Financial-Market Information and Corporate Finance:

An Overview with New Perspectives for the FinTech Revolution

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1. Interaction between Corporate Finance and Financial Markets

Corporate Finance and Financial Markets

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

- Corporate Finance:
    - Firms raise capital, invest, employ, produce, and provide services. This is the real economy
- Financial Markets:
    - Traders trade securities, prices are formed
- Financial market prices ought to reflect the fundamentals in the real economy. But, why are they affecting the real economy?

- One story, Proposed by Baker (2009), goes as follows:
  - Market prices move for non-fundamental reasons, such as investors' tastes and beliefs
  - Limited arbitrage, due to, for example, limited capacity of financial intermediaries, implies that such mispricing is not easily corrected
  - Opportunistic managers take advantage of this mispricing, and it ends up affecting their capital issuance and possibly other decisions
  - Hence, shocks in the financial market end up affecting the real economy

- But, there are two critical limitations in this story:
  - It only applies to primary financial markets, not to secondary financial markets
    - Primary financial markets are characterized by new capital issuance
    - Most trading in financial markets happens in secondary markets after capital issuance has already happened
  - Even in primary financial markets, this channel can be used to explain capital issuance, but not so easily to explain the important real variables such as investment, employment, and production

- A different path is proposed in Bond, Edmans, and Goldstein (2012):
  - The real effect of (secondary) financial markets relies on the informativeness of market prices
  - There are two possible channels:
    - 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 and affect their incentives
      - The only reason to base compensation on market prices is that they are informative

2. Learning from Prices

Information in Prices

- A basic premise in financial economics: market prices are very informative about assets fundamentals
- This line of thinking goes back to Hayek (1945)
    - He argued that prices are key sources of information for guiding production and allocation decisions
    - Prices aggregate information from many different traders, providing information that would be hard to generate otherwise
    - While Hayek was referring to prices of all goods and services in the economy, the argument applies to financial-market prices also, as

they gather information from many different participants, who trade on their own money

- There is a lot of empirical work investigating the informational content in market prices, and largely supporting the idea that prices contain useful information
    - A leading example is Roll (1984) who shows that orange-juice futures markets improve weather forecasting relative to traditional meteorological forecasts
    - A large literature on prediction markets argues that markets provide the most efficient mechanism for predicting various realizations, such as outcomes of elections (see Wolfers and Zitzewitz, 2004)

The Feedback Effect

- Given the information content in market prices, it is natural to expect that decision makers in the real side of the economy will make use of this information in their decisions
- What prices may be useful?
  - Stock prices, futures prices, bond prices; depending on the context
- Who can learn from prices?
  - Managers, Creditors, Regulators, Customers, Employees, etc.
  - As long as there is *some* information in the price they don't know
- Much of the literature focuses on managers learning from stock prices

Should Managers Learn from Stock Prices?

> *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)**

- If financial markets aggregate information from many different market participants, this information can help managers
- While managers know many aspects of the firm best, there are dimensions on which they can gain from others' insights:
  - Information about synergies in mergers and acquisitions, product-market demand, strategic interactions between firms in the market

Examples from Mergers and Acquisitions

- Coca-Cola's attempted acquisition of Quaker Oats:
  - On November 20, 2000, the Wall Street Journal reported that Coca-Cola was in talks to acquire Quaker Oats, and shortly thereafter, Coca-Cola confirmed such discussions
  - The market reacted negatively, sending Coca-Cola's shares down 8 percent on November 20 and 2 percent on November 21
  - Coca-Cola's board rejected the acquisition later on November 21, and connections were made to the negative market reaction, leading to Coca-Cola's shares rebounding 8 percent in the following day

- Hewlett Packard's (HP) acquisition of Compaq:
  - HP's stock price fell 19 percent following the announcement of the acquisition on September 4, 2001
  - To everyone's surprise, Walter Hewlett, who earlier voted in favor of the deal as a board member, announced opposition on behalf of the Hewlett Foundation in the wake of the stock price drop, mentioning the market's reaction
  - As chairman of the second-largest shareholder and the son of the company's founder, he posed a credible threat to the deal. Shares of HP rose 17 percent in response

Survey Evidence

Goldstein, Liao, Liu and Yang (2020): Market Feedback in China

The survey was conducted from Jun 24 to Jun 28, 2019.

