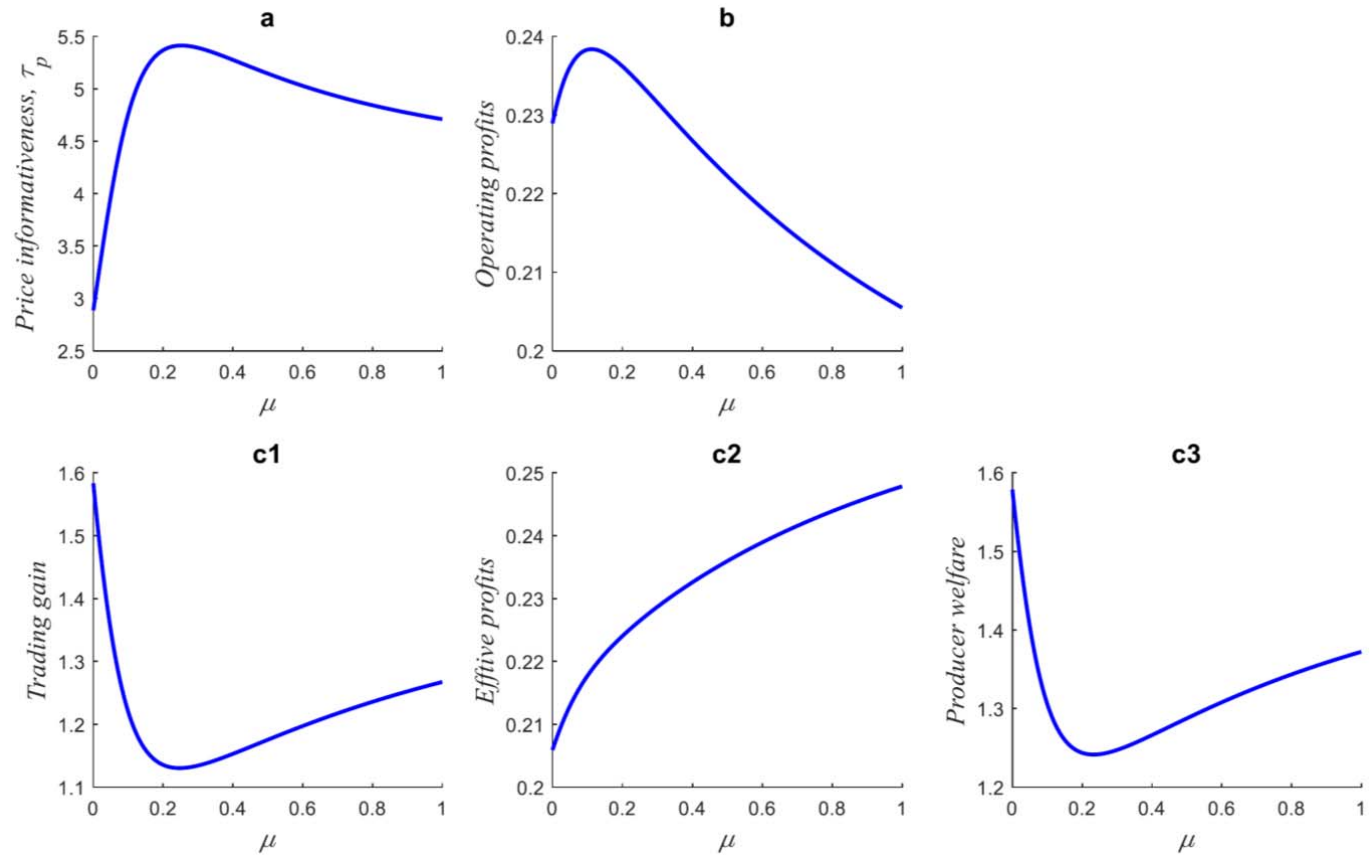
Financialization and Price Informativeness

- How does an increase in **financialization** μ affect the **informativeness** of the price about the fundamental $\tilde{\theta}$?



- Financial traders bring both “**noise**” ($\tilde{\alpha}$) and **information** ($\tilde{\theta}$) to the price
 - **Second effect dominates** only when their **mass is relatively small**
 - Initially their presence is effective to overcome noise trading ($\tilde{\xi}$), but as they become more prominent in the market, the additional factors they bring ($\tilde{\alpha}$) also become more prominent and mask $\tilde{\theta}$
- **Empirical literature** provides conflicting results
 - Raman, Robe and Yadav (2017) vs. Brogaard, Ringgenberg and Sovich (2017)
 - Our model can **reconcile** them and emphasizes the importance of how **advanced the process of financialization** is

Real Effect of Financialization



- Thinking about the real effects is more complicated:
 - On the one hand, **greater informativeness translates into greater operating profits for the producers**
 - This is in the spirit of the empirical evidence in Brogaard, Ringgenberg and Sovich (2017)
 - But, there are other things operating in the opposite direction:
 - **Greater informativeness hurts trading gains** for producers in futures market
 - **Producers benefit from volatility in futures price** because this is the effective price for their production decisions

- Overall, greater informativeness would translate to greater real efficiency if producers **were not active in the futures market**
- But, because of other effects, it turns out that the overall real efficiency is affected in the **opposite direction when producers are active in futures market**
- Hence, interpretation of empirical evidence might be tricky
- There are additional complications in the context of commodities futures markets on top of the usual feedback effect models
 - Combination of **primary** (price has direct effect on production) and **secondary** (price has an informational effect) financial markets effects

Summary

- **Feedback effects** from financial markets to real economy are present in the **data** and generate important **theoretical implications**
- New dimensions for exploration in the context of **commodities futures markets** are very prevalent in the wake of their financialization
- Interpreting real effects in this context is a bit trickier when commodity producers are also **active directly in futures markets**
 - Futures markets act both as **primary** and **secondary**, as the price has a **direct** effect and **informational** effect on production