N. A-share listed firms	3,628
N. Responding firms	3,626
Response%	99.9%

I. How much does your company pay attention to the stock market when making real investments? (Select one answer)
N. Responding firms = 3,626

	N. Choice	Choice%
a. Only care about the price of your own company's stock	271	7.5%
b. Only care about the prices of other similar companies' stocks	36	1.0%
c. Both A and B	3,049	84.1%
d. Only care about the composite stock index	43	1.2%
e. Do not care about the stock market at all	227	6.3%

II-1. If you choose a or c in I: Which of the following is the reason that you CARE about the stock price of your OWN company? (Select all that apply)
N. Responding firms/firms choosing a or c = 3,320

	N. Choice	Choice%
a. The stock price contains information that is new for investment decisions	2,496	75.2%
b. The compensation of management is linked to the stock price, or they hold stocks or options	375	11.3%
c. The stock price would impact refinancing (SEO/ bond issuance/ bank loan)	2,193	66.1%
d. The pressure from the board and shareholders	1,183	35.6%
e. Merger and acquisition protection	337	10.2%

Empirical Evidence

- Empirical Challenge:
  - Correlation between prices and corporate investments are not necessarily indication of active learning
  - They could both be affected by the same underlying fundamental
- A lot of the empirical evidence relies on the idea that investment-price sensitivity will be stronger in some cases than others:
  - The evidence suggests that firms rely on prices more when they are expected to do so based on informational theories

- Luo (2005) – Mergers are more likely to be cancelled when prices react more negatively and managers are trying to learn: uncertainty is not about technology and deal is easier to reverse
- Chen, Goldstein, and Jiang (2007) and Bakke and Whited (2010) – Sensitivity of investment to price is higher when prices are more informative, based on microstructure variables, even when controlling for measures of managerial information
- Foucault and Fresard (2012) – Cross-listed firms have stronger investment-price sensitivity since prices become more informative with multiple markets

- Foucault and Fresard (2014) – Learning from peers' stock prices:
  - Firms' investments are more sensitive to their peers' stock prices when these prices are more informative and their own prices are less informative
  - Their sensitivity to their own stock prices decreases when their peers' prices are more informative
- Edmans, Jayaraman, and Schneemeier (2017) – Investment sensitivity to price increases following greater enforcement of insider-trading laws
  - Enforcement of insider trading laws brings more information that is unknown to managers to the price

Empirical Evidence based on Mispricing

- Relying on non-fundamental shocks to prices has been an alternative empirical strategy to identify the real effect of financial markets
  - If one wants to rely on shocks, then clearly they cannot be fundamental shocks; fundamental shocks affect real economic variables and financial-market prices at the same time
  - Non-fundamental shocks in financial markets can conceptually satisfy the exclusion restriction
    - They affect market prices, and do not affect real economic variables, except for their effect through market prices

- Edmans, Goldstein, and Jiang (2012) propose a measure of fire sales utilizing mutual-fund extreme outflows as a non-fundamental shock to price,
  - Moving away from fundamental-based sales by:
    - Instead of looking at actual sales by mutual funds, focus on hypothetical sales based on their holdings; hence, not subject to managerial selection concerns
    - Exclude sectorial funds; hence, less subject to fundamental outflows
  - They show that firms more exposed to the shock are more likely to become takeover targets

- Dessaint, Foucault, Fresard, and Matray (2019) – Using the same non-fundamental shock to prices, it is shown that firms respond to a negative shock for their peers by cutting their own investments
    - Clear indication of a learning channel with faulty information
- Recently, a couple of papers raise challenges for the construction of the measure: Berger (2018) and Wardlaw (2018)
- However, there is ongoing debate about the critiques; moreover, results appear largely robust to the recommended adjustments in the measure: Bian, He, Shue, Zhou (2018), Dessaint, Olivier, Otto, Thesmar (2019), Gredil, Kapadia, and Lee (2019)

3. Broadening the Scope: Other Decision Makers or Other Market Prices

On the Central Role Market Prices Play in Policy Making:

"*…policy makers watch financial markets carefully for another reason, which is that asset prices and yields are potentially valuable sources of timely information about economic and financial conditions. Because the future returns on most financial assets depend sensitively on economic conditions, asset prices—if determined in sufficiently liquid markets—should embody a great deal of investors' collective information and beliefs about the future course of the economy.*" **Bernanke (2004)**

Using Market Prices for Bank Supervision:

"*Market data are generated by a very large number of participants. Market participants have their funds at risk of loss. A monetary incentive provides a perspective on risk taking that is difficult to replicate in a supervisory context. Unlike accounting-based measures, market data are generated on a nearly continuous basis and to a considerable extent anticipates future performance and conditions. Raw market prices are nearly free to supervisors. This characteristic seems particularly important given that supervisory resources are limited and are diminishing in comparison to the complexity of large banking organizations.*"

Gary Stern, Former President of Minneapolis Fed

Other Decisions Based on Prices

- Board of directors decides on whether to keep the CEO
  - Large empirical literature discusses the effect of stock prices on the CEO-retention decision, e.g., Jenter and Kanaan (2015)
- Credit rating agencies set ratings
  - Although recent evidence by Gredil, Kapadia, and Lee (2019) suggests they can differentiate fundamental from non-fundamental information
- Lenders, creditors, and depositors determine access to capital
  - See how SEC explained restrictions on short sales for financial institutions

Commodities Futures Markets

"*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)

- This issue has become very relevant recently with the wave of commodities financialization, whereby financial traders have entered the commodities futures markets: Cheng and Xiong (2014)

- Economists and regulators are concerned about whether and how financialization has affected the functioning of futures and spot markets and what is potentially the real effect
- Recent theoretical analyses provided by Sockin and Xiong (2015) and Goldstein and Yang (2019)
- Empirical evidence by Brogaard, Ringgenberg, and Sovich (2019) presents some intriguing findings:
    - Financialization decreased the informativeness of commodities futures prices and hurt the profits of firms that depend on them

4. The Feedback Loop: New Paradigm for Financial Markets

Implications for Theory

- A feedback loop emerges between market prices and firms' cash flows and fundamentals. Prices reflect *and* affect cash flows:
- Traditional models on financial markets – Grossman and Stiglitz (1980), Kyle (1985), Glosten and Milgrom (1985) – 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

Theoretical Lessons: Bond, Edmans, and Goldstein (2012)

- 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)
  - Different notions of efficiency
    - Forecasting Price Efficiency (FPE), or Market Efficiency
    - Revelatory Price Efficiency (RPE), or Real Efficiency
    - Former is often emphasized, but latter really matters

Manipulation: Goldstein and Guembel (2008)

- The fact that prices perform an allocational role creates a scope for price manipulation by uninformed speculators via short sales:
    - Uninformed traders establish short position
    - Price decreases
    - Real investment decreases
    - Value of asset decreases
    - Uninformed traders make a profit on the short position
- The channel is not symmetric:

- Under-investment due to manipulative short sales reduces firm value and allows speculators to make a profit
- Over-investment due to manipulative buying also reduces firm value and does not allow speculators to make a profit
- This is implicitly understood by regulators as a primary reason for short-sales restrictions, which are very common

- There is an inherent limitation in the allocational role of prices
- Such manipulation has negative real effects: The fact that speculators might engage in manipulation reduces the informativeness of the price and the efficiency of investment decisions

Limits to Arbitrage and Asymmetric Trading: Edmans, Goldstein, and Jiang (2015)

- Broad definition of arbitrage: trading on private information
- Limit to Arbitrage (LTA) arises because the value of the asset being arbitraged is endogenous to the act of arbitrage
    - If speculator knows that state is bad, shorting stock may convey this to the manager and induce a corrective action
    - This improves firm value and harms the profitability of a short position

- Our LTA is asymmetric
  - Trading in either direction (buying on good news and selling on bad news) improves price informativeness, increasing firm value
  - This increases the profitability of a long position, but decreases the profitability of a short position
- Price impact ends up being asymmetric too (even though market maker is rational and takes into account the LTA)
  - Bad news has a smaller impact than good news
  - Since bad news is not incorporated in prices, overinvestment arises

Strategic Complementarities and Trading Frenzies: Goldstein, Ozdenoren, and Yuan (2013)

- Trading Frenzies arise when speculators rush to trade in the same direction causing large pressure on price
  - Give rise to bear raids, financial-market runs
- What causes trading frenzies?
  - Markets usually feature strategic substitutes, not complementarities
- Feedback effect turns out to be source of complementarities

- Consider a capital provider deciding how much capital to provide for a new real investment
- Decision of capital provider depends on assessment of investment productivity, based on private information and information in price
- Due to feedback effect, speculators have a tendency to act like each other and use correlated information: trading frenzy
  - A lower price reduces the firm's access to capital, reducing firm value, and increasing incentive to sell
  - Capital provider, as a decision maker, generates different implications than manager: Amplifying vs. Corrective action

Disclosure and Feedback: Goldstein and Yang (2019)

- The paper studies the real-efficiency implications of public disclosure in a model with feedback effect
- The model differentiates between different types of information and shows that implications can be different depending on what is being disclosed, how precise the disclosure is, how efficient the market is
- There is a clear benefit in providing public information about what decision makers already know, as it pushes the market to focus on the information that decision makers care to learn

- Providing public information about something decision makers wish to learn might backfire, because it crowds out useful market information, especially when market is efficient at aggregating
- Implications: Having public disclosure focused on the quality of technology and products is always beneficial. However, providing public disclosure on competition with other firms might not be desirable if market is efficient and public disclosure has low precision
- Result provides rationale for accounting metrics that are based on backward looking information and not forward looking assessments

5. Implications for FinTech Revolution

What is FinTech?

- FinTech is a broad phenomenon, including new technologies in different parts of the financial sector
- When we did the FinTech Initiative at the RFS, we had a chance to get input from the field on what people think FinTech is about
- A big part of FinTech is about information:
  - One of the key topics in submissions we received was "Big Data"
  - Word cloud reveals the importance of words like "information", "ambiguity", "efficiency", "liquidity"


INTERMEDIARIES
CROWDFUNDING
EFFICIENCY
SPEED
COLLABORATION
LIQUIDITY
TRANSFER
INSTITUTION
CREDIT
CAPITAL
NETWORKS
CRASHES
EXCHANGE
INTERVENTIONS
DEVELOPMENT
CATFIN
TRANSACTIONS
BORROWERS
BLOCKCHAIN
TOOL
SYSTEM
LOAN
BITCOIN
MINING
TRADING
FINTECH
BID
FINANCING
USERS
MEDIA
PEER
SOCIAL
TIME
ADVISORS
METRIC
ONLINE
PLATFORM
P2P
CHINA
LENDERS
SETTLEMENT
FAKE
POLICY
NOVEL
LENDING
BANK
AMBIGUITY
TRUST
INFORMATION

Technology and Information

- New technologies enable investors in financial markets to rely on a lot more information when they trade
- Existing information can be processed, analyzed, and aggregated much more quickly and effectively
  - Big data, Machine learning
- New sources of information shed light on dimensions that were previously unknown
  - Real-time information about consumer transactions, satellite images, etc.

What are the Implications?

- Immediate instinct is that all the information will improve the efficiency of markets and resource allocation. However, caution is required
- Improvement in market efficiency is not guaranteed
  - New sources of information can crowd out old sources of information
  - Dugast and Foucault (2018): fast imprecise signals replace slow precise signals
- Market efficiency does not automatically translate to real efficiency
  - Market can focus on learning what managers know: Goldstein and Yang (2019)
- Recent empirical evidence is starting to emerge on the nuances involved

Some Recent Work

- Weller (2018): Algorithmic trading facilitates the incorporation of existing information into prices, but reduces the amount of new information available
- Zhu (2019): Firms more affected by access to new sources of data see an increase in price efficiency and investment efficiency
- Farboodi, Matray, Veldkamp, Venkateswaran (2020): Abundance of data contributed to market efficiency in large growth firms only
- Gao and Huang (2020): The introduction of EDGAR brings on more informed trading and improves price efficiency
    - In current work – Goldstein, Yang, Zuo (2020) – we show that the implications for real efficiency are less clear: sensitivity of investment to price has decreased

Takeaways and Future Directions

- All these papers and others demonstrate the complexities involved with newly introduced technologies
- The tensions highlighted above – potential for crowding out and tension between market and real efficiency – are reflected in this work
- There are many more opportunities to explore these issues, given the mixed messages and the abundance of new data sources
- Another interesting dimension to think about is the extent to which new sources of information can replace the